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ABSTRACT

A question of both theoretical and practical importance for the study of phonological development is whether there is a difference in the status of productions rendered spontaneously by the child and those repeated by the child after either an adult model or his own production. The relevant theoretical questions are: (1) Are all the child's productions mediated by his current phonological system? (2) What is the role of the adult model in phonological acquisition? The spontaneous and repeated utterances of four children were examined, and it was found that there were differences between the spontaneous and echoic forms produced. The child's productions immediately following those of the adult did not necessarily approach the model more closely than did spontaneous productions. In certain cases a "trade-off" occurred, i.e., a sound segment in an echoic form more closely approached the model while another sound segment fell short of the target. This suggests that echoic and other repeated forms are not "phonologically progressive," as had been proposed. (Author/CFM)

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Phonological Variation in Children's Speech: The Trade-off Phenomenon*

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A question of both theoretical and practical importance for the study of phonological development is whether there is a difference in the status of productions rendered spontaneously by the child and those repeated by the child either after an adult model or his own production. The relevant theoretical questions are (1) are all the child's productions mediated by his current phonological system? and (2) what is the role of the adult model in phonological acquisition? The answers to these questions are of practical importance to the investigator studying phonological development, who must decide whether it is more appropriate to include all of the child's identifiable and intelligible productions in phonological analysis, or just some part.

There are conflicting statements in the literature on the status of the child's productions in response to an adult model. Some investigators suggest that the child is capable of phonetically accurate reproductions of utterances under these circumstances, but that such productions are independent of the child's phonological system. Spontaneous productions, those with no immediately preceeding model, are, according to this view, less accurate phonologically because they are mediated by the child's primitive phonology. For example, Waterson (1970) reports that her child would often imitate a word with great phonetic accuracy at a given age, but that when this same word was used subsequently it conformed to the child's less sophisticated system. Moskowitz (1970) suggests that all data on child's sound system based on utterances obtained as imitations (productions immediately after the adult model) are probably unreliable and even misleading.

Another view is that spontaneous and imitated productions have the same status and that it is perfectly acceptable to consider both as evidence in phonological studies. For example, Templin (1957) utilized both types of productions in her analysis of children's speech sound articulations. She justified this procedure on the basis of findings from a previous study in which she found similar results in articulation skills, regardless of the types of production used.

Fitzgerald (1966) reports the same percentage of errors for "immediate imitations", (no intervening words between adult model and child's repetition), and "delayed imitations", after interventions ranging from a brief utterance to greater than ten utterances.

The present study considers the spontaneous and repeated productions of several normally developing children. The questions of primary concern are whether the child's production of a word immediately following an adult model significantly differs from his spontaneous production(s) of that word, and, if such differences do exist, what general principles explain them.

1. Method.

Four children participated in this study (two males and two females). They ranged in age from 1;11 to 2;4. They had normal intelligence and normal hearing, and by all indications were progressing normally in their language development.

Each child took part in two testing sessions. In the sessions pictures and various objects familiar to the children were used to elicit single word responses. The child was presented with a picture book, showing common objects and asked to name these objects. The experimenter presented each stimulus item in turn and asked "what's this?" Usually the child gave a response. If the child did not give an immediate response, a second attempt was made to elicit the word in exactly the same manner. Following the child's production of the word, or an unsuccessful attempt to elicit a word, an imitated response was elicited by the experimenter, who said "that's a _____. Say _____". Productions of words were collected from each child ranged from 27 to 35. This includes words that the child introduced himself during the course of the session.

The testing sessions were conducted in a small room with only the child and the experimenter present. The sessions were recorded on a Revox A77 using a Sony ECM-16 electret condenser microphone, that was hidden in a vest worn by the child. Each item produced by the child was transcribed in narrow phonetic transcription by two trained transcribers.

For the purposes of our investigation it was necessary to classify the utterances produced by the children. Investigators of child phonology do not generally make more than two-way distinctions between types of utterances. Items are typically classified either as "spontaneous" or "imitated" (cf. Moscowitz, Waterson, and others). What is meant by each of these terms is often left ambiguous. Only Fitzgerald has made a distinction in types of imitation--immediate vs. delayed.

