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Comparison of the types of child utterances mothers expand in children with language delays and with Down's syndrome

P. J. Yoder,[1] N. Hooshyar,[2] T. Klee[3] & M. Schaffer[4]

1 *Vanderbilt University, Nashville, Tennessee, USA*
2 *Dallas, Texas, USA*
3 *Department of Speech, University of Newcastle upon Tyne, England*
4 *Bill Wilkerson Speech and Hearing Center, Nashville, Tennessee, USA*

Abstract

Sixteen children with language delays and their mothers were studied to identify the types of child utterances mothers were most likely to expand. Eight of these children had Down's syndrome (DS), while the other eight were pairwise-matched for mean length of utterance (MLU) and did not have DS, but were language delayed. Twenty-minute mother–child free-play sessions were videotaped and transcribed. Trained observers coded utterances for child intelligibility, child utterance length, adult expansions and adult non-expansions. Sequential analysis results indicated that mothers of children with DS were more likely to expand partially intelligible multi-word utterances than to expand fully intelligible multi-word utterances. The opposite pattern occurred in the dyads without DS. Single-word utterances were least likely to be expanded in both groups. The implications of the results for language intervention and future research are discussed.

Keywords facilitating inputs, language delays, mental retardation

Introduction

Most intervention designed to facilitate grammatical development is carried out for a brief period (e.g. 30 min) a few times a week (e.g. two times) by a relatively unfamiliar interventionist (e.g. a speech/language clinician) and concentrates on very specific language targets (e.g. is + verb + ing). This model of language intervention may prove to be viable only if we target aspects of the child's speech and language that helps him or her develop faster in the natural environment. For example, we might be able to identify which aspects of the child's speech and language elicits the types of grammar-facilitating behaviour parents and teachers naturally use. Once identified, professionals could target the eliciting aspects of the child speech and/or language in their intense therapy sessions. If successful, the children would elicit more grammar-facilitating linguistic input from a variety of partners in a variety of settings throughout the day.

Shatz (1987) pointed out that children produce various kinds of behaviours that influence the ways that adults communicate with them. When such child behaviours influence adult use of language-facilitating behaviour, the child behaviours are examples of 'eliciting bootstrapping operations' (Shatz 1987). Expansions represent one type of adult linguistic input thought to facilitate children's language development. The utterances produced by a child that precede the mother's use of expansions might be considered to be one type of eliciting bootstrapping operation.

Expansions may be defined as adult utterances that repeat one or more of the clause elements of the child's previous utterance (e.g. subject, verb or adverbial), and add syntactic and semantic information to the child's message. For example, the child's utterance 'Ball' may be followed and expanded by the adult's utterance 'You want the ball'. This definition of expansion includes what others have termed 'recasts' (e.g Snow *et al.* 1987): replies that structurally change one or more of the components of the child's utterance. For example, the child's utterance 'I want ball' might be recasted by the adult as 'Do you want this ball?' Expansions represent a subset of topic continuations: adult utterances that maintain the main idea or relationship between ideas in the child's previous utterance.

Expansions may be powerful carriers of analysable linguistic information because they add semantic or syntactic information to an utterance the child has just produced. The temporal proximity and linguistic overlap of the child's and adult's utterances may in turn allow the child to notice the differences between the utterances. Such cognitive comparisons may serve as a mechanism that facilitates grammatical development (Nelson 1989). Internally-valid studies of language intervention indicate that expansions facilitate grammatical development in several populations of children: those without disabilities (for review, see Nelson 1989); those with specific language impairment (SLI) (Camarata *et al.* 1994); and those with mental retardation (Yoder *et al.* 1995).

The process of why mothers expand certain kinds of their children's utterances while not expanding others has received little attention in research involving children with language impairment. This line of inquiry is potentially important for professionals working with such children because knowledge of how discourse factors influence the use of language-facilitating behaviours may help identify language goals that may improve the efficiency of language intervention. For example, if we find that mothers expand multi-word fully intelligible utterances more than other types of utterances, then directly targeting multi-word fully intelligible utterances may increase the efficiency of intervention for grammatical development. Such an intervention may empower the children to elicit expansions from primary partners which may, in turn, facilitate grammatical development. In this way, parents and other primary interactors may act as unwitting interventionists without the expense and possible negative side-effects of directly altering the mother–child interaction style (Mahoney & Powell 1988).

