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ABSTRACT

Dialogues with 22 echoic 3-year-old children were analyzed according to question type to determine whether some questions are more likely than others to trigger echoic responses. The children were asked to identify and manipulate toy objects such as a car, to identify a group of familiar objects such as a key or scissors, and to respond to questions concerning body parts, food, family, pets, and daily activities. A total of 1.509 questions were asked, with an average of 69 questions per child. Eighty-two percent of the questions asked fell into yes/no, nominal, and locative categories. Results showed that the pooled echo rate for locative probes was nearly twice as great (57.9%) as the performance on the yes/no (32.4%) and the nominal (31.1%) probes. The findings indicated that a verbally handicapped child would be more likely to echo as response demands increase, the children might not have the developmental ability to cope with Wh word forms, and that the presence of an object might be associated with increased echo output in the locative and nominal categories. Posttesting with the same protocol 1 year later showed an echoic rate of 6.1% for the 22 children. (Author/MC)

OCCURRENCE OF CHILDREN'S ECHOIC RESPONSES ACCORDING TO INTERLOCUTORY QUESTION TYPES

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Abstract

Dialogues with 22 echoic three-year-olds were analyzed according to question type in an effort to determine whether some probes are more likely than others to trigger echoic responses. Most of the 1,509 questions fell into three categories: yes/no, nominal, and locative. The pooled echo rate for locative probes was nearly twice as great as the performance on either of the other two types. Results are discussed in terms of probe-constraints, developmental syntax of Wh questions, and other potential variables.

OCCURRENCE OF CHILDREN'S ECHOIC RESPONSES ACCORDING TO INTERLOCUTORY QUESTION TYPES

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Earlier studies of childhood echolalia have repeatedly demonstrated high correlations between echoic responses and failures in comprehending the triggering utterances (Fay, 1967a, b; 1969; Fay and Butler, 1968; Matheny, 1968; Saxman and Fay, 1970). These studies have shown also that even heavy echoers are non-echoic in response to many verbal stimuli. The logical conclusion that the children probably understand the non-echoed stimuli is only partially valid. An analysis of the output of both delayed echoers and of a group of clinical referrals has shown a mean echoic performance of about 40% for each sample (Fay, 1967a). Their non-echoic responses (45%) were considered to be appropriate about half of the time. The remaining 15% were classed as silence (i.e., no response or inaudible response). How then might we account for this apparent selectivity in a behavior which is otherwise characteristically motile?

Assuming general constancy in the speaking situation, the interlocuter's delivery, and the responder's attentiveness, the only external variable remaining which could seemingly dictate selectivity is the verbal stimulus, per se, or its referents. Minimal evidence in support of such a postulation was reported in the case of an autistic child, L. C. (Fay, 1969). In an effort to plot changes in this boy's responding behavior an interview protocol was tape-recorded at bi-monthly intervals. Subsequent reviews of these conversations showed that L. C. repeatedly failed to identify on request simple objects arrayed before him. Moreover, the failure was

consistently accompanied by an echoic return of all or part of the request: "Show me the ___." In contrast, a succeeding imperative involving one of the failed objects, "Pick up the man," was just as consistently executed correctly and without echoic response. Consequently, at a later recording session he was subjected to repeated stimulation with the carrier phrases "Point to the ___," "Where is the ___?," and "Show me the ___," in multiple permutations of phrases, objects, and pictures of objects. With almost perfect consistency echo/error occurred for "Show me the ___" and "Where is the ___?"; for the imperative "Point to the ___," objects were identified without echoing. I attempted to explain this apparent selectivity as a result of a defect in abstraction among such children (Scheerer, Rothmann, and Goldstein, 1945; Goldstein, 1959), and as a possible consequence of grammatical differences among the carrier phrases.

In effect, L. C.'s response selectivity demonstrated that the interlocuter--not the child--created the echo by his choice of words. If I phrased my request "correctly," I received the desired identification minus echo. The terminal noun, i.e., the object to be identified, proved not to be the critical variable. Rather, the nature of the other parts of the stimulus seemed to dictate this child's response. Was L. C.'s behavior the unique performance of an abnormal mental condition, or did it expose in extreme form a more generalized reaction to adult interrogation by linguistically ill-equipped children?

