What we have set as our immediate goal is the overall grammatical capacity of children—their general linguistic competence.[1] The question of course is how to arrive at this competence. The utterances produced —which seem the most direct access to competence—cannot give the total answer. There is really no way to determine which of the child's utterances are grammatically non-deviant in terms of his own grammar. And even if the grammatically non-deviant utterances could be reliably determined, they could only give hints as to the total grammatical capacity of the child, which includes not only what has been produced (or understood) but also what could be produced (or understood). The situation is the same as that involved in describing our own adult grammar if we limited ourselves to what had been uttered over some short period of time and faithfully gave equal weight to everything uttered, no matter how it actually came out. What is actually done, in analysing, is to select. Sentences are selected which are felt intuitively to be most free of deviances, and then one goes beyond the mere corpus to develop a more structured theory that excludes sentences which are wrong grammatically (i.e., present clear deviances) and that explains the status of the other cases. The range of difficulties that face the analyst in describing the language of children on the basis of their utterances should be illuminated by examining a sketch of grammatical structure in adult English.

Approaching the grammar of child language from the other direction answers certain of the problems—that is, from the point of view of the child's ability to understand sentences. Sentences the child understands describe the scope of his grammar more accurately than those he produces, just as with the adult. But if the child's 'understanding' of adult sentences is examined, there is some evidence to suggest that the child comprehends sentences according to his existing grammar. Where comprehension involves syntactic characteristics not present in the child's utterances it seems that this does not represent a relatively rich grammar coupled with a much poorer production device, but rather a limited grammar coupled with a liberal perceptual device that sifts out or by-

1. This work was supported in part by The Joint Services Electronics Project under contract BA 36-039-AMC-03200 (E), in part by The National Science Foundation Grant GP-2495, The National Institute of Health Grant MH 0473-05, The National Aeronautics and Space Administration Grant NSG-496, The U. S. Air Force ESD contract AF 19 (628-2487), and Public Health Service Research Grant MH 7088-04 from the National Institute of Health.

passes unfamiliar material. As an example, we tested children whose speech did not contain passives on this construction, using pairs of pictures. For instance, one picture showed a cat being chased by a dog, and another, a dog being chased by a cat. When the children were asked to point to the picture of the cat chased by the dog, they pointed to the picture of a cat chasing a dog, and vice versa (Fraser, Brown & Bellugi, 1963). We plan to use as much information on comprehension of syntax as possible in investigating the grammar of children.

A striking characteristic of the language acquisition situation is the fact that the particular linguistic ability that develops in the individual child as he gradually masters his native language is grossly underdetermined by the utterances he hears. Not only does he understand, produce, and recognize as perfectly normal countless sentences he has never heard, but he will reject as deviant in some way or other countless utterances that he has heard produced during his linguistically formative years. The child will reject as deviant all the various slips of the tongue, false starts, interrupted completions, and noises that are present in our everyday utterances. Given the external characteristics of language acquisition, the psycholinguist asks: How do any two children—to say nothing of those of a whole speech community—arrive at anywhere near the same language? How does a particular language—each time it is acquired by a child—keep from changing radically? Since language does not change radically in this situation, there must surely be some general principles at work, and it is the principles underlying language acquisition which we want eventually to illuminate.

But first, prior questions must be investigated. If one looks closely at the development of speech in children who have heard totally independent language environments during the early period of language acquisition, it may well be that each will follow an independent path in his grammatical growth and syntactic patterns. And if the limitations on what the child produces have little relationship to his grammatical capacity, one would not expect that a study of children's speech would reveal regularities in the order of appearance of structures across children. We propose to investigate the development of negative and interrogative structures in the speech of three children in order to examine some of these questions.

