J. Child Lang. 10 (1983), 401–414. Printed in Great Britain

Error assimilation as a mechanism in language learning*

CAROLE BUTLER PLATT AND BRIAN MACWHINNEY
University of Denver *Carnegie-Mellon University*

(*Received* 6 *March* 1982)

ABSTRACT

The present study tests the hypothesis that many of the grammatical errors that occur during the course of language development can serve as 'auto-input' leading directly to the acquisition of new expressive forms. A free-speech corpus of grammatically incorrect sentences was gathered from each of 4 four-year-old subjects. Three additional sets of sentences were constructed: sentences containing errors similar to those actually produced, sentences containing 'baby errors' and correct sentences. The children were asked to judge these sentences as correct or incorrect. Significantly fewer corrections were made in the sentences with subject-generated errors than in the sentences with similar errors or 'baby errors'. These results can be explained by assuming that children learn their own errors.

INTRODUCTION

Although it is reasonable to assume that children acquire most of their knowledge about language by listening to other people talk, researchers often overlook the ways in which the learner's own productive formations can serve as inputs to the language acquisition device. This lack of attention to an acquisitional role for errors is all the more surprising when one considers the importance generally assigned to errors as proofs of pattern productivity. One of the classic findings of child language research is that language learners systematically produce constructions which are not available in the input. It is generally agreed that such errors and neologisms must be explained as resulting from some kind of productive reorganization of the input. Thus, overgeneralizations such as *foots*, *catched* and *goed* are frequently viewed as 'the best evidence we have that the child possesses construction rules' (Brown 1973). Phrasing the same argument from the opposite point of view, MacWhinney (1978, 1981) argues that errors constitute strong evidence that 'not all forms are produced by rote memorization of the input'.

* Address for correspondence: Carole Butler Platt, Department of Psychology, University of Denver, Denver, CO 80208.

The present study is an attempt to specify further the role the child's own productions might play in the process of language acquisition. The study tests the hypothesis that errors can serve as 'auto-input' leading directly to the acquisition of new expressive forms. This hypothesis can be illustrated in the context of the model of word acquisition proposed by MacWhinney (1978). According to this model, children can produce words either by memorization of unitary unanalysed forms or by the productive combination of morphemes. For example, if a child uses the word *feet* as the plural of *foot*, he must be using rote, because there is no productive process in English for changing /ʊ/ to /i/ to mark plurality. If the child uses *foots* as the plural of *foot*, one would normally argue that he is producing it by the combination of *foot* and the suffix /s/. For regular plurals like *cats* it is usually impossible to be sure which of these processes is operative in a given case, although MacWhinney (1975, 1978) shows how the two accounts can be tested statistically in certain experimental contexts. One further possibility, not usually considered in the literature, is that the child can learn even forms like *foots* by rote. Of course, the child could not have learned *foots* from his parents, since adults do not say *foots*. However, having produced *foots* once by combination, he could have listened to his own error and then learned it as a whole by rote. MacWhinney (1978) argues that this can occur because the child is always looking for forms to express frequently occurring functions. Thus, while listening to or monitoring his own output, the child takes the output as input and locates the desired form.

Jacoby (1978: 649) has proposed a virtually identical model to account for the superiority of distributed over massed practice in word list learning. He argues that 'when a problem is repeated, the later presentation of the problem sometimes results in the subject responding by remembering the solution rather than by going through the operations that would otherwise be necessary to solve the problem'. If the child remembers a productive formation which is also an error, then the child will have taught himself an error. Accordingly, many grammatical errors produced by children might be traceable not to adult speech patterns but to children's own incorrect productions. Furthermore, the child's own memory of self-generated errors can, for a while, dominate over information available in reception from other speakers. This analysis leads to the following prediction: if a child were to be given a set of ungrammatical forms which he has produced himself, we would expect that he would mistakenly judge them to be correct. In other words, having learned his own errors, he would at first be unable to distinguish them, receptively, from correct productions.

In order to test this hypothesis, four types of sentences are needed – one set of errors produced by children and three additional sets of control sentences. For the first set of stimuli, it is necessary to obtain a large number of sentences containing grammatical errors actually produced by children.

For the second set, one must develop a list of comparable control sentences containing similar errors that were not actually generated by the child himself. By comparing a child's acceptability judgements for these first two types of sentence, one can determine if having previously made an error increases the likelihood that that error will be accepted as correct. Two additional types of sentence are needed as controls to ensure that the children are indeed processing the sentences at the required grammatical/metalinguistic level rather than simply responding to some aspect of the meaning that sounds 'wrong' or 'silly'. Thus the third set of sentences must contain mistakes characteristic of a much younger child. If the child is able to judge these sentences as erroneous and to change them to the correct form, there is evidence that he is responding to the task of making a grammatical judgement rather than reacting to some exclusively semantic aspect of the sentence. Finally, a fourth set of grammatically correct sentences can be used as controls. The expectation is that such sentences will be accepted as correct. Accurate acceptability judgements for these last two sets of sentences – the BABY ERRORS and the CORRECT SENTENCES – provide evidence that the child is also using his grammatical judgement skills when responding to the first two sets of sentences.

