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A Normative Study of Representational Play at the Transition to Language

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A theoretical sequence of cognitive developments is proposed as influencing representational play and language in the second year of life. Scale analysis supported an ordinal sequence of play developments for 102 children (cross-sectional sample, 8 to 24 months of age) and a comparable longitudinal sample of 10 children, despite some inconsistency of temporal placement and overlap of onset time. Structural and temporal links between play and language indicate the influence of developing mental representation, but variation in timing of developments points to the influence of intervening variables. A dynamic systems perspective (E. Thelen, 1989) provides a useful descriptive framework for the transition to language.

If underlying changes in the capacity for mental representation contribute to language acquisition, these same underlying changes should affect other representational skills such as play (McCune-Nicolich, 1981b). Contemporary theorists (e.g., Leslie, 1987; Mandler, 1988, 1992) consider *representation* as a process, available early in development, whereby infants store information resulting from perceptual analysis of their ongoing experience. This view is not incompatible with the function of mental representation proposed here. *Mental representation* is distinguished from other cognitive processes in that one element, the *signifier,* "stands in" for a separate element, the *signified* (Piaget, 1962). Leslie (1987) characterized this capacity as "decoupling" (p. 417), where, for example, using a banana (signifier) as a telephone (signified) exemplifies decoupled pretend. McCune (1987, 1993) described earlier skills that culminate in the more advanced behaviors described by Leslie.

Mental representation is proposed as influencing the development of observable skills such as play and language as part of a dynamic system of variables (Thelen & Fogel, 1989). The shift from a prelinguistic to a linguistic phase of vocal development requires progress in a number of specific variables, including phonetic skill sufficient for speech, communicative capability, and awareness of sound–meaning correspondences (McCune, 1992). Mental representation is the internal component that supports the expression of meaning in various modalities including play and language.

McCune-Nicolich (1981b) proposed correspondences in the development of play and language that should follow from her analysis of developmental changes in signifier–signified relationships observable in both domains (Nicolich, 1977; Piaget, 1962). Three relationships were proposed: (a) onset of the lexicon with onset of pretending, (b) onset of combinations in language with onset of symbolic play combinations, and (c) onset of syntax in language with hierarchical combinations in play. However, these relationships are necessarily influenced by the status of other variables in the dynamic system. This is a somewhat different approach from that of Gopnik and Meltzoff (1986, 1987), who found support for specific semantic linkages between related cognitive and linguistic skills.

The purpose of the present article is to (a) provide comprehensive descriptive data regarding the development of representational play by using both a longitudinal and cross-sectional sample and (b) evaluate the hypotheses proposed by McCune (McCune-Nicolich, 1981b).[1]

Developmental Sequences for Play and Language

A sequence of representational play developments indicating underlying transitions in signifier–signified relationships has now been observed in a number of studies (e.g., Bates, Benigni, Bretherton, Camaioni, & Volterra, 1979; Belsky & Most, 1981; Nicolich, 1977; Piaget, 1962; Power, Chapieski, & McGrath, 1985). The following is a summary of theoretical propositions regarding these transitions and a review of the evidence regarding play and language relationships.

Presymbolic Play Schemes

When a child briefly touches an empty cup to his or her lips and then sets it aside (Level 1, Appendix A), the observer recognizes that this act represents literal drinking of liquid from a cup (McCune, 1993; Van Gulick, 1982). However, the signifier (drinking gesture) is merely a part of the signified (literal drinking), with deletion of swallowing and other consumatory behaviors. This act is presymbolic and shows recognition of the relationship between perceptual features of a familiar object and action.

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[1] Throughout the article, discussion of the "McCune hypothesis" refers to the hypothesis proposed in McCune-Nicolich (1981b).

Self-Pretend

Pretend is distinguished from presymbolic play by evidence that the child processes the link between the play act and its real counterpart. The child essentially imitates his or her own behavior out of context (Level 2, Appendix A), while indicating by sound effects, facial expression, or gesture an awareness of the differentiation of the literal (signified) and played (signifier) behaviors. Sound effects and exaggerated gestures (such as throwing the head back to drink deeply) that accompany the drinking action supply, in a pretend manner, some aspects of real drinking. This suggests a mental comparison between the two and thus an awareness of the distinction between signifier and signified. Word use requires this same level of representation because the child must process the relationship between the word (signifier) and an internal meaning that is signified.

