LEARNING TO SPEAK A SECOND LANGUAGE: WHAT EXACTLY DOES THE CHILD LEARN?

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Introduction. Research in child second language acquisition has been accumulating at a remarkable rate over the past few years. Most of these studies have focused on certain grammatical features of the language and have attempted to characterize the data in terms of order or stages of acquisition. Grammatical morphemes seem to be a favorite, and Dulay and Burt (1973, 1974b), Bailey, Madden, and Krashen (1974), and Hakuta (1974a) have all made attempts to establish an order of acquisition for these structures. The interrogative structures have been characterized in terms of sequences of development by Ravem (1968), Huang (1971), and by Cancino, Rosansky, and Schumann (1974). The development of negation has been described by Milon (1974) and by Rosansky, Schumann, and Cancino (1974). And Zimin (1973), Dulay and Burt (1974a), and Selinker, Swain, and Dumas (1974) have made attempts at characterizing the types of systematic errors made by second language learners.[1]

While these studies are beginning to give a clearer picture of the learners' patterns of development, very little is yet known about the learning process itself, that is, the way in which children go about learning the structures that they produce. What I would like to report on in this paper is a small set of observations that I have made in studying the acquisition of English as a second language by a five-year-old Japanese girl named Uguisu. These observations, I believe, may give a glimpse of some of the leading edges of a more general process which may be operative in the acquisition of a second language, and possibly a first.

Uguisu, 'nightingale' in Japanese, came to the United States during the period of two years that her father was a visiting scholar at Harvard, and they took residence in North Cambridge in a working-class neighborhood. The children in that neighborhood were her primary source of language input. Uguisu also attended public kindergarten for two hours a day, and later elementary school, but with no explicit tutoring in English syntax. Most of her neighborhood friends were in her same class at school.

Spontaneous speech of about two hours for each biweekly sample was recorded and later transcribed in traditional orthography. She was observed over a period of 60 weeks, from the time she was 5;4, which was five months after her exposure to English began, until the time she was 6;5, when her family returned home to Japan. The first sample represents the point at which she first began spontaneously producing utterances in English.

One of the advantages to a longitudinal study of this nature is that one can perform what might be called a 'micro-analysis' of the data. That is, one can take given structures which appear with a good deal of frequency across samples, and trace the development of the form over time. The profiles of development obtained through such micro-analyses may give a glimpse of some processes involved in the acquisition of language. What follows are profiles of the development of three rather unrelated linguistic forms, all of which I believe have something to tell concerning the nature of language acquisition. The first form involves a rather functionally redundant yet semantically complex feature of English: the indefinite article a, as in a sock. The second form that I shall micro-analyze is the future form be gonna (be going to in more formal adult English), as in I'm gonna fool you and we're gonna play with playdough. And finally, I will discuss wh-embeddings, as in I know how to play hopscotch and I don't know where you are.

The indefinite article a. English has a very complex system of articles, dividing along the dimension of the definite and indefinite. [2] They come under the category of what Brown (1973) has called 'grammatical morphemes', for which obligatory contexts can be established and the child's performance scored for whether or not the morpheme is supplied. Brown in his study of Adam, Eve, and Sarah did not score separately for the definite and indefinite forms of the articles. I, however, did since I was present at every sampling session with Uguisu and was always aware of the context, and I found it possible to identify the obligatory context for the respective forms of the articles in about 90% of the cases. I thus tallied the two separately. For purposes of the present paper, I shall concentrate only on the indefinite form a, but it is of incidental interest to note that both forms attain the 90% criterion set by Brown within one sample of each other,

suggesting that the full control of a and the requires learning along similar dimensions. [3] Figure 1 charts the development of the indefinite article a over time. [4] One sees that in no way is there a sudden leap in the usage of the form, but rather a slow and gradual rise in the probability of the morpheme being supplied, eventually settling somewhere above the 90% level. Why this gradual and nonabrupt rise in Uguisu's control of the indefinite article? At least two