METHOD

Subjects

Four children, two males and two females, ranging in age from 4;6 to 4;8, served as subjects: Emily, 4;6; Tim, 4;6; Michael, 4;7 and Andrea, 4;8. They were all observed in a Montessori day care programme and all were concurrently enrolled in the Montessori School of Denver. All were from upper-middle-class professional families and had no siblings. None of the children had been identified as having any developmental disabilities or difficulties.

Stimuli

In order to obtain a corpus of ungrammatical sentences for particular children, the investigator (C.P.) followed these four 4-year-olds around during their normal daily activities at the day care centre. The language of each child was observed during play with other children, during interactions with adult supervisors, and in conversations with the observer. All ungrammatical sentences produced during the observational periods were written down. Because the sentences were collected in a variety of situations, the samples of sentences are assumed to be representative of the children's speech errors. These self-produced ungrammatical sentences constitute the first category of test sentences and will be referred to as SUBJECT-GENERATED ERRORS. The goal was to obtain 30 such sentences for each child. This number

was obtained for two of the children; however, due to vacations, only 15 such sentences were logged for each of the other two subjects. Thirty sentences were collected from another child, but she was dropped from the study because of her inability to provide corrections for any of the three categories of incorrect sentences. Like many 3-year-olds, this child could not render systematic judgements of grammaticality and her data tell us nothing of interest regarding the main hypothesis of the study.

The nature of the specific errors made by the subjects should be mentioned. The errors can be divided into four types: (1) formal overgeneralizations; (2) functional substitutions and omissions; (3) incorrect word order or morpheme placement order; and (4) other. The largest proportion (34% of the total) of the subject-generated mistakes were verb-tense overgeneralizations. The majority of this class of mistakes (87%) were (stem + *ed*) patterns overgeneralized to irregular verbs; there were only a few (4%) of the (past + *ed*)-type errors in these samples. Use of *gots* instead of *has* was found for all four children (8% of all subject-generated errors). Other such formal errors included comparative/superlative overgeneralizations and redundancies, e.g. *gooder, worser, more bigger* (6% of total errors). Functional substitutions and omissions included the use of present tense forms for past tense forms (7% of total), omission of the auxiliary (9% of total), incorrect marking of subject/verb agreement for person and number (4% of total), and incorrect use of the past participle (4% of total). Incorrect word order occurred in 9% of the subject-generated sentences and there was a 2% occurrence of incorrect placement of the possessive marker *'s*. Finally, there were a number of other subject-generated sentences that may best be described as idiosyncratic means of expression or unusual patterns of usage (16% of total). One-third of these sentences (5% of the total) contained comparative constructions. Examples of each of these four types of errors are given in Table 1.

Three lists of control sentences were also constructed. The first list of control sentences comprised 30 erroneous sentences characteristic of children in the early three-word sentence stage. These 30 sentences will be referred to as the BABY ERRORS. The sentences in this list were the same for all four subjects. The second list of control sentences comprised 30 CORRECT SENTENCES. These were chosen to be comparable in length, complexity and familiarity to the first two types of sentence. The third list of control sentences was in fact four lists – one for each of the four children. These four lists will be called the SIMILAR ERRORS. These were sentences that were individually designed to have a syntactic structure exactly parallel to each of the actual errors. Only the lexical items were changed. The idea here is that, if the child has learned by rote some specific erroneous structure (MacWhinney 1978, 1981), he should not be able to apply that erroneous structure when different lexical items are involved. Examples of each of the four types of sentence are given in Table 2.

TABLE 1. *Examples of the four error types*

Type	Example
Formal overgeneralizations	I feeled the water in the flowers.
	They broked.
	Mine is gooder than anybody's.
	He gots a big brother.
Functional substitutions and omissions	My mom buy it for me.
	Where my thing go?
	I weren't bothering her.
	My slip-slops began to came off.
Incorrect word order or morpheme placement	There might be not any dinosaurs left.
	Who is this ducky's?
	Are we gonna do any else things?
	It was in my hiding secret place.
Other	When is she gonna be done to read it?
	Would you write a flower for me?
	Let's go both the same fast.
	They kick it how high planes fly.

TABLE 2. *Examples of the four sentence types*

Type	Example
Subject-generated errors	I'm going to there.
	I breaked through it.
	The hair camed off of it.
Baby errors	Where pencil?
	He sat in Mommy chair.
	This is himz chair.
Correct sentences	We sing songs at Montessori School.
	I want some ice cream.
	Billy has blue eyes.
Similar errors	We're going at the park.
	I runned through the sprinkler.
	The toy broked.

Procedure

A puppet game similar to that used by de Villiers & de Villiers (1972) was employed as an elicitation technique. Two hand puppets were presented at the initiation of the 'game'. One was described as the 'smart' puppet who 'knows how to talk well'; the other was described as the one who 'can't talk very well yet and who needs help learning how to talk better'. The child was given the smart puppet and the experimenter kept the 'dumb' puppet. Then the child was given the following instructions: 'This puppet sometimes has trouble saying things. Your puppet knows how to talk a lot better and can help mine. My puppet is going to say some sentences now. You can help by

having your puppet fix up the sentences if they don't sound good. If the sentence sounds O.K., your puppet can repeat it and say it just the same as mine did'.

