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1 Mothers' speech research: from input to interaction

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ISSUES IN MOTHERS' SPEECH RESEARCH

The first descriptions of mothers' speech to young children were undertaken in the late sixties in order to refute the prevailing view that language acquisition was largely innate and occurred almost independently of the language environment. The results of those mothers' speech studies may have contributed to the widespread abandonment of this hypothesis about language acquisition, but a general shift of emphasis from syntactic to semantic–cognitive aspects of language acquisition would probably have caused it to lose its central place as a tenet of research in any case. It is thus important to point out that even the very first mothers' speech studies, those most concerned with refuting the innatist view of the language input, were relevant to several other important issues, and contributed to the general acceptance of significant new ideas about language acquisition. I think it is valuable to identify these issues, and to touch upon the research findings relevant to them, precisely because they will shape the future of research in the field of language input. Very briefly, since I will return to them again and again in the course of this paper, I would like to mention three basic assumptions about language acquisition whose acceptance has been furthered by the results of mothers' speech research:

(1) Language acquisition is the result of a process of interaction between mother and child which begins early in infancy, to which the child makes as important a contribution as the mother, and

which is crucial to cognitive and emotional development as well as to language acquisition.

(2) Language acquisition is guided by and is the result of cognitive development.

(3) Producing simplified speech registers is one of the many communicative skills whose acquisition is as interesting as the acquisition of syntax or phonology.

The first task undertaken by mothers' speech researchers was simply to describe the characteristics of mothers' speech when they were talking to children learning language. This task was interpreted as one of describing the input in a way very similar to the way children's speech studies of the same period were describing output. The underlying theoretical notion was quite similar to the Language Acquisition Device paradigm – that the only interface between input and output occurred in the child's head. The early mothers' speech studies (and too many of the more recent ones as well) paid little or no attention to what the child was saying or doing. The notion that mothers' speech, like children's speech, occurs in conversations (see Lieven, 1976; Gleason, this volume; Newport, 1976), and that the need to communicate with one's conversational partner affects the structure of one's utterances, had not yet affected the way research into mothers' speech was carried out.

Description of the characteristics of the speech was primarily accomplished by seven papers which looked at mothers' speech in a general way, and by an additional five which concentrated on the description of particular features. These studies have been reviewed in detail by Farwell (1973) and Vorster (1975). The seven – Broen (1972),Drach (1969), Phillips (1970; 1973), Remick (1976), Sachs, Brown & Salerno (1976) and Snow (1972) – among them looked at 34 dependent variables, which can be roughly divided into measures of prosody, of grammatical complexity and of redundancy. In Table 1.1 I have listed these variables, noting which studies made use of which variables. Mean Length of Utterance (MLU) and a few others are notable for their ubiquity, but in general very few measures have really been intensively studied. It is thus encouraging to note that the five specialized descriptions concentrated on some of the points that are only lightly touched upon in the general descriptions, these being interrogatives (Holzman, 1972), pragmatic features and ellipsis (Holzman, 1974), repetition (Kobashigawa, 1969), discourse features and teaching devices (Moerk, 1972) and syntactic complexity (Pfuderer, 1969), respectively. Two of the

Table 1.1 *Dependent variables in mothers' speech studies. X indicates the variable has been tested experimentally. Y indicates the variable has been employed only descriptively*

	Broen, 1972	Drach, 1969	Phillips, 1970	1973	Remick, 1976	Sachs, *et al.*, 1976	Snow, 1972
PROSODIC FEATURES							
Rate of speech	X	X	–	–	–	X	–
Ease of segmentation	X	Y	–	–	Y	–	–
Disfluencies	X	Y	–	–	–	–	–
Pitch	–	Y	–	–	X	Y	–
Pitch range	–	Y	–	–	X	–	–
COMPLEXITY FEATURES							
Amount of speech	–	–	–	–	X	–	X
MLU	–	X	X	X	–	–	X
Variance of MLU	–	X	–	–	–	–	–
Subject of utterance	–	–	–	–	X	–	–
Verb forms	–	–	X	X	–	–	–
Verb tense	–	–	–	–	X	X	–
Complex sentences	–	X	X	X	–	X	X
Modifiers	–	–	X	–	–	–	–
Preverb length	–	–	–	–	–	–	X
Utterance fragments	Y	–	–	–	–	–	X
Conjunction	–	X	–	–	–	–	–
Deletions	–	X	–	–	–	–	–
Adverbials	–	X	–	–	–	–	–
Imperatives	Y	X	–	–	–	–	X
Questions	Y	X	–	–	X	X	X
Declaratives	Y	X	–	–	–	X	–
Negatives	–	X	–	–	–	–	–
One-word utterances	Y	–	–	–	–	–	–
Adjectives	–	X	–	–	–	–	X
Possessives	–	X	–	–	–	–	–
Function words	–	–	X	X	–	–	–
Content words	–	–	X	X	–	–	–
Old English verbs	–	–	X	–	–	–	–
Weak verbs	–	–	X	–	–	–	–
REDUNDANCY							
Type–token ratio	X	X	X	X	X	–	–
Concreteness/nouns	–	–	X	X	–	–	–
Phrase repetition	–	–	–	–	–	–	X
Sentence repetition	–	–	–	–	–	–	X
Paraphrases	–	–	–	–	–	–	X