However, studying discourse patterns of mothers and children without disabilities is not sufficient. Conti-Ramsden (1990) reported that parents of children with SLI recast their children's utterances for different reasons than parents of children with similar language levels but without disabilities.

Mothers of children with language impairment tend to expand child utterances containing more intelligible elements relative to utterances containing fewer intelligible elements (Yoder *et al.* in press). In the Yoder *et al.* (in press) study, mothers were found to expand multi-word fully intelligible utterances more often than multi-word partially intelligible utterances or single-word utterances.

However, mothers of children with Down's syndrome (DS) may expand different types of utterances than mothers of children with language delays counted by other aetiologies. This difference may occur because of systematic differences in the speech and language patterns of children with DS. For example, children with DS characteristically produce utterances which are shorter and less intelligible than do children with disabilities resulting from other aetiologies but matched for general language level (Rosin *et al.* 1988; Chapman *et al.* 1989). Parents of children with DS may expand different utterances than non-DS language-delayed children because the former must learn to co-construct the message more actively because of their children's less intelligible and shorter utterances.

To determine whether the types of utterances mothers expand varies according to presence or absence of DS, the children must be matched for developmental level, not chronological age (Rondal 1978). However, mean length of utterance (MLU) may be a more appropriate developmental matching variable than mental age (MA). Children with DS appear to have syntactic abilities which are lower than those expected for their MA (for review, see Chapman, in press). Moreover, the types of utterances mothers expand—and the extent to which

they expand their children's utterances—appear to vary as a function of the child's MLU (Yoder *et al.* in press).

In summary, the present study sought to address the following research question: 'Do mothers of children with DS expand different types of utterances than mothers of children with language delays but without DS. 'Length and intelligibility of child utterances were selected as the aspects of child utterances to investigate. Considered simultaneously, the four utterance types were: (1) multi-word partially intelligible utterances; (2) multi-word fully intelligible utterances; (3) single-word partially intelligible utterances; and (4) single-word fully intelligible utterances. The children in the current study were closely matched in a pairwise fashion on MLU.

Methods

Subjects

Sixteen children and their mothers were studied. The mother–child interaction sessions that were investigated in this study were originally collected as part of three studies (Hooshyar 1987; Klee *et al.* 1989; Yoder *et al.* 1994). Samples from multiple labs were collected to maximize the sample size. These labs were located in Dallas, TX, USA (Hooshyar 1987) and Nashville, TN, USA (Klee *et al.* 1989; Yoder et al. 1994). These samples were selected because past articles revealed that the data were collected in a similar fashion. All data were collected from parent–child interaction sessions with children who had disabilities. All sessions were videotaped and transcribed using the same format (Hooshyar 1987; Klee *et al.* 1989; Yoder *et al.* 1994).

Children who were considered 'language delayed' were selected from a subset of these three samples. Our criteria for language delay was an MLU that was at least 1.5 standard deviations below that expected for their chronological age using the Miller & Chapman (1981) sample data and regression equation. To make the subsamples from the three labs as comparable as possible, sessions were selected that met the following criteria: the selected sessions (1) were 20 min long, (2) were between child and mother only, and (3) had at least 50 intelligible utterances.

All the children with DS from this larger language-delayed subset were selected for the current study (n=8). These eight children had karyotypes that indicated trisomy 21, except one which showed translocation. Six of the children with DS came from the Hooshyar (1987) sample and two came from the Yoder et al. (1994) sample. We will refer to this sample as the DS sample.

The eight children without DS were those selected from the language-delayed subset that could be pairwise-matched on MLU with the children in the DS sample within 0.25 of a morpheme. The DS sample constrained the matching and selection process because we had many fewer participants with DS than potential participants with language delays without DS. The MLUs were computed from mother–child interaction sessions described in the procedures section. We will refer to this sample as the non-DS language delayed (NDLD) sample.

We recognize that matching on one variable does not necessarily ensure a match on all variables not directly affected by DS. This is a weakness of all nonequivalent group comparison designs. In addition to presence or absence of DS, we will attempt to determine what other variables differ between the samples to generate alternative hypotheses to the results of this study.