In order to determine if the child understood the directions, several sentences were given as practice trials; these practice sentences consisted of five or six gross errors typical of a 2-year-old's grammatical mistakes, such as *Where Mommy?*, *No do that* and *Daddy go store*, along with three or four correct sentences. The experimenter first modelled several such sentences, taking the role of both puppets; after this, the child took over the 'smart puppet' role and practised correcting further sentences.

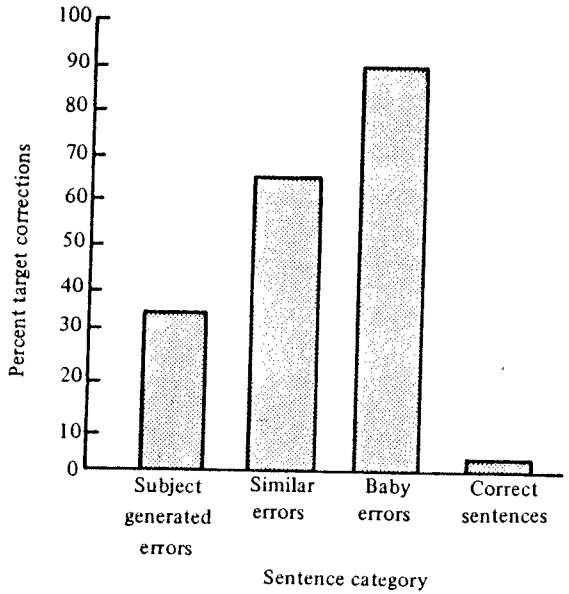

Fig. 1. Percentage of target corrections for the four different sentence types.

RESULTS

Correctness judgements

A breakdown of the results of the judgements of correctness is shown in Fig. 1. Of the sentences with subject-generated errors, 35·5 % were corrected; of the sentences with similar errors, 65·5 % were corrected, and of the sentences with baby errors, 90 % were corrected. Only 2·2 % of the correct sentences were 'corrected' (i.e. hypercorrected).

A comparison between the responses to the baby errors and the correct sentences provides evidence that all four children were responding to the grammatical structure of the sentences. For both the group as a whole and

for each individual, the differences between the number of sentences corrected in these two categories are significant ($P < 0{\cdot}0001$; Fisher exact probability test). In the baby errors group, most of the sentences were accurately judged as incorrect and subsequently corrected. In the correct sentences, most of the sentences were accepted as correct.

Further, there is a significant difference in the percentage corrected between the self-generated errors and the similar errors ($P < 0{\cdot}001$; Fisher exact probability test), indicating a fundamental difference between the two categories in judgements of grammaticality. The subject-generated errors were considerably less likely to be corrected than the similar errors. This finding was significant for the group as a whole and for each child individually.

Reliability test

The reliability check which was made on the wording of the children's corrections involved repeating the presentation of the first 30 sentences after completion of the entire set of sentences. Any change at all in the wording of the child's response was scored as a different judgement. This second presentation of the sentences resulted in a very stable pattern of the wording of the correction response. Of the sentences with SUBJECT-GENERATED and SIMILAR ERRORS, 77 % were responded to in exactly the same way as when first presented. Note that this is an extremely conservative way of measuring reliability, since even a very minor change in a long string of words is scored as a failure to replicate. This high replicability seems to provide evidence that children do indeed have fairly detailed internal models against which they compare new forms, and that the shape of these models may be significantly affected by previous production of the forms.

Specific strategies in corrections

The actual corrections given by the subjects indicate the presence of four specific strategies for coping with incorrect sentences: (1) *repetition* of part or all of the incorrect sentence prior to the attempt at correction; (2) *reformulation* and concurrent simplification of the sentence in order to make it sound better; (3) correction of an error by *another error*; and (4) *avoidance* of the incorrect sentence.

Repetitions. A sequence of repeating the incorrect sentence aloud and then making a correction was observed in each of the four children for a total of 17 times. Table 3 illustrates responses of this type.

Reformulations. There were 26 cases in which the sentence was completely reformulated. These sentences generally involved a simplification of the structure and a concurrent semantic change. For example, in several cases an incorrect past tense was changed to the present tense. Examples of this type of response and other variations of the reformulation/simplification pattern are given in Table 4.

TABLE 3. *Examples of repetition strategy*

Model sentence	Child	Child's response
This is himz chair.	Michael	This is himz chair...(giggle)...This is his chair.
I be happy.	Michael	I be happy...no, I do be happy?...I do be happy.
She gots two hats.	Emily	She gots...She does got two hats.
Someone tooks the records.	Emily	Someone tooks the records...Someone took the records.
And the hair camed off of it.	Andrea	And the hair camed off of it...the hair comed off of it.
Who hide it?	Andrea	Who hi...hid...Who hided it?
Daddy should have tooked his books	Andrea	Daddy should have tooked his book...taked his book.
That's my cat's Suki food.	Andrea	That's my cat's...Suki's food.
Her go school.	Andrea	Her...she's going to school.
Lisa can't find her shoeses.	Tim	Lisa can't find her shoeses...shoes.
I drinked Tang.	Michael	Drinked? No. I drink, not I drinked.
That's what I digged.	Tim	That's what I digged...dig...I mean digged, digged sounds better.
Hers is badder than mine.	Andrea	Hers is badder than mine...Hers is better than mine.
I eated all my carrots.	Andrea	I eated all my carrots...I ate all my carrots.

