CHAPTER 4

Imitativeness: A Trait or a Skill?

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Imitation has been dealt with in so many different ways by different subfields of psychology that it, in fact, may constitute a number of quite different conceptual phenomena, related only in that they all have the same name and somewhat similar external forms. Researchers on infant development, starting with Piaget himself, considered imitation an accomplishment, a developmental milestone to be achieved, a position that is, of course, supported by the findings that children's ability to imitate increasingly complex and novel models improves with age (e.g., Masur & Ritz, 1984; McCall, Parke, & Kavanaugh, 1977; Piaget, 1962). Many researchers in child language have viewed verbal imitation as exactly the opposite—the fallback strategy of the child whose language competence is unequal to the comprehension of incoming material (e.g., Leonard, Schwartz, Folger, Newhoff, & Wilcox, 1979). Thus, whereas imitating a maternal gesture was seen by Piaget as a reflection of the child's competence, imitation of a maternal utterance is seen by many in child language as an indication of failure to process or understand. Indeed, parents evidently share this view and often respond to child imitations of adult utterances with repetitions in somewhat simplified forms (Stine & Bohannon, 1983). Many child-language researchers have also noted the wide individual differences in tendency to imitate among children (see, e.g., Dunkeld, 1978; Field, 1982; Hayes & Watson, 1981; Heimann & Schaller, 1985; Masur, 1984), and have assumed furthermore that imitation is a behavior related to "imitativeness," which is seen as something very like a personality trait, a characteristic of the child resulting in certain kinds of behavior under certain conditions. Thus, it has been hypothesized that imitativeness should relate to other relatively stable characteristics of the child, such as willingness to take risks, preference for holistic rather than analytic strategies, and a social/expressive style of language development (see, e.g., Bates, Bretherton, & Snyder, 1988; K. Nelson, 1981).

A few researchers have transcended the simplistic interpretation of imitation as solely an achievement, a sign of incompetence, or a trait. Užgiris (1981, 1984), for example, points out the double function of imitation—a marker of cognitive achievement, but also a socially effective way for the child to stay engaged in the ongoing interaction and to elicit responses from the other participants. Keenan (1974), Bruner (1983), Rees (1975), Shatz (1983), and others have likewise pointed out the social function of imitations, especially for children so young that they have few other effective social responses available. In the domain of social interaction, then, imitations have been seen as skillful strategies.

Some basis can also be found for the claim that imitation is an effective strategy for learning at least some things about language. Bloom, Hood, and Lightbown (1974) found that some children use imitations as a way of introducing new words into their output, whereas others introduce new syntactic structures in imitations of utterances with familiar vocabulary. Clark (1977) and Snow (1981) both give case-study data suggesting that imitation was a major mechanism by which the children they were studying first produced various sorts of complex constructions. Thus, for some children at least, imitation must be seen as a useful strategy in language acquisition as well as in social interaction (see Bohannon & Stanowicz, Chapter 6, this volume, for a model of imitation's contribution to language development).

Quite a different angle on imitation is provided by the studies suggesting that imitation is a technique learned by children whose mothers model it frequently, but not learned by children whose mothers rarely model it (Folger & Chapman, 1978; Kuczaj, 1983; Masur, 1984; Nelson, Baker, Denninger, Bonvillian, & Kaplan, 1985; Seitz & Stewart, 1975). These observations link most closely to the conceptualization of imitation presented in this chapter—that imitation is a skill. I believe the evidence supports the following position:

(1) Imitating is a skill that some children have more opportunity to learn than others;
(2) once learned, it tends to be relied on, thus accounting for the phenomenon of highly imitative children;
(3) acquiring the skill of imitation allows the development of certain procedures for processing language that those not skilled at imitation may not have; and
(4) finally, both the process of acquisition and the nature of what is acquired may be different for the skilled imitator temporarily, but given the availability of many additional procedures for acquiring information about language, such differences would be likely to disappear ultimately.