THE LANGUAGE ACQUISITION PROJECT

For several years, our research group (Professor Roger Brown and his

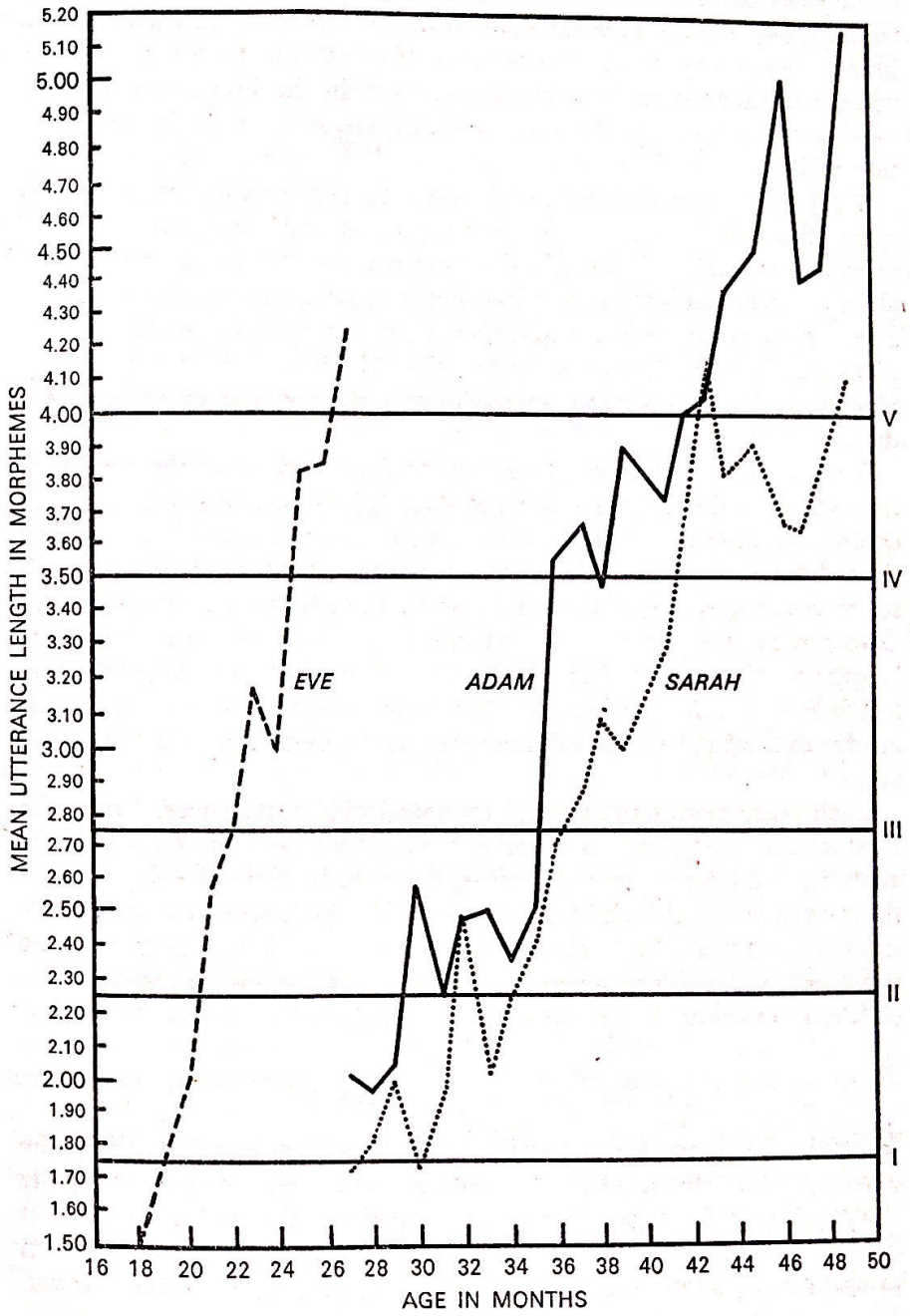

Figure 1

associates[1]) has been studying language acquisition. We have as data for this research a developmental study of three children. We collected two hours of speech every two weeks in a natural setting; that is, recordings of conversations between mother and child in the home. We supplemented this data by performing small experiments to begin investigation of the children's grammatical comprehension and competence.

With these three children, each was followed by a different investigator; the families were totally unacquainted and independent of one another, and each child heard a different set of sentences as 'input'. The children were beginning to string words together in structured utterances when we began the study. One child was 18 months old, another 26 months and the third was 27 months old when we began the study. However, all three were at approximately the same stage of language development.

For each child, then, there are two to four sessions of the speech of the mother and child per month as data. These sessions were tape recorded and later transcribed together with a written record made at the time of the recording which includes some aspects of the situation which relate to the meaning of the interchange. In order to describe stages in development we picked two end points in terms of mean utterance length; the first stage is from the first month of study for each child; the last is from the month in which the mean utterance lengths approach 4.0 for each of the three children; and the second stage is between the two.

Each stage represents several thousand child utterances. From the total speech we isolated the negative statements and the questions for analysis, and have suggested outlines for a study of the development of these systems in the children's speech. We have used the children's utterances and evidence about the children's understanding of these constructions in the language of others, in attempting to consider the children's developing grammatical capacities.

NEGATION IN ENGLISH

To begin, it is necessary to specify some of the linguistic facts about the terminal state toward which the children are progressing, that is, the syntax of English negatives and interrogatives. We will consider that *negative* is a morpheme which can combine with other parts of speech to motivate negation in a sentence, and its usual expression is *no* or *not*.

1. This group has included also Colin Fraser, Dan Slobin, Jean Berko Gleason, and David McNeill.

With this notion, we can examine the facts about English negation that are relevant to the early stages of language acquisition; there are many complexities that do not occur at all in those early stages, but the basic facts about negation in simple English sentences are all relevant.

Negation and Auxiliary Verbs. The negative morpheme *no* or *not* appears most commonly in conjunction with the auxiliary verbs in English and is generally contracted with them in speech. Consider first the modal auxiliaries (*will, can, may, must, could, would, shall, should,* etc.) and notice that the negative morpheme is generally attached to the auxiliary of the sentence when there is one, and is located after the first helping verb. Compare these sets of affirmative and negative sentences:

The man will finish today.	*The man won't finish today.*
The baby can sit up.	*The baby can't sit up.*
He will have been doing it.	*He won't have been doing it.*

The negative morpheme is connected with the auxiliary verb *be*, with *be* as a copular verb, and with *have* as an auxiliary and sometimes as a main verb:

They are coming here.	*They aren't coming here.*
Her face is red.	*Her face isn't red.*
I have done it.	*I haven't done it.*

In each case, the contraction of the negative element with the auxiliary is optional. One can say either: *They can not go*, or *They can't go*, although the latter seems more frequent in informal speech.

The negative element is not attached to main verbs, nor does it stand in place of an auxiliary; thus we do not say **I wantn't it* or **I not want it*, but rather *I don't want it*. The auxiliary verb *do* occurs wherever the affirmative version of a sentence does not have an auxiliary verb, and not only carries the negative morpheme but also the tense marker. *He made one* is the affirmative sentence corresponding to *He didn't make one*, not to **He doesn't made one*. (An asterisk preceding an utterance means that this is not a possible sentence of English).

Negative Imperative. There are reasons to consider the imperative sentences of English as having a deleted subject (*you* or an indeterminate *somebody*) and modal auxiliary (*will* or *can*); and the negative imperative then begins with the negative with *do* that co-occurs with *you* followed by a verb phrase:

Don't be late, will you?
Don't trip over that.

and sometimes:

Don't you do that again!

One cannot have imperatives of the following forms: **Can't have it*, **Isn't coming*, **No go*, **Not do it*, **Doesn't want it*, etc.

Negation and Indefiniteness. Generally, simple English sentences have only one negation in standard speech. In affirmative sentences the form of the indeterminate pronoun is *some*, as in *I see somebody* and *I want something*. The distributional facts of negative sentences suggest that if a negative element is embedded in the auxiliary of a sentence, the indeterminate form becomes an indefinite. Compare the following sets:

You have some milk.	*You haven't any milk.*
Give me some more.	*Don't give me any more.*
I want something.	*I don't want anything.*

When the negative element appears in conjunction with an auxiliary verb the form corresponding to the indeterminate *some* is the indefinite *any*.