Three studies contribute evidence supporting this proposed relationship. Kelly and Dale (1989), who studied 20 children in the age range of 12 to 24 months, reported that the 5 children not yet using words (all 12 months old) also failed to show symbolic play, whereas 3 of 5 single-word speakers showed Level 3 play, and the others showed Level 1 or 2 play (which they did not distinguish in their research). Folven and Bonvillian (1991) observed 1 child who was deaf and 8 hearing children learning sign as a first language and reported that 6 of 7 children for whom data were available showed their first referential sign after Level 2 play had been observed. Ogura (1990), in a longitudinal study of 4 Japanese children, reported use of "first names" at Level 2, when children were 12 to 13 ½ months of age, but they did not reach a milestone of 10 words until between 13 and 16 months of age when they were between Levels 4 and 5 in play.

Other-Pretend

Play involving the activities of others and use of actors other than oneself demonstrates that the meaning of such action is differentiated from the specific bodily acts of the real behavior. That is, different motoric sequences are used to feed a doll than those used to feed the self. At Level 3, the child pretends at behaviors observed in others (e.g., cleaning with a sponge, "reading" a book) and uses others (mother or doll) as actors in play (e.g., feeds doll or mother), indicating *decentration* (i.e., extension of play beyond self-actions; Piaget, 1962). Many such acts that the child performs are derived from maternal behaviors. Such play provides an additional vehicle for maintaining close symbolic ties with the mother (Slade, 1987a, 1987b) and relates in theory to the child's psychological differentiation from the mother (Mahler, Pine, & Bergman, 1975; Slade, 1986).

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Combinatorial Pretend

A combinatorial symbolic ability supports portrayal of a variety of signifier–signified relationships in sequence. The child shows recognition of differentiated components of events that can be referenced separately by, for example, pretending to drink from a cup, then pouring "liquid" into the cup or offering a drink to the mother or doll. Thus, self or mother may be shifted in and out of the drinker role, whereas the action component (drinking) remains constant, and the cup can serve as receptacle for pouring, as well as a prop for pretend drinking. In addition, a new form of integration is apparent as the several acts are linked within a frame of meaning (Nelson, 1985).

Earliest word combinations also reference differentiated components of events. For example, a typical early combination, "allgone cookie," refers to an entity (a cookie) and its relational state (current absence and previous presence; McCune-Nicolich, 1981a). Such combinations are linear in the sense that the elements are joined only by virtue of reference to aspects of a common context (as the play elements are) rather than by linguistic rules (McCune-Nicolich, 1981b). McCune-Nicolich and Bruskin (1981) presented evidence for this relationship in 5 children studied longitudinally. Data from Folven and Bonvillian (1991), Kelly and Dale (1989), and Ogura (1990) provide evidence of sign or word combinations having little or no syntactic basis occurring contemporaneously with Level 4 play.

Hierarchical Pretend

Pretend is considered hierarchical when the action follows from internal mental processes rather than being dominated by perceptual aspects of real objects in the environment. When the child picks up a doll, then searches for a bottle, and finally feeds the doll, internal mental processes that are evident from the search behavior guide first the search and then the play act. A new form of integration is achieved in this case by the internal representational intention (Sartre, 1948/1962; Searle, 1992), which can be inferred to precede and to accompany the play action. Similarly, establishment of an equivalence between a real object and a representational meaning (e.g., block = food) or designation of an inanimate object as having animate qualities (e.g., making a doll walk) depends on a prior representational intention or plan. In this case, the integration is hierarchical as the internal plan is apparent before play action and performs an integrative function across external behavioral acts. Leslie (1987) attributed such differentiation to an internal process termed *decoupling*.

Syntactic rules in language require hierarchical organization. Rule-based word combinations (Braine, 1963, 1976) were predicted at this level on the basis of initial findings by McCune-Nicolich and Bruskin (1981). Kelly and Dale (1989) provided partial support for this hypothesis, with 4 of 5 participants showing productive syntax in sign following Level 5 play; 1 child demonstrated use of syntax before this milestone. Ogura's (1990) participants exhibited Level 5 play at 23 to 25 months, with syntactic utterances occurring with 0 to 2 months delay.

In summary, three studies—a cross-sectional study of 20 children learning English (Kelly & Dale, 1989), a longitudinal study of 4 children learning Japanese (Ogura, 1990), and a longitudinal study of 1 deaf and 8 hearing children learning sign (Folven & Bonvillian, 1991)—provide support for one or more of the McCune hypotheses. However, the findings of these three studies are merely suggestive, failing to provide statistically significant evidence. In addition, the results are somewhat obscured in the original studies by variation in definition of the critical variables of word, combination, and syntax as well as by variation in interpretation of the hypotheses being tested. This article provides a comprehensive longitudinal and cross-sectional evaluation of children's developmental progress through

the five levels described and the hypothesized relationships with language.