Table 1.2 *Independent variables in mothers' speech studies*

	Listener variables			Speaker variables			Situation variables	
	Age	Sex	Linguistic ability	Age	Social class	Other	Activity	Listener reaction
Anderson & Johnson, 1973	1½ years 3 years 5 years Peer Adult	—	—	8 years	—	—	Story-telling Block-stringing Free play	—
Bakker-Renes & Hoefnagel-Höhle, 1974	—	—	—	—	—	—	Eating Bathing Dressing Chatting Free play Reading	—
Gleason, 1973	Baby Peer Adult	—	—	4–5 years 7–8 years Adult	—	—	—	—
Bingham, 1971	—	—	High Medium Low	—	—	—	—	—
Broen, 1972	18–26 months 4–6 years Adult	—	—	—	—	—	Free play Story-telling	—
Cherry & Lewis, 1976	— —	Male Female	—	—	—	—	—	—

Table 1.2 (*continued*)

	Listener variables			Speaker variables			Situation variables	
	Age	Sex	Linguistic ability	Age	Social class	Other	Activity	Listener reaction
Phillips, 1973	8 months 18 months 28 months Adult	Male Female	–	–	–	–	–	–
Ringler *et al.*, 1975	12 months 24 months	–	–	–	–	High contact Low contact	–	–
Sachs & Devin, 1976	Baby Peer Mother	–	–	2–5 years	–	–	–	Child Doll
Shatz & Gelman, 1973	2 years Peer Adult	–	–	4 years	–	–	–	–
Snow, 1972	27–40 months 9–12 years	–	–	–	–	Mother Non-mother	Easy Difficult	Absent Present
Snow *et al.*, 1976	–	–	–	–	Academic Lower middle Working	–	Free play Story-telling	–

papers in this volume fit into this rubric of intensive description of a subsystem — Olga Garnica's description of prosodic features in mothers' speech and Dorothy Wills' study of the pronoun system specific to child-directed English. The broad outlines of mothers' speech to children — that it is simple and redundant, that it contains many questions, many imperatives, few past tenses, few co- or subordinations, and few disfluencies, and that it is pitched higher and has an exaggerated intonation pattern — are quite well established. Filling in the rest of the details will be one of the research tasks of the next few years.

As soon as enough is known about a phenomenon like mothers' speech to identify it as a phenomenon, researchers, especially those of us who have survived formative experiences in departments of experimental psychology, want to test its strength. We want to know what situations make it disappear and what situations make it stronger. We want to know if everyone does it, if you become better at it with practice, whether you do it because you learn to, if men as well as women do it, if children do it, if all social classes do it. And so came the second wave of mothers' speech studies, which overlapped with the first in the sense that some of the central studies also incorporated experimental independent variables and that some of the second phase studies added to the basic description of mothers' speech. Table 1.2 gives an overview of the experimental studies and of the independent variables manipulated in each of them. Age of the addressee has, of course, been an independent variable of central importance, tested necessarily in the seven central studies in order to identify and define the phenomenon of mothers' speech. The generality of the phenomenon was a matter of interest to Phillips (1973) and to Cherry & Lewis (1976), who tested whether both boys and girls elicit mothers' speech, and to Snow (1972), who compared mothers to non-mothers as producers of mothers' speech. The effect of early mother–infant contact on the tendency of mothers to produce modified speech was studied by Ringler, Kennell, Jarvella, Navojosky & Klaus (1975).