We also recognize that using the small DS sample to constrain the selection process for the NDLD sample and using such a tight pairwise-matching criteria (i.e. 0.25 morphemes) may have resulted in selecting a NDLD sample with much variance on important variables. Five of the children in NDLD sample came from the Klee *et al.* (1989) sample and three of the children came from the Yoder *et al.* (1994) sample. The children from the Klee *et al.* (1989) study met the criteria for specific language impairment (i.e. normal non-verbal intelligence, hearing screenings within normal range, significant delay in expressive language). The remaining three children from the Yoder *et al.* (1994) sample have known expressive language delays as indicated by their MLUs, but status on non-verbal intelligence tests and hearing screenings are unknown. These three children did score below 85 on the Bayley (1969) Scales of Infant Development, but the Bayley is not a 'non-verbal' intelligence test. Additionally, the parental or school reports for these three

children from Yoder *et al.* (1994) did not indicate any evidence for hearing loss.

In the final analysis, members of any sample will be different on many variables. One can only attempt to determine the variable on which members differ affects the dependent variable of interest. In this light, it is useful to note that the eight NDLD children were a part of a larger study (Yoder *et al.* in press) that found that the types of utterances that mothers of the children with known SLI were not significantly different from the types of utterances expanded by the mothers of the other children in the NDLD group.

Table 1 indicates the children's mean length of utterance (MLU) and the chronological age (CA) in months at the time the data were collected.

It should be noted that the DS children were older than the NDLD children ($t=-3.71$; $P=0.003$). Because MLU was closely matched, the older mean age of the DS children indicates that the DS children had more severe language delays relative to their CAs than did the NDLD children.

Procedure

Mother–child free-play sessions

Data were collected from 20-min free-play sessions between one child and his/her mother. The mother–child interaction sessions occurred either in the child's home (Hooshyar 1987) or in a lab (Klee *et al.* 1989; Yoder *et al.* 1994). The toys available during the sessions either belonged to the child (Hooshyar 1987) or were provided by the experimenters (Klee *et al.* 1989; Yoder *et al.* 1994). In all cases, the mothers were instructed to 'play with your child as you normally do'. No other instructions were given.

Transcription and reliability of transcripts

Trained observers transcribed the mother and child utterances from the tapes of the sessions verbatim using the Systematic Analysis of Language Transcripts (SALT; Miller & Chapman 1986) format. Hooshyar (1987) stated that utterance by interobserver agreement of the transcription was estimated by having two observers independently transcribe 10 sessions. After reaching an average of 0.98 agreement on these 10 sessions, observers transcribed the remaining videotapes in the Hooshyar (1987) sample. Using the reliability method described in Miller & Smith (1983), Klee *et al.* (1989) reports a 88.25% agreement between pairs of observers across 25% of his transcripts (range=81–93%). In the Yoder *et al.* (1994) sample, the mean percentage agreement from 15% of their transcripts on the following variables was 93% (SD=0.08): segmentation of utterances, utterance level transcription aqreement, judgement of intelliqibility and speaker code.

Coding

The transcribed utterances were coded while viewing the videotaped session for contextual information. Coders did not chanqe the oriqinal transcriptions because doing so would render the reliability estimates on the transcriptions uninterpretable.

Each child utterance was coded for intelligibility and length. Intelligibility coding had three possible cateqories: (1) unintelligible (i.e. the transcriber interpreted no vocalizations as a particular Enqlish word); (2) partially intelligible (i.e. the transcriber interpreted at least one vocalization as an English word and could not interpret at least one other vocalization as a particular English word within the same utterance); or (3) fully intelligible (i.e. the

Table 1 Means and standard deviations of the chronological age and mean lenghth of utterance of the children*

	Chronological age (months)		Mean length of utterance		
Diagnosis	Mean	SD	Mean	SD	*n*
DS	83	26	1.89	0.50	8
NDLD	44	9	1.91	0.42	8
Total	64	19	1.90	0.46	16

*DS, Down's syndrome; NDLD, non-Down's syndrome language delayed.

transcriber interpreted all vocalizations within the utterance as particular English words). Length codinq had two possible categories: single word utterances (i.e. only one word could be interpreted) and multi-word utterances (i.e. two or more words). Single-word utterances included those that had one or more vocalizations that could not be interpreted as a word. Such utterances were considered 'single word' because we could not be sure that the unintelligible portion of the utterance was a word. Single-word utterances with unintelligible vocalizations were called 'single-word partially intelligible utterances'. Single-word utterances with no unintelligible utterances were called 'single-word fully intelligible utterances'. Analogous categories were created for the two multi-word categories (see Table 2 for definitions and examples).