Method

Participants

Participants were sought through newspaper advertisements and articles and announcements on local radio. In the cross-sectional sample, there were 6 children, 3 male and 3 female, at each month of age between 8 and 24 months of age. Ten longitudinal participants were studied monthly beginning between 8 and 10 months of age and continuing until 24 months of age or later, as necessary for them to complete the developmental transitions of interest. The samples were not selected by social class, but most parents were middle class on the basis of their education, employment, and area of residence. In all of the cases, mothers were primary caregivers for their children, filling that role for 50% or more of the child's waking hours. English was the primary language spoken in the homes. The cross-sectional participants varied in birth order; 7 longitudinal participants were firstborn, and 3 were later born.

Procedure

Data were collected in homes at a time of day when mothers indicated that their children were usually awake and engaged in play activities. The Bayley Mental Development Index and Infant Behavior Record (Bayley, 1969) were administered at an initial home visit to ensure that the children exhibited normal cognitive development. Videotaped play observation occurred at an additional visit to the home within 1 week of the first visit. For the longitudinal sample, the Bayley scales were administered when the children were 8, 12, 18, and 24 months of age.

For the play observation, mother and baby were seated on the floor in a room free of the child's own toys; a set of toys similar to those used by Nicolich (1977) was placed near them (see Appendix B). This large diverse toy set is designed to offer manipulative, problem-solving, and pretend play opportunities. The toys were arranged in a large plastic dishpan, with the same toys protruding at each session. This method of presentation typically leads to exploration of the contents of the dishpan, which provides both familiarization with the toy set and a warm-up exploratory period before the child settles into play.

Children in this age range prefer to play in the presence of their mothers (Dunn & Wooding, 1977; Slade, 1987a). Piaget's (1962) original descriptions of pretend play obviously occurred in his presence, although he occasionally indicated a belief that the child was unaware of being observed. Despite the difficulty of variation in maternal behavior, representational play is most appropriately studied as it usually occurs, in the presence of an adult partner. Pilot observations had indicated, however, a tendency for mothers to be very stimulating in this context; therefore, mothers were told that the experimenter was interested in how children choose to initiate play with toys, and they were asked to "let the child take the lead" in play, especially for the first few minutes of the 30-min session, and to respond to their children as naturally as possible.

The play sessions were videotaped using an external microphone placed near the mother and child. After 20 min of taping, the bucket was emptied and inverted and a subset of the toys that have been found to elicit representational play was arranged around and on the bucket. (See asterisked items in Appendix B.) The mother was told that this arrangement was made so that the child would be sure to notice these toys but that the child could play with these, or not, by choice. Before taping resumed, the experimenter attracted the child's attention to the toy arrangement. The taping proceeded for another 10 min without any further planned interruptions. However, if the baby left the room, or the mother answered the phone, or other similar events occurred, the taping was stopped until the participants were ready to resume the session.

Transcription and Language Evaluation

Transcription of children's language were made with accompanying contextual descriptions of the child's actions, the mother's actions, and the mother's language. *Words* were identified by the following criteria: proximity to adult phonological shape, appropriate context, and multiple occurrences. Each transcription was checked by an independent transcriber, and cases in which disagreements concerning the status of an utterance as a word could not be resolved were eliminated from the analysis. Children were considered to have begun lexical development if they produced five or more spontaneous single words. Vihman and Miller (1988), in weekly observations, found that subsequent, but not prior to this milestone, children showed stable vocabulary acquisition.

Word combinations were identified as sequences of words sharing a single intonation contour with falling intonation only on the final word. Vocalizations that are usually considered unitary expressions in the early language literature (e.g., "what's that," "thank you," and "all gone") were treated as single words both because they always function as a unit and because they are frequently observed when all of the child's other language consists of single words. Onset of multiword utterances was defined as production of three or more multiword types to correct for the possibility that early combinations may reflect idiosyncratic errors of segmentation, rather than a juxtaposition of separate lexical elements. Mean length of utterance (MLU) was computed in words, rather than morphemes. This is a conservative approach, customary at the early transition to combinations because data are insufficient to determine the independent status of a particular morpheme; for example, the plural "s" may be observed with only a single lexical item (e.g., shoes) for which the singular form may fail to be observed.

Evaluation of Representational Level

The goal of this approach to play assessment is to infer the child's capacity for mental representation from play. Expression of a particular level of play provides the basis for such inference. However, a single occurrence is less persuasive than multiple occurrences, and the frequency with which children engage in symbolic play is a further indicator of their capacity to use representational functions. Consequently, each videotaped play session was evaluated by using several measures to characterize the child's representational performance.