One source of evidence that imitation can better be viewed as a skill than as a trait is provided by reports of how elicited imitation is used as a language-teaching strategy in some cultures. Among both the Kwara'ae (Watson-Gegeo & Gegeo, 1986) and the Kaluli (Schieffelin, 1986), children are often told what to say in social settings and are instructed to repeat the modeled utterance. The utterances presented for imitation in these cases are often quite complex, both

semantically and syntactically; it is not expected that the child understand exactly what the utterance means, only that he or she repeat it accurately. Somewhat surprisingly to those of us who have studied American children, the accuracy of whose imitations is limited by their comprehension, Kaluli and Kwara'ae children at very young ages evidently can repeat quite long and complex utterances, suggesting that they have become relatively skilled in imitating. If imitativeness were a relatively fixed trait, children who did not possess the trait would be very badly adapted to language learning in a Kaluli or Kwara'ae family; needless to say though, children are as universally successful in learning Kaluli or Kwara'ae as they are in learning English or French. It is also tempting to hypothesize that children whose mothers give them many models for elicited imitation have become relatively skilled at using their own imitative output as a source of information about the structure of the adult language – a processing skill that nonimitative children may never acquire.

The analyses I will describe in this chapter form part of a much larger study of individual differences, undertaken collaboratively with Steven Reznick, Edward Mueller, Malcolm Watson, and Dennis Wolf. The plan was to collect data at several points from a sample of 100 children, in order to assess individual differences in a number of domains (language, play, temperament, sociability, activity level, etc.) and ultimately to see if these domain-specific dimensions of individual difference related across domains in any comprehensible way. The study thus provides the potential to relate imitativeness to temperamental factors (degree of inhibition), a relationship we might expect if imitativeness is, indeed, a tendency associated with the willingness to take risks. The study also provides the potential to assess imitativeness in a number of different domains – social imitation with mother and with peers, spontaneous verbal imitation, elicited verbal imitation, spontaneous and elicited imitation of fantasy play acts, and so forth. If imitativeness is a trait rather than the reflection of a differentially developed skill, we might expect to see rather high correlations on imitativeness across domains (gesture, language, and play); if, on the other hand, imitativeness derives from a skill that children have acquired, it might be expected to be much more specific to the domains in which children have had imitation modeled, and to show low cross-domain correlations. Masur (Chapter 3, this volume) finds that mothers imitate children's vocalizations and words most frequently, not their gestures or their object-mediated actions. We would expect, then, that the correlation between maternal and child imitation holds only for vocal/verbal imitation, not for other types of child imitations. Užgiris, Broome, and Kruper (Chapter 5, this volume) report precisely this – that mothers' and children's imitations correlate within but not across behavioral categories. If, furthermore, verbal imitativeness reflects a skill that is acquired in interaction with adults who do a lot of verbal imitating, one might expect that children who are highly verbally imitative and who have highly imitative mothers perform better on elicited verbal imitation tasks. Finally, one might expect to find some differences in the language of the verbally highly imitative and the verbally less imitative children;

previous research suggests that highly imitative children might produce more unanalyzed chunks (Nelson, 1981), show more variation in phonological systems as a function of recency of model (Ferguson, 1979; Macken, 1979), have generally less easily describable systems in both syntax and in phonology, but be better than nonimitative children in both short- and long-term auditory memory (Speidel, Chapter 9, this volume).

It will not be possible to present the analyses that relate to all the above hypotheses in this chapter. In fact, the data that one would like to have to test some of them optimally are not even available. However, data relevant to the following predictions will be presented:

(1) A trait view of imitativeness predicts that children who are highly vocally imitative will also be highly imitative in other domains (gesture, object, unelicited actions), whereas a skill view predicts that frequency of spontaneous imitation will not correlate highly across domains.
(2) A skill view of imitativeness predicts that children whose mothers are highly vocally or verbally imitative will show high levels of imitation only in the verbal/vocal domain.
(3) A skill view of imitativeness predicts that children who take more opportunity to imitate verbally at younger ages will become better at it and thus will perform better on elicited verbal imitation tasks later.
(4) A skill view of imitativeness predicts that children who are highly verbally imitative will develop a different set of language processing and language-acquisition procedures from children who do not engage in verbal imitation, which will be revealed in various aspects of their developing language systems (e.g., sloppy articulation, absence of clear phonological or syntactic rules, and extensive use of unanalyzed chunks and social routines interspersed with rule-generated utterances).

As we shall see, the analyses that have been finished accord with the predictions from the skill view better than those for the trait view of imitativeness; they also open up many new questions that can be tackled from further analyses of the available data on these 100 children.