Negative sentences are not only formed by embedding the negative element in the auxiliary of the sentence; the negative element may also combine with a pronoun or adverb, as in *no one*, *nothing*, *never*, or with a determiner, as in *no more*, *no books*, and so on. In this case, there is one negativized element per simple sentence of English, and this does not co-occur with auxiliary negation, but is an alternative.

The negative element is attached to the left-most relevant constituent; that is, the negative occurs as soon as possible in the sentence. Ordinarily it is the subject that is negated: *No one is coming* rather than **Anyone isn't coming*. However, in a passive sentence it is the object that occurs on the left, and that would therefore be negated. Compare the negative active and passive forms:

No one is persuading anyone to do it. (Subject)
No one is being persuaded by anyone to do it. (Object)

The points of concern here are:

1. An indeterminate occurring in a sentence which has a negative element in it will be of the form *any*.
2. Negation tends to occur as early in the sentence as possible, perhaps as a signalling device. It is the word order in the surface structure and not the base structure which determines this tendency.

3. Negation can occur with auxiliary verbs, adverbs, and indefinite pronouns and determiners. Thus we find:

He never did it.
He didn't do it.
No one ever did it.

Negation not included in this study. The sections described above cover the problems which arise in relation to negatives in the children's speech as far as we have considered it in this study. Symptomatic of sentence negation in adult English is the possible occurrence of an *either*-clause (*I didn't like it and he didn't either*); the negative appositive tag (*I don't like dogs, not even little ones*); and the question tag without *not* (*He's not going, is he?*). None of those occur in the children's speech in the early stages. Negative word-marking does not occur either (*unfortunately*, *impossible*, *unmade*), nor do inherently negative words like *doubt*, *reluctant*.

This discussion comprises part of what we mean by the negative system, the interrogative system and the auxiliary system in adult English; that is, all the occurrences and non-occurrences involving those parts of the grammar. We will try to capture the nature of these systems by a set of rules something like those on the following pages, although undoubtedly as more is learned about grammatical systems in general and about English in particular, the form of these rules will be different. We feel that in their present state they do at least capture the spirit of this part of the grammar in a way that is compatible with other aspects of the grammar of English. One can think of the rules as giving some verifiable substance to our claim that these occurrences and non-occurrences fit together in some systematic way.

RULES FOR NEGATION IN ADULT ENGLISH

The verb phrase has at one level in its derivation the following form:

$$\Big[[\mathrm{T} - do]_{\mathrm{Aux}_1}\ (\mathrm{Neg})\ \Big[\begin{Bmatrix}\mathrm{IMP}\\ \mathrm{M}\end{Bmatrix}\ (have\text{-pp})\ (be\text{-prp})\ (be\text{-pp})\Big]_{\mathrm{Aux}_2}\ \begin{Bmatrix}\mathrm{V}\\ be\\ have\end{Bmatrix}\Big]\mathrm{VP}$$

or $\Big[[\mathrm{T} - do\ (\mathrm{Neg})]_{\mathrm{Aux}_1}$ etc. $\Big]\mathrm{VP}$

This represents the underlying structure after certain transformations (the details of which are not important in this study) have already operated; for example, the positioning of the negative morpheme, the occurrence of the passive auxiliary.

Transformations

I. Replacement of *do*

$$T - do - (\text{Neg}) - \left\{\begin{matrix} M \\ have \\ be \end{matrix}\right\} \Rightarrow T - \left\{\begin{matrix} M \\ have \\ be \end{matrix}\right\} - (\text{Neg}) - \phi$$

II. Interrogative Inversion

$$Q\,[X^1 - wh + \text{indet}] - NP - \text{Aux}_1 - X^2 \Rightarrow$$
$$Q\,[X^1 - wh + \text{indet}] - \text{Aux}_1 - NP - X^2$$

III. Indefinite Colouring

1. $X^1 - \text{Indet} - X^2 - \text{Neg} - X^3 \Rightarrow X^1 - \text{Indef} - X^2 - \text{Neg} - X^3$

2. $X^1 - \text{Neg} - X^2 - \text{Indet} - X^3 \Rightarrow X^1 - \text{Neg} - X^2 - \text{Indef} - X^3$

(If Neg is treated as occurring initially in the underlying string, then a simpler formulation is possible.)

IV. Formation of Negative Pronouns

1. Obligatory

$$X^1 - \text{Indef} - X^2 - \text{Neg} - X^3 \Rightarrow$$
$$X^1 - \text{Neg} + \text{Indef} - X^2 - \phi - X^3$$

2. Optional

$$X^1 - \text{Neg} - X^2 - \text{Indef} - X^3 \Rightarrow$$
$$X^1 - \phi - X^2 - \text{Neg} + \text{Indef} - X^3$$

V. *Do* Deletion

$$T - do - V \Rightarrow T - \phi - V$$

or, expanded to include imperatives as approximately:

$$T - do - (\text{IMP}) \left\{\begin{matrix} V \\ be \\ have \end{matrix}\right\} \Rightarrow T - \phi - \left\{\begin{matrix} V \\ be \\ have \end{matrix}\right\}$$

NEGATION IN CHILDREN'S SPEECH

What it is that the child learns in becoming a mature speaker of the language is, of course, the whole system which we have tried to capture by the rules above, and certainly not those particular tentative rules. It should be understood that when we write rules for the child grammar it is just a rough attempt to give substance to our feeling about, and general observations demonstrating, the regularity in the syntax of children's speech.

We have intentionally allowed ourselves much freedom in the formulation of these rules. Even within this freedom we feel that at the very earliest stages perhaps we fitted the language unjustifiably to what we assume to be the underlying structure of adult language. These rules reflect but certainly do not describe completely the utterances produced by the child. Whenever possible we took into consideration comprehension of utterances; but comprehension, like speech, only REFLECTS the grammar. Our aim in both cases is to find basic regularities.

One of the ultimate objectives in describing such regularities is to discover—given the child's own linguistic abilities as they have developed at some particular stage and given the utterances that he hears—what system or possible systems the child will ascribe to the language.