Episodes. Because play sequences were of interest, each tape was divided into episodes in which sequences of acts could be evaluated. Multiple viewings were necessary to determine episodes and to evaluate sequences. The criteria for beginning an episode were as follows: (a) The child picked up a toy and began to engage in scorable representational play; (b) with a toy in hand, there was a shift in activity from manipulative to scorable representational play; and (c) a plan for representational play was apparent in the child's verbal or nonverbal behavior, followed by execution of scorable representational play. The criterion for ending an episode was that the child (a) dropped the object or set of objects he or she had been playing with or (b) shifted to a manipulative or problem-solving form of play.

Play levels. Within each episode, each representational play act was assigned a symbolic level, and the episode was assigned the highest symbolic level occurring within it using the categories listed in Appendix A. Children were also assigned scores for *onset level* of play, defined as observation of a single play act at that level, even if the criterial act had been modeled or suggested by the mother, and an *independent level*, which required two or more different acts at that level, neither of which had been modeled or suggested by the mother. Scoring was completed by graduate students who were naive to the hypotheses and who had been trained until agreement on identifying episodes and classifying the level of component acts reached .85 for a sample of 100 acts.

Table 1
Age at Onset of Levels 1 to 5 in the Longitudinal Participants

Child	Level 1	2	3	4	5
Alice	9	10	9	9	15
Aurie	8	15	13	13	19
Danny	9	17	11	18	22
Jase	9	12	15	15	18
Kari	8	11	10	12	19
Nenni	8	16	12	14	22
Rala[a]	9	12	12	15	18
Rick	8	13	14	15	21
Ronny[a]	10	11	12	13	18
Vido[a]	11	15	11	16	21

[a] Data are missing for Rala at 8, 11, 14, 17 and 23 months; for Ronny at 8 and 9 months; and for Vido at 8 and 9 months.

Results

Sequential Development of the Play Levels

Scale analysis of the cross-sectional data demonstrated that 85 of the children (83%) showed the predicted ordinal pattern (coefficient of reproducibility = .93 and scalability = .75), which is significant by criteria in Nie, Hull, Jenkins, Steinbrenner, and Brent (1975) requiring coefficient of reproducibility above .90 and scalability above .60. Two of the children omitted Level 1 (presymbolic play), 1 omitted both Levels 1 and 2, and the remaining 14 omitted Level 2 while showing higher levels.

For the longitudinal sample, simple observation of order of onset is more appropriate than scale analysis because the data do not meet the independence assumption. The ages of acquisition of the five levels for the longitudinal sample are displayed in Table 1. Four of the 10 children exhibited the levels in the predicted order, although for two of these cases, two levels were first observed in the same session. Three children reversed Levels 2 and 3 in order of acquisition, and 3 children showed both Levels 3 and 4 before Level 2.

Relationships of Play Level to Age and Sex

The relationship among age, sex, and frequency of play acts for the cross-sectional sample was examined by analysis of variance. The sex variable and the Age × Sex interaction were not significantly related to the play variable. The age trend was clearly linear. There were significant age differences, $F(1, 16) = 9.53$, $p < .001$. The 8-, 9-, and 10-month-olds differed in frequency of play acts from the 15- to 24-month-olds, whereas the remaining ages showed overlapping patterns of significant and nonsignificant differences that were not readily interpretable (see Table 2). Both the onset and independent play scores were highly correlated with age, .85 and .86, respectively ($p < .001$). See Table 2 for the mean frequency of play acts by age and the age at which 50% of the cross-sectional children first demonstrated each level. There was considerable variability in attainment of Level 5. Five of six 18-month-olds showed this level, whereas at 19 and 20 months, fewer than 50% of the sample did.

For the longitudinal sample in which order of acquisition of the play levels was known from observation, age at onset of either Level 2 or 3 was considered as indicating the onset of pretending, because these levels did not show a consistent order of onset between them. Mean age for the attainment of the levels, average age of attainment of successive levels, and the age at which 50% of the sample demonstrated each level are presented in Table 3.

Table 2
Relationships Between Age and Play Level for the Cross-Sectional Sample

Age (months)	*M* total acts	Children showing each level 1	2	3	4	5
8	1.1	3				
9	2.1	4				
10	2.6	3				
11	5.1	6				
12	16.3	6	1	3		
13	26	6	4	6	3	
14	27	6	5	5	4	
15	43.8	6	5	6	5	
16	30	6	5	6	4	
17	51	6	6	6	6	1
18	58.5	6	5	6	6	5
19	53	6	6	6	6	1
20	43.8	6	4	6	6	2
21	41.5	5	6	6	6	3
22	44	6	4	6	6	4
23	48.3	6	6	6	6	3
24	52	5	5	6	6	5

Note. More than 50% of the sample first show a level at the following ages: 9 months (Level 1), 13 months (Levels 2 and 3), and 14 months (Level 4). Older participants also show these levels. More than 50% of the sample show Level 5 only at 18, 22, and 24 months.