In the retrospective study to be described we have examined the occurrence of children's echoic responses in relation to the nature of the interlocuter's triggering stimuli. Although requests both for nonlinguistic

behavior (imperatives) and for linguistic responses (questions) were considered, the primary focus was upon varieties of question types. Under investigation was the issue of whether there are some types of interrogation which are more likely than others to trigger echoic behavior.

Subjects and the Corpus

Typescripts of tape-recorded interviews between the author and 22 echoic three-year-olds served as the corpus. These interviews were collected for a previous investigation (Fay, 1967a). They were obtained between December, 1963, and November, 1965, and pre-dated by several years the author's concern for question-type as a potential triggering variable in the occurrence of echoic responses.

The subjects were drawn from a population of three-year-olds who were routinely administered the 36-month Speech, Language, and Hearing Examination of the Collaborative Study of Cerebral Palsy, Mental Retardation, and Other Neurological and Sensory Disorders of Infancy and Childhood, National Institute of Neurological Diseases and Stroke. The Oregon contribution to this study originally included 3,465 children of lower socioeconomic status who were born in the county hospital of the Portland metropolitan area. If during the routine speech examination a child was found to be substantially echoic, he was tape-recorded in a subsequent interview. Those children who were found to echo ten or more of 50 consecutive speech-evoking stimuli in the interview were included as subjects. They represented about three percent of the children tested during the two-year period. Ages ranged from 35 to 41 months with a mean age of 35.95 months. There were 15 White and 7 Black children; according to sex there were 15 males and 7 females. These

children were regarded as physically normal, but the mean IQ and IQ range of the Stanford-Binet intelligence test administered at 48 ± 2 months were 83.59 and 53-109 respectively (Fay and Butler, 1968). The mean four-year IQ and standard deviation of the population from which they were drawn are 94.44 and 14.54, based on an N of 762 (Kangas, Butler, and Goffeney, 1966).

The interview protocol was designed to be essentially the same for each child. No script was followed, however, and variations in stimuli across subjects are clearly apparent. Both interviewer and interviewees must share responsibility for this compromise with standardization. Nevertheless, each interview covered essentially the same topics and included identical stimuli in numerous instances. The typical interview lasted about ten minutes and was composed mainly of questions and imperatives in about a 3:1 ratio.

Most imperatives and some of the questions occurred in the administration of the Verbal Comprehension subtest of the speech examination. In this subtest the child is asked (or told) to identify and manipulate toy objects placed before him (e.g., "Show me the car;" "Where is the box?;" "Put the cat in the box;" "Turn the cup upside down."). The children were also asked to identify a group of familiar objects or pictures of objects (key, scissors, chair, dog, spoon) with such questions as "What is this?" or "What do you call it?" In addition, each child received questions from a narrow spectrum of subjects which had previously proved somewhat successful in eliciting speech from this age group. These speech-evoking questions concerned body parts, food, family, pets, and daily activities.

Analysis

Questions from the 22 transcriptions were classified according to a system developed by Leach (1972) which is based upon adult-initiated probes to children and the types of constraints placed upon the response. High correlation coefficients for all inter- and intra-examiner comparisons have been demonstrated in the use of the system (Baker and Leach, 1971).

Not all of the question classes defined by Leach occurred in the interviews. Those which did appear in Table 1 together with their constraint classes and examples from the corpus.

Insert Table 1 about here.

Each question was then classified according to whether an echoic response followed immediately. A pure echo was defined as an immediate repetition of all or part of the interlocuter's preceding utterance. With this age group the echolalia is typically limited to the terminal word or words of the stimulus, sometimes without the definite article and usually with evidence of non-comprehension. Mitigated echolalia was also treated as an echoic utterance. This variation of pure echolalia may be classed according to one of two types (Fay, 1967b): Type I is an echo in which the interlocuter's speaker-appropriate pronoun is transformed to a listener-appropriate pronoun (e.g., "Where do you sleep?"/"I sleep."); Type II is generally characterized by a verbal suffix to a pure echoic segment (e.g., "Where does your cat sleep?"/"Cat sleep . . . can't find my cat."). Mitigation often signals emergence from the echolalic period and shows evidence of increased verbal

comprehension (Fay and Butler, 1968).