Mothers' speech has been compared in different situations — in easy versus difficult tasks (Snow, 1972), in free play versus book-reading (Broen, 1972; Snow, Arlman-Rupp, Hassing, Jobse, Joosten & Vorster, 1976), and in playful versus caretaking situations (Bakker-Renes & Hoefnagel-Höhle, 1974). Task difficulty has little effect on mothers' speech, but kind of activity has a large effect. Bakker-Renes & Hoefnagel-Höhle compared six situations, of which three involved caretaking (dressing, bathing and eating) and three were unstructured

and 'for fun' (playing, chatting after lunch and reading a book). They found that mothers' speech was more complex in free situations than in caretaking situations, and most complex in book-reading, as measured by length of utterance and length of paraphrase. Snow *et al.* (1976) also found that book-reading elicited more complex speech than free play. It might be that the need to communicate efficiently produces simpler speech in the caretaking situations, and that the extra situational support of pictures in the book-reading situation limits the possible topics sufficiently that the comments can be more elaborated than in less well-defined situations. These studies, which found that mothers' speech varied with situation, made it clear that mothers' speech could not be characterized as a single corpus, but must be seen as the product of specific interactions between mothers and their children. Mothers' speech varied in simplicity and redundancy, depending on the communicative demands of the situations in which it was used.

The idea that mothers' speech is a product of carefully adjusted interactional processes appears in Phillips' (1973) finding that true mothers' speech does not appear reliably until children are old enough to respond to adults' speech, and in Snow's finding that even an experienced mother is not capable of producing fully adequate mothers' speech if the child is not present to cue her. The child's role in shaping the interaction is discussed by Jean Berko Gleason (this volume). How the mother's beliefs and perceptions shape the interaction has been described by Bingham (1971), who found that prelingual children elicit simplified speech from adults who believe that the children are cognitively advanced and can understand a great deal, but not from adults who do not believe this. Thus, even prelinguistic infants can elicit the typical mothers' speech style from adults, if the adults are willing to treat the infant as a participant in the interaction. It has been suggested that adults' persistent attempts to carry on conversations with inadequate conversational partners may account for several of the striking features of the mothers' speech style, such as the redundancy and the high frequency of questions (Snow, 1977). The variable of how adults perceive and interpret the behavior of children becomes especially important when we realize that there are large (sub) cultural differences in both what is believed about and expected from children (see, for example, Blount, 1972*b*; Tulkin & Kagan, 1972). Specific social class comparisons of mothers' speech have been made as far as I know only twice (Holzman, 1974; Snow *et al.*, 1976). Holzman compared content, elliptical features and pragmatic force of utterances in the speech of

two middle class and two lower class mothers. She found interesting individual differences but could not relate these to social class. Snow *et al.* found that academic and lower middle class mothers produced more expansions, fewer imperatives, more substantive deixis and fewer modal verbs than working class women. Whether these differences are in any way significant can only be decided after direct comparison of features of the input with speed and ease of language acquisition (see Cross, this volume; Newport, Gleitman & Gleitman, this volume).

The idea that mothers' speech is a sociolinguistic skill which children have to acquire along with all their other linguistic skills has been treated in four papers; Shatz & Gelman (1973), Sachs & Devin (1976), Andersen & Johnson (1973) and Gleason (1973). Children as young as three years can modify their speech for younger listeners and, even more surprisingly, seem to modify it in much the same way that adults do, by simplifying, repeating and using attention-getters. Marilyn Shatz and Rochel Gelman (this volume) suggest a mechanism which might explain how very young speakers can modify the linguistic complexity of their speech so effectively.

MOTHERS' SPEECH AND LANGUAGE ACQUISITION

The central theme of mothers' speech research, of course, one which was present implicitly if not explicitly in all the studies mentioned above, is the relevance of mothers' speech to language acquisition. The generality of mothers' speech, including young children's ability to produce it, had to be established in order to show that all language-learning children, even those raised by fathers or older siblings, have access to a simplified speech register. No one has to learn to talk from a confused, error-ridden garble of opaque structure. Many of the characteristics of mothers' speech have been seen as ways of making grammatical structure transparent, and others have been seen as attention-getters and probes as to the effectiveness of the communication. But experiments in which language acquisition is the dependent variable and quality of input the independent variable have unfortunately been rare, and those few that have been performed have not all led to the conclusion that the input greatly affects language acquisition. Perhaps the best-known attempt to find a direct relationship between input and language acquisition, Hess & Shipman's (1965) study, predated all the recognized mothers' speech studies, but was nonetheless clearly addressed to the same issues.

Hess & Shipman concluded that poor quality input, by which they meant input insufficiently adapted to the level of complexity the child could process, hindered language acquisition.