Discussion: Play

The majority of the levels revealed a regular pattern consistent with the developmental proposals. The sequences and age-related patterns observed for the cross-sectional and longitudinal samples were similar, with the longitudinal sample providing additional information regarding the time lag between levels.

In contrast with these regularities, Level 2 was observed at various points in development in individual children. This is consistent with findings from an earlier study of children with Down's syndrome (Hill & McCune-Nicolich, 1981) but is inconsistent with the work of others who have reported that self-

Table 3
Relationships Between Age and Onset Play Level for the Longitudinal Sample

Level	*M* age	Range	Months to next level	Age of 50% competence
1	8.9	8–11	2.5	9
2/3	12	9–13	2.6	12
4	14.1	9–18	5.2	15
5	19.3	15–22		19

pretend appeared in sequence as expected (e.g., Belsky & Most, 1981; Ogura, 1990; Power et al., 1985). Two primary and related possibilities may account for this discrepancy. First, assignment of play level was conservative in the present study, such that self-directed acts without clear evidence of pretend were classified as Level 1 (see Appendix A). For example, 1-year-olds commonly put the nipple of the toy bottle to their own lips. If there was no elaboration (such as sound effects or gestures) to suggest any awareness that they are simulating real drinking rather than recognizing the perceptual aspects of the bottle, the behavior was classified as Level 1. With such elaboration, it was classified as Level 2, pretending to drink. By contrast, feeding a doll (Level 3) is an obvious elaboration and will not be misclassified as a lower level. Thus, the data may include false negatives, such that behavior based on an underlying representational state equivalent to Level 2 fails to present sufficient external evidence yielding this code. Previous studies, especially when coding was done without benefit of videotape, may include false positives for Level 2. Second, presence of mother as play partner and many replicas in the present study (in contrast with previous studies) may also have enhanced the frequency of other-pretend at the expense of self-pretend in children capable of both.

In fact, self-directed acts (coded as either Level 1 or Level 2) were observed in all of the children who produced other-directed acts (Level 3), replicating Fenson and Ramsay (1981), who disregarded the pretend distinction. This pattern of findings suggests that the ability to pretend develops following a period of presymbolic acts but may be immediately applicable to self and other, rather than requiring decentration before other-pretend can occur. The exact form that pretending will take in a given session is influenced by aspects of context such as availability of toys and a social partner.

Development of Language in Relation to Development of Play: Cross-Sectional Sample

The next set of analyses deals with relationships between play and language. Three relationships between specific representational levels and language skills were evaluated: (a) that the onset of the lexicon was associated with the beginning of pretend behavior (Level 2/3), (b) that the onset of combinations in language was associated with onset of combinations in play, and (c) that the beginning of rule-governed language combinations was associated with the onset of Level 5 play.

Both representational play and language production depend partially on the development of mental representation and partially on additional developmental skills. Because speech requires complex fine-motor control of the vocal apparatus (McCune & Vihman, 1987) as well as learning some aspects of a specific language, the language milestones are proposed as more likely to be achieved at the same time or after the corresponding play milestones than before by normally developing children. The proposed correspondences were tested with Fisher exact tests, a variant of the chi-square statistic that evaluates the probability of observing relationships between the presence and absence of two variables in a sample if the variables are independent, with each individual participant as a unit of analysis. A causal relationship between the variables is not assumed.

Table 4
Number of Children Showing Play Level 2 and Lexical Onset

	Onset play level		Independent play level	
Words	< Level 2	≥ Level 2	< Level 2	≥ Level 2
<5	27****	27****	32****	22****
≥5	0	18****	1****	18****

**** $p < .001$ (one-tailed Fisher test).

In each case, the comparison was made twice, once using the onset level of play and once using the independent level. Each correspondence was tested only among segments of the sample showing variability in the particular language and play variables under test to eliminate spurious positive findings.

Lexical onset. Seventy-two children were included in this analysis, after participants already showing language combinations who had presumably made the transition to single words some months earlier than the observation session were eliminated. This is a conservative strategy, because these children were beyond the transition being evaluated but would contribute to confirmation of the proposed relationship.

As shown in Table 4, there was a significant association between onset of pretending and beginning lexical development. Inspection of the data revealed that none of the 27 children noted in Table 4 as not pretending was credited with any words in the transcription process.