A computer program recorded the coding decision based on the above rules for each child utterance. A human observer found identical results as the computer coding program on three transcripts.

Adult utterances were coded for whether they were expansions or not. Only adult utterances that occur after partially or fully intelligible child utterances are possible expansions. The definition and examples of expansions are presented in Table 2. Trained observers coded the adult utterances from the transcripts and videotapes.

Table 2 Definitions and examples of child and mother utterance types

Variables	Definition	Examples
Child single-word partially intelligible utterance	Utterance with one word interpreted and at least one vocalization not interpreted by the transcriber.	C: x ball. C: He x.
Child single-word fully intelligible utterance	Utterance with one word interpreted and no other uninterpretable vocalizations.	C: Ball C: Mine.
Child multi-word partially intelligible utterance	Utterance with more than one word interpreted and at least one vocalization uninterpreted by the transcriber.	C: That x mine. C: x be there.
Child multi-word fully intelligible utterance	Utterance with more than one word interpreted and no other vocalizations in the utterance are uninterpreted by the transcriber.	C: That ball is mine. C: He be over there.
Maternal expansions [exp]	Maternal utterance occurring immediately after a partially or fully intelligible child utterance that repeats a major clause element from the child utterance *and* adds semantic or syntactic information. Adding information occurred in the form of adding words or morphemes *or* changes in child's word order.	C*: The barrel fell. P*: Yes, the brown barrel fell down [exp]. C: Broke. P: The truck broke [exp]. C: Is the truck broke? P: The truck is broken [exp].
Matrnal non-expansions [non]	Maternal utterances that occur after other adult utterances *or* those that occur after child utterances that are unintelligible, *or* those that occur after partially or fully intelligible child utterances, but (a) do not repeat at least one major element of the child's utterance, or (b) do not add semantic or syntactic information.	C: Train. A: Train [non]. C: Train goes. A: Yeah, goes [non]. C: Train. A: It goes to my house [non]. C: Train. A: I've got a box car [non]. C: Train. A: I want to go home and eat [non].

Reliability of coded categories

The point-by-point inter-observer agreement for coding expansions and non-expansions was estimated using kappa (Bakeman & Gottman 1986). Kappa estimates agreement after controlling for chance agreement. An independent observer recoded 11 sessions to estimate the reliability for the total data. The Kappas were as follows: adult expansions and non-expansions (mean 1.0; SD=0.01; range=1.0–0.96). Reliability of length and intelligibility dimensions are summarized under 'Transcription and reliability of transcripts'.

Results

Descriptive statistics

Before testing the hypotheses, we describe the means and standard deviation of various aspects of the mother–child interactions to provide background information for data used to address the research question (see Table 3). Included in these are the relative number of times the various types of coded child utterances occurred.

It should be noted that children with DS had over three times as many multi-word partially intelligible utterances than did children with NDLD who were matched for MLU. This may have occurred because MLU is computed only on complete and fully intelligible utterances. However, when considering all utterances, both single-word and multi-word, it should also be noted children with DS spoke about as intelligibly (mean=0.68; SD=0.16) as children with NDLD did (mean=0.74; SD=0.16; paired $t<1.0$). This was contrary to our expectations, but provides important information that may help explain the results, which will be explored in the 'Discussion' section.

In addition to the data presented in Table 3, the proportion of child utterances that mothers of children with DS expanded (mean=0.08; SD=0.03) was remarkably similar to that of mothers of children with NDLD (mean=0.08; SD=2.02). In fact, the mean of the difference between the matched pairs in the two groups was 0 with an SD of 0.05 (paired t-test=0; $P=1.0$).

Despite these similarities, the types of utterances that mothers expanded was markedly different between the two groups, as will be seen in the following section. The fact that the groups differed in the frequency of multi-word partially intelligible utterances took on special interest when we examined how the groups differed in terms of the types of child utterances the mothers expanded.

Testing group differences in the type of child utterances mothers expand

Table 4 presents the means and standard deviations for the indices of sequential dependency (i.e. phi) for maternal expansions after the four types of child utterances.