The only truly experimental manipulations of input have all been based on the observation that expansions occurred frequently in adults' speech to children (Brown & Bellugi, 1964). Expansions seem ideally designed to teach children about the structure of language, since they provide information about the correct realization of a specific structure at the time the child most wants to know it. The first two attempts to demonstrate that providing expansions speeded up language acquisition (Cazden, 1965; Feldman, 1971) were, however, unsuccessful. No positive effect of providing expansions to children was found. An experiment in which children received not only expansions of their incomplete utterances (syntactically correct and complete versions of telegraphic utterances which retain all the content words of the child utterance in their original order) but also recast versions of their complete sentences (repetition of the child's sentence in a new syntactic form) did demonstrate an effect on children's language ability after 22 20-minute sessions (Nelson, Carskaddon & Bonvillian, 1973), compared to an untreated control group. A second treatment group of children who received the same amount of interaction with an individual adult but no expansions or recast sentences were not significantly different from the expansion–recast sentence group (though their mean scores on all the measures of language ability were lower), suggesting that conversation with an interested adult may be more crucial to the acquisition of syntax than any particular techniques used by the adult. It may be that expansions are relevant to language acquisition only because parents who produce expansions during one stage of their children's linguistic growth provide relevant, responsive and interesting input at all stages of linguistic development. Children learn to talk by conversing with adults. The quality of the conversation which is carried on may be the crucial variable affecting language acquisition (see Cherry & Lewis, 1976; Cross, 1976, this volume; Harkness, this volume; Lieven, 1976).

The most recent published report of a comparison of input and output, Nelson's (1973) monograph, concluded that language acquisition is retarded if the linguistic input is of poor quality in the sense of not matching the child's cognitive organization. This finding indicates the importance of taking individual differences between children, and thus between appropriate styles for interacting with those children, into account when evaluating maternal speech (Lieven, 1976).

A SEMANTIC APPROACH

When trying to relate what mothers say to what children learn, it is crucial to operate with a 'correct' description of language acquisition. 'Correct' does not here mean immutably true, but does mean a description which can account for (*a*) the facts of children's speech production and (*b*) the facts of what children know about language. 'Correct' is used in the sense that pivot-open grammars have convincingly been shown not to be correct (Bloom, 1971; Bowerman, 1973; Brown, 1973; Van der Geest, 1974*a*), since, even if they do describe the output correctly for at least some children, they do not in any sense describe what children know about language, how children's linguistic knowledge is internally organized. A reasonable study of input factors in language acquisition relies on and must wait for a reasonable description of language acquisition. It has been remarked that psycholinguistics is always five years behind linguistics in its theoretical assumptions. I would suggest that mothers' speech research is another five years behind child speech research, and thus, considering the advances linguistics can make in 10 years, hopelessly out of date linguistically.

The mothers' speech studies discussed above were largely conceived of, planned and carried out between 1967 and 1973, and they show the influence of the child language studies of 1962–68 in their concentration on syntactic description (as can be seen from Table 1.1). The problems faced by children in learning to talk were seen as syntactic – establishing word order, learning about agreement, distinguishing subjects from objects and the like. But as semantic rumblings began to be heard in linguistics, these were picked up by developmental psycholinguists. Generative semanticists and case grammarians pointed out that syntactic representations have less than perfect correlation with semantic representations; for example, the syntactic constellation Subject–Verb–Object can represent Instrument–Action–Patient or Dative–Action–Agent in simple active sentences as easily as Agent–Action–Patient. This is an aspect of language that children have to learn just as much as they have to learn to invert subject and verb to form questions. So developmental psycholinguists began describing child language in different terms, not as 'phrase structure rules plus a few transformations' but as a 'subset of the possible semantic relations'. The overwhelming preponderance of animate nouns in subject position in child sentences became more important than Subject–Verb word order. Information from context and situation became crucial in studying child speech

because what children meant was more important than what classes of words they combined or what they deleted.

It has been about five years now since the semantic revolution in child speech, so perhaps it is time to try some semantic analysis of maternal speech. Semantic aspects of mothers' speech have not been entirely ignored until now. Juliet Phillips (1970) pointed out that the most striking characteristic of mothers' speech was its here-and-nowness, its everydayness. Mothers' speech is effectively limited to discussions of what the child can see and hear, what he has just experienced or is just about to experience, what he might possibly want to know about the current situation, as is well-documented in many of the interaction sequences quoted by Moerk (1972). That this is so, of course, is an important piece of evidence in favor of a semantic primacy theory of language acquisition. Mothers make very predictable comments about very predictable topics, which is precisely what must happen if Macnamara (1972) is correct in his suggestion that children are able to learn to talk because they can work out the meaning of the sentences they hear independent of the sentences themselves.