TABLE 4. *Examples of reformulation strategy*

Model sentence	Child	Child's response
They throwed them to me.	Tim	They throw them to me.
I drinked Tang.	Michael	I drink Tang.
I telled her.	Michael	I tell her.
At Easter I seed chocolate ones and purple ones.	Tim	At Easter I see chocolate ones and purple ones.
I feeled sick at home.	Michael	I feel sick.
I knowed the answer.	Michael	I know the answer.
She seed a yellow car.	Michael	She see the yellow car.
Robbie catched the ball.	Michael	Robbie catch the ball.
I runned through the sprinkler.	Emily	I run through the sprinkler.
They goed to the mountains.	Emily	They go to the mountains.
She goed to the store.	Andrea	She's going to the store.
I feeled the water in the flowers.	Andrea	I can feel the water in the flowers.
She seed a yellow car.	Michael	She watched a yellow car.
Forests are supposed to be big.	Andrea	Forests have to be big.
My slip-slops began to came off.	Andrea	My slip-slops are beginning to come off.
Lisa hasn't gave me anything.	Andrea	Lisa didn't give me anything.

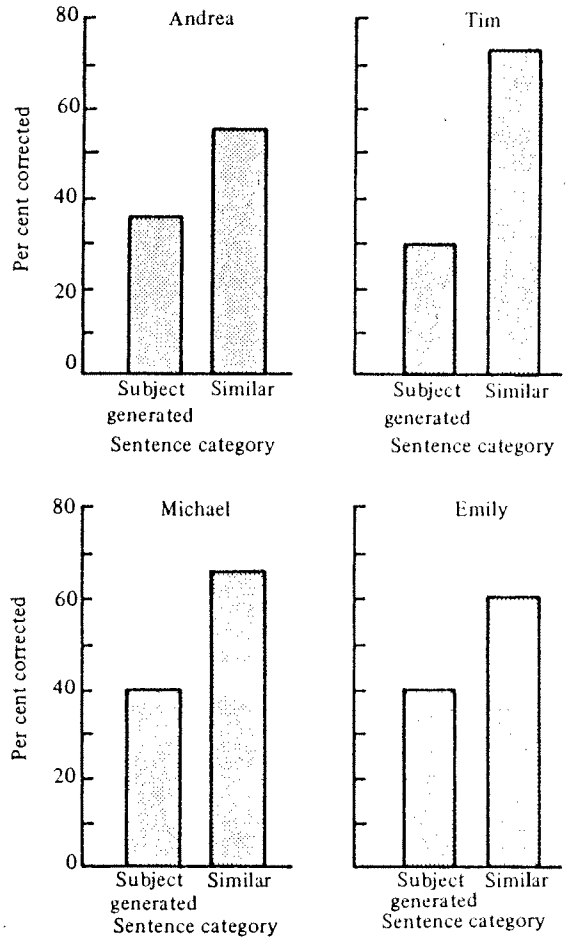

Fig. 2. Percentage of target corrections by each child for subject-generated vs. similar error sentence types.

Correction with another error. There were 19 instances in which a child corrected an error with another error. Examples of this type of response are seen in the sentences in Table 5. It should be noted that the last five examples are all instances of the child having corrected an incorrectly formed irregular past from the shape *irregular past + ed* to the shape *present stem + ed*. However, when presented with models of the form *present stem + ed*, such as *feeled*, *throwed*, or *buyed*, the children never 'corrected' such forms by producing the *irregular past + ed* form. Rather, they most frequently accepted the model form as correct (in 28/52 or 54 % of the presentations) and repeated the error; other responses were either accurate corrections to the irregular past (15/52

or 29% of the presentations) or erroneous corrections to the present tense stem (9/52 or 17% of the presentations). These data suggest that the child is capable of semantically processing the incorrect *past + ed* form, categorizing it as an error, and relating it to its corresponding present-tense base form. He does not accept the *past + ed* as correct, but neither does he produce the correct irregular past form. Kuczaj (1978) has reported that such forms as *gaved, camed* and *broked* (i.e. *past + ed* forms) are more likely to be accepted as correct by 5- and 6-year-old children, whereas forms such as *gived, comed,* and *breaked* (i.e. the *present stem + ed* forms) are more likely to be accepted by 3- and 4-year-old children. The four children in the present study would fall into Kuczaj's younger group and would thus be predicted to accept more frequently as correct the *present stem + ed* form of the past tense. In fact, this is precisely the pattern of responses that was observed.

TABLE 5. *Examples of correction with another error*

Model sentence	Child	Child's response
Daddy should have tooked his books.	Andrea	Daddy should have takened his books.
There's too many ice in my glass.	Andrea	There's too many ices in my glass.
Michael be here.	Emily	Michael are here.
You should have gaved me one.	Michael	You should have gived me one.
And the hair camed off of it.	Andrea	And the hair comed off of it.
Brielle wored her 'Brielle' dress today	Andrea	Brielle weared her 'Brielle' dress today.
Allison sawed me at Child Care yesterday.	Andrea	Allison seed me at Child Care yesterday.
The toy broked.	Andrea	The toy breaked.