Not very much is known about how people understand a particular sentence or what goes into producing one; but something is known about the systematicity of adult language. It has seemed to us that the language of children has its own systematicity, and that the sentences of children are not just an imperfect copy of those of an adult.

Are there hazards in considering the grammar of a child's language from the point of view of his speech? Of course there are many. One possibility is that the limitations on what is produced have nothing at all to do with the grammar but have to do with factors of memory, immediate requirements of explicitness, and the like. However, if this were the case, one would not expect the order of appearance of certain structures, and in particular certain systematic 'mistakes', to be regular across children. We want to emphasize here that we are not dealing with the expression of semantic concepts on the part of the child, or of basic grammatical notions like subject function and transitivity; rather we are concerned with the way he handles lower-level syntactic phenomena like position, permutability, and the like.

Stage I. The sentences we want to describe from stage I, are taken from the protocols of all three children:

No...wipe finger
More...no
No a boy bed
Not...fit
No singing song
No the sun shining
No money
No mitten
No sit there
No play that
Wear mitten no
Not a teddy bear
No fall!

Unless otherwise noted, the sentences included in this report represent large numbers of like utterances in the children's speech, and are not to be considered isolated examples but rather reflections of recurrent structures occurring in the children's spontaneous speech. Notice that there are no negatives within the utterances, nor are there auxiliary verbs. The element which signals negation is *no* or *not*, and this element either precedes or follows the rest of the utterance.

Let us refer to the elements *wipe finger*, *more*, *the sun shining*, in the above sentences as the Nucleus. Notice incidentally that there seems to be limited structure to the Nucleus. The sentences consist largely of nouns and verbs without indication of tense or number. Non-occurrences include inflections, prepositions, articles, pronouns, adjectives, adverbs, auxiliary verbs, and so on.

The negation system at stage I can be considered as follows:

$$\left[\left\{\begin{matrix}no\\not\end{matrix}\right\} - \text{Nucleus}\right] \text{ S} \quad \text{or} \quad \left[\text{Nucleus} - no\right] \text{ S}$$

At this stage, there is no clear evidence that the child even understands the negative embedded in the auxiliary of adult speech, without at least some reinforcement. The adults at this first stage often reinforce their negative statements, as in, *No, you can't have that*, or as in the following interchange:

Mother: *I'm not sure.*
Child: *Sure.*
Mother: *No, I'm not sure.*

What is striking in the speech of the child at this stage is that he employs extremely limited means for negative sentences in his own speech, and the same system is repeated in all three subjects. In subsequent periods, the rule for negation will have a different form. In those subsequent periods there may indeed be an initial sentence adverb *no*, but this initial element is not a sufficient or even necessary part of negation.

The rule for negation that we have given serves many negative functions in the child's speech at stage I which will later be supplanted by other more complex rules, as the following interchanges will suggest:

Adult: *Get in your high chair with your bib, and I'll give you your cheese.*
Child: *No bibby.*
Adult: *Oh, you don't want your bibby?*

Adult: *Well, is the sun shining?*
Child: *No the sun shining.*
Adult: *Oh, the sun's not shining?*

(An adult leans over to talk to the child. Child looks up and puts up a hand in warning.)
Child: *No fall!*

Child: *No.*
Adult: *No what?*
Child: *No, Mommy.*
Adult: *No Mommy what?*
Child: *...No.* (as if she is having trouble finding words)
Adult: *No what?*
Child: *No...Oh foot...foot floor.* (pushes mother's foot onto the floor)
Adult: *Oh, you want my foot on the floor.*

Stage 2. Some of the sentences we want to describe, again from all three children, are as follows:

I can't catch you.
I can't see you.
We can't talk.
You can't dance.
I don't sit on Cromer coffee.
I don't want it.
I don't like him.
I don't know his name.

No pinch me.
No... Rusty hat.
Book say no.
Touch the snow no.
This a radiator no.
No square... is clown.

Don't bite me yet.
Don't leave me.
Don't wait for me... come in.
Don't wake me up... again.

That not 'O', that blue.
He not little, he big.
That no fish school.
That no Mommy.
There no squirrels.

He no bite you.
I no want envelope.
I no taste them.

A characteristic of child language is the residue of elements of previous systems, and the sentences produced might well be described as a coexistence of the rules at stage 1, and a new system. Let us begin with a basic structure something like:

$$S \rightarrow \text{Nominal} - (\text{Aux}^{neg}) - \left\{\begin{matrix}\text{Predicate}\\ \text{Main Verb}\end{matrix}\right\}$$

where Neg has as possible lexical representatives *can't don't, not* and occasionally *no*. The auxiliary verbs can be thought of as occurring in the speech of the children only when accompanied by a *neg*, since it is a fact that the auxiliary verbs do not occur in questions or declarative utterances at this stage. They occur only in negative sentences, and in these limited forms. This first rule can be related to the shape of sentences by the following rules:

$$\text{Aux}^{neg} \rightarrow \left\{\begin{matrix}\text{Neg}\\ \text{V}^{neg}\end{matrix}\right\}$$

$$\text{Neg} \rightarrow \left\{\begin{matrix}no\\ not\end{matrix}\right\}$$

$$\text{V}^{neg} \rightarrow \left\{\begin{matrix}can't\\ don't\end{matrix}\right\} \text{V}^{neg} \text{ restricted to non-progressive verbs}$$

where the particular selection of the negative is determined by the Main

Verb with *don't* and *can't* restricted to occurrence before instances of non-progressive main verbs.

Two auxiliary verbs appear in the negative form, *don't* and *can't*. These are considered as lexical representations of V^{neg} since there are no occurrences of *I can do it, Can I have it?, He shouldn't have it, They aren't going*, etc., but only instances of the sort described above. The negative element is also found within the sentence, but not connected to an auxiliary verb, as in *He no bite you.*

There are a number of sentences with neg (*no* or *not*) followed by a predicate. There is a limited class of subjects in this set. The negative imperative has appeared in the speech of all three children, in the form: *Don't leave me.* In the previous stage the imperative form was presumably *No fall.* There is at this stage an affirmative imperative as well, as in *Come here* and *Do it.* There are hardly any sentences with indefinite determiners or pronouns, but there are by now personal and impersonal pronouns, possessive pronouns, articles and adjectives.