FIGURE 1. Acquisition curve for the indefinite article a, scored for percent supplied in obligatory contexts. Samples are biweekly. The number of obligatory contexts for each data point ranges from about 50 to 200.
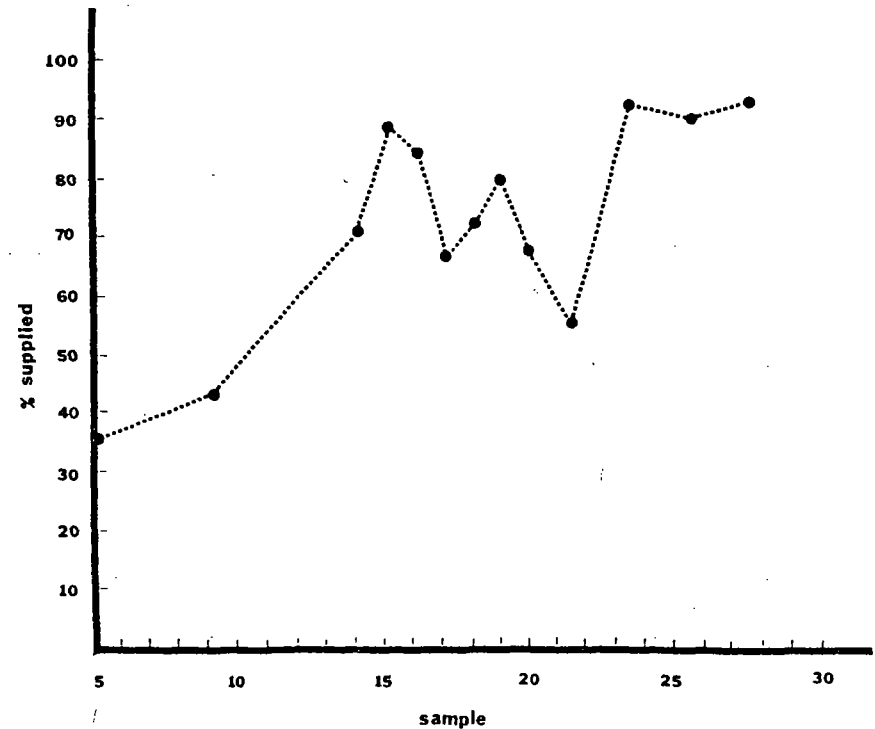
possibilities exist. One such possibility is that what is considered to be the rule for the indefinite article in fact consists of many minute subrules, and that although each individual subrule is learned abruptly, the curve appears to be gradual because they are all 'scrunched' together under one category. A second possibility is that there are certain phonological constraints which make the article more difficult to supply with certain nouns than others.

There is a way to test for such possibilities. One can take a maximally restricted context in which the article is obligatory and score for percent supplied in only that context. Then one can compare the acquisition curve obtained from this analysis with that of Figure 1, that is, the entire range of contexts requiring a, and see how closely they match. Ideally, what one would like to find is a single noun, such as book, which appears frequently in the data. Taking that single noun, one could establish maximally restricted contexts, and score for only those contexts. Unfortunately, I found no such ideal. What I did find, however, was a rather odd but adequate substitute: 'nother, as in Do you have 'nother story?. In earlier samples, Uguisu consistently used 'nother, as opposed to which she gradually began using: a#nother. I am particularly confident that the a in a#nother was productively supplied because Uguisu, though infrequently, also used its variants the#nother and some#nother, as in the following:

> The#nother one is, um, Maria.
> But some#nother people will catch your children.

All samples were scored for presence/absence of the indefinite article in the context [a/_nother], and the acquisition curve obtained appears in Figure 2, superimposed on the acquisition curve for the entire range of contexts requiring a, which is taken from Figure 1. The profiles of the two curves are strikingly similar, except for the earlier samples (prior to Sample 14) where the percent supplied for the context for [a/_nother] is close to zero. The difference in the earlier samples, I believe, is due to instances where in total contexts, the instances of a which appeared were in fact simple phonological stems of other morphemes, such as in-a or look-like-a, and not necessarily productive. What the foregoing analysis suggests, then, is that even within maximally restricted contexts, the learning involved is not abrupt and sudden but rather a gradual process in which the probability of the article being supplied slowly rises from a zero to a 100 percent.[5] Furthermore, it suggests that the probability, at any given point in time, may very well be constant across the entire range of obligatory contexts for the indefinite article.