Avoidance. In four cases there seemed to be an effort to avoid the original sentence, as if it did not sound right but the child did not know what to do about it. This particular strategy was also observed in a previous study with the 4-year-old daughter of the first author. These avoidance responses are given in Table 6.

In addition to these four strategies, one other tendency seems noteworthy. Some of the sentences in the BABY MISTAKES category – a total of 26 out of 90 sentences – have multiple omissions (i.e. are examples of telegraphic speech). In order to correct the sentence completely, more than one change must be made (for example, *Put truck window, Him a girl, Her go school, Where pencil?, Hand hurt, Big Bird go store* and *Mommy sit table*). While in most cases at least one element of the model sentence was changed, in 15 out of 26 corrections of such sentences, the sentence was not completely corrected. Table 7 lists these partial corrections. This pattern of partial correction would

TABLE 6. *Examples of avoidance strategy*

Model sentence	Child	Child's response
No, I aren't.	Andrea	Yes, you are... No, you aren't... no, it isn't... I do hurt sounds better. (*The child was referring back to the previous model sentence.*)
Put truck window	Emily	Put... what? Oh, I can't say that, it's too hard for me.
I made big two cookies.	Andrea	I made big two cookies... (*shook head*)... I saw (*pause*) one cookie (*pause*)... I made one big then I made one big two, then you're supposed to say one big two. (*The experimenter then asked,* 'How would you say it?') One's big and one's little.
The shoe is on the feet. (*using a picture of a shoe on one foot*)	Andrea	It's not on the feet. The shoe is off the feet (*referring to her own feet with shoes off*)... The shoe is lost... The shoe is on the big big big bigger feet. It's on the biggest feet.

TABLE 7. *Examples of partial corrections*

Model sentence	Child	Child's response
Put truck window.	Andrea	Put truck on the window.
	Tim	Put truck under the door.
	Michael	Put truck in the window.
Him a girl.	Michael	It is a girl.
	Andrea	He's a girl.
Her go school.	Michael	Her goes to school.
	Tim	Her goes to school.
	Emily	Her go to school.
Where pencil?	Michael	Where is pencil?
Hand hurt.	Michael	Hand does hurt.
Milk's on table.	Andrea	The milk's on table.

seem to indicate a possible limit on the number of elements that a 4-year-old is capable of processing on the metalinguistic level that is used to correct deviant sentences.

DISCUSSION

The children in this study were shown to be more likely to accept, judge as correct, and repeat their own self-generated grammatical errors than those comparable errors that they themselves had not produced. These results support the hypothesis regarding the role of errors as 'auto-input'. Children do, in fact, seem frequently to learn their own solutions to language structure

problems, to such an extent that these errors dominate for a while over the correct forms to which the child is more frequently exposed via reception. The primary source of the incorrect form must be the child himself. Additionally some common errors may be heard from playmates. Although this latter source of learning must be taken into account, it does not seem reasonable to consider it the primary source of the phenomenon under discussion. First, the children in this study were more likely to accept their OWN errors than those that were similar. Many of the subject-generated errors were relatively original constructions and not likely to be learned by rote merely through reception. Second, even given that children might tend to reinforce each others' mistakes, the frequency of exposure to the correct form would still be expected to be greater than the frequency of exposure to the incorrect form.

One question that may be asked with respect to the conclusion that children learn their own errors is whether the phenomenon is instead one of children simply learning NOT to make errors; that is, is it possible that the results merely reflect errors that the children have not yet learned not to make? However, the crux of the argument presented here is that children first PRODUCE the errors themselves, learn them from this production, and then at some later point learn that they are incorrect by reception of the correct form. Because frequent forms are the ones first acquired, they should be the ones first leading to errors. In order to test this claim, we used the longitudinal data presented by Kuczaj in his 1976 dissertation. A month-by-month speech sample of Kuczaj's son Abe from the age of 2;5 to 5;0 was examined in order to determine the age at which overgeneralizations of regular past formation of 31 irregular verbs first occurred. These ages were correlated with the frequency of the verb in its past tense form as estimated in the *American heritage word frequency book*'s list for 3rd grade text. A correlation of $-0{\cdot}365$ was obtained (Pearson's; $P < 0{\cdot}05$, 2-tailed), indicating that as the frequency of a given verb increased, the age of appearance of the first overgeneralization tended to decrease. Given the fact that the children in this study are pre-schoolers, rather than 3rd graders, and given the fact that frequency lists are subject to data biases of various sorts, the size of this correlation is particularly impressive. A better indicator of frequency in the input might well yield a considerably higher correlation.

Since the earliest errors involve frequent forms, the first sources of erroneous auto-input would also involve frequent forms. As Kuczaj (1978) has shown, acceptability of errors at a given age is a function of the kinds of errors children make at that age. When children are making errors like *eated*, they accept *eated* and reject *ated*. Later, when making errors like *ated*, *eated* is less often accepted. Note also that children initially go through a period of using the correct form of the past tense, *ate* – a form which must be acquired through reception. Later they begin to produce incorrect forms such

as *eated* and *ated* not available in reception and which therefore must be self-generated. The crucial point is that the child's own production of erroneous linguistic data serves to reinforce itself to a greater degree, at least for a time, than does correct receptive input from other sources.