We found the two-way classification inadequate. The addition of a third category (delayed imitation) was only a small improvement. Even with this three way distinction we were unable to classify more than half of the utterances in our corpus. Thus we expanded the classification system to include five categories. These categories are defined as below:

spontaneous (S) - The child's utterance where no adult vowel of the item is present in the previous five minutes.

echoic (E) - The child's production of a word directly after an adult model.

self-repeated (SR) - The child's repetition of his own production of a word when either no adult intervention occurs or the adult requests a repetition without including the model in the request (e.g. "say that again").

delayed-repetition (DR) - The child's production when there is no immediately proceeding model by the adult or child, but the word has been produced within a five minute period.

preseveration (P) - The child's production immediately following two or more (SR)s (whether or not the adult attempts to elicit another item).

2. Results.

2.1. Spontaneous versus echoic forms.

There are several alternative hypotheses that can be made about the relationship between spontaneous and echoic productions:

1) In all cases there is no difference in form between the echoic and spontaneous productions of an item.

2) In some cases the relationship described in (1) holds but in other cases there are differences between the spontaneous and echoic productions of an item.

3) In all cases there are differences in the spontaneous vs. achoic productions of an item.

Cases (2) and (3) imply that the adult model has some influence on the child's subsequent productions. We examined our data for all instances of spontaneous and echoic pairs. We calculated the number of items in which the echoic form was the same as the spontaneous form and also the number of items in which the two differed. The following types of changes were considered as differences:

(a) one segment substituted for another, or a feature change: zebra (S) [diba] (e) [ðiba] (frication added)

(b) a segment is inserted:
vest (S) [vɛt] (E) [vɛst]

(c) a segment is deleted:
spoon (S) [spun] (E) [pun]

The results appear in Table 1. Although the finding is based on only a small number of items (especially for subject number 4), it was found that some of the items showed no differences. This supports hypothesis (2) above and suggests that the adult model may have an effect on the child's subsequent echoic production.

Table I

Subject	Number of Spont./Echoic Pairs	Number of Spont./ Echoic Pairs Showing Change	Number of Spont./ Echoic Pairs Showing No Change
1	28	25 (90%)	3 (10%)
2	25	15 (60%)	10 (40%)
3	24	19 (79%)	5 (21%)
4	11	6 (55%)	5 (45%)

The next question is whether the changes in echoic production are in the direction of the target sound (as defined by the adult's production). All instances of spontaneous/echoic sequences were examined to determine if the target sound was achieved in the echoic form. The results of this analysis appear in Table 2.

Table 2

Subject	Total Number of Segments Undergoing Change	Number of Segments that Hit Target	Number of Segments That Do Not Hit Target	Indeterminate
1	29	13	7	9
2	19	12	5	2
3	28	17	9	2
4	9	5	3	1

An example of a segment reaching the adult target in the child's echoic form is

S1 milk (S) [mo$^{\upsilon}$k^{h}] Adult model [mɪlk^{h}]
(E) [mɪ$^{\upsilon}$k^{h}]

In this example the [l] is still absent in the echoic form, but the vowel has reached the target. In other instances the target sound was reached in the spontaneous production but was altered in the echoic production, e.g.

S1 fish (S) [fɪs]
(E) [fɛʃ] Adult model [fɪʃ]

Here the vowel becomes less like that in the adult model. Some cases were more complex and could not be classified into one of these two categories. Such instances were labelled "indeterminate", e.g.

S1 yellow (S) [lælo] Adult model [jɛlo]
(E) [lʌlo]

The first vowel is more raised, but it is also more central and thus misses the target.

Thus we find that the echoic forms often do differ from the spontaneous forms and that in many instances the change is in the direction of improvement of the child's inadequate spontaneous renditions of a word. There are, however, notable exceptions to this pattern. Some echoic forms show no change from the spontaneous forms, while others show an apparent deterioration. Some echoic forms show improvement in one part and deterioration in some other part (see fish example above).