Be-gonna. The second form which I wish to micro-analyze is the future form be-gonna. Uguisu began using this form as early as Sample 4, and with high frequency from Sample 9. She produced utterances such as the following:

> I gonna make 'nother baseball.
> Oh, they gonna kill the fish.

FIGURE 2. Acquisition curve for the indefinite article a in the restricted context a/_nother compared to the entire range of contexts a/_NP, scored for percent supplied in obligatory contexts. Samples are biweekly. The number of obligatory contexts for each data point for a/_nother ranges from 4 to 18, with a mean of 9.
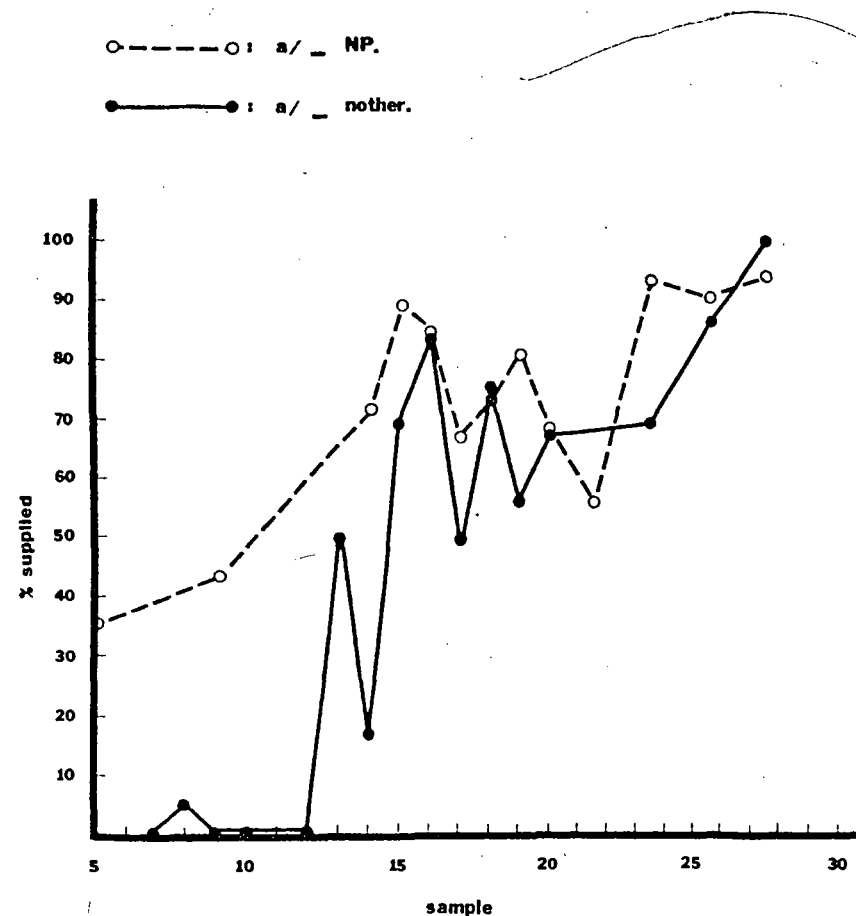

> She gonna kill her.
> Everybody gonna do it.
> We gonna punch you.

Note that the auxiliary be, which is obligatory in adult speech, is missing. She eventually did begin supplying the be, and so I decided to score for percent supplied in obligatory contexts for all samples, tallying separately for the three allomorphs am, is, and are. The

results of the scoring appear in Figure 3. For the moment, leave aside the strange downward swoop of the curve for am between