A 'sequential dependency' is the extent to which one behaviour (e.g. expansions) follows another behaviour (e.g. multi-word fully intelligible utterances) more than is expected by chance given the total occurrence of each behaviour in the session (Bakeman & Gottman 1986). Detailed explanation and rationale for using phi as an index of sequential dependency in group-level analyses can be found in

Table 3 Means and standard deviations for selected summary level variables in 20-min free-play ($n=16$) for non-Down's syndrome language delayed (NDLD) and Down's syndrome (DS) subjects

	NDLD		DS	
Variables	Mean	SD	Mean	SD
Frequency of adult expansion	18.4	7.2	20.02	9.4
Percentage of adult utterances that were expansions	0.07	0.03	0.06	0.02
Frequency of adult utterances	280	156	342	145
Frequency of child utterances	206	47	249	81
Frequency of child single-word partially intelligible utterances	10.4	4.8	13.9	6.5
Frequency of child single-word fully intelligible utterances	86.5	53.4	107.9	72.5
Frequency of child multi-word partially intelligible utterances	9.0	7.9	31.2**	30.38
Frequency of child multi-word fully intelligible utterances	70.8	35.0	59.9	23.0

**$P<0.05$ with two-tailed test, paired t-test. All others are non-significantly different across groups.

Variables	NDLD		DS	
	Mean	SD	Mean	DS
Maternal expansions after:				
Multi-word fully intelligible utterances	0.29[a]	0.11	0.13[b]	0.08
Multi-word partially intelligible utterances	0.04[c]	0.07	0.23[a]	0.07
Single-word fully intelligible utterances	0.05[c]	0.07	0.05[c]	0.12
Single-word partially intelligible utterances	0.01[c]	0.06	0.05[c]	0.07

Table 4 Means and standard deviations of the phi-values for the sequential dependencies between maternal expansions and various types of child utterances in non-Down's syndrome language delayed (NDLD) and Down's syndrome (DS) subjects

[a>b>c] $P<0.05$ with two-tailed test using Duncan's multiple range test with within-subjects error term from MANOVA.

Bakeman *et al.* (in press). Briefly, phi allows us to quantify the sequential dependency between expansions and a particular utterance type while controlling for the total number of utterances and the total number of the antecedent and consequent utterance types. That is, using phi to quantify sequential dependencies allows us to test group differences in the mothers' tendency to expand a particular type of child utterance without worrying about possible group differences in the extent to which mothers expand or the extent to which children use the four utterance types. It is well known (but not frequently addressed) that group differences in conditional probabilities (e.g. number of expansions after multi-word fully intelligible child utterances/number of multi-word child utterances) can occur simply because the superior group has more target events (e.g. expansions) (Bakeman & Gottman 1986).

To test the significance of the difference between these mean phi scores, we followed McCall & Appelbaum's (1973) suggestion to use MANOVA to test within-subject effects when the levels of the within-subject factors exceed two. Both group (i.e. DS and NDLD) and utterance-type condition (i.e. four Child utterance types) were within-subject factors in this analysis. The interaction between group and utterance-type condition was most relevant to testing the research question for this study. All statistical assumptions were tested; none were violated (e.g. phis were approximately normally distributed).

A significant interaction between group and utterance-type condition [$F(3,21)=20.1$; $P<0.01$] indicated that the relative extent to which mothers expanded the various types of child utterances differed by group. The Duncan's Multiple Range Test using the within-subjects error term from the MANOVA confirmed that this interaction occurred because the mothers in the two groups differ in the extent to which they expand multi-word partially intelligible utterances. Mothers of children with DS expanded multi-word partially intelligible child utterances more than they expanded multi-word fully intelligible child utterances. However, the opposite pattern existed in the mothers of children with NDLD. In fact, the extent to which mothers of children with NDLD expanded multi-word partially intelligible utterances was about the same as they expanded single-word utterances: at or below chance levels. Therefore, it comes as no surprise that mothers of children with DS expanded multi-word partially intelligible utterances more than mothers of children with NDLD. Finally, mothers of children with NDLD expanded multi-word fully intelligible utterances more than mothers of children with DS.