How can we characterize the semantics of mothers' speech more explicitly? An obvious place to start would seem to be the semantic characterizations which have been offered for child speech. These have mostly been based on some sort of case grammar, though they have not necessarily been completely consistent with any of the specific case grammars offered for adult speech. I have chosen to apply the semantic characterization used by Brown (1973) for several reasons – it is pleasantly eclectic, it seemed relatively easy to use and and, most importantly, it accounted for about 70 % of the multimorpheme utterance types produced by children in Stage I, i.e. it would seem to reflect children's linguistic knowledge fairly well. Brown found that eight 'prevalent semantic relations' are sufficient to represent most of the children's two-term utterances: Agent–action, action–object, action–locative, agent–object, possessor–possessed, entity–locative, demonstrative–entity, and entity–attribute. Children's three-term utterances consisted of any three of the four terms agent, action, object and locative, and four-term utterances consisted of precisely these four terms. Notable for their absence from these prevalent semantic relations are such functions as instrumental (The *key* opened the door), dative (John gave *Mary* the book) (within Fillmore's (1968) case grammar, possessor is in the dative case, but this seems to be too abstract a classification for

child language, see Bowerman, 1973), complement (John sang a *song*), and experiencer (*Mary* saw a cat).

How far can we get by applying these same semantic relations to mothers' speech? I have done a Brown-type analysis on 13 samples of about 200 mother utterances each, and the results of that very preliminary and in many ways imperfect analysis suggest that the prevalent semantic relations provide a very adequate description of the content of mothers' speech.

The samples which I analyzed were collected from nine Dutch-speaking mothers while they were playing and reading a book with their 23- to 35-month old daughters (see Snow *et al.*, 1976, for data collection procedure). The mothers of two of the children, Jolanda and Sabine, were tested twice more at two- to four-month intervals, producing 13 samples in all.

What are the practical considerations associated with scoring maternal utterances using Brown's system? Brown's system was designed for two- to five-word long child utterances which consisted primarily of uninflected content words. The mothers' speech samples consisted of utterances up to 20 words in length, averaging three to six words, which in almost every case contained all the required inflections, prepositions, articles and other grammatical morphemes. Thus, in classifying the child utterances of Stage I the semantic relations were in principle exhaustive. They described everything the children had to know in order to produce those utterances. In classifying the maternal utterances, the semantic relations describe only the kernel, the propositional meaning, and fail to capture any of the grammatical knowledge which allowed the mothers to produce correct, complete sentences. But this is not a crucial difference for our purposes. We are not trying to describe maternal competence, we are trying to describe output limitations in their language use. Classifying the semantic relations expressed may enable us to do that.

Precisely because Brown was interested in describing competence, he based his data analysis on utterance types. Because I am more interested in classifying a body of utterances, one of whose primary characteristics is repetitiveness, I have classified utterance tokens.

Brown did not include in his classification one sentence type which figures centrally in maternal speech, the wh- question. It is not entirely clear to me why wh- questions were excluded from the analysis. In general, Brown ignored the modality part of the child sentences, scoring, for example, 'doggie chair' as entity–locative whether it was said with normal, declarative inflection or with a rising inflection which would indicate a yes–no question. Why, then,

not score 'where doggie' as entity–locative as well? *Where* is an element which questions locative by saying, in effect, fill locative in here, and as such seems to me to qualify as a locative as much as the element which it questions would. Following this line of reasoning I have scored *where* as locative in questions like 'Where is the doggie?' and *who* as agent in questions like 'Who is riding the bike?' One very frequent question in maternal speech is 'What is that?' (*Wat is dat?* in Dutch) and its minor variants. Because these occur in numbers sufficiently large to greatly influence the results, I have scored these separately but, still following the reasoning above, as demonstrative –entity–question. The other very common maternal question, *Wat doet NP?*, is ambiguous between the readings 'What is NP doing?' and 'What does NP do?', and thus could be scored only by taking the expected answer into account. In most cases it was scored as agent–action, the minimal specification for a correct response being action (e.g. *eating* or *reading*). Sometimes, however, the verb *doen* was used not as a dummy verb but as a lexical verb, and the question required specification of the NP *wat*, e.g. in animal-noise sequences like '*Wat doet de koe?*' '*Boe*' (How does the cow go? Moo). In this case I scored the question as agent–action–complement, taking *wat* as representing the unspecified complement.