FIGURE 3. Acquisition curve for the three allomorphs am, is, and are as auxiliaries to the catenative gonna, scored for percent supplied in obligatory contexts. Samples are biweekly. The number of obligatory contexts for each data point is greater than 5, in most cases between 15 and 30.
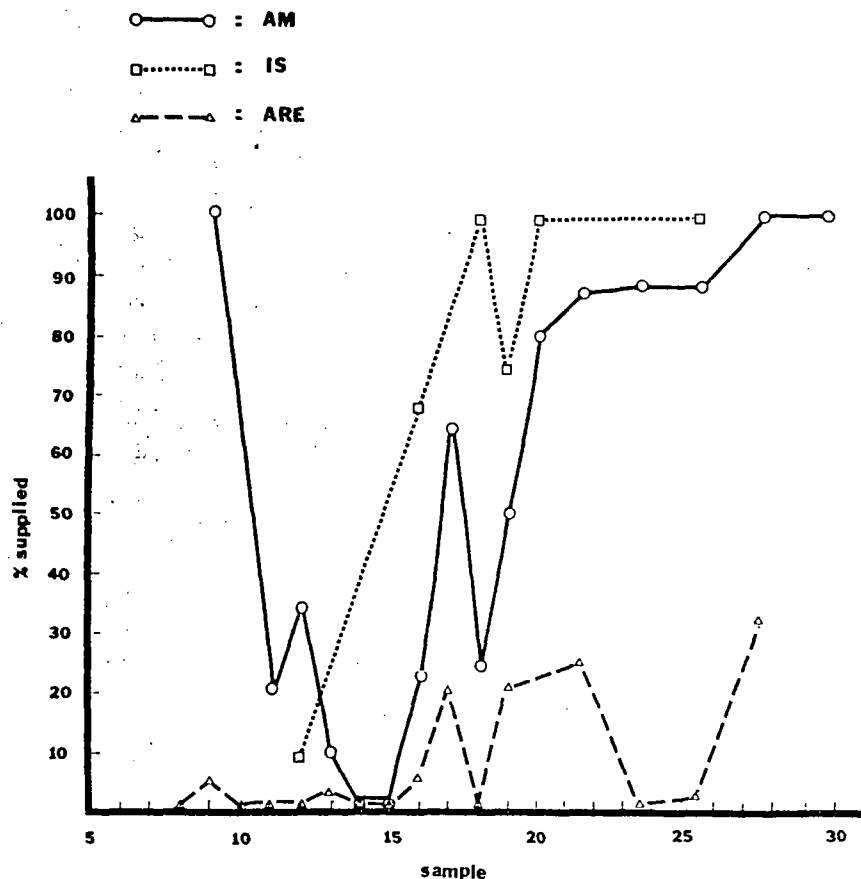
Samples 9 and 14. We shall return to it later. Notice first in Figure 3 that the acquisition curves for the three allomorphs manifest a slow, probabilistic rise, just like the curve observed for the indefinite article in Figures 1 and 2. Also note that the allomorphs am and is

attain the 100 percent level of being supplied, while the allomorph are trails limply, never getting above the 40 percent level.

Why the difference between the different allomorphs of be? This is a rather odd result in light of the fact that Uguisu was quite good with other forms of be, namely the copula and the auxiliary in the present progressive. For the copula, omissions occurred rarely (about 1 percent), and I have argued elsewhere (Hakuta 1974b) that they are what I have called 'prefabricated patterns'. Similarly for the auxiliary, omissions were infrequent, the auxiliary being supplied in well over 95% of the obligatory contexts across all samples. Uguisu produced am, are, and is with equal ease, and so the problem cannot be phonological in nature.

One possibility is that the sequencing of constituents in the input may provide difficulty. That is to say, when a declarative sentence, such as You're gonna try this one, is transformed into the interrogative form, it becomes Are you gonna try this one?, where the auxiliary be is moved out of its normal environment and placed in front of the sentence. Thus:

$$\text{Pro} + \underline{\text{be}} + \underline{\text{gonna}} + \text{VP} \implies$$
$$\underline{\text{Be}} + \text{Pro} + \underline{\text{gonna}} + \text{VP}$$

This results in a sequence of constituents where the auxiliary be is in effect omitted from its position between the subject and gonna.[6] It may very well be the case that this provides an erroneous model to the learner. The possibility is reinforced by the observation of Evelyn Hatch (1972) that a good number of the second language learners studied by her students at UCLA followed an 'operating principle' of 'pay attention to the end of utterances and especially to content words'. In accounting for Uguisu's poor performance with are, the explanation on grounds of sequencing of constituents is an intuitively appealing one. One generally asks questions about you and we, such as Are you gonna come with me? or What are we gonna do about this problem?, both of which involve the allomorph are. It seems unlikely that one would ask questions with the subject I, i.e. Am I gonna have a tantrum?. Questions involving a third person singular subject, such as Is he gonna read this paper?, would also be less likely than questions with you and we as subjects.