Mothers in both groups expanded single-word utterances the least of any of the four types of utterances, regardless of whether the utterance was partially or fully intelligible. It should be noted that 'single word partially intelligible utterances' refers to utterances in which aonly one word is interpreted as a particular English word and at least one vocalization cannot be interpreted in the same utterance. Therefore, single-word partially intelligible utterances were not the same as an utterance in which a single word can be interpreted with less than perfect certainty. The latter type of utterances were not distinguished from easily understood utterances in our transcripts or coding.

It should be noted that two children in the NDLD group had fewer than five instances of multi-word partially intelligible utterances. All other children had over five instances of the utterance types. When the analysis was repeated without these two children and without their matches from the DS group ($n=6$ in each group), the interaction between group and utterance type remained significant [$F(3,15)=20.44$; $P<0.05$]. The relative difference between the means for this reduced group remained very similar to the results with all 16 children. Therefore, the group× condition interaction is not merely an artifact of the infrequent occurrence of multi-word partially intelligible utterances in the NDLD group.

Discussion

The results indicated that mothers of children with DS expand their children's utterances to a remarkably similar degree as mothers of children with NDLD. However, the types of child utterances that mothers of children with DS expanded were different from the types of utterances that mothers of children with NDLD expanded. Specifically, mothers of children with DS expanded partially intelligible multi-word utterances more than did mothers of children with NDLD. In contrast, mothers of children with NDLD expanded fully intelligible multi-word utterances more than did mothers of children with DS. Within the NDLD group, mothers expanded the children's fully intelligible multi-word utterances more than any other type of utterance. Within the DS group, mothers expanded partially intelligible multi-word utterances more than any other type of utterance. Before discussing these results reviewing the internal and external validity of the present study may help the reader place the results in a proper context.

The internal validity of the present study was compromised in two ways. First, comparing nonequivalent groups, regardless of how well they are matched on a limited set of variables, always leaves open the possibility that variables other than the variable of primary interest caused the group differences. Fortunately, we could identify two variables on which the children with DS differed from the NDLD children beyond the presence of DS. Children with DS had greater chronological ages and more partially intelligible multi-word utterances than children with NDLD. Future studies should attempt to match on chronological age and the percentage of multi-word utterances that are partially intelligible as well as MLU.

Secondly, despite the fact that the sequential nature of the data allowed us to explore the data at a very specific level, the correlational nature of the research design prevents us from confidently inferring that multi-word utterances elicit maternal expansions. It is possible that unmeasured variables are responsible for the results of the present study. For example, it is possible that transcribers are more likely to transcribe a child's multi-word utterance as fully intelligible because the mother expanded the utterance. This example would not account for the DS sample's results. However, it provides an example of why we cannot use the current results to confidently conclude that certain child utterance types elicit maternal expansions.

However, the current results do provide guidance for designing future experiments. Future experimental work is needed to determine whether children's multi-word utterances elicit maternal expansions. In such a study, length and intelligibility of children's utterances would need to be manipulated through intervention while monitoring possible changes in parental expansions of child utterances.

If the results demonstrate that increasing length and intelligibility of children's utterances increases maternal expansions, then such elicited expansions may affect future child grammatical development only in children who are in Brown's stages I and II. Expansions that are not specific to particular language goals may be most likely to model the language skills children are developmentally ready for when the children are in stages I and II (Yoder *et al.* 1995).

Because this is a new area of study, an exploratory approach, such as that used in the present study, is useful for generating hypotheses. Doing so with a small sample allowed us only to detect very large group differences. Using participants from studies designed for a different purpose was appropriate given the exploratory stage of investigating the research question at hand, but future work is needed to determine whether the current findings can be

replicated. Other future studies are necessary to test the following hypothetical explanations for the current study's results.

In the current study the results from both groups support the general premise that expansions frequently occur when mothers attempt to clarify and extend their children's topic. When they clarify and extend the topic of their children's multi-word utterances, the adult utterances are classified as expansions more often than when extending the topic of children's single-word utterances. This probably occurs because there are more intelligible elements in multi-word utterances than in single-word utterances, making it more probable that the adult utterance will repeat a clause element of the child's previous utterance.