There is at least one further alternative to the hypothesis of auto-input. This alternative postulates a rather direct relation between comprehension and production. According to this view a child who produces *foots* by rule may also have a rule in comprehension that accepts *foots*. In order to account for the pattern of results found in the four children observed here, we would have to assume that erroneous combinatorial patterns in production are, in general, matched by erroneous combinatorial patterns in comprehension. We must then ask how this matching arises. One possible mechanism would be some meta-rule specifying an automatic internal transfer. Alternatively, we can assume that the transfer occurs by auto-input during production. To compare properly these alternatives we would need to look at the metalinguistic judgements of subjects who had been deprived of auto-input for some time. It is clear that such a study could only be conducted if a period of temporary deafness had been induced in some population by a natural experiment.

Further implications

It is important to consider the implications of this phenomenon for language learning theory in general. The data presented here provide further evidence against theories of 'learnability' (Wexler & Culicover 1980, Pinker 1982) that are based on the assumption that children only learn language forms from other people and never receive or use negative data. In fact, children do provide 'negative instances' by producing them themselves. Furthermore, it would seem that, on some level, children have alternative (receptive) information about the correctness of productive forms and use this knowledge to come to know that these forms are wrong. Not only has it been shown that parents tend not to make grammatical corrections of children's language, but also that such corrections, when made, have little observable effect (Brown & Hanlon 1970). However, as can be seen from this argument, the child may be his own best teacher by providing himself with negative instances. This study thus provides more support for the validity of teaching oneself as an important way of learning.

The persistence of child errors against the receptive model provides evidence for the existence of auto-instruction. However, if children can teach themselves their own errors, then they can also teach themselves their own correct productions. Any number of correct combinations such as *jumped*, *giraffes*, *my dog*, *really dark outside* or *why don't you* could be unitary forms that the child originally pieced together and then ended up learning as single forms. Thus, it may be that large segments of the language ability of even adults derive from auto-instruction.

REFERENCES

Brown, R. (1973). *A first language : the early stages*. Cambridge, Mass.: Harvard University Press.

Brown, R. & Hanlon, C. (1970). Derivational complexity and order of acquisition in child speech. In J. R. Hayes (ed.), *Cognition and the development of language*. New York: Wiley.

Carroll, J., Davies, P. & Richman, B. (1971). *The American heritage word frequency book*. New York: American Heritage.

de Villiers, J. & de Villiers, P. (1972). Early judgments of semantic and syntactic acceptability by children. *JPsycholingRes* **1**. 299–310.

Jacoby, L. (1978). On interpreting the effects of repetition: solving a problem versus remembering a solution. *JVLVB* **17**. 649–67.

Kuczaj, S. (1976). -ing, -s, and -ed: a study of the acquisition of certain verb inflections. Unpublished doctoral dissertation, University of Minnesota.

—— (1978). Children's judgments of grammatical and ungrammatical irregular past-tense verbs. *ChDev* **49**. 319–26.

MacWhinney, B. (1975). Pragmatic patterns in child syntax. *PRCLD* **10**. 153–65.

—— (1978). The acquisition of morphophonology. *Monogr. Soc. Res. Ch. Devel.* **39**. (3).

—— (1981). Basic syntactic processes. In S. Kuczaj (ed.), *Language development : syntax and semantics*. Hillsdale, N.J.: Erlbaum.

Pinker, S. (1982). A theory of the acquisition of lexical interpretive grammars. In J. Bresnan (ed.), *The mental representation of grammatical relations*. Cambridge, Mass.: M.I.T.

Wexler, K. & Culicover, P. (1980). *Formal principles of language acquisition*. Cambridge, Mass.: M.I.T.

J. Child Lang. **10** (1983), 415–429. Printed in Great Britain

More negative findings for positive prepositions*

G. G. ABKARIAN
Colorado State University

(*Received* 1 *October* 1981)

ABSTRACT

Three- and four-year-old children were tested on their comprehension of the locative prepositions *in front of*, *in back of*, *ahead of*, and *behind*. Results demonstrated that those prepositions characterized as positive by H. Clark (1973) were, contrary to theoretical predictions, comprehended more poorly than their ostensibly negative counterparts. Discussion of the possible reasons for these findings is included.

INTRODUCTION

In the study of child language development, the decade of the 70s was characterized by the attempted wedding of concepts originating from two major disciplines: linguistics and cognitive psychology. In the realm of developmental semantics, the area of language most intimately involved with this disciplinary intersection, a ubiquitous explanatory theme is the semantic feature approach (E. Clark 1972, 1973, Anglin 1977), an approach closely tied to notions associated with marking theory and componential analysis in linguistics (Greenberg 1966, Lyons 1977). The idea that in paired lexical units one of the terms is more neutral (unmarked) has been widely employed in the language development literature, sometimes with contradictory findings (*big*, Maratsos 1973: *more/less*, Donaldson & Wales 1970; spatial adjectives, Eilers, Oller & Ellington 1974, Bartlett 1976, Townsend 1976; *this/that*, Clark & Sengul 1978, de Villiers & de Villiers 1974; *here/there*, Clark & Sengul 1978; *come/go – bring/take*, Clark & Garnica 1974; *before/after*, Harner 1976).