The hypothesis tested was that echoic responses were in the same proportion as non-echoic responses regardless of the question category. A chi-square was computed on the pooled responses in each category to test independence among question types.

Results

A total of 1,509 questions were asked for an average interview of 69 questions per child. Figure 1 shows distribution of questions by probe type. Clearly, the interview was most heavily weighted with yes/no, locative, and nominal questions. Eighty-two percent of the probes fell into these three categories.

Insert Figure 1 about here.

The /OR/ classification was eliminated from further analysis for two reasons. First, all instances were variations of "boy or girl?" or "lady or man?," thus providing a restricted sampling. Also, in an attempt to tally the responses, one could never be sure whether the response was correct or echoic. For example, a girl who is asked, "Are you a boy or girl?" might respond echoically "boy or girl," incorrectly "boy," or—correctly or echoically--"girl."

To a lesser degree equivocal responses also occurred to some Y/N questions. If a child when asked "Do you want to play another game?" responds with "nudder game," the response can be interpreted either as echo or as affirmation by repetition. The Y/N category allows for both confirmatory

and imitative responses, nevertheless, so these equivocal responses were tallied as echoes even though they might qualify as "legitimate" ones.

Of the questions asked, 600 (39.8%) yielded echoic responses. This percentage is very similar to the 40.9% obtained from a sample of the same corpus, which included non-interrogative stimuli as well (Fay, 1967a). Individual differences in echoic output ranged from 14% to 70% with a mean rate of 27.3 echoic responses per child.

There were substantial differences among question types in the likelihood of an associated echoic response. Table 2 summarizes these differences.

Insert Table 2 about here.

The pooled chi-square value for the 22 children (eliminating TAG and TIME because of small frequencies) amounted to 76.8 ($p < .001$). Outstanding in this statistic was the contribution of 45.9 by LOC. By treating the pooled data as a single large sample, however, there remains the possibility that one or more aberrant children could bias the sample. In order to determine the likelihood of this possibility a test of heterogeneity was employed (Snedecor, 1956, p. 214). Here, the pooled chi-square was subtracted from the sum of the chi-square values obtained for each child's individual performance across the six probe types. The measure of heterogenity was small and failed to reach the level of statistical significance (51.7, df=105). As a more stringent test of heterogenity only the 17 smaller individual chi-square values were used, thus in effect eliminating the five heavy contributors from the sample. Again, the smallness and nonsignificance of the

heterogeneity chi-square (34.4, df=80) is further evidence that the several samples were drawn from a common population and were varying predominantly in the same direction.

Supplemental Analyses. Although the focus of this study was upon how the echoic child handled interlocutory questions, a further analysis considered the sentences which were not questions. Most of the non-interrogatives could be categorized either as imperatives or declaratives, the latter group here including single word rejoinders, exclamations, etc. Table 3 shows the pooled results for the three main sentence categories together with number of echoes and percentage of echoic responses.

Insert Table 3 about here.

The seemingly high percentage of echo for declaratives (53.9%) is somewhat misleading because of the disproportionately small occurrence of this sentence type.

Another post-investigative analysis considered the issue of the physical presence of a context object or picture. The imperatives were given almost exclusively in association with toys or pictures clearly visible to the child. As for questions, it would seem to make some difference in a child's response whether a mother's question "Where are your shoes?" concerned shoes currently on his feet or currently on the back steps. A reanalysis considered this issue for both LOC and NOM. Results are summarized in Table 4.

Insert Table 4 about here.

It is clear from this table that more than half of the probes and more than half of the echoes in the NOM and LOC categories occurred with objects or pictures present.

Discussion

Results of this study indicate that these children did respond differentially according to the types of questions asked. The echo rate for LOC was substantially greater than that resulting from the other primary probe types, Y/N and NOM. This discussion will focus upon some of the possible reasons for the differential echolalia.

