Children's Control of Adult Speech

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BOHANNON, JOHN NEIL, III, and MARQUIS, ANGELA LYNN. *Children's Control of Adult Speech.* CHILD DEVELOPMENT, 1977, **48**, 1002–1008. 2 studies were done to test the hypothesis that short simple sentences (Motherese) addressed to children are the result of children signaling noncomprehension for longer, complex utterances. Study 1 observed 15 adults converse with a 32-month-old child, and later 5 adults interacted with the child when he was 36 months old. The results indicated that the child differentially comprehended adult utterances of different lengths in the predicted direction and that 19 of 20 adults reduced their length of utterance following a clear signal of noncomprehension by the child. Study 2 had 20 adults tell a story under 4 conditions: (1) to an adult (*A*), (2) to a pretend child (*AC*), (3) to a child accomplice who signaled comprehension (*C*), and (4) to the same accomplice who signaled noncomprehension (*NC*). While no differences in group mean length of utterance (MLU) occurred between the *A* and *AC* conditions, all the subjects used longer sentences in the *C* condition than in the *NC* condition. Briefly, the results of study 2 were $A = AC > C > NC$. It was concluded that children may limit the complexity of their linguistic environment through comprehension feedback.

It was once thought that adult speech to children, or Motherese, was essentially not different from any other kind of speech (e.g., Bever, Fodor, & Weksel 1965). However, recent work has shown that speech directed to children is characterized by simple syntax, short sentences, and more concrete words than speech to adults (Gleason 1973; Philips 1973; Slobin 1975; Snow 1972). It has also been shown that the occurrence of different grammatical structures in the mother's speech to children is sensitive to the grammatical level of the child (Longhurst & Stepanich 1975; Moerk, in press) and correlates with the emergence of those structures in the child's own spontaneous speech (Newport 1976). Therefore, the simpler character of Motherese is no longer seriously questioned.

Yet, what makes adults speak Motherese? It does not seem dependent upon actually being a mother. Snow (1972) and Sachs, Brown, and Salerno (Note 1) found that strange adults speak Motherese just as well as the child's own mother. One does not even have to be an adult, as Shatz and Gelman (1973) found that 4-year-olds also spoke a form of Motherese to younger children. In fact, the only variable that seems necessary for the occurrence of Motherese is the presence of a listening child. The importance of a child's presence is shown by Snow's finding that both mothers and strangers only minimally simplified their speech when instructed to give directions to children who were not actually present.

What is it about the child's physical presence that makes people speak Motherese? Glanzer and Dodd (Note 2) found a negative correlation between the number of child responses within any set of eight successive mother or child utterances and the mean length of the mother's utterances (MLU); the more the child spoke to the adult, the more the adult spoke Motherese. Another study (Sachs et al., Note 1) had five strange adults tell a story to a 2-year-old. Despite the fact that the 2-year-old was silent throughout testing, the subjects narrated their stories in Motherese.

There is a hypothesis that could account for both findings. Several authors (Dale 1976; Glanzer & Dodd, Note 2; Lord, Note 3) speculate that all speakers adjust their language output to meet the comprehension needs of the listener. For this to be true there must be some form of feedback concerning the listener's comprehension available to the speaker subse-

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quent to his utterance. The comprehension feedback may have occurred in the child's utterances in the Glanzer and Dodd (Note 2) study or in a nonlinguistic mode (i.e., lack of attention or a blank stare) in the Sachs et al. (Note 1) study. That this may have been the case is indicated by Sachs's report that the adults in her study addressed a surprising number of questions to a 22-month-old child who never replied. Moreover, when Pratt, Bumstead, and Raynes (1976) observed staff speech to retarded adults, they reported significant positive correlations between the complexity of staff speech (MLUs) and the IQs and comprehension abilities of the patients.