To test for this possibility, I decided to analyze the interactor's speech[7] taken from two distinct time periods, the first from Samples 7 through 9, and the second from Samples 17 through 22. I shall refer to these two periods as Time I and Time II. I first extracted all utterances involving the form gonna, and then scored them, using as categories the three allomorphs am, are, and is, as to whether they provided a 'good model' or a 'bad model'. A good model was

defined as where the be is placed between the subject and gonna, such as We're gonna play with playdough; a bad model as where the be is not between the subject and gonna, but rather preposed, as in What are you gonna do? The percentage of good models over total gonna constructions was computed for Time I and II, and the results appear in Table 1. The results show that at both Time I and Time II, the percentage of good models for are is significantly lower than for am and is. If one accepts the assumption that similar profiles appear in Uguisu's input, and I think it likely, then this analysis suggests that her apparent difficulty with the allomorph are had to do with her attempts to make her speech in effect consistent with what she heard in her input, a process which might be called 'external consistency'.

TABLE 1. Percent of good models over total gonna constructions in interactor speech from two time periods.

	Time I	Time II
am	.80 (15/19)	.95 (18/19)
is	.74 (14/19)	.74 (23/31)
are	.29 (22/75)	.33 (29/87)

Reference is again made to Figure 3 where, as mentioned earlier, there exists a rather strange downward swoop for the allomorph am between Samples 9 and 14. In Sample 9, Uguisu supplied am in all five instances with gonna. Prior to Sample 9, between Samples 4 and 8 when the gonna form was infrequent, Uguisu supplied am in 4 out of 5 instances. By Samples 14 and 15, am was omitted in all 22 obligatory contexts. One can well ask the question: 'Uguisu, what are you doing?' When a presumably correct form becomes deviant over time, one infers that some process of reorganization is going on. One possibility which immediately presents itself is that the function of the form gonna is quite similar to that of other catenatives, have to and wanna. They all signal some form of 'intentionality' or 'imminence' (Brown 1973:318). Of these three catenatives, however, gonna is the only one in which an auxiliary be is required. Did Uguisu have the other forms wanna and have to ? Wanna was present from the very first sample; more interestingly, the form have to, though existent infrequently from Sample 5, went through a 'peak usage' between Samples 9 and 12, where approximately 14-15% of her total constructions used this form. This compares to an approximate 4% usage in the later samples. When a form undergoes such overuse, it suggests some process through which the form is being actively 'tried out' by the learner. Interestingly, this period of overuse of

have to, which lasted from Sample 9 to 12, corresponds to the period when the downward swoop for am in gonna is observed, between Samples 9 and 14. This observation leads me to speculate that Uguisu was attempting to make her gonna form consistent with her other two catenative forms, wanna and have to, thereby dropping the am in gonna, a process which might be called 'internal consistency'. Uguisu was trying to keep related linguistic forms within her system consistent with one another.

Wh-embeddings and wh-questions. [8] While the notion of 'internal consistency' is still fresh in mind, I shall go on to the next problem of wh-embeddings and wh-questions, which I think speaks more directly to this issue.

As early as Sample 5, Uguisu made the following set of utterances:

I know how to do it.
I know how to do read it this.
I know how to read it this.
I know how to make.
I know how to draw it cat.
I know how to draw (it) butterfly.
I know how to draw it boy.

What appeared at that time to be quite grammatical constructions of embedded how-questions, however, disintegrated over time into forms such as the following, which she produced at the very last session:

First I gotta write it and show you how do you spell 'Debra'.
I know how do you spell 'Vino'.
We only know how do you make it like that.
I know how do you write this.