One tenable approach is to look at the nature of the response demands placed upon the child by the various question types. Presumably a verbally handicapped child would be less able to cope--and thus more likely to echo--as the response demands increased. Williams and Naremore (1969) developed a classification system for adult questions according to response demands. A hierarchical pattern of three probe-constraint classes emerged from their analysis of fieldworkers' questions to children in the fourth to sixth grades. The Williams and Naremore classes are given below together with comparable classifications involved in the present study:

A. Simple: Where the probe could be minimally answered with a simple negative or affirmative (our TAG and Y/N categories).

B. Naming: Where the probe could be minimally answered by providing the name or names of something (NOM and /OR/).

C. Elaboration: Where the probe requires more than a simple negative or affirmative reply or naming (non-labelling Wh questions, i.e., LOC, TIME, ADJ, VRB, ADV).

Our data (Table 2) would seem to indicate little variability in echoic output for simple and naming probe constraints, but a marked increase for the elaboration category. If the echoic response of other non-labelling Wh questions are added to the LOC results, nearly half (47%) of the total echoic output could be so classified. Why?

One explanation lies within the developmental acquisition of the ability to deal with the Wh question in general, the Wh word in particular, and quite possibly the abstract morpheme symbolized by "wh".

In her study of how children answer questions, Ervin-Tripp (1970) considered both the order of development in discourse agreement and the nature of the answers children made before agreement was similar to the adult form. Her data showed that question comprehension developed sequentially from Yes-no, to what, and next to where or what-do. These in turn are followed by whose, who, why, where-from, how, and when.

Ervin-Tripp also found that a child's questions and responses tend to develop contemporaneously. If this be so, then Brown's (1968) study of the development of the Wh question in speech is pertinent here. He noted that the underlying structure is not strongly suggested by the surface form of Wh questions. Rather, he suggests that recurrent discourse patterns which are rich in structural information may constitute the basis for a learning process. An integral aspect of this development, according to Brown, is the active use

by parents of probes, prompts and imitative expansions. On this criterion we can only speculate about the amount of parental probing our rather slow developing children received. Exposure may have been insufficient for comprehension of the grammar of the IOC questions.

Generalities concerning Wh question grammar do not seem to apply to the naming probe-constraint introduced by "What is this/that?" The exact figures were not tallied for our NOM category, but a majority involved variations on this actual question as an object was presented for identification. Brown noted that at a developmental age when there is no evidence that rules necessary for generating Wh questions are apparent, the predicative nominative question "What is that?" was frequently produced by the children whom he studied. He does not, however, consider such production as evidence of internal transformation processes for other Wh generations. Rather, he suggests that certain recurrent sentences such as this are perhaps learned as independent routines on a rote basis. These are acquired as unanalyzed routines as, in effect, longer words. Such utterances could probably be handled at an earlier age receptively, as well as productively. If so, it is possible that some of the echoing evident for NOM is attributable to an inability to identify or label the object rather than to an inability to understand the what question.

In one respect the Y/N results are the most difficult to evaluate. Because of the relative constraint simplicity of these questions, one would expect a lower percentage of echoic output than the 32.4% obtained. Perhaps, as previously mentioned, false positives resulting from equivocal affirmations by repetition have inflated our results. With response options limited to

a verbal or gestural "yes" and "no" together with such grammatical clues as rising intonation and departure from declarative word order, it is surprising that so much echoing did occur. This is not to suggest that the semantic value of these questions is necessarily understood by children of this age, but the opportunity to respond is there regardless. Several years ago I tested this aspect of responding patterns by presenting a series of 120 three-year-olds the declarative stimulus: "El camino reál." To this, 24% responded affirmatively, 5% negatively, 37% silently, and the remainder opted for such responses as "Oh," "OK," "Good," "I don't know," "I can't say dat," "Two," "Four," "What is dat?," "Just Jerry," and "Because anyhow Mom said." When I asked these children the pitch-inflected "question" of "El camino reál?," the affirmative count rose to 62%. Confirmation is an easy option even if your interlocuter makes no sense at all.