The hypothesis that the child's comprehension feedback is the main determining factor in the occurrence of Motherese assumes that comprehension responses by the child occur differentially to adult utterances of different lengths: the child should indicate comprehension of shorter utterances and noncomprehension of longer utterances. Given such differential comprehension responses, the hypothesis predicts that they in turn control the production of utterances by speakers as follows: (*a*) responses indicating noncomprehension should tend to reduce the length of the adult's subsequent utterances; therefore (*b*) the length of adult utterances should increase with age (and increased comprehension abilities) of the child, and (*c*) if adult utterance length is controlled by the child's moment to moment comprehension, there should be no significant differences between MLUs addressed to the child by the child's own mother and strange adults.

These hypotheses can be tested with a method requiring a group of adults to interact with a single child. In fact, this may be the better design to test for developmental differences in comprehension and MLUs addressed to the child, since Glanzer and Dodd (Note 2) found that when groups of mother-child pairs were contrasted the within-age variability was too great to yield significant cross-age differences. In the first study, groups of adults were observed interacting at two different times over a span of 4 months with the same child.

Study 1

Method

Subjects.—Fifteen undergraduates and five graduate students participated in the experiment. The child, Nat, was 2-8 (MLU = 3.59 morphemes) when he interacted with the undergraduates. He was 3-0 (MLU = 3.73 morphemes) when he interacted with the graduate students. Nat is the son of a college professor and a college graduate and probably verbally precocious.

Equipment.—All interactions were recorded on Realistic Super Tape by means of a Realistic CTR-29 Cassette Deck. During the interaction several play materials (i.e., blocks, stuffed animals, and books around the house) were made available for assisting conversations.

Procedure.—The students were given minimal instructions concerning the experiment. They were simply told to converse with the child and to try to draw him into conversation. The undergraduate students were sent to Nat's home in six teams of two students and one team of three students. The graduate students were composed of one team of two and one team of three students. During each interaction, the noninteracting team members took contextual notes while the other team member interacted. The mother was present during all interactions. They were also accompanied by an experimental assistant to run the tape recorder. The average interaction lasted about 15 min, with one group of undergraduates going a full hour. These transcripts were checked against the tapes for accuracy by Nat's mother and the authors.

Results

We focused exclusively on length of utterance, as it is an easily quantifiable measure of syntactic complexity. The corrected transcripts were scored for length of utterance by Brown's (1973) method.

Our first prediction was that comprehension of short utterances should exceed comprehension of longer utterances. The transcripts were examined for evidence of comprehension versus noncomprehension. For the purposes of this study, Nat was judged as having comprehended an adult utterance if he displayed the following behaviors: (*a*) affirmative responses (i.e., yes, yeah, unhuh, etc.), (*b*) appropriate answers to questions, and (*c*) continuation of subject matter broached in preceding adult utterance. Nat was judged as not having comprehended if he displayed (*a*) no response to a direct question, (*b*) inappropriate response to a question, (*c*) imitation and reduction of the adult utterance (Brown & Bellugi 1964), (*d*) response such as what? huh? or wha?

Those responses that did not clearly fit into the above categories were judged as neutral and did not enter into the comprehension analysis. Four different raters made the comprehension judgments. All judgments were cross-checked with at least one other judge. The interrater reliability (2,153 agreements/2,322 judgments = .93) indicated that the comprehension criteria were clear and easily discernible in the transcripts.

The χ^2 analyses were done on the relative frequency distributions of comprehended versus noncomprehended adult utterance lengths. The results indicated that the group of utterances to which Nat displayed comprehension was shorter than those utterances yielding no comprehension for both the 2-8 speech, $\chi^2(11) = 21.21$, $p < .05$, and the 3-0 speech, $\chi^2(11) = 20.80$, $p < .05$.

This pattern of differential comprehension can also be examined in terms of the relative probability of Nat's comprehension. For each utterance length, comprehension values (comprehended = 1, noncomprehended utterance = 0) were summed and divided by the number of utterances of that length. These data are shown in figure 1 for those utterances addressed to Nat at ages 2-8 and 3-0. A t test, $t(11) = 2.47$, $p < .05$, revealed that Nat's probability of comprehension significantly increased over the 4 months of this study, but the pattern is virtually identical at both ages (see fig. 1).