It is clear that the child understands the negative embedded in the auxiliary of the sentence by this stage. Some typical interchanges suggesting discourse agreements are:

Mother: *I don't know that song, Adam.*
Child: *Why not?*

Mother: *Well, I can't change your diaper right now.*
Child: *Why not?*

There is also evidence that the child uses negatives to negate a preposition by this stage as in:

Mother: *Did you play in the snow?*
Child: *No, play sunshine.*

Child: *He not little, he big.*

The system which we have suggested for stage 2, then, is the rule for stage 1, and:

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Stage 3. A sample of the sentences to be described, again from all three children:

Paul can't have one.
I can't see it.
This can't stick.
We can't make another broom.

I didn't did it.
Because I don't want somebody to wake me up.
I don't want cover on it.
I don't ...have some...too much.
You don't want some supper.
You didn't caught me.
You didn't eat supper with us.
I didn't see something
Paul didn't laugh.
I didn't caught it.

I gave him some so he won't cry.
'Cause he won't talk.
Donna won't let go.

No, I don't have a book.
No, it isn't.
That was not me.
I am not a doctor.
I isn't...I not sad...

This not ice cream.
This no good.
They not hot.
Paul not tired.
It's not cold.

I not crying.
That not turning.
He not taking the walls down.

Don't put the two wings on.
Don't kick my box.
Don't touch the fish.

I not hurt him.
I not see you anymore.
Ask me if I not made mistake.

In the speech of the children, the modal auxiliaries now appear in declarative sentences and questions, as well as in negative sentences; so we can now begin with a basic structure like:

$$S \rightarrow \text{Nominal} - \text{Aux} - \left\{\begin{matrix}\text{Predicate}\\ \text{Main Verb}\end{matrix}\right\}$$

and suggest some rules as follows:

$$\text{Aux} \rightarrow T - V^{aux} - (\text{Neg})$$

$$V^{aux} - \left\{\begin{matrix}do\\ can\\ be\\ will\end{matrix}\right\}$$

where *be* is restricted to predicate and progressive and is optional, *can* and *do* to non-progressive main verbs.

Transformations

I. Optional *be* deletion
$NP - be \Rightarrow NP$

II. *Do* deletion
$do - V \Rightarrow V$

In the speech of the children at this stage the negative auxiliary verbs are now no longer limited to *don't* and *can't*, and the auxiliary verbs now appear in declarative sentences and questions, so that the auxiliary verbs can be considered as separate from the negative element of the sentence.

Indeterminates now start appearing in the children's speech, in affirmative utterances as *I want some supper* or *I see something*. The children's negative sentences have the form, *I don't want some supper* and *I didn't see something*. The negative versions are clearly not imitations of adult sentences, and indicate that the complex relationship of negative and indefinite has not yet been established. Examples of indefinite colouring or negative pronouns are rare, and do not appear with any regularity until subsequent stages.

RULES FOR NEGATION IN CHILDREN'S SPEECH

Stage 1.

$$\left[\left\{\begin{matrix}no\\ not\end{matrix}\right\} - \text{Nucleus}\right] S \quad \text{or} \quad \left[\text{Nucleus} - no\right] S$$

Stage 2.

$$S \rightarrow \text{Nominal} - \text{Aux}^{neg} - \left\{\begin{matrix}\text{Predicate}\\ \text{Main Verb}\end{matrix}\right\}$$

$$\text{Aux}^{neg} \rightarrow \left\{\begin{matrix}\text{Neg}\\ \text{V}^{neg}\end{matrix}\right\}$$

$$\text{Neg} \rightarrow \left\{\begin{matrix}no\\ not\end{matrix}\right\}$$

$$\text{V}^{neg} \rightarrow \left\{\begin{matrix}\text{can't}\\ \text{don't}\end{matrix}\right\}$$

where the particular selection of the negative is determined by the Main Verb with *don't* and *can't* restricted to occurrence before instances of non-progressive main verbs.

Stage 3.

$$S \rightarrow \text{Nominal} - \text{Aux} - \left\{\begin{matrix}\text{Predicate}\\ \text{Main Verb}\end{matrix}\right\}$$

$$\text{Aux} \rightarrow \text{T} - \text{V}^{aux} - (\text{Neg})$$

$$\text{V}^{aux} \rightarrow \left\{\begin{matrix}do\\ \text{M}\\ be\end{matrix}\right\}$$

where *be* is restricted to predicate and progressive, *can* and *do* to non-progressive main verbs.

Transformations

I. Optional *be* deletion
$\text{NP} - be \Rightarrow \text{NP}$

II. *Do* Deletion
$do - \text{V} \Rightarrow \text{V}$

INTERROGATIVES IN ENGLISH

For questions in adult English, we represent the interrogative nature of the sentence by the symbol Q, with which may be associated some interrogative word(s) (*What will that person make*?) or the element *yes/no* (*Will that person make something*?) In direct questions, the co-occurrence of Q and *yes/no* has no phonological effect, whereas in the corresponding indirect questions *whether* occurs (*I asked whether that person will make something*).

The interrogative words can be thought of as special instances of various constituents of the Nucleus of the sentence. Thus *what* in

What will that person make? is a special instance of a noun phrase (to wit, the noun phrase functioning as direct object of the verb *make*). To capture the similarity in syntax of the interrogative words on the one hand and the indeterminate and indefinite pronouns on the other, let us represent the interrogatives as *wh* + *indet*. In the presence of an initial Q, one interrogative word may be preposed (*That person will make what*? and *What will that person make*?).

The subject noun phrase of the sentence and the first auxiliary verb are inverted if Q and either an interrogative word or the element *yes/no* occurs before them (*Which person will make it*? but *What will that person make*?) Auxiliary *do* is absent as in negation, unless some element intervenes between *do* and the main verb.