2.2. The "trade off" phenomenon.

One interesting phenomenon we observed in our data is best termed "trade off". In "trade off" one sound segment (or feature) in an echoic form more closely matches the appropriate sound in the model while another segment (or feature) in the same utterance diverges from the model. For example:

thumb	(S)	[fʌŋ]	Adult model [θʌm]
	(E)	[fʌm]	

This example of "trade-off" involves a consonant and a vowel. The consonant reaches its target while the vowel is lowered. Other examples of "trade-off" may involve two or more consonants.

brush	(S)	[bʌs]	Adult model [brʌʃ]
	(E)	[wʌsʃ]	

Trade-off may also involve more complicated changes:

airplane	(S)	[ˈæ pʰlɛn]	Adult model [ˈɛr pʰlen]
	(E)	[ˈʌ pʰwen]	

3. Discussion

Thus far we have observed that there are some differences between spontaneous and repeated utterances. It is now necessary to explore the principles governing these differences. We investigated the possibility that the changes between spontaneous and repeated utterances were connected to the position of the segment in the word (e.g. whether it is the initial sounds or final sounds that are altered when the adult model is presented). The evidence did not support this hypothesis. There was no consistent pattern tied to the position of the segment in the word. Position in the utterance played no systematic role in the trade-off cases as well.

Another possibility is that the variability is governed by the child's phonological system. In order to explore this issue, we analyzed the consonant system of each of the four children, based on the utterances produced by each child during three sessions. These

sessions took place within one month of our testing session. They were part of an independent phonological study and were similar to those described above, except that no attempt was made to elicit echoic responses. We formulated substitution rules for each English consonant sound for five positions in the word: initial, final, preconsonantal, postconsonantal and intervocalic. Each consonant was then classified according to three degrees of stability:

1) stable sound - target sound present 75% of the time.

2) stable substitute - non-target sound substituted consistently in 75% of the cases.

3) variable - two or more non-target substitutes none of which reach the 75% level.

The data indicate that changes taking place between spontaneous and repeated utterances are governed by the stability of the particular segments. Those sounds which are stable in the child's system do not change in echoic and other repeated forms. This is to be expected. This is not necessarily obvious, since, if one suspects that echoic forms exhibit advances over the child's current system, one would expect these sounds to achieve the target sound in the echoic forms, which they do not always do. Those sounds which are termed variable do sometimes change in the echoic forms, but the target sound appears only rarely.

This analysis may help to explain why the notion of "phonologically progressive" echoic forms arose. A comparison of spontaneous and echoic forms which ignores the variability in sounds in the child's productions would show that in some parts of the echoic forms the target sound is achieved. This holds between (S) and (E) for the initial sound in the following example:

juice	(S)	[dʲjus]	
	(E_1)	[dʒus]	Adult model [dʒus]
	(E_2)	[djus]	Adult model [dʒus]

In this case the initial segment in the (E_1) form is different from the segment in the (S) form and matches the target sound in the adult model. With respect to variation in the child's system, however, we find that word-initial [dʒ] is variable for this child. The variant which occurs in E_1, that is [dʒ], is one of a number of possibilities which is produced by the child in this position. Other variants are [dʲj] and [dj]. The appearance of [dʒ] in the echoic form is not necessarily related to the fact that the utterance was produced after an adult model. An examination of the other echoic form (E_2) supports this claim.

This analysis applies to the trade-off cases as well. Trade-off occurs between sounds which are variable. When one sound in the trade-off reached the target, it is simply a manifestation of variability in the child's system and not necessarily an instance of overall improvement or of a production not mediated by the child's system. When another sound in the system seems to exhibit regression, this too is a manifestation of variability. As an example consider

brush (S) [bʌʃ]
(E) [bwʌs] Adult model [brʌʃ]

For this child /b/ is stable in initial position, postconsontal /r/ is variable and final /s/ is variable.[a] Initial [b] is not affected in the trade-off. The [w] is a variant which alternates with ∅ (zero) in initial r-clusters. The final [s] is a variant of /ʃ/.

4. Conclusions.

In summary, we examined the spontaneous and repeated utterances of four children and found that there are differences between the spontaneous and echoic forms produced. Interestingly the child's productions immediately following those of the adult do not necessarily approach the model more closely than do spontaneous productions. In certain cases a "trade-off" occurs, i.e. a sound segment in an echoic form more closely approaches the model while another sound segment falls short of the target. This suggests that echoic (and other repeated forms) are not "phonologically progressive", as had been proposed.

Footnote

[a]This paper was presented at the IVth International Congress of Applied Linguistics, Stuttgart, Germany, August 1975. The material for this study was collected at Stanford University while both authors were associated with the Child Phonology Project (NSF Grant #30962). We would like to thank Jeannie Luckau for assistance in the data sampling and her many useful suggestions and other assistance. An earlier version of this paper was read by Clara Bush, Eve Clark, and Charles Ferguson. We want to thank them for their insightful criticism and suggestions. The final responsibility for the content is, of course, our own.

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