Our second prediction was that comprehension responses should influence subsequent adult utterance length. This was determined by calculating the relative change in utterance length given that feedback occurred. Each transcript was examined for utterances receiving responses indicating either comprehension or noncomprehension. The length of the subsequent adult utterance was compared with the preceding utterance, and increases or decreases were summed to arrive at a net change to either comprehension feedback or noncomprehension feedback. The net changes were then divided by the number of comprehension or noncomprehension responses yielding an average change of utterance length contingent on comprehension or noncomprehension feedback by Nat for each student.

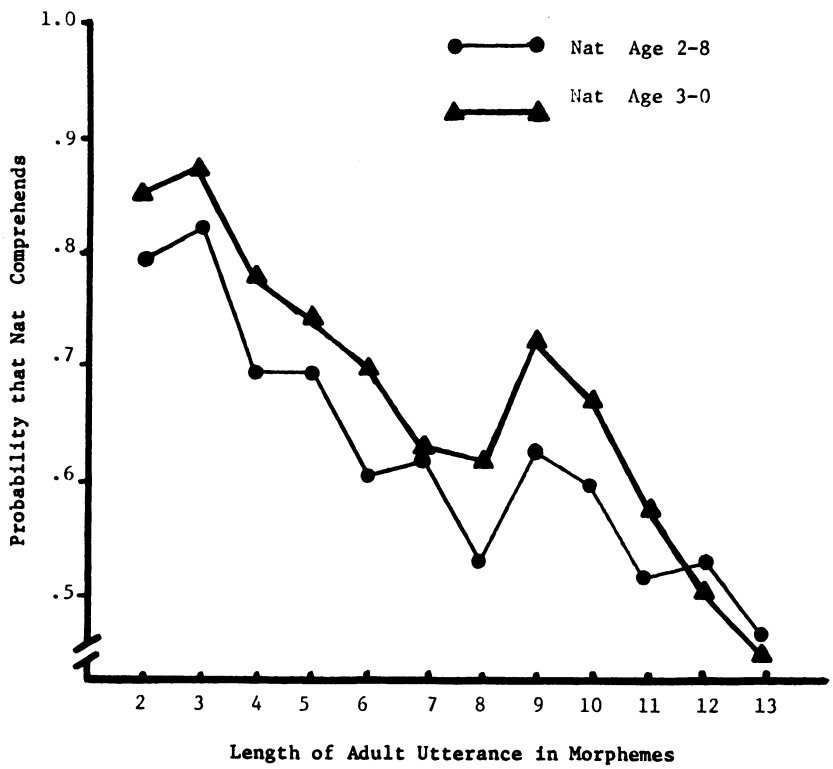

FIG. 1.—The relative probability that Nat comprehends as a function of the length of adult utterance

A one-way analysis of variance, $F(1,9) = 18.92$, $p < .001$, on the net change scores revealed that the students reduced their length of utterance more following noncomprehension feedback (mean change = —1.36 morphemes) than following comprehension feedback (mean change = —0.11 morphemes). This pattern was displayed by 19 of 20 subjects. It is clear that the length of adult utterances directed to Nat were sensitive to Nat's noncomprehension feedback. The hypothesis that adults would increase the length of their utterances following comprehension was not supported, since there was virtually no change in utterance length following comprehension.

The hypothesis that adult MLUs would increase with the increasing comprehension abilities of the child over age was also not supported. Although Nat significantly increased the probability that he would comprehend (fig. 1), a t test indicated that the utterances addressed to Nat at age 2-8 ($\bar{X} = 6.09$, SD = .52) were not significantly shorter than those addressed to him at age 3-0 ($\bar{X} = 6.43$, SD = .53).