RULES FOR QUESTIONS IN ADULT ENGLISH

$\text{S} \rightarrow (\text{Q}(yes/no))\text{Nucleus}$
$\text{Nucleus} \rightarrow \text{NP} - \text{Aux} - \text{VP}$
$\text{NP} \rightarrow (\text{wh}) + \text{indet}$ (provided that Q, but not Q (*yes/no*) occurs before Nucleus)

The verb phrase has at one level in its derivation the following form:

$$\left[[\text{T} - do - (\text{Neg})]\ \text{Aux}_1\ [(\text{M})\ (have\text{-pp})\ (be\text{-prp})]\ \text{Aux}_2 \left\{\begin{matrix}\text{V}\\ be\\ have\end{matrix}\right\}..\right]\ \text{VP}$$

Transformations

I. Replacement of *do*

$$\text{T} - do - (\text{Neg}) - \left\{\begin{matrix}\text{M}\\ have\\ be\end{matrix}\right\} \Rightarrow \text{T} - \left\{\begin{matrix}\text{M}\\ have\\ be\end{matrix}\right\} - (\text{Neg}) - \phi$$

II. Interrogative Preposing (Optional)

$$\text{Q} - \text{X}^1 - [\text{X}^2 - wh + \text{indet}]\left\{\begin{matrix}\text{NP}\\ \text{PP}\end{matrix}\right\} - \text{X}^3 \Rightarrow$$

$$\text{Q} - [\text{X}^2 - wh + \text{indet}]\left\{\begin{matrix}\text{NP}\\ \text{PP}\end{matrix}\right\} - \text{X}^1 - \text{X}^3$$

III. Interrogative Inversion

$$Q\left\{\begin{matrix}(yes/no)\\ [X^1 - wh + \text{indet}]\end{matrix}\left\{\begin{matrix}NP\\ PP\end{matrix}\right\}\right\} - NP - Aux_1 - X^2 \Rightarrow$$

$$Q\left\{\begin{matrix}(yes/no)\\ [X^1 - wh + \text{indet}]\end{matrix}\left\{\begin{matrix}NP\\ PP\end{matrix}\right\}\right\} - Aux_1 - NP - X^2$$

IV. *Do* Deletion

$T - do - V \Rightarrow T - \phi - V$
wh + something $\Rightarrow$ *what*
wh + someone $\Rightarrow$ *who*

QUESTIONS IN CHILDREN'S SPEECH

Stage I. The questions to consider, from all three children, are:

Fraser water?
Mommy eggnog?
See hole?
I ride train?
Have some?
Sit Chair?
No ear?
Ball go?

Who that?
Why?
What(s) that?
What doing?
What cowboy doing?

Where Ann pencil?
Where Mama boot?
Where kitty?
Where milk go?
Where horse go?

Again, one can consider the elements *Fraser water*, *Mommy eggnog*, *Ann pencil*, *my milk go*, in the above questions as the Nucleus. As with the

negative, in stage I there is very limited structure to the Nucleus, which consists primarily of nouns and verbs without indication of tense and number. If one considers the Nucleus of questions, negatives and interrogatives, there are few distributional distinctions which one could make at this stage. The sentences include *Want bibby*, *Get it*, *Mom sandwich*, *Baby table*, and so on.

The questions without an interrogative word can be thought of *yes/no* – nucleus, where the *yes/no* marker is expressed as rising intonation. There are no other identifying characteristics of yes/no questions in adult English, since there are no auxiliaries, and there is no form of subject-verb inversion. From the context of mother-child interchange, it seems that these rising intonation sentences are frequently responded to by the adult as if they were *yes/no* questions. The formulation suggested is:

S: *yes/no* – Nucleus

The *wh* questions can be described as a list which includes only a few routines that vary little across the three children. The most common questions are some version of *What's that?* and *Where Nounphrase (go)?* and *What Nounphrase doing?* It is not at all clear that the *What* in *What cowboy doing?* has any relationship to a grammatical object of the verb *do* (that is, that it is a special case of Q Nucleus where the particular interrogative occurs as the object of *do*). What might be said, with reservation, is that, indeed, there is a relationship in the child's speech between sentences like *go NP* and *Where NP go?* but that the special interrogative form is bound to the particular word *go* and does not at all have the generality of the adult structure. Paraphrases of the above questions for the child might be: *I want to know the name of that thing*; *I want to know what you call that action*; and *I want to know the location of that object*. One might tentatively suggest a formulation as follows:

$\rightarrow Q^{what} - NP - (doing)$
$\rightarrow Q^{where} - NP - (go)$

Let us take as an example the interrogative word questions in which the object of a verb is the missing constituent and has been replaced by a preposed *what*. If one looks at the set of what-object questions, which the mother asks the child in the course of the samples of speech, one finds that at stage I the child generally does not respond or responds inappropriately, as in:

Mother: *Well, did you hit?*
Child: *Hit.*

Mother: *What did you do?*
Child: *Head.*

Mother: *What do you want me to do with his shoe?*
Child: *Cromer shoe.*

Mother: *What are you doing?*
Child: *No.*

At this stage, then, the children are not producing questions that even superficially resemble what-object questions, and they do not understand this construction when they hear it.

The child's interrogative system at stage I may be summarized as:

S→(Q(*yes/no*))Nucleus
→Q^{what} NP (*doing*)
→Q^{where} NP (*go*)

Stage 2. Some of the questions to consider are:

See my doggie?
Dat black too?
Mom pinch finger?
You want eat?
I have it?

Where my mitten?
Where baby Sarah rattle?
Where me sleep?

What book name?
What me think?
What the dollie have?
What soldier marching?
Why?
Why you smiling?
Why you waking me up?
Why not?
Why not he eat?
Why not me sleeping?
Why not...me can't dance?
Why not me drink it?

You can't fix it?
This can't write a flower?

There is some development in the superficial structure of the sentences since stage I. Notably, pronouns have developed, articles and modifiers are more often present, some inflections (present progressive and plurals) occur, and the verb phrase may include a prepositional phrase or preverb. There are no modal auxiliaries in affirmative sentences, and only two negative modal forms (*don't* and *can't*). There are few indeterminates or indefinites.