What one finds here once again is a progression, from presumably grammatical utterances to a deviant form. This progression, from how to to how do you, is also a gradual and not a sudden process. Figure 4 plots the story, and the graph can be read as follows: 'Given the instances when embedded how-questions were used, what percentage took the proper form how to?'[9] Once again, one may well ask the question: 'Uguisu, what are you doing?' A glimpse of the process can be had by looking at other wh-embeddings used by Uguisu. Table 2 gives an exhaustive list of embedded where-questions used by Uguisu. The form starts out with the configuration 'Sentence+ Questions', as in We know where is this.[10] Through a gradual process, the question becomes 'uninverted', as in I don't know where the

FIGURE 4. Proportion of correct how embeddings (how to) over total how embeddings. Biweekly samples are paired.
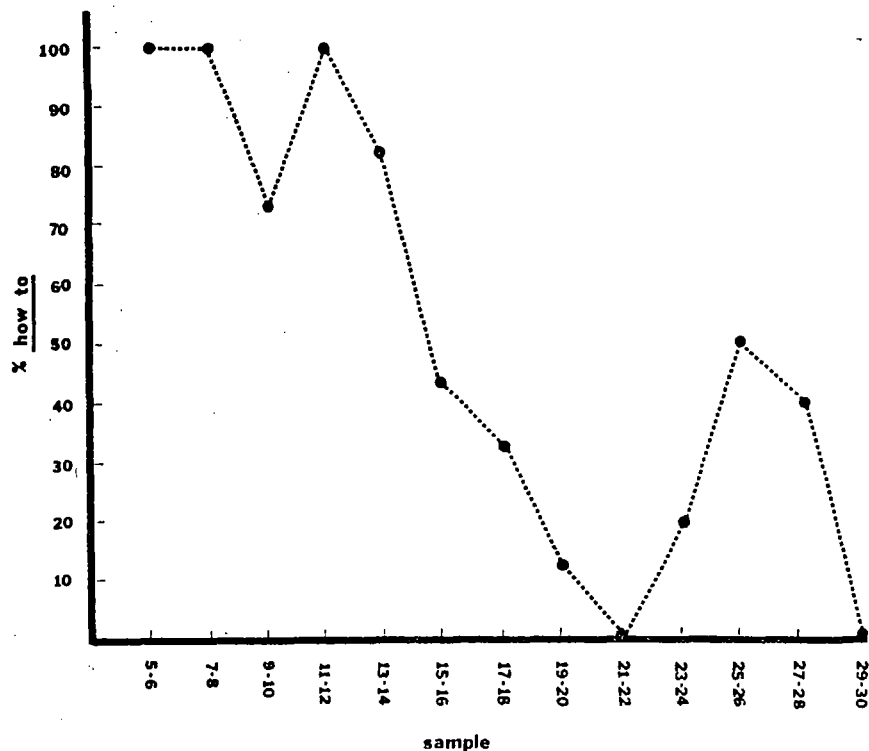
bathroom is, after some redundancy, as in You will see where is your house is. A similar progression is observed with other embedded wh-questions, but with less frequency of occurrence.

The wh-questions produced by Uguisu complete the picture. From the first sample on, Uguisu was able to construct where-questions of the following sort:

Where's purple?
Where is the nose?
Where is potato?

She was also able to construct how-questions of the following sort:

How do you make it bread?
How do you play this?
How do you put it on?

TABLE 2. Exhaustive list of embedded where-questions in Uguisu.

Form*	Sample	Sentence
I	1	I don't know, where is money.
I	7	We know where is this.
I	7	I don't know where is it.
I	10	My father tell me where is here.
I	10	I didn't know, where is, um, doctor's room.
U	11	I know where it is.
I	11	You have to close your eye and you have to see where is it.
U	12	I don't know where she is.
I	13	I don't know where is your house.
I	14	I didn't know where is it.
I	16	You know where is my house.
I	16	You will see the house where is it.
R	16	You will see where is your house is.
R	16	I don't know where is the telephone number is.
R	18	I don't know where is the woods is.
I	18	I know (it) where is it.
U	18	I know where it is.
U	24	I don't know where the bathroom is.
U	26	I know where it is.

*I = inverted; U = uninverted; R = redundant

It seems that Uguisu was forming her wh-embeddings by attaching her wh-question to a sentence, except for the how-embeddings. The gradual progression from the proper form how to into the deviant how do you, then, suggests Uguisu's attempt once again to maintain the internal consistency of her linguistic system. I suppose that, had Uguisu remained in the United States, her now deviant how-embeddings would have returned through a gradual process to the proper how to form, just as her deviant where-embeddings gradually became un-inverted into the proper form. Presumably, the move away from the internally consistent 'Sentence+Question' configuration is motivated this time by some propelling forces toward the maintenance of an external consistency, that is, the input that Uguisu hears.