Combinations in play and language. In the evaluation of the correspondence of first combinations in play and language, all of the children who had not begun to speak were excluded from the analysis, as were children who used more multiword utterances than single words. This is a conservative strategy because all of these children would contribute to confirmation of the proposed relationship, despite the fact that their developmental levels were either well below or well beyond the transition under test. Forty-one children were included in the analysis. It can be seen in Table 5 that onset Level 4 of play was not significantly associated with onset of word combinations, whereas independent Level 4 of play was significantly associated with onset of word combinations. It should be remembered that to achieve onset, only one combination was needed, and this may have included participation by the mother. In contrast, the independent level requires two combinations, neither of which was modeled or suggested. Seven children who showed Level 4 as an onset level failed to show that level as an independent level. All of

Table 5
Number of Children Showing Play Level 4 and Onset of Language Combinations

	Onset play level		Independent play level	
Multiwords	< Level 4	≥ Level 4	< Level 4	≥ Level 4
<3	1	17	8***	10***
≥3	0	23	1***	22***

*** $p < .003$ (one-tailed Fisher test).

Table 6
Number of Children Showing Play Level 5 and Syntactic Development

Measure	Onset Level 5		Independent Level 5	
	< Level 5	Level 5	< Level 5	Level 5
Single words > multiwords	25**	16**	36*	5*
Multiwords > single words	1**	6**	3*	4*

* $p < .03$ (one-tailed Fisher test). ** $p < .017$ (one-tailed Fisher test).

these children who were less mature in play also failed to show a combinatorial ability in language.

Hierarchical combinations. To evaluate the correspondence between hierarchical combinations in play and the development of syntactic combinations in language syntax, I inferred onset from the observation that children used more multiword than single-word utterances. It seems plausible that children whose language constructions are guided by a rule-based system are likely to use that system, yielding a predominance of combinatorial utterances. Children who were not yet speaking or who used five or fewer single-word types were eliminated from the analysis; this was a conservative strategy, because their data would necessarily contribute to confirmation of the predictions. Forty-eight children were included in the analysis. There was a significant association between predominance of multiword utterances and both onset Level 5 and independent Level 5 (see Table 6).

A capacity for hierarchical organization of representational acts is, in theory, inferred from the observation of Level 5. Such a shift in organizational capacity would be expected to facilitate language acquisition. We therefore compared those children who had demonstrated independent Level 4 in play combinations but who failed to combine words in language (the Level 4 décalage group) with those who demonstrated independent Level 4 in play and who also combined words (the Level 4 correspondence group) and those who demonstrated Level 5 play (Level 5 group) on the following language variables: mean length of utterance, mean number of multiword utterance types, and total intelligible utterances. It can be seen in Table 7 that the three groups differed significantly on these three language variables.

In addition to the evaluation of specific hypotheses regarding transitions by individual participants, a regression analysis was conducted by using onset level of play in conjunction with age to predict mean length of utterance (MLU). The purpose of this analysis was to evaluate the joint contribution of these variables to a general index of language maturity. Both play level ($\beta = .32$, $p < .001$) and age ($\beta = .59$, $p < .001$) contributed to prediction of mean length of utterance ($R^2 = .78$), $F(1, 99)$ 173.99, $p < .001$.

Sequences in Play and Language: Longitudinal Sample

For purposes of evaluating language production in relation to play level in the longitudinal sample, time lines were developed that indicate acquisition of milestones in both areas (Table 8). Independent play levels were used for Levels 2 to 4 to minimize maternal influence, whereas onset level was used for Level 5 because this category occurs with low frequency, because it is rarely subject to maternal influence, and because not all children exhibited it at the independent level before 24 months of age. Two children, Danny and Kari (omitted from Table 8), achieved the play milestones at times roughly comparable with the other children but developed their productive language repertoires after 24 months of age. Data for Rala were not available across the full age range of the study and are not presented here.

Results of the analysis demonstrate a consistent pattern with the cross-sectional sample but provide additional information regarding time lags between expression of the play and language variables. The 7 children first produced five single-word utterances following the onset of pretending (Level 2 or 3) with lags varying from 0 to 5 months and a modal lag of 2 months. They first produced multiword combinations following independent Level 4 combinations in play with lags of from 0 to 6 months and a modal lag of 2 months. After onset of Level 5, the combinatorial ability was more fully expressed in language as was apparent in mean length of utterance spurts that were observed subsequent to the onset of Level 5 play and seemed to demonstrate the children's control of the ability to use hierarchical representational processes in the more facile production of multiword utterances (Table 8).