There seems to be a gradual development of rules and not necessarily the wholesale replacement of one set by another. The same form of constituent questioning is continued as in stage I. Although the interrogative word *what* appears in sentences which have a missing object, there are frequent occurrences of that interrogative without those conditions. It is perhaps premature to associate this word with a particular deleted element; here, as in other structures in the child's sentences, there is an indication that certain elements have been too closely linked. Certainly there is already an association of what will be referred to as an interrogative constituent with zero form and the interrogative introducer *what*. In the next stage it is quite clear that the association is made. Let us begin with the nounphrase:

NP→(Det) N
N →interrog

where *interrog* may represent any N in a question which is not a *yes/no* question (i.e. in an S of the form Q – Nucleus). The ultimate form of interrog is ϕ:

S→(Q(*yes/no*)) Nucleus
→*what* – Nucleus
→*where* – Nucleus

where the nucleus has some interrogative (i.e. a ϕ) in an N – constituent. For example:

What [*the dollie have* [interrog]N]Nucleus
What [*soldier marching*] Nucleus

In the *wh*-question, all *wh*-interrogative words are in initial position; the auxiliaries are missing in all questions. The set of *why* and *why not* questions relates this stage to stage I:

→*why* (*not* (V^{neg})) Nucleus

where the negative *not* is related to the negation in stage 1 and some of the children's sentences still are produced in this way, and the V^{neg} is related to the negation in stage 2. A transformational rule gives the appropriate order:

why not – V^{neg} – Nominal – MV ⇒ *why not* – Nominal – V^{neg} – MV

Notice that at no other place in the grammar at this stage do we find multiple negation, and this form is no longer produced by the next stage but may be replaced by complex multiple negation.

By this stage there are appropriate answers to most questions. The responses reflect that the child understands that the object of a verb or preposition is being questioned:

Mother: *What d'you need?*
Child: *Need some chocolate.*

Mother: *Who are you peeking at?*
Child: *Peeking at Ursula.*

Mother: *Who were you playing with?*
Child: *Robin.*

Mother: *What d'you hear?*
Child: *Hear a duck.*

The system which we have hesitantly suggested for stage 2 is:

NP → (Det) N
N → interrog (where interrog may represent any N in a question which is not a *yes/no* question. The ultimate form of interrog is ϕ.)
S → (Q(*yes/no*))Nucleus
→ *what* – Nucleus
→ *where* – Nucleus
→ *why* (*not* (V^{neg})) – Nucleus

Transformation

why not – V^{neg} – Nominal – MV ⇒ *why not* – Nominal – V^{neg} – MV

Stage 3. The questions to consider are:

Does the kitty stand up?
Does lions walk?
Is Mommy talking to Robin's grandmother?
Did I saw that in my book?
Oh, did I caught it?
Are you going to make it with me?

Will you help me?
Can I have a piece of paper?
Where small trailer he should pull?
Where the other Joe will drive?
Where I should put it when I make it up?
Where's his other eye?
Where my spoon goed?
What I did yesterday?
What he can ride in?
What you had?
What did you doed?
Sue, what you have in you mouth?
Why the Christmas tree going?
Why he don't know how to pretend?
Why kitty can't stand up?
Why Paul caught it?
Which way they should go?
How he can be a doctor?
How they can't talk?
How that opened?
Can't it be a bigger truck?
Can't you work this thing?
Can't you get it?

Between the previous stage and this one there is an impressive and sweeping set of developments in the children's grammar. There is now a class of verbal forms that inverts with the subject in certain interrogatives (*yes/no* questions) and may take the negative particle with it. One particular verb, *do*, occurs only in its function as a helping-verb in inverted questions and negatives, seldom in *wh*-questions. At this point, the system that has been developed bears striking similarities to the adult pattern. Notice, however, that the auxiliary verbs are not inverted with the subject nounphrase in *wh*-questions. There are other aspects that set this child's system apart from the adult language, namely the child does not produce the full set of sequences of the adult auxiliary system. In the adult system, the possible sequences are (M) (*have*-pp) (*be*-prp); that is, any combination of these, but always in that order, where tense appears always on the first, or if none of these are present, then with the main verb. The children, at this stage, do not produce any combinations of auxiliaries.

Considerable development is found in the children's grammar by this

stage. In addition to the noun and verb inflections appearing in the previous stage, one finds possessive markers, third person singular present indicative, and the regular past indicator. The sentences are no longer limited to simple English sentences. There is considerable development in complexity, and we find relative clauses and other embeddings present for the first time: *You have two things that turn around*; *I told you I know how to put the train together*; *I gon' get my chopper for chopping down cows and trees*; *They don't turn when I get on the floor*; *Let's go upstairs and take it from him because it's mine*;

Let us begin with the same basic structure as for negatives at stage 3:

$$S \rightarrow (Q) - \text{Nominal} - \text{Aux} - \left\{\begin{matrix}\text{Predicate}\\ \text{MV}\end{matrix}\right\}$$

$$\text{Aux} \rightarrow T - V^{aux} - (\text{Neg})$$

$$V^{aux} \rightarrow \left\{\begin{matrix}can\\ do\\ will\\ be\end{matrix}\right\}$$

$$NP \rightarrow wh + \text{indet}$$

Transformations

I. Interrogative Preposing

$$Q - X^1 - wh + \text{indet} - X^2 \Rightarrow Q - wh + \text{indet} - X^1 - X^2$$

II. Interrogative Inversion (for *yes/no* questions only)

$$Q - NP - V^{aux} - X \Rightarrow Q - V^{aux} - NP - X$$ (provided NP is not *wh* + indet)

III. *D* deletion

$$do - V \Rightarrow V$$

In *yes/no* questions, we have noted that the children invert the auxiliary component with the subject noun phrase appropriately. Affirmative sentences generally have an auxiliary. In *wh* questions, however, the auxiliary is generally not inverted. The auxiliary form of *be* is optional at this stage, and the auxiliary *do* is not present in the final shape of most of the wh questions.