4.1 The Study

4.1.1 Data Collection

One hundred children whose mothers were contacted by letter were tested in two 1- to 1½- hour sessions in the laboratory at 14 months, and again at 20 months. Interaction during videotapes of the first 20 min of the first laboratory session was coded for spontaneous imitations by the child. These 20-min sessions started with a 5-min warm-up, during which the mother and child were asked to wait but were told they could play with any of the available toys. A standard set of toys was present, including a book, a small car, a rubber duck, a jack-in-the-box, and a few

others. After 5 min, the experimenter entered, placed the child in a sassy seat at a low table, and deposited a variety of small toys on the table. The mother was asked to fill out a questionnaire at another table in the room, not to initiate interaction with her child, but to respond normally to the child. The small-scale toy-activity segment ended with the presentation of a forbidden object for 30 sec; this interval was not coded. Subsequently, the mother and child were asked to play successively with the contents of four boxes. The mother was told the whole play session would be 10 min and that she should get through all four boxes. The boxes contained a ball, a cloth for peekaboo, a set of crayons with paper, and a book.

Two formal test procedures were used at 20 months to elicit information about the child's phonological system and skill at elicited imitation. Using a high-quality tape recorder and microphone, the child was asked to name the pictures from the Expressive One-Word Vocabulary Test (EOWVT; Gardner, 1979); if the child could not name the picture spontaneously, then a model was provided, and imitation of the model encouraged. This test provides the data that can be analyzed to understand the child's phonological system and to assess phonological strategies. Elicited sentence-imitation data were collected during a home session at 20 months, using a set of sentences that increased in length and syntactic complexity, and that included novel as well as familiar words. The experimenter asked the child to repeat each sentence, giving a second chance if the first produced no attempt. The test was abandoned if no attempts at imitation were made to five successive sentences. Unfortunately, some subject attrition and technical difficulties reduced the number of subjects available for each of these two tests below the 100 who were coded for spontaneous imitation. Only 82 subjects attempted the EOWVT, of whom only 36 named enough items to yield usable data, and only 61 subjects completed enough items to be scored on the elicited sentence-imitation test. The primary reason for failure to complete the formal tests was that the children were very young; the mean vocabulary size of the 36 children completing the articulation test was only marginally higher than that of the larger sample, and there was no difference between the 61 who completed the sentence imitation test and the larger sample.

Table 4-1 gives an overview of the data collected. For purposes of clarity of presentation and brevity, full-scale analyses of only two sources of data will be presented here: the 14-month mother–child play session, and the 20-month elicited sentence-imitation task. We will also rely on data available on about 62 of the children at both 14 and at 20 months from the administration of the age-appropriate versions of the Communicative Development Lexical Inventory (Bates et al., 1988; Snyder, Bates, & Bretherton, 1981) to their mothers. The Lexical Inventory consists of a list of words compiled from the early vocabularies of many children, which is administered in a questionnaire format to mothers, who are given examples of what it means to "say" a word, and are asked to check off words their children say. The words are organized semantically (animals, vehicles, food and drink, etc.) and can be analyzed in various categories (nouns, verbs, etc.). Data on articulation from the EOWVT will be presented for a few

Table 4-1. Data Collection and Analysis

Age	14 months	20 months
Observations	20-min mother–child interaction: Coded for frequency of child imitations	20-min mother–child interaction: Coded for frequency of child imitations
Tests administered		Elicited sentence imitation: Coded for percentage of models imitated and for accuracy of imitations
		EOWVT: Coded for percentage of words not known spontaneously that were imitated, and results assessed for articulatory accuracy
Interview data	Lexical inventory (maternal report)	Lexical inventory (maternal report)

children who represent extremes on imitativeness, to give a flavor of how future analyses will proceed.

4.1.2 Coding

Separate coding procedures had to be developed for each of the types of data collected. Given the sample size, there were also constraints on the exhaustiveness of the possible coding systems; for example, we could not transcribe all of the 100 14-month mother–child sessions prior to coding them, but had to develop a method for coding directly off the videotapes.

The mother–child sessions were coded for the occurrence of full or partial child imitations in any of three domains: vocal, gestural, or object mediated. Gestures were defined as movement of the limbs, adoption of whole-body posture, head nods or shakes, or marked shifts of facial expression (e.g., wide smile, pout, laugh). Object-mediated actions were any actions on or with an object, for example, shaking a rattle, rolling a ball, turning a crank. A full imitation was scored if it was judged that the child was attempting to repeat the entire utterance, gesture, or object-mediated action of the adult. Failure to replicate the adult's behavior due to inability (e.g., imitation of the adult's "Wanna play?" as "Enne pay?", or making the motion of cranking the jack-in-the-box after the adult but failing to make a full turn because of insufficient strength) was counted as full imitation. A partial imitation was scored if the child imitated only part of the adult's utterance or gesture, imitated the intonation of the adult utterance but not the segments or vice versa, imitated an adult action on one object using a different object, or produced a complete action (e.g., opening a box) after only a partial demonstration (e.g., the adult jiggling but not removing the lid of the box). Imita-

tions were scored only if they occurred immediately after the model (i.e., with no intervening child behavior) and within 3 sec. Interjudge agreement calculated on eight tapes coded independently by both judges was 84% for category of imitations identified by both (vocal, gestural, or object mediated) and 92% for full or partial. One coder identified an average of .5 more instances of imitation than the other, but the rank order of the subjects on frequency of imitation was identical according to both coders.