In a departure from this model, mothers of children with DS expanded partially intelligible multi-word utterances more frequently than any other type of utterance. In contrast, mothers of children with NDLD tended not to expand such utterances. Interestingly, children with DS produced a greater frequency and proportion of their multi-word utterances in partially intelligible manner than did children with NDLD. Because the children with DS are chronologically older than children with NDLD, it is possible that mothers of children with DS have to interpret this partially understandable speech for longer than the mothers of children with NDLD. This longer history of interacting with a marginally intelligible speaker may lead the mothers of children with DS to be more active in co-constructing the children's messages by asking clarification and confirmation questions, and guessing what the child is trying to say. It is possible that children with NDLD who have unusually many multi-word partially intelligible utterances for an unusually long time will also influence their mothers to expand such utterances at an unusually high rate. This is a subject for future research.

Regardless, one may wonder why children with DS would have a greater proportion and number of multi-word utterances that were partially intelligible than would children with NDLD of the same general productive language level. This pattern may have occurred because a linguistic trade-off between early grammar and phonology may be more pronounced in children with DS than in children with NDLD. A linguistic trade-off is a reduction in one aspect of language when another aspect of language improves (Crystal 1987). Crystal (1987) suggests that young children's limited cognitive resources are taxed when they begin using a new aspect of language (e.g. grammar) such that performance in a relatively familiar aspect of language (e.g. early phonology and articulation) temporarily regresses.

In stages I and II (Brown 1973), there may be a linguistic trade-off between MLU and intelligibility. Because children with DS have more difficulty producing multi-word utterances and intelligible speech than do children with NDLD (Rosin *et al.* 1988; Chapman *et al.* 1989), the linguistic trade-off between grammar phonology is likely to be more distinct in the former group. Reduced intelligibility may occur when they produce multi-word utterances, because children in Brown's stages I and II who have DS are attempting to do two particularly difficult tasks simultaneously.

The notion that producing intelligible multi-word utterances is particularly difficult for DS children was supported by the finding of the current study that the children with DS had a greater proportion of multi-word utterances which were only partially intelligible than did children with NDLD. It was interesting that there was *no* difference between groups in overall intelligibility when all utterances were considered. The between-group difference in intelligibility showed up for multi-word utterances.

Miller *et al.* (in press) reviewed central nervous system and anatomical differences between people with DS and people without DS. They concluded that such differences are likely to reduce the precision sequencing and timing of speech movements. Miller *et al.* (1991) found that children with DS had a later onset of multi-word speech than other children matched for mental age. Therefore, it does appear that children with DS may have more difficulty producing multi-word utterances intelligibly than do children with NDLD.

As the grammar and phonology of the children with DS improve, the trade-off between MLU and intelligibility may reduce. For example, as children's speech and language develops, they may have sufficient cognitive resources to integrate their phonological knowledge, articulatory skill, and

semantic and syntactic knowledge to produce fully intelligible multi-word utterances with more consistency. Additionally, it is easier for a listener to interpret a marginally intelligible utterance if the utterance follows the word order and morphological rules the listener knows (Osberger 1992).

The linguistic trade-off between MLU and intelligibility may be limited to the early stages of development. If it is, then there would be a positive relationship between intelligibility and MLU in the broader population with DS when looking at people with a broad range of MLUs. In two longitudinal studies of people with DS that span a broad developmental period, the relationship between intelligibility and MLU was positive (R. Chapman, personal communication; B. Hart, personal communication).

If the trade-off between MLU and intelligibility is limited to the early stages of language development, then the types of utterances that mothers of children with DS expand may become similar to those expanded by mothers of children with NDLD in later stages of language development. That is, when the children are able to convey intelligible multi-word utterances frequently and clarify their own topics, then mothers of children with DS may let their children share more of the responsibility for the conversation, as mothers did in the NDLD sample.

In summary, the present exploratory study generated several hypotheses concerning how children with language delays may elicit maternal expansions. It was hypothesized that mothers of children with DS expand partially intelligible utterances more than mothers of children with NDLD because the former group of mothers must actively co-construct their children's messages more often than the latter group. However, it was hypothesized that this greater degree of maternal message co-construction may be limited to the early stages of language development. Finally, it was emphasized that future studies with internally valid experimental designs are needed to determine whether increasing the length and intelligibility of children's utterances will increase maternal expansions and subsequent child grammatical development. If it does, the efficiency of intervention on grammatical development in the early stages of language development should be greatly improved.

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