Many features of adult speech fall outside the representation in semantic relations. Tense, time adverbials, manner adverbials, modal verbs, imperatives, negation – these aspects of sentences all fall into the modality component and, since the semantic relations are meant to represent only the proposition, I have ignored them. This means then that the sentences:

Zet jij de boot op het water neer (You put the boat on the water).
Wil je de boot op het water neerzetten? (Do you want to put the boat on the water?)
Ik heb de boot op het water neergezet (I put the boat on the water, past tense).
Ik ga de boot niet op het water neerzetten (I'm not going to put the boat on the water).

all are scored identically, as agent–action–object–locative.

What, then, are the results? First we must subtract from the approximately 200 utterances per sample those that express no relations, those that consist of only one term (see Table 1.3). These accounted for an average of about 30 % of the mothers' utterances, a large number of which (36 %) were instances of nomination. Actions and demonstratives used alone were fairly common (30 %

Table 1.3 *One-term utterances in the speech of mothers to two-year-old children. Scores in the first five categories represent percentages of one-term utterances*

	Jolanda I	Brigitte	Jolanda II	Sabine I	Marion	Liesje	Sabine II	Saskia	Sabine III	Barbara	Bibi	Monique	Jolanda III	Average
Nomination/ entity	70.9	11.8	33.7	49.1	14.3	29.6	27.4	37.6	40.0	37.8	23.8	45.8	44.7	35.9
Action	7.1	33.8	16.3	18.7	11.9	9.9	35.3	10.6	16.0	29.7	4.8	12.5	2.1	16.1
Demonstrative	7.1	5.9	10.9	5.7	2.4	5.6	0.0	11.8	18.0	5.4	2.4	4.2	8.5	6.8
Case functions	7.1	10.3	18.5	20.7	25.0	29.6	11.8	17.6	12.0	10.8	40.5	20.8	27.7	19.4
Unanalyzable	7.9	38.2	20.6	5.7	46.4	25.3	25.5	22.3	14.0	16.2	28.6	16.7	17.0	21.9
% of utterances containing only one term	57.7	34.9	45.3	25.1	41.2	32.4	24.3	40.9	24.5	16.4	18.3	12.8	23.3	30.6

Table 1.4 *Multiterm utterances in the speech of mothers to two-year-old children. All scores represent percentages of multiterm utterances*

	Jolanda I	Brigitte	Jolanda II	Sabine I	Marion	Liesje	Sabine II	Saskia	Sabine III	Barbara	Bibi	Monique	Jolanda III	Average
TWO-TERM														
Agent–action	11.8	19.7	1.8	15.8	16.7	17.6	10.1	10.6	12.3	6.9	10.2	9.8	4.5	11.4
Action–object	2.2	7.1	0.0	0.6	0.8	2.0	3.1	0.0	4.5	9.6	1.1	0.6	4.5	2.8
Action–locative	1.1	6.3	0.0	0.6	2.5	1.4	2.5	1.6	3.2	0.0	0.0	0.6	1.3	1.6
Entity–locative	14.0	7.1	11.7	3.2	14.2	7.6	13.8	11.4	11.7	1.6	15.5	5.5	16.8	11.1
Possessor–possessed	2.2	6.3	1.8	5.1	5.8	1.4	0.0	4.1	3.9	3.7	7.5	6.7	2.6	3.9
Entity–attribute	22.6	6.3	9.0	8.2	11.7	15.5	9.4	6.5	10.4	9.0	19.3	17.1	12.3	12.1
Demonstrative–entity	14.0	3.9	22.5	13.3	9.2	10.1	16.4	16.3	7.8	19.9	12.3	9.8	12.3	12.8
Prevalent semantic relations	67.7	56.7	46.8	46.8	60.8	55.4	55.3	50.4	53.9	50.0	65.8	50.0	54.2	54.9
Demonstrative–entity–question	16.1	19.7	18.0	19.0	1.7	14.9	10.1	9.8	9.1	9.6	0.5	2.3	6.5	10.6
Total prevalent semantic relations	83.9	76.4	64.9	65.8	62.5	70.3	65.4	60.2	63.0	59.6	66.3	52.4	60.6	65.5
Other semantic relations	3.2	4.7	2.7	4.4	1.7	2.0	1.3	1.6	1.3	2.1	2.1	4.3	2.6	2.6
THREE-TERM														
Agent–action–object	0.0	0.8	4.5	0.6	6.7	6.1	1.9	4.9	5.8	11.7	1.6	6.7	1.9	4.1
Agent–action–locative	0.0	5.5	1.8	1.3	5.8	3.4	1.9	9.8	1.3	1.6	2.7	3.7	1.9	3.1
Agent–object–locative	0.0	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.2
Action–object–locative	1.1	2.4	0.9	2.5	5.8	0.0	1.3	0.0	0.6	4.3	0.0	0.0	3.2	1.7
Prevelant semantic relations	1.1	7.6	9.0	4.4	18.3	9.5	5.0	14.6	8.4	17.6	4.3	10.4	7.1	9.0
Other semantic relations	0.0	1.6	0.0	10.1	0.8	2.7	1.9	5.7	3.2	9.6	4.8	7.3	2.6	3.9
FOUR-TERM														
Agent–action–object–locative	2.2	0.0	0.0	0.0	2.5	1.4	1.3	1.6	1.9	0.0	1.6	2.4	1.9	1.3
Other semantic relations	0.0	0.0	0.0	1.3	0.0	1.4	4.4	0.8	3.9	5.3	3.7	0.0	2.6	1.8
ALL MULTITERM														
Unanalyzable	9.7	9.4	23.4	13.9	14.2	12.8	20.8	15.4	18.2	5.9	17.1	23.2	22.6	15.9
Total prevalent semantic relations	87.2	84.1	73.9	70.3	83.3	81.2	71.8	76.4	73.3	77.2	72.2	65.2	69.8	76.3