RULES FOR QUESTIONS IN CHILDREN'S SPEECH

Stage 1.

$$S \rightarrow (Q(yes/no)) - \text{Nucleus}$$
$$\rightarrow Q^{what} - NP - (doing)$$
$$\rightarrow Q^{where} - NP - (go)$$

Stage 2.

$$NP \rightarrow (\text{Det})\ N$$

N → interrog (where interrog may represent any N in an S of the form Q – Nucleus. The ultimate form of interrog is ϕ.)

$$S \rightarrow (Q(yes/no))\ \text{Nucleus}$$
$$\rightarrow what - \text{Nucleus}$$
$$\rightarrow where - \text{Nucleus}$$
$$\rightarrow why\ (not\ (V^{neg})) - \text{Nucleus}$$

$$why\ not - V^{neg} - \text{Nominal} - MV \Rightarrow why\ not - \text{Nominal} - V^{neg} - MV$$

Stage 3.

$$S \rightarrow (Q) - \text{Nominal} - \text{Aux} - \left\{\begin{matrix}\text{Predicate}\\ \text{Main Verb}\end{matrix}\right\}$$

$$\text{Aux} \rightarrow T - V^{aux} - (\text{Neg})$$

$$V^{aux} \rightarrow \left\{\begin{matrix}can\\ do\\ will\\ be\end{matrix}\right\}$$

$$NP \rightarrow wh + \text{indet}$$

Transformations

I. Interrogative Proposing

$$Q - X^1 - wh + \text{indet} - X^2 \Rightarrow Q - wh + \text{indet} - X^1 - X^2$$

II. Interrogative Inversion (for *yes/no* questions)

$$Q - NP - V^{aux} - X \Rightarrow Q - V^{aux} - NP - X$$ (provided NP is not *wh* + indet)

III. *Do* deletion

$$do - V \Rightarrow V$$

SUMMARY

The speech of the three children consists primarily of a small set of words strung together at the earliest stage we have investigated in two and three word sentences. Among the early systematic aspects of child speech in its step-by-step approximation to the adult system are the following: in the early period the negatives and an ever-growing class of interrogative introducers occur first in the sentence, as sentence modifiers in the basic framework. The association of the interrogative word with other constituents of the sentence is very limited at first, restricted at the beginning to a complement of one or two particular verbs (e.g., *go*

in *Where NP go*). Only later does the association apply to whole categories, such that the proposing of *wh* + prefixed elements can be spoken of with any generality. The auxiliary verb emerges first (anticipated perhaps by the optional occurrence of the copula *be*) always associated with negatives (as *can't*, *don't*). Not until afterwards do the modal auxiliary verbs and *do* appear inverted with the subject, and then only in the *yes/no* questions (i.e the question not introduced by an interrogative word). At the same time, the modal auxiliary verbs, but not *do*, finally emerge independent of interrogatives and negatives. Not until the next stage does the inversion of auxiliary verbs extend to questions introduced by an interrogative word. Negation is embedded in the auxiliary verbs by this third stage, but the complex relation of negative and indefinite is not established yet. We have attempted to capture the regularities which we found in the speech of the three children in the rules which we have suggested for negatives and interrogatives.

Discussion

RENIRA HUXLEY

Our main topic at this conference is the nature of the relationship between competence models and performance in language. The competence model is really an abstraction; yet it is difficult to characterize the linguistic competence of children.[1] In many, by the age of about two and a half, a large number of utterances can be described in the same theoretical terms as simple adult utterances; that is, in terms of a single phrase marker with a restricted set of sub-categorizations of the verb and slightly different low-level rules. At ages younger than two and a half, however, almost none of the language of children can be described in this way, and yet it contains obvious regularities. There is here a difficult problem: both stages have somehow to be described in terms of the child's competence, and his linguistic knowledge. Chomsky has commented on this problem (in Brown & Bellugi, 1964:36):

> ...it seems to me that if anything far-reaching and real is to be discovered about the actual grammar of the child, then rather devious kinds of observation of this performance, his abilities and his comprehension in many different kinds of circumstances will

1. The author is currently engaged upon the research into children's language being carried out at Edinburgh University with the support of the Nuffield Foundation (Principal investigator: T.T.S. Ingram). It is this research which is referred to below as 'the Edinburgh survey'.

> have to be obtained so that a variety of evidence may be brought to bear on the attempt to determine what is in fact his underlying linguistic competence at each stage of development. Direct description of the child's actual output is no more likely to provide an account of the really underlying competence in the case of child language than in the case of adult language, ability to multiply or any other non-trivial rule governed behaviour.

Lees (in Brown & Bellugi, 1964) and Weksel (1965), and others have made similar observations. On reading K & B's paper, it is apparent that such suggestions have influenced work in child language. The paper begins by stating that the 'immediate goal' is the 'general linguistic competence' of children, although collected data cannot give the whole answer in terms of a subject's performance at any age, child or adult. The authors also make the point that the only real way to gain insight into competence is by careful experiment. Roger Brown's group have made such experiments; K & B quote those with the passive in their introductory section. But once the discussion of negatives starts, the 'immediate goal' of characterising competence weakens to becoming what the authors want to achieve 'eventually', and they conclude their work thus: 'We have attempted to capture the regularities which we found in the speech of these children in the rules which we have suggested for negatives and interrogatives'. Capturing regularities is very different from studying grammatical capacity! K & B have produced a data-reduction scheme of a type criticized by Chomsky, Lees and Weksel. Certainly it is superior to some of these earlier studies, because the paper under discussion includes a careful examination of English negation made by Klima. Careful studies of child language need such a rigorous background of an adult competence model, if they are to be at all revealing.

Early in the paper, the authors describe the actual scope of the grammatical rules written for the three children examined: 'It should be understood that when we write rules for the children's grammar it is just a rough attempt to give substance to our feelings about, and general observations demonstrating, the regularity in the syntax of children's speech'. Their main concern in dealing with these utterances is with 'lower level syntactic phenomena like position, permutability and the like'. Thus the paper deals with the surface-structure of the utterances. There are many objections to this approach. At the earliest stages of grammatical development many utterances have the same first morpheme, for instance *no*, followed by a noun or verb. Such utterances abound with ambiguities: the formula NO + (Nucl) could be expanded