The final prediction was that the mother's MLU and that of the strange adults would be similar, since both are controlled by the child's comprehension abilities. The data indicated that the mother's MLU to Nat at both age 2-8 (5.92 morphemes) and 3-0 (6.95 morphemes) fell within 1 SD of the mean MLUs of the unfamiliar subjects. Therefore, it cannot be concluded that the length of the mother's speech to Nat was significantly different from the MLUs of the other adults in this study.

Discussion

Before proceeding with the discussions, several caveats should be noted. Nat is probably an atypical 3-year-old in that he is socially facile in verbalizing with strange adults. He interacted with 20 strangers. Many children his age would have become taciturn and shy with even one strange adult. The authors also recognize their good fortune in that Nat signaled his noncomprehension in the verbal mode. Most children, especially those below Nat's level of language acquisition, probably indicate their noncomprehension by nonverbal signals (i.e., lack of attention, quizzical expressions, etc.), which are difficult to detect on audiotape. Finally, the present study was observational in nature and cannot support a cause-effect hypothesis relative to the relationship between a child's comprehension and the appearance of Motherese.

Yet in spite of the above limitations the data are compelling. The results of the present observations can be predicted from a comprehension feedback model of Motherese almost point for point.

First, the child must indicate differential comprehension for those utterance lengths that characterize Motherese (i.e., short sentences). Figure 1 indicates decreasing comprehension (or signals indicating such a state) with increasing length of adult utterance. An index of the validity of this measurement is shown in figure 1 where the absolute probability of comprehension increased with age yet evidenced the same shape curve.

The reader must remember that although the above demonstration of differential comprehension feedback is striking it would lack force without evidence that adults are sensitive to these signals. The observations of the present study were that 19 of the 20 adults tended to reduce the length of their utterance more following a signal of noncomprehension than following a signal of comprehension. Nat's mother also demonstrated this pattern, further supporting the notion that adults adjust their speech to the comprehension skills of the listening child.

In view of the strength of the above results, it is surprising that we have several unsupported hypotheses concerning the intergroup comparisons. The increase in mean adult MLU from 2-8 interactions to 3-0 interactions did not obtain significance, although it was in the predicted direction and paralleled a similar increase in the mother's MLU. This may have been due in part to large within-group variance, the small number of subjects employed, and the narrow span of 4 months within which the study took place. The reader will probably note that age of the listener and the educational level of the subjects employed was confounded, but in light of the parallel increases shown by the mother's MLU, the possibility that graduate students (the 3-0 group) use longer sentences simply because they have graduated from college is rather unlikely.

In summary, adult verbal behavior appears to vary with unequivocal signs of listener comprehension. Yet proof of a cause-effect hypothesis of children's feedback and Motherese needs a manipulative study. Therefore a second study was run in which signals of comprehension and noncomprehension were brought under experimental control.

Study 2

A variation of the Snow (1972) method was chosen for study 2. Snow asked adults to interact verbally with other adults (*A*), with imaginary children (*AC*), and with actual children (*C*). Her results showed that the mean MLUs of both the *A* and *AC* conditions were greater than the *C* condition. Similarly, study 2 had adult subjects interact with another adult and an imaginary child, but in addition the subjects were asked to interact with a child accomplice who was instructed to signal comprehension and noncomprehension. Signals of comprehension (yeah, unhuh, etc.) and noncomprehension (what? hum? imitation and reduction, etc.) were like those used by Nat in study 1.

If noncomprehension feedback is the sole determinant of shorter sentences addressed to children, then Motherese should only occur when such signals are delivered by the child. Additionally, there should be no difference in MLUs between talking to an adult and a child when both signal comprehension. It was therefore hypothesized that the MLUs of the subjects would conform to the following pattern: $A = AC =$ child comprehending $(C) >$ child noncomprehending (NC). On the other hand, to the extent that other factors (e.g., his/her childish appearance, or the variable degree of sensitivity of speakers to listener characteristics; see Newport [1976]) influence the production of Motherese, the above predictions may require some qualification.