and 6 %), and 11 % of the single term utterances could be assigned case functions on the basis of context. Sixteen percent were unanalyzed, either because the cases they represented had not been included in the scoring possibilities (e.g. vocative, experiencer) or because they were not susceptible to case analysis.

Of the approximately 70 % of utterances that consisted of more than one term, 66 % contained exclusively the prevalent semantic relations identified by Brown, and another 10 % consisted of variants of 'What is that?', i.e. demonstrative—entity—question (see Table 1.4). Brown found that about 70 % of children's utterances were accounted for by the prevalent semantic relations, and argues that these relations express precisely the kinds of ideas to be expected of a child in the sensori-motor stage. It would seem that mothers of sensori-motor children limit their sentences to expressions of these same ideas. This is perhaps not surprising; after all, mothers know pretty well what their children will and will not be able to understand, and they certainly want to produce comprehensible utterances. It would be enlightening to analyze samples of adult—adult speech for the presence of the prevalent semantic relations. It may be that, at least in certain contexts, much adult—adult speech is also limited to discussions of agents, actions, objects, locatives, possessives and the attributes of entities. However, discussion of thoughts, feelings and attitudes is also an important aspect of conversation with adults (see Shatz & Gelman, this volume) which seems to be largely missing from talk to two-year-olds.

Of the remaining multiterm utterances, 15 % were unanalyzed. These included utterances for which experiencer would have been necessary among the semantic relations, some metalinguistic utterances, utterances in which *kunnen* (can) or *mogen* (may) or other non-actions were used as the main verb, sentences expressing comparisons or purposives, and other utterances for which the semantic relations simply were not clear to me.

About 6 % of the utterances contained a complement, dative or instrumental. The three-term utterances can be described with the rule

$$\text{(agent) action } \left(\left\{\begin{matrix}\text{complement}\\ \text{object}\end{matrix}\right\}\right) \left(\left\{\begin{matrix}\text{dative}\\ \text{instrumental}\end{matrix}\right\}\right) \text{ (locative)}$$

plus an output limitation of maximally three terms, and the four-term utterances can be described by the same rule with a four-term output limitation. No utterances of more than four major terms were produced.

The subjects in Tables 1.3 and 1.4 are arranged according to MLU of the mother, with the lowest on the left. It would have been preferable to arrange them according to MLU of the child, but I simply had insufficient information about the children to be able to do that. I will have to assume that the MLUs of the children increase with those of the mothers, an assumption supported by the fact that the MLUs increased with time in the two mothers who were tested longitudinally. Judging from the transcripts of the children's utterances and from their longest utterances, I would judge that only Jolanda I and Brigitte are still in Stage I, and that some of the later children are probably in Stage IV. It is perhaps surprising that mothers' utterances are largely limited to the prevalent semantic relations of Stage I even after their children are beyond Stage I. Is there any evidence in these data for a shift from the prevalent to the other semantic relations at some point on our continuum of mother–child pairs? If we estimate this roughly, simply by dividing the mothers into a group with MLUs below 4.0 and a group with MLUs above 4.0 (between Sabine II and Saskia), only one striking difference between the groups appears. The mothers with shorter MLUs produce almost three times as many demonstrative–entity–questions as the other mothers (14.2 % versus 5.4 % of all multiterm utterances). The only other difference is that mothers with longer MLUs produce more multiterm utterances (77.3 % versus 62.7 % of all utterances). It might seem self-evident that longer utterances are more likely to be multiterm, but, after all, there are many ways mothers can lengthen their utterances besides adding semantic relations to them.