Coders were trained to observe instances of imitation on the tape, to transcribe the relevant adult and child utterances and behaviors on the score sheet, and then to code each instance as vocal, gestural, or object mediated, and as full or partial. Subsequent imitations within imitative episodes (e.g., rolling a ball back and forth several times, or a lengthy exchange of imitated babble sounds) were described but not coded as separate imitations. Because the tapes were not fully transcribed, there was no basis for comparing children in terms of their opportunities to imitate, that is, there were no data on number of maternal vocalizations, gestures, or object-mediated actions. Obviously, some mothers were much more active and/or vocal than others, and some engaged their children more effectively in interactive play than others, thus providing many more opportunities for child imitations to occur. Some mothers, however, are so active that they reduce opportunities for child imitations by leaving few pauses in the interaction. To be able to assess at least roughly such maternal effects, coders were also trained to rate each mother globally using a 4-point scale on the following dimensions: level of physical activity, degree of interactivity, talkativeness, directiveness, and tendency to imitate child. (In our observations, as in those reported by Masur in Chapter 3, maternal imitations were almost exclusively of words and vocalizations.) In addition, to get a rough estimate of the children's level of development, each child was globally rated on a 4-point scale on use of clear conventional words, use of semiconventional vocalizations (protowords), use of conventional communicative gestures (points, waves, etc.), and sophistication of object play. The 14-month sessions were coded by one of two research assistants (BK or CB); eight mother–child dyads were coded by both to establish comparability of judgment. The elicited sentence-imitation task was coded from transcriptions of the children's imitative attempts. Each attempt was compared to the model, to determine whether the modeled syllables were reproduced correctly or partially. For example, the model "I live in Boulder" could be reproduced as "live duh boduh." The syllables *live* and *bo* were reproduced correctly, the syllables *in* and *der* were attempted in the imitation but not reproduced correctly, and the syllable *I* was deleted. The child would receive a syllable score of 2 points for a correctly reproduced syllable, 1 point for a "mushily" imitated syllable, and 0 points for any omitted syllable. The child's syllable score per modeled utterance was then calculated as a percentage of maximum possible score (i.e., number of syllables in model times 2).

In addition to the syllable score that reflected accuracy of imitations, we calculated a score to reflect willingness to imitate, by taking the number of utterances the child attempted to imitate as a percentage of total number offered for

imitation. Furthermore, each child's imitations were globally rated on a 5-point scale on articulation (1 = very mushy, hard to understand; 5 = exceptionally clear and precise) and on intonation (1 = limited intonational range, monotonic; 5 = perfect mimicking of adult intonation patterns).

4.2 Results

4.2.1 Frequency of Imitations

The first point to note about our findings is that, in a session of only 15 min of mother–child interaction, the number of child imitations could be as high as 40. All the children produced at least a few partial imitations. Gestural imitations were much less frequent than object-mediated imitations, a finding that replicates Abravanel, Levan-Goldschmidt, and Stevenson (1976) and Masur (1984), and reflects perhaps the greater ease of object-mediated imitation for children in this age range (Masur & Ritz, 1984).