Method

Subjects.—The subjects were 20 undergraduate students enrolled in a psychology class. The accomplice was an elementary school girl who appeared younger than her 8 years.

Materials.—A Realistic CTR-29 Cassette Deck recorded all interactions using Realistic Super-Tape. All interactions were timed by a stopwatch.

Procedure.—At the beginning of each condition, the subjects were instructed to tell the story of *The Wizard of Oz* for 2 min and that completion of the story was not necessary. Each subject underwent four different conditions in two sessions. (1) In one session, subjects told the story to an adult experimenter (the *A* condition). Following this, the subjects were instructed to pretend that a "young elementary school child" was present and to relate the story to that "pretend" child (the *AC* condition). (2) In the other session, subjects told the same story to the child accomplice who signaled comprehension for 1 min (the *C* condition) and noncomprehension (the *NC* condition) for 1 min. The order of presentation of sessions (*A* and *AC* vs. *C* and *NC*) and feedback (*C* vs. *NC*) was counterbalanced across subjects. Half the subjects ran in the *A-AC* session first, half in the *C-NC* session first. In addition, half the subjects received a *C-NC* feedback order and half a *NC-C* order when interacting with the accomplice. During all interactions the experimenter stood behind the subject and signaled the accomplice to yield the appropriate feedback. All story narrations were terminated at 2 min.

Results

The tapes were transcribed and the morphemes counted according to Brown's (1973) method. In determining the number of utterances, it was noted that many of the subjects would begin a new statement with the word "and." Therefore when an utterance began with an "and" while containing an explicit subject, it was counted as a separate utterance including the word "and."

A one-way analysis of variance on MLUs (*A*, *AC*, *C*, and *NC*) yielded a significant effect for conditions, $F(3,57) = 30.84$, $p < .001$. Subsequent t tests revealed that the *A* condition (mean MLU = 13.80 morphemes) was not significantly different from the *AC* condition (mean MLU = 14.03 morphemes). However, both conditions with the child listeners were significantly different from conditions without a child listener. Furthermore, the comprehension (*C*) condition (MLU = 11.64) was significantly different from the noncomprehension (*NC*) condition (MLU = 8.77). In brief, $A = AC > C > NC$. A 2 (order of sessions) × 2 (order of feedback) × 2 (type of feedback, *C* vs. *NC*) analysis of variance done on the child interaction data yielded the single significant effect of feedback type, $F(1,16) = 37.82$, $p < .001$. In other words, there was no effect of participating in the *A* and *AC* conditions prior to interacting, nor was there an effect of order of comprehension feedback. In all of these conditions, subjects produced a lower MLU when the child signaled noncomprehension than when she signaled comprehension.

A finer analysis was achieved by breaking each minute of the subject's interaction with the child into sequential quarters of

utterances. Quartile means for the group that received a comprehension-noncomprehension order of feedback (Group I) and the group that received opposite feedback order (Group II) were then calculated, as shown in figure 2. It is clear that, after the first quartile of the first minute of interaction, group MLUs separated, with the comprehension feedback group (Group II) increasing their MLUs while Group I, receiving noncomprehension feedback, decreased their MLUs. In the second minute of interaction when the feedback condition for each group was reversed, the groups showed a rapid adjustment to the new situation. Group I increased their MLU while Group II decreased their MLU.

Discussion

Study 2 points to two findings of consequence. First, the presence of a child may be a sufficient condition for the appearance of Motherese. The strong hypothesis that comprehension feedback was the sole determinant of simplified speech from adults to children ($A = AC = C > NC$) was not supported. Even when the accomplice indicated comprehension, significantly shorter adult MLUs occurred than in the A or AC conditions ($A = AC > C > NC$). A possible methodological explanation is that the positive feedback occurring in the C condition interrupted the utterances, whereas this could not have happened in the A or AC condition because no verbal feedback was delivered. On the other hand, this factor could not have been responsible for the differences between the C and NC conditions, as roughly the same number of feedback responses from the accomplice occurred in both conditions. The results of study 2 parallel the findings of Snow (1972) and Sachs et al. (Note 1) in that the mere presence of a child seems to be a discriminative stimulus (releasing stimulus?) for the occurrence of Motherese.