Concluding remarks. The impression that I hope to have conveyed through the above set of observations is that the process of second language acquisition is a dynamic, fluid process in which the system of the learner is constantly shifting: shifting in a slow and gradual manner either toward the maintenance of an internal consistency within the structures which the learner possesses, or in the direction of an external consistency, where the learner attempts to fit the internal system into what is heard in the input.[11] The phenomena described in this paper may be the edges of some generally overlapping and interacting processes which make occasional appearances in the data. What one needs to know, of course, are the dimensions along which the child comes to maintain the internal or external consistency; one would also like to know what the variables are that make the child 'ready' to make certain changes in the linguistic system at certain periods in the course of development.

Let me conclude this paper with a point which is so easily overlooked. The learner does not sit in a box receiving input of the second language, working at the task of figuring out the grammar of the language day in and day out, generating rules, hypotheses, strategies, and utterances. Language is learned in the context of the environment within which the learner operates, and from that environment the learner learns things other than language as well. The environment may be in the context of playing hopscotch, in the context of routine daily activities, in the context of fighting with a friend over a Tinkertoy piece. What it is that motivates a child to learn language in order to operate within those contexts is clear: the child wants to communicate. What it is that motivates a child to change the form of an utterance, I don't know where is the answer to I don't know where the answer is, is not clear: it needs to be.

NOTES

1. There is, of course, conflicting evidence. See Schumann (1975) for a concise, insightful review of some of the studies.

2. See Brown (1973:340-356) and Maratsos (1971) for a detailed discussion of the English article system and its acquisition by L1 children.

3. The full story on the development of articles in Uguisu can be found in Hakuta (in preparation). Relative to other grammatical morphemes, it is worth noting that articles were acquired late by Uguisu.

4. Articles were scored for Samples 14 through 28, since prior to Sample 14, many seeming articles appear to be not segmented morphemes but rather phonological features of verbs (e.g. look-like-a) and prepositions (e.g. in-a). Brown (1973:355) notes similar problems with the analysis of articles in his early samples: 'Before the attainment of the 90% criterion I have found that the child's use of articles cannot support any inferences about his control of semantic and grammatical rules. This is partly because certain seeming articles in earlier samples probably are not organized as separate morphemes at all but are rather features of the pronunciation of particular words.' However, I did score Samples 5 and 9, regardless of whether the seeming articles were unsegmented morphemes or not, and the data points appear in Figure 1.

5. It might be argued that the curve for a/_nother is abrupt, especially between Samples 12 and 16. It should be noted, with regard to this consideration, that each sampling period covers two weeks. Furthermore, it is not until Sample 28 that it attains the 100 percent level. In addition, the n for each sample for the context is relatively small (only those cases with more than four obligatory contexts were included), as the contexts are restricted. Mathilda Holzman (personal communication) suggests that a 'moving average' system for scoring might cut down on random fluctuations due to sampling, and may provide a more reliable, gradual curve although it has not been done for the present paper.

6. Roger Brown (personal communication) points out that in colloquial speech, especially in lower-class speech, the auxiliary is often dropped, to yield You gonna try this one?

7. The interactor varied from sample to sample: in a few cases, I was the only one present; in others, native English-speaking adults were simply asked to 'play' with Uguisu. The profiles of the different interactors, however, were very similar with regard to gonna.

8. Part of the data in this section was reported in Hakuta (1974b).

9. Samples were paired in order to give sufficient sample size, i.e. n > 5, but in most cases, the n was about 10.

10. Evelyn Hatch (1974) reports similar structures of the configuration 'Sentence+Question' in many of the second language learners whom she has studied, from varying L1 backgrounds.

11. Note, incidentally, the analogy between my notion of internal and external consistency and Piaget's notion of assimilation and accommodation. I am heavily tempted to make some generalizations, but feel that at this point with so little data, it's stretching it a bit too far. Future studies, with more emphasis on input, may substantiate this analogy.

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