4.2.2 Interrelations Among Types of Imitations

The first question that arises in attempting to determine whether imitation operates more like a trait or a skill is whether children who produce many of one kind of imitation also produce many of the other kinds. The pattern here is quite clear (see Table 4-2; Snow & Reznick, in preparation, give more detail on statistical analyses): Frequency of spontaneous gestural full or partial imitation relates to no other imitative frequency, but there is a slight tendency for children who produce many vocal imitations to also produce many object-mediated imitations ($r = .30$). Furthermore, it is interesting to note that the frequency of full and partial imitations does not correlate within category of imitation except for vocal imitations. For example, whereas frequency of full and partial object-mediated imitations correlates only .04, the frequency of full and partial vocal imitations correlates .37. It would seem, then, that it does make sense to identify vocal imitativeness as a salient dimension of individual difference at 14 months, but that vocal imitativeness relates not at all to gestural imitativeness and only weakly to object-mediated imitation. These findings extend and confirm others' results on interrelationships among imitation types. Masur (1984) reported a stronger relationship ($r = .47$) than we found between vocal and object-mediated imitation, in 18 children aged 10 to 14 months (see also Masur, Chapter 3, this volume). Užgiris and Hunt's (1975) vocal and gestural imitation scales correlate at a level as low as we found, and Hardy-Brown (personal communication, 1983) found a correlation of .01 between gestural and vocal imitation in 100 12-month-olds. It seems clear, then, that vocal and gestural imitativeness are not related—a surprising finding given that in children in the age range under study vocal and gestural behaviors are both components of the communication system and are often used together for communication, and that spontaneous exploitation

Table 4-2. Correlations Among Child Imitation Frequencies at 14 Months[a]

Object-mediated imitation	1	2	3	4	5	6	7	8	9
(1) Full	–	−.05	.85[c]	.02	−.17	−.03	.10	.25	.19
(2) Partial		–	.48[c]	.03	.03	.03	.24	.15	.24
(3) Total			–	.03	−.13	−.01	.21	.30[b]	.30[b]
Gestural imitation									
(4) Full				–	.04	.95[c]	.13	−.01	.09
(5) Partial					–	.33[c]	.08	−.04	.04
(6) Total						–	.14	−.02	.09
Vocal imitation									
(7) Full							–	.37[c]	.90[c]
(8) Partial								–	.74[c]
(9) Total									–

[a] Because approximately 100 correlations were calculated on this data set, coefficients significant only at the .05 level are neither specially noted nor considered further. All correlations reported in this table were based on an n of 100.

[b] $p < .01$.

[c] $p < .001$.

of gestural and vocal resources for communication are highly related (Bates, Benigni, Bretherton, Camaioni, & Volterra, 1979).

Since the tendency to imitate any particular modeled act or utterance is known to be influenced by the novelty and difficulty of the model compared to the child's own ability level (Masur & Ritz, 1984), it might be hypothesized that large differences among the children in their verbal skills would affect the pattern of relationships among kinds of imitation found. Hardy-Brown (1981), for example, found that frequency of vocal imitations was a component of the single communicative competence factor she found for 100 12-month-olds, although Scarborough and Davidson (1985) found no relation between proportion of child utterances that were imitations and any measure of language proficiency in 24- and 30-month-olds. A verbally precocious 14-month-old might imitate many more maternal utterances than an age-mate whose verbal skills were somewhat below average, whereas the second child might show considerable gestural or object-mediated imitation. To assess this possibility, partial correlations among the various types of imitation were calculated, partialing out in separate analyses the effects of total vocabulary size and of number of verbs produced (based on the Communicative Development Lexical Inventory administered at 14 months to the mothers). The pattern of relationships found remained essentially unchanged: Correlations between gestural and vocal or object-mediated imitations remained close to zero, and the correlation between vocal and object-mediated imitations remained significant but low. The correlations between partial and complete vocal imitations were increased considerably by partialing out the effect of total vocabulary, however.

Table 4-3. Correlations Between Maternal Measures and Child Imitation at 14 Months[a]

	Maternal measures				
Child imitations	Activity	Interactivity	Verbosity	Imitativeness	Directiveness
Object mediated					
Full	.10	.17	.10	.33[c]	.28[b]
Partial	.12	−.01	−.17	.09	.07
Total	.16	.15	.01	.34[c]	.28[b]
Gestural					
Full	.07	.07	−.01	.14	.03
Partial	−.03	.13	−.07	.10	−.10
Total	.06	.10	−.03	.16	.00
Vocal					
Full	−.02	.01	.04	.45[c]	.15
Partial	.21	.19	.12	.35[c]	.20
Total	.08	.10	.08	.49[c]	.20

[a] Because approximately 100 correlations were calculated on this data set, coefficients significant only at the .05 level are neither specially noted nor considered further. All correlations reported in this table were based on an n of 100.

[b] $p < .01$.

[c] $p < .001$.

The correlations between the rating scales of maternal behavior and children's imitation revealed the predicted strong relation between maternal imitativeness and child vocal imitations (see Table 4-3). Maternal imitativeness also related significantly, but more weakly, to child object-mediated imitations, as did maternal directiveness. It was not the case that those mothers who talked more, were more active, or were more interactive had children who produced more vocal imitations.