INPUT AND OUTPUT

The purpose of this exercise in semantic analysis was not simply to show in yet another way how simple mothers' speech to children is. The point is that the semantic content of mothers' speech is largely limited to constructions the child has already mastered, and it is this semantic limitation which produces the grammatical simplicity. The semantic content, unlike the grammar, of mothers' speech is limited to what the child can already produce himself. A further point is that the interpretation of the rather conflicting results of the (too few) studies correlating input with output which have appeared to date depends crucially on recognizing differences between the semantics and the syntax of input and output. Brown (1973) has shown very convincingly that order of acquisition of grammatical

words and inflections is determined by their grammatical and semantic complexity, not by the frequency with which they are encountered in the input. Brown & Hanlon (1970) presented a similar argument for the order of acquisition of grammatical structures such as negation, questions, etc. Yet such features of child language as the order of subject (S), verb (V) and object (O) are quite clearly determined by frequency in adult language, so that if S–O–V is the highly dominant order in the mother's speech the child will adopt S–O–V (Klein, 1974), and if several possible orders are encountered in the mother's speech the child will use all of them in the same order of dominance as the mother (Bowerman, 1973).What is the difference between rules for word order and rules for inflections? If we assume, with Macnamara (1972), that children start to learn language with a store of cognitive abilities which determine what they say, the difference must be that a choice of order for S, O and V is a minor matter of mechanism for expressing ideas the child already has, while the acquisition of inflection in Stage II reflects the need to learn the meaning of the inflections as well as their syntactic or phonological realizations. Frequency of a structure in the linguistic input, even specific teaching of and practising with the structure, can have an effect on language acquisition only after the child has independently developed the cognitive basis which allows him to use that structure. At that point, the frequency and saliency of the structure in the input language can have a crucial effect on its acquisition. The child whose cognitive development has just brought him to a distinction between, for example, past and present, will be hindered in his language acquisition if he can at that point find no unambiguous past tenses in his mother's speech. If his mother is responding at all adequately to this fictitious child, it is of course highly unlikely that he would find no past tenses. He himself, by referring to past events, creates the situation in which his mother can produce past tenses, e.g.

Child: See grampa.
Mother: And what did grampa give you when you saw him?

or

Child: Breakfast.
Mother: You've had your breakfast already.

This description of the language acquisition of a fictitious child is not entirely imaginary. It is based partly on my own experiences as an adult language learner in a more-or-less natural situation, and on my observations of and discussions with other adult second-language

learners. Making progress in learning a second language seems to be a three-step process: in the first stage you are doing something completely wrong without knowing it, in the second stage you know you are doing it wrong but do not know how to do it right, and in the third stage you have worked out how to do it right and it all seems very simple. The second of these adult-stages is analogous to the child-stage of having a concept but not being able to realize it syntactically. The transition to the third stage can, in my experience, be the result of a trivial event – being corrected, or happening to hear the problematical construction used a couple of times in succession – or of relatively long exposure. I have no doubt that children's discovery of syntactic devices is a similarly irregular process, except of course that they have the advantages of more intimate interactions with native speakers and less input of a confusing nature.

Some experimental evidence supporting this account is also available. Ton van der Geest has reported that, in a longitudinal study of eight mother–child pairs, frequency peaks for semantic features, i.e. aspects of the paraphrase or 'rich interpretation' of utterances, occur earlier for children than for their mothers, whereas frequency peaks for features actually realized in the utterances occur earlier for the mothers (Van der Geest, Snow & Drewes, 1973). Children use certain semantic features frequently before their mothers do, perhaps indicating thereby to the mother that she can now also use those semantic features in her speech.

This view of language acquisition implies that the simplicity and redundancy of mothers' speech are the effects of very specified adjustments to the child, cued by what he says and tries to say as much as by his attentiveness and comprehension. The consistent simplicity and redundancy may primarily serve the purpose of minimizing confusion and helping to consolidate gains in language acquisition. The big steps forward in language acquisition, the insights concerning how to apply some rule or produce some structure, may occur as the result of interactions and sequences such as those described by Moerk (1972) and Snow *et al.* (1976). Accordingly, investigators of the role of input in language acquisition may want to shift their emphasis from descriptions of large samples of mothers' speech to characterizations of what can be and is learned from specific interactions.

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