The proportion of multiword utterance types did not exceed that of single-word types until beyond 24 months for 7 of the 10 children. Alice, Aurie, and Rick showed this milestone at 4-, 3-, and 1-month lags, respectively, following Level 5 onset. Data from Danny and Kari, who developed productive language many months after the play skills, support the hypothesis that the language variables will emerge either at the same time as or later than the play variables; the data demonstrate the need, however, to consider other variables in addition to mental representation that may be needed for language acquisition.

Table 7
Comparison of Children in Independent Play Level Groups On Language Variables

Measure	Level 4		Level 5	$F(2, 44)$
	Décalage	Correspondence		
n	17	21	9	
MLU	1	1.31	1.53	21.28
M combinations	0	25	61	19.28
Total intelligible utterances	44.2	144.6	249.6	23.49

Note. The Level 4 décalage group differed from the other two groups in MLU ($p \leq .001$). The Level 4 correspondence group differed in MLU from the Level 5 group ($p \leq .02$). The Level 4 décalage group differed from the Level 4 correspondence group in mean language combinations ($p \leq .002$) and from the Level 5 group ($p \leq .0001$). The Level 4 correspondence group differed from the Level 5 group ($p \leq .0004$). The Level 4 décalage group differed from the Level 4 correspondence group in total intelligible utterances ($p \leq .0002$) and from the Level 5 group ($p \leq .0001$). The Level 4 correspondence group differed from the Level 5 group ($p \leq .001$). MLU = mean length of utterance.

Table 8
Ages at Language and Play Milestones for Longitudinal Participants

Child	Independent Level 2/3	Five words	Independent Level 4	First multiwords	Onset Level 5	MLU spurt months	MLU spurt values
Alice	9	11	11	16	15	17/19	1.03/1.82
Aurie	13	13	16	17	19	19/21	1.08/1.36
Jase	14	16	15	17	18	21/23	1.06/1.45
Nenni	14	19	17	23	22	23/24	1.01/1.24
Rick	15	16	16	18	21	21/22	1.32/1.74
Ronny	12	15	15	18	18	20/22	1.09/1.34
Vido	14	16	16	16	21	21/22	1.05/1.27

Note. MLU = mean length of utterance. The MLU spurt occurred between the months separated by the slash symbol.

General Discussion

The basic premise of this research is that symbolic play and language are a function of the underlying capacity for mental representation, emerging in the context of a system of related skills. Representational play develops in an orderly fashion, beginning with presymbolic acts (Level 1), progressing next to single pretend acts (Levels 2 and 3), then to representational sequences (Level 4), and finally to hierarchical pretend (Level 5). Comparison with previous studies indicated that frequency of the various types of pretend appears highly sensitive to such contextual elements as length of play session, availability of mother, and objects provided.

Analyses of language and play performance supported the McCune hypotheses that children who made specific representational transitions as indicated by their performance in play were more likely to evidence language milestones that were hypothesized as requiring the same underlying representational skill than children who had not demonstrated the play transition. These more specific findings expand on previous correlational studies relating language and representational play (e.g., Bates et al., 1979; Shore, O'Connel, & Bates, 1984; Tamis-LeMonda & Bornstein, 1990).

A causal relationship between the variables is not implied, as developments in both are assumed to be affected by the underlying development of mental representation and to require supportive development in other areas. For example, just as speech requires vocal control, early representational play depends on the ability to see and manipulate objects. Children who are blind (Fraiberg, 1977) and those with motor impairments (DeCarie, 1969) who cannot express representational meanings in play nevertheless demonstrate representational capacities in language.

It should be emphasized that representational development is highly correlated with age. With increasing age, children show more frequent representational play, and older children are more likely than younger children to have made a given transition in play (see Table 2). Regression analysis relating age and play level to mean length of utterance supported the joint contribution of age and representational development to language.

The findings of the present study support the developmental view that early language acquisition is integrated with other developments, rather than being a unique separate ability as proposed by some theorists (e.g., Bickerton, 1990; Chomsky, 1986; Fodor, 1983). Children who were observed longitudinally made the language transitions at the same time as or following the proposed structurally equivalent representational play developments despite individual differences in rate of development of both language and play, indicating the availability of underlying representational capacity at the time the language transitions were made.