4.2.3 Imitations at 14 and 20 Months

The next question of interest is whether tendency to imitate at 14 months relates at all to performance on the elicited imitation task at 20 months. The pattern of findings here was quite clear (see Table 4-4): Correlations between object-mediated and gestural imitation at 14 months and elicited verbal imitation at 20 months were low and mostly negative, but the 14-month vocal-imitation scores showed moderate positive correlations with elicited verbal imitation at 20 months. In short, we have yet another support for the notion that imitation is a rather domain-specific phenomenon. The elicited sentence-imitation task generated two kinds of scores: the number of models that the child attempted to imitate, and the accuracy of the imitation attempts. Although these two scores correlated highly (.78) with one another, it was consistently the case that the first

Table 4-4. Spontaneous Imitation at 14 Months Related to Elicited Imitation at 20 Months

	20-month scores			
	Raw correlations		With total vocabulary at 20 months partialed out	
14-month scores	Percentage of models imitated	Accuracy	Percentage of models imitated	Accuracy
Object mediated				
Full	−.04	−.01	−.06	−.01
Partial	−.22	−.19	−.18	−.16
Total	−.15	−.11	−.14	−.09
Gestural				
Full	−.05	−.16	−.02	−.14
Partial	.14	.18	.08	.16
Total	−.02	−.11	−.00	−.10
Vocal				
Full	.31[a]	.18	.13	.01
Partial	.15	.17	.04	.05
Total	.29[a]	.19	.12	.02

[a] $p < .05$; N for these analyses is 42.

related more strongly to vocal imitation at 14 months. Because verbally precocious children might have produced more vocal imitations at 14 months and be more likely to score high on the elicited imitation task 6 months later, we redid these correlations, partialing out the total productive vocabulary derived from the Communicative Development Lexical Inventory at 20 months. This eliminated the correlation between vocal imitativeness at 14 months and the accuracy score at 20 months, suggesting that this relationship was an artifact of verbal skill (see Table 4-4). It substantially reduced but did not entirely eliminate the correlation between tendency to produce vocal imitations spontaneously and in eliciting settings.

4.2.4 Imitativeness and Language Development

These various findings all seem to confirm the hypothesis that imitativeness is a highly domain-specific characteristic, not a general response strategy that a child uses across a variety of domains. We know from previous work (see Masur, Chapter 3, this volume; Užgiris, Broome, & Kruper, Chapter 5, this volume) that mothers primarily imitate children's vocalizations and words and that the frequency of children's verbal imitations relates to the frequency with which their utterances are repeated by their mothers. We replicated this latter finding using our very rough index of maternal imitativeness, a 3-point scale. Despite the

minimization of correlations associated with such a truncated scale, our measure of maternal imitativeness correlated .49 ($p < .0001$) with children's vocal imitations. Some children evidently have considerable opportunity to learn from their mothers that imitation is an appropriate verbal strategy, and they seem to adopt it for their own use. Indeed, Masur (1984) describes interactions that suggest some mothers are instructing their children to imitate novel actions and utterances. Other children's mothers do not reveal to them the appropriateness or usefulness of imitation as an interactive device or processing strategy, so those children presumably adopt other procedures for processing novel information.

It is clear that imitation is a useful strategy for some interactive problems—taking a turn when one has nothing to say, keeping up one's end of the conversation despite not having fully understood the previous talk, signaling miscomprehension, and so forth. It is less clear (and, indeed, rather controversial) whether the verbal imitations of vocally highly imitative children contribute to their language development. We cannot offer any clear-cut answer to this question with the data available to us (see Bohannon & Stanowicz, Chapter 6, this volume; Speidel & Herreshoff, Chapter 8, this volume), but we do have correlations between imitativeness at 14 months and scores reflecting language sophistication from the Communicative Development Lexical Inventory both contemporaneously and 6 months later. Vocal imitativeness at 14 months correlates significantly with a number of measures of language skill at 14 months: number of nouns produced ($r = .41$), number of verbs produced ($r = .39$), total productive vocabulary ($r = .41$), and the production/comprehension ratio ($r = .39$). Interestingly, gestural imitativeness also showed significant (though smaller) correlations with language measures, including number of verbs produced ($r = .23$), total productive vocabulary ($r = .21$), and the production/comprehension ratio ($r = .23$), whereas object-mediated imitations showed generally negative (though nonsignificant) correlations with language measures. These findings recall those of Heimann and Nelson (1986), who found a negative correlation between object-mediated imitation at 15 months and communication skill at 12 months, but a positive correlation between gestural imitation and communication skill. They also replicate Hardy-Brown's (1981) positive correlations between vocal imitation and productive vocabulary and Bayley Language items at 12 months.