In the realm of locative terms, it has been proposed that these features stem from the child's conceptual understanding of space. Describing the child's development of spatial concepts, Piaget, his co-workers and disciples (Piaget & Inhelder 1956, Laurendeau & Pinard 1970, Sauvy & Sauvy 1974, Windmiller 1976, Pufall & Shaw 1973) have identified an ontogenetic progression from topological spatial relationships to projective and Euclidean relationships. Topological relationships, primarily one-dimensional, deal largely with

[*] Thanks to Judith Rae Johnston, who read and commented upon an earlier draft of this paper. Address correspondence to: G. G. Abkarian, Department of Communication Disorders, Colorado State University, Fort Collins, Colorado 80526, U.S.A.

Appendix A

Subject-generated errors and responses to correction task

A.P.

I feeled the water in the flowers.	I feeled the water in the flowers. I can feel the water in the flowers.
I don't got my shoes on.	I don't got my shoes on. I don't got my shoes on.
I want the seed took out.	I want the seed took out. I do want the seed takened out.
I catched a balloon.	I catched a balloon. I catched a balloon up in the air.
Liz is much more bigger than me.	Liz is much more bigger than me. Liz is much more littler than me.
I throwed it in.	I throwed it in. I throwed it in.
You should have gaved me one.	You should have gived me one. You should have gived me one.
Mine is gooder than anybody's.	Mine is gooder than anybody's. Mine is gooder than anybody's.
I drinked it all. ;	I drinked it all.
The back's the worsest today.	The back's the worsest today.
Erikalen gots some new sandals, too.	Erikalen gots some new sandals, too.
And the hair camed off of it.	And the hair camed off of it...the hair comed off of it.
I get to give you it, ok?	OK
Last night Lillian read (with present tense pronunciation) the bunny book.	Last night Lillian read (no change in pronunciation) the bunny book.
I weren't bothering her.	I weren't bothering her.
I got a BandAid because my knee bleeding.	I got a BandAid because my knee's bleeding.
I catched this.	I catched it.
And we can invite some people that been there the same.	And we can invite some people that been there the same.
I drawed a cow, Mommy.	I drawed a cow, Mommy.
Brielle wored her "BRIELLE" dress today.	Brielle weared her "BRIELLE" dress to
This is more longer than that.	This is <u>more</u> longer than that.
Erin's Collar mother is gonna go.	Erin's Collar's mother is gonna go.
No, I aren't.	Yes, you are...No, you aren't...no, it isn't. I <u>do</u> hurt sounds better.

Are we gonna do any else things?	Are we gonna do any more things?
The butterfly flied away.	The butterfly flied away.
Forestθs are supposed to be big.	Forestθs are supposed to be big... Forestθs have to be big.
My slip-slops began to came off.	My slip-slops are beginning to come off
It was in my hiding secret place.	It was in my hiding secret place.
Grandpa's fixing me a toast.	Grandpa's fixing me toast.
Who hide it?	Who hi...hid...Who hided it?

T.C.

I breaked through it.	I breaked through it. I broke through it.
At Easter I seed chocolate ones and purple ones.	At Easter I see chocolate ones and purple ones. At Easter I saw chocolate ones and purple ones.
Well, we'll give you it.	We'll give you it. Well, we'll give you it.
I saw them at the mountains way far.	I saw them at the mountains way far awa I saw them at the mountains way far.
I been to National Park.	I've been to National Park. I've been to National Park.
They kick it how high planes fly.	They kick it how high planes fly. They kick it how high planes fly.
I gived it to Robbie.	I gave it to Robbie. I gave it to Robbie.
Do you take how much I take?	Did you take how much I take?
They broked.	They broke.
When is she gonna be done to read it?	When is she gonna be done to read it?
[illegible]	[illegible]t.
We sure do got a lotta water.	We sure got a lotta water.
Then why don't you dig the walls more faster.	Then why don't you dig the sand out more faster.
That's what I digged.	That's what I digged...dig...I mean, digged. Digged sounds better.
You're just making more water coming in here.	You are just making more water coming in here.

You get sit on my lap.	You get <u>to</u> sit on my lap.
Does the hat come more up?	Does the hat come more further up?
I feeled a raindrop.	I felt a raindrop.
It runned away.	It ran away.
I'll make you it.	I <u>will</u> make you it.
I don't got any.	I don't <u>have</u> any. You don't say 'got' when you need to say 'have'.
I thought it was up in the tree but he fall down.	He fell down.
He throwed some sand up.	He threw some sand up.
There might be not any dinosaurs left.	There might be not any dinosaurs left; but there really is, right?
I've rided in an airplane.	I've rided on an airplane.
I'm doing to there.	I'm going to there.
What is her?	What is her?
It sticked.	It sticked.
Did you gave Michael one of those things?	Did you give Michael one of those things?
What else of the new ones do you have?	What else of the new ones do you have?
Its bends.	It's Ben's...It bends.

<u>M.R.</u>

I going home at 3:20.	I'm going home at 3:20.
	R: I <u>am</u> going home at 3:20...or I'm going home at 3:20.
Don't throw away those.	Don't throw away those.
	R: Don't throw away those.
It fall down slow.	I fall down slow.
	R: It fall down slow.
He gots the same as I got.	He gots the same as I got.
	R: He gots the same as I got.
I drinked Tang.	Drinked? No. I <u>drink</u> Tang, not I drink
	R: I drink Tang.
I feeled sick at home.	I <u>feel</u> sick.
	R: I feel sick.
Where my thing go?	Where did my thing go?
	R: Where did my thing go?