What effect did the presence of context objects have on the echo rate? Data from Table 4 would suggest a somewhat greater occurrence for both LOC and NOM when an object or picture was involved. Echo rate for imperatives (Table 3), which were almost exclusively object-oriented show also a slight increase over questions in general. These results should be viewed cautiously, however, particularly with regard to a direct cause-and-effect relationship. It is quite possible that at least two opposing forces are involved here, one promoting and one inhibiting echoic responses. Hooper (1971) included conditions involving presence or absence of context objects in his study of questions put to normal pre-schoolers. Fewest errors in responding occurred with the context object present, but no significant differences were found among context conditions. If comprehension for the

echoers was aided somewhat by the objects, one would expect an abating influence. On the other hand we are dealing here with a common echo phenomenon which might be termed labelling echo. When a child is confronted concurrently with an object and an auditory signal (typically the stressed noun terminating the question or imperative) audible echo may occur. The effect suggests an overtly exposed perceptual matching process presumably involving visual and auditory images. Although labelling echo may be either pure or mitigated (Type II), among the heavier echoers it is rarely accompanied by evidence of comprehension. Here, the lack of appropriate action following the object identification request or probe generally testifies to comprehension failure. Further evidence of minimal symbolic processing is afforded by the typically brief latencies between trigger and echo (Saxman and Fay, 1970).

On balance, then, it would appear that presence of an object may be associated with increased echoic output in LOC, NOM, and possibly the imperatives. If object context worked substantially toward echo abatement, we might expect the opposing forces to cancel one another. Whether the labelling echo phenomenon is responsible for the increases cannot be determined with certainty from these data. Its occurrence among typically non-echoic three-year-olds, however, suggests that it may be a potent force within the echoic group as well.

We may conclude, therefore, that certain forms of questioning of these children were more likely to trigger echo than were other forms. By far the most efficient echo producer was the locative question. There is a

suggestion, also, that had more Wh questions of other types been included in the interview the echo rate for these kinds of probes might exceed even LOC. Whether one considers the syntax of the question or the burden for elaborative response, the more difficult, late-developing forms were the prime echo producers. Yet for the group as a whole, question-type differences did not account for all of the echo selectivity in the interviews. An additional influence may well be the presence of a context object. Further research should offer some insights into these and other potential variables. Meanwhile, it may be of interest that the 22 children of this study were re-recorded with the same protocol one year later. By the age of four, their mean echoic rate was a respectable 6.1% (Fay, 1967a).

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Table 1. Constraint classes used in the interviews with examples drawn from the corpus.

Type	Constraint Classes	Examples
TAG	Confirmation	Those are new shoes, aren't they?
Y/N	Optional Confirmation or Motor or Vocal Imitation	Do you like hamburgers? Can you wave the flag?
TIME	Wh: Locate-time segment	When do you eat peas?
LOC	Wh: Locate-space segment	Where is the box? Where do you sleep?
NOM	Wh: Nominal segment	What is this?
ADJ	Wh: Adjectival segment	How old are you?
VRB	Wh: Verbal segment	What did my dog do?
ADV	Wh: Adverbial segment	How are you? How is he walking?
/OR/	Alternate: Conjoined OR	Are you a boy or girl?

Table 2. Pooled totals and percentages of echoic responses by probe type.

	Total Number of Responses	Total Echoic Responses	Percentage Echoic Responses
TAG	14	0	0.0
Y/N	512	166	32.4
TIME	3	3	100.0
LOC	342	197	57.9
NOM	380	118	31.1
ADJ	44	14	31.8
VRB	106	54	50.9
ADV	40	16	40.0
/OR/	68	32	47.1

Table 3. Pooled totals and percentages of echoic responses according to sentence type.

	Total Number of Responses	Total Echoic Responses	Percentage Echoic Responses
Questions	1,509	600	39.8
Imperatives	525	226	43.4
Declaratives, etc.	180	97	53.9

Table 4. Pooled distribution and echoic response results according to presence of a context object or picture.

	Probes with Context Object	Total Echoic Responses	Echoic Responses with Context Object
NOM	268 (71%)	118	68 (58%)
LOC	218 (64%)	197	142 (72%)

Figure 1. Distribution of question types used in the 22 interviews.