Vocal imitativeness at 14 months also showed significant correlations with several language measures at 20 months, suggesting at the very least that imitative children were not handicapped in their acquisition of total vocabulary ($r = .50$ for total vocal imitations at 14 months and total productive vocabulary at 20 months), nor in their acquisition of verbs, which reflects greater syntactic and semantic complexity in 20-month-olds' speech ($r = .50$ between total vocal imitations at 14 months and number of verbs used in production at 20 months). This pattern of correlations is absolutely specific to vocal imitations at 14 months; no correlation between gestural or object-mediated imitations and any of the language measures at 20 months reached even marginal significance.

Conversely, total productive vocabulary and number of verbs produced at 14 months showed significant but only moderate correlations to number of models imitated in the elicited imitation task at 20 months, and no correlations at all to the accuracy score. Not surprisingly, language measures at 20 months related to performance on the elicited imitation task at 20 months, but here again stronger relationships were found with number of models imitated than with accuracy of imitation. It might have been expected that the large amounts of practice at imitating amassed by the vocally imitative children between 14 and 20 months would have made them more accurate imitators, but such seems not to be the case, at least as measured by our task.

4.2.5 Performance on Articulation Task

One of the directions for future research with this data set includes looking at the children's strategies for pronunciation as related to their imitativeness. There has been considerable speculation that children who refuse to imitate have more orderly phonological systems than children who willingly imitate (Ferguson, 1979; Macken, 1979). It would ultimately be desirable to assess the children's phonological systems by looking at their spontaneous, conversational speech at both 14 and 20 months, but at the moment we have not even finally solved the problem of how to judge their phonological strategies by looking at their performance on a relatively standardized confrontation naming task, the EOWVT. The difficulties inherent in scoring data of this sort will be familiar to all who have tried to test 20-month-olds. Presented with a picture of a dog, one child says quite clearly "dog," another says "goggie," and another says "woof-woof." We have no evidence about production of initial stops from the third; although we know that the first child shows no consonant assimilation in monosyllabic words, we know nothing about his strategies in producing multisyllabic words such as the second child chooses to produce. Such problems recur with every test item. Some children respond to a picture of a telephone with "phone," others with something like "wawafo," clearly modeled on a different adult version of the word, whereas still others respond "hello." Given these difficulties with quantification, we resort here to an older procedure in child language research: a case-study presentation.

Table 4-5 presents data on 5 children in the study—the 3 most vocally imitative children for whom all relevant data sets were available, and 2 randomly selected from among the 37 children who produced no vocal imitations, limiting the group further to those for whom all information was available. All these children except Thomas showed comparable and relatively high frequencies of object-mediated imitation. It can be seen that, for this small subsample as for the entire sample, the children who were less imitative at 14 months had smaller vocabularies at 20 months, and showed less tendency to imitate on the sentence-imitation task.

Let us now consider how these children functioned in the articulation task. Carla, a low vocal imitator, produced 12 of the 22 target words spontaneously, but

Table 4-5. Imitation and Language Data from Five Children

	Frequencies of spontaneous imitations at 14 months		Percent elicited imitations at 20 months		Language measures from Communicative Development Lexical Inventory at 20 months		
	Object-mediated	Vocal	Utterance score	Syllable score	Referential words	Action words	Total vocabulary
Carla	7	0	0	0	132	22	181
Evan	11	0	13	20	112	18	146
Mark	8	12	58	28	193	47	283
Thomas	1	14	43	26	273	102	486
Alex	14	25	38	48	232	96	406

refused to imitate 9 of the other 10 even after several elicitations. She did produce /bək/ for *book*, but refused to imitate *phone*, *plane*, *swing*, *boy*, *bus*, *tree*, *truck*, or *pumpkin*. Her spontaneous productions were all consonant/vowel (CV) or consonant/vowel/consonant (CVC) forms in which the final *C* was /t/, except for *apple*, which she produced as /æbə́/. She did not attempt any target words with consonant clusters in them (she responded to the train with /bot/), and her mother interrupted the test session to report, "She doesn't say anything with a blend." Carla clearly has a rather conservative approach in her phonological development, as evidenced by her restricted set of productive word forms and her refusal to misrepresent more complex target words by reproducing them within her own phonological formats.