Longitudinal studies offer a person the opportunity to examine factors that might contribute to extensive delays between play and language developments exhibited by later talkers who developed play skills at ages similar to early talkers (e.g., Danny and Kari; see Table 1), as well as factors influencing more moderate lags (e.g., Nenni; see Table 8). The early talkers in the present study (e.g., Alice and Rick; see Table 8), for whom language milestones occurred close in time to hypothesized representational levels, exhibited "vocal motor schemes" (McCune & Vihman, 1987, p. 72) showing articulatory control in producing specific consonants as early as 9 months of age. Later talkers (e.g., Danny) did not exhibit articulatory control in babbled vocal motor schemes prior to speech; rather, such control was only apparent when they began frequent word production (beyond 24 months in Danny's case; McCune, 1992). These findings are well accommodated within a dynamic systems perspective (Sameroff, 1983; Thelen, 1989). Fine-motor control of the vocal apparatus seems to act as a rate-limiting factor (Bushnell & Boudreau, 1993; Thelen & Fogel, 1989) that leads to a greater lag between representational play and language in some children.

Kennedy, Sheridan, Radlinski, and Beeghly (1991) and Rescorla and Goosens (1992) found that children beginning language production beyond 24 months show less mature and less enriched symbolic play than children making the transition early in the second year, and they may continue to show limitations in both domains in early childhood. By 36 months of age, follow-up indicated age-appropriate language for all longitudinal participants described in the present report. It is of theoretical and practical interest to determine in detail what organismic developments or environmental conditions distinguish early from later talkers and successful later talkers from those who exhibit continued difficulty in representational play or language.

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(Appendixes follow on next page)

Appendix A

Levels of Representational Play

Sensorimotor Period

Level 1: Presymbolic Play Schemes

The child recognizes the function of an object by use (e.g., touching a comb to hair, touching a cup to lips, rubbing a sponge on the floor, or pushing a toy car).

Level 2: Self-Pretend (Autosymbolic Schemes)

The child pretends at self-related activities, such as eating, drinking, sleeping, or grooming, while showing by elaborations such as sound effects, affect, and gesture an awareness of the pretend aspects of the behavior.

Symbolic Stage I

Level 3: Other-Pretend (Decentered Symbolic Play)

The child extends pretending beyond the self by (a) pretending at others' activities (e.g., cooking, reading) or (b) having others enact pretend schemes (e.g., feed doll, groom mother).

Level 4: Combinatorial Pretend

Several schemes are related in sequence: Level 4.1—a single scheme is enacted with several agents (i.e., feed mother, then doll); Level 4.2—different schemes are played in sequence (i.e., feed doll, groom doll); and Level 4.3—different schemes are played in order (i.e., place doll in car, roll car).

Level 5: Hierarchical Pretend

Level 5.1—A single act exhibits hierarchical structure in one of the following ways: (a) A plan is apparent before the enactment as the child verbalizes, searches for materials, or engages in other preparation; (b) one object is substituted for another with evidence that the child is aware of the multiple meanings expressed; (c) a doll is treated as if it could act independently (i.e., placing food in the hand rather than the mouth, or moving its legs as it walks along). Level 5.2—An act meeting the above criteria is part of a play sequence as described in Level 4.

Appendix B

Toys Used in Experiment

(Items with asterisks are toys that have been found to elicit representational play.)

Baby doll (9 in. [22.9 cm]) with painted hair wearing diaper, jacket, and bonnet and wrapped in blanket*
Little girl doll (9 in. [22.9 cm]) with long hair wearing stretch pants, jacket with hood, and shoes*
Toy bottle with soft nipple*
Doll-size comb, brush, and mirror; large comb*
Stuffed dog (9 in. [22.9 cm])*
Stuffed monkey (7 in. [17.8 cm])*
Five blocks
Metal coffee pot with cover; saucer and cup*
Rattle with bell visible inside
Jack-in-the-box (3 in. cube [7.6 cm])
Dumping bottle (10 in. [25.4 cm]) of clear plastic filled with miniature apple, grapes, banana, lemon, doll bottle, two fish, butter, milk, orange juice, ketchup, corn, and dressed turkey
Finger puppets—Oscar and Grover (Sesame Street)
Toy iron
Jeep toy (3 in. [7.6 cm]) with open top
Fisher Price mail truck (3 in. [7.6 cm]) with person
Plastic dump truck (12 in. [30.5 cm])*
Match box, white, sliding
Toy mop
Cloth napkin*
Cover from baby bottle
Six round nesting cups
Necklace (24 in. [60.9 cm]) string of white plastic beads*
Pop-it necklace of 15 large beads
Ping-pong ball
Toy purse*
Puzzle with five pieces: chicken, pig, mule, cow, duck
Plastic scrub brush*
Slippers—women's plain white mules (size 5)*
Sponge*
Child's sunglasses with lenses removed*
Toy telephone with rotary dial*
Toy toolbox; hammer, screwdriver, wrench, saw, pliers*

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