I telled her.	I told her.
	R: I <u>tell</u> her.
We already digged to the ground	We already digged to the ground.
No, me made it.	No, <u>I</u> made it.
How come these are bended?	How come these are bended?
Both of the time it went down.	Both of the time it went down.
Let's go both the same fast.	Let's go both the same fast.
He bited you.	He bited you.
Is two there?	Is two there?
I told you it go that fast.	I told you it <u>goes</u> that fast.

<u>E.K.</u>

My mom buy it for me.	My mom buy it for me.
Who buyed this for me?	Who buyed this for me?
If you hit, the teacher come and get you.	If you hit, the teacher will come and get you.
Would you write a flower for me?	Would you write a flower for me?
He gots a big brother.	He gots a big brother.
He sticked me on the leg.	He sticked me on the leg.
It didn't broke down.	I broke down.
Now it be green and not purple anymore.	Now it is green and not purple anymore
She gots two hats.	She gots...She does got two hats.
I writed it.	I...She writed it.
Who is this ducky's?	What?...Whose is this duck?
He teared my picture.	He teared my picture.
I want draw on another one.	I wanta draw on another paper.
I drawed on it already.	I drawed on it already.
I've got to take off this.	I've got to take off this.

Appendix B

Similar errors and responses to correction task

A.P.

We don't took our shoes off in the winter.	We don't take our shoes off in the winter. R: We don't take our shoes off in the winter (but I do).
Lisa hasn't gave me anything.	Lisa didn't give me anything. Lisa didn't get me anything.
I writed some numbers.	I writed some numbers. I writed some numbers.
Your swimming suit is more wetter than mine.	Your swimming suit is more wetter than mine. Your swimming suit is more wetter than mine.
She goed to the store.	She's going to the store..she went to the store, I mean. R: She's going to the store...She went to the store, too.
Daddy should have tooked his books.	Daddy should took his books. R: Daddy should have tooked his book... taked his books.
Hers is badder than mine.	Hers is badder than mine...Hers is better than mine. R: Hers is better than mine, not badder
I eated all my carrots.	I eated all my carrots...I ate all my carrots. R: I ate all my carrots.
My Mommy boughts new shoes.	My Mommy bought some new shoes.
The toy broked.	The toy breaked.
Jenny takes him it.	Jenny takes him it.
Last night I have hamburger for supper.	Last night I had hamburger for suppe
Daddy weren't in Guatemala.	Daddy waan't in Guatemala.
Mommy working.	Mommy's working.
Allison sawed me at Child Care yesterday.	Allison seed me at Child Care yesterday.
There's too many ice in my glass.	There's too many ices in my glass.
Daddy taked me to the baseball game.	Daddy taked me to the baseball game
Why don't you build the walls more higher.	No! Help Daddy build the walls more bigger.
She were in Mexico.	She was in Mexico.

That's my cat's Suki food.	That's my cat's...Suki's food.
I are listening.	I are listening.
This one's more better.	This one's more better.
Did I took one?	Did I take one?
Bath$s are a lot of fun.	Baths are a lot of fun.
Mommy started to ran after supper.	Mommy started to run after supper.
Daddy telled me to eat my breakfast.	Daddy <u>told</u> me to eat my breakfast.
Who is this ducky's?	Who are those duckies?
We have long three sticks.	We have long three sticks.
We maked a snowman.	We made a snowman.
Billy ride the tricycle yesterday.	Billy rode the tricycle yesterday.

<u>T.C.</u>

I runned through the sprinkler.	I runned through the sprinkler.
	R: I runned through the sprinkler.
I eated oranges and grapes.	I ate oranges and grapes.
	R: I ate oranges and grapes.
They throwed them to me.	They throw them to me. They threw them to me.
She comed to Montessori School.	She came to Montessori School. She came to Montessori School.
He gone to Boulder.	He went to Boulder. He went to Boulder.
It falled.	It falled. It falled.
I want read my book.	I want to read my book.
	R: I want...uh...I want to read my book.
Can you build the house more bigger?	Can you build the house more bigger?
	R: Can you build the house more bigger?
He tooks his bicycle home.	He took his bicycle home.
How are we gonna finish to build it.	How are we gonna finish to build it?
She's runs.	She's jogging.
She sure does bought a lot of groceries.	She sure does bring a lot of groceri
They're telling him going outside.	They're telling him to go outside.
He tooks his toys home.	He took his toy home...Is there only one toy?
Jenny takes him it.	Jenny took him it.
We goed to the mountains last week.	We <u>went</u> to the mountains last week.

Amy likes eat carrots.	Amy likes <u>to</u> eat carrots.
Robbie catched the ball.	Robbie Carmichael catched the ball.
We maked a river.	We made a river.
We build it how high skyscrapers are.	We builded it how high skyscrapers ar
We're going at the park.	We're going <u>to</u> the park.
They telled him what to do.	They told him what to do.
We might go not to the store.	We might go to the store...we might not go to the store.
Did you went to the store yesterday?	Did you went to the store yesterday?
Who is him?	Who is he?
Debbie readed me a story.	Debbie readed me a story.
I