Evan, who also failed to produce spontaneous vocal imitations at 14 months, produced 3 elicited imitations of model words: /ai/ for *eyes*, /kə/ for *truck*, and /pəfə/ for *pumpkin*, though he also refused to imitate 4 other unknown words despite repeated attempts at elicitation. His spontaneously produced words were all CV or CVCV (consonant/vowel/consonant/vowel) forms, and included /hɛwo/ for *phone*, /kiyə/ for *key*, /pɛpɛ/ for *plane*, and /klʔi/ for *cat*. Like Carla, Evan utilized a rather limited set of word formats, and refused even to attempt imitations of words that violated his productive format, such as ones with initial consonant clusters.

Mark, a more spontaneously vocally imitative child, refused to imitate only 2 of the 6 words he did not know, though his imitations were not very close to the target, for example, /dēi/ for *train*, /bæp/ for *apple*, and /di/ for *tree*. His spontaneous responses were often equally far from the target: /bəi/ for both *boy* and *bus*, and /bei/ for both *bird* and *plane*. His 15 spontaneously produced responses included several types: CV (the most common by far), CCV (consonant/consonant/vowel), CVC, CVCV, and V (vowel). Based on the rather small amount of data available, it seemed his system was characterized by considerable varia-

bility; for example, a final consonant produced in one word was omitted in a different word of no greater complexity, and /b/ was produced correctly at the beginning of *book*, *bird*, *boat*, and several other words, but reduced to /h/ in *ball*. This accords well with Macken's findings that imitative children have "messier" phonological systems.

Neither Alex nor Thomas fits the picture one would like to base on the above three cases, however. Alex would only sit still for 13 words, of which he produced 7 spontaneously, imitated 3 quite well, and refused to imitate 3. His phonological system is fairly sophisticated (several final consonants, initial consonant clusters), but also somewhat variable (e.g., /meko/ and /šeko/ were alternating attempts at *bicycle*), though the variability was not increased by the imitations he was willing to produce. Thomas was even more unwilling than Alex to imitate (2 words imitated of 7 he did not know), and particularly refused to attempt the more difficult words like *pumpkin* and words with initial clusters. Clearly, he, like Carla the nonimitator, was unwilling to stretch his system (which included no spontaneously produced initial clusters) to incorporate new forms by using imitation.

This small group of case studies suggests some strategies for looking further for differences between vocally highly imitative and vocally nonimitative children, but also serves to warn us that clear-cut distinctions cannot be expected. It seems, based on these five children, that nonimitators may have more restricted phonological systems, and may be disinclined to imitate words that fall outside the word formats they have already mastered. Imitative children seem to have somewhat more options for word shapes, but note that they also have larger vocabularies; their phonological sophistication may reflect the larger number of words available—or conversely may have enabled the child to learn more words! Imitative children also seem to have somewhat more variability in their phonological production systems, though it is not inevitably the case that they will expand this variability indefinitely by imitating novel or difficult words.

4.3 Conclusion

Many fascinating claims have been made about the sources of children's tendencies to imitate, and about the consequences of imitation for development, and in particular for language learning. We feel our data are consistent with the view that imitativeness is not a general tendency on the part of the child, but a strategy learned for a particular domain. Verbally imitative children have been shown to have verbally highly imitative mothers—presumably their mothers have created interactive situations that enable the children to learn the value of verbal imitations, and to develop skill with imitation as a technique for interaction. The skill thus developed evidently carries over to a task in which imitations are elicited, and may be one of the factors determining how children choose to expand their phonological systems. It does not, however, carry over very strongly to other

domains within which imitation might also be a useful strategy—gesturing, or operating on objects—nor does it predict very exactly what the course of a child's phonological development will be.

Many questions remain to be addressed using the data set available from these 100 children. A first question is the degree of stability in spontaneous imitativeness from 14 to 20 months. A second question is whether the relation between spontaneous and elicited imitation reported here for the verbal domain can be replicated in the domain of object-mediated imitation. At both 14 and 20 months, the children engaged in a play interaction with an experimenter who modeled increasingly abstract fantasy actions (e.g., taking a mock bite out of a real apple, taking a mock bite out of a red wooden ball, taking a mock bite out of a blue block). We will analyze the children's imitations of the adult object-mediated actions for relationships with spontaneous object-mediated imitation at both 14 and 20 months. High correlations will strengthen our conclusion that imitativeness is not a general trait that some children possess, but the result of domain-specific skills that different children have differential opportunities to acquire.

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