The second finding of study 2 was that noncomprehension feedback had an immediate effect on adult utterance lengths. When our accomplice acted as though she did not comprehend, adult MLUs dropped dramatically. Figure 2 demonstrates almost perfect moment-to-moment control of adult utterance lengths dependent upon the type of signal yielded by the child. The overall downward adjustment of MLUs in the noncomprehension conditions relative to the A and AC conditions was twice that of the comprehension condition.

The usefulness of such feedback is obviously important for efficient communication between any two individuals. In terms of the acquisition of language it seems convenient that children should control the level of speech addressed to them such that linguistic variability between adult speakers is held to a minimum.

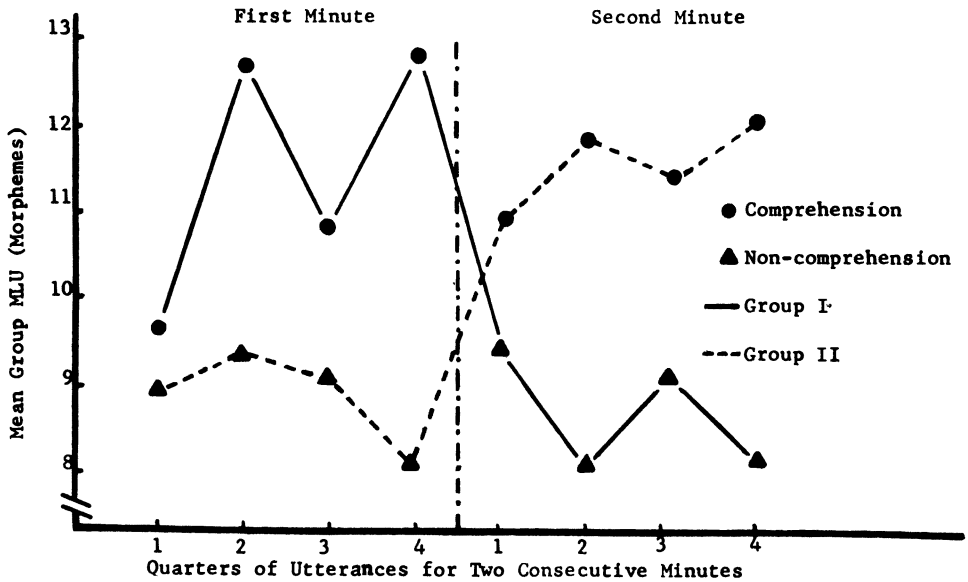

FIG. 2.—The mean group MLU as a function of quarters of utterances for 2 consecutive min

A synthesis with Moerk's (in press) recent finding that children tend to imitate syntactic structures just prior to their appearance in the child's spontaneous speech suggests the following stages of linguistic structure acquisition:

1. The child limits the occurrence of a structure (e.g., passive voice) in utterances addressed to him/her by noncomprehension feedback.

2. The child imitates and reduces that structure and adults affirm (reinforce) the statements.

3. The child permits a higher rate of occurrence of that structure with comprehension feedback and spontaneously uses it in his/her own productive speech.

Such a system of data limitation followed by imitation and practice looks like a fairly efficient system at first blush. What is lacking in the above model are those mechanisms which allow the child to discover syntactic regularities in the linguistic environment for later use in expressive speech (movement from stage 1 to stage 2 above). Newport (1976) voiced a similar complaint in her work on Motherese. Although the present study describes the intricacies of the interaction between children and their linguistic environment, it does not reveal if comprehension feedback has any effect on how children acquire language. Such a demonstration must await different methodologies from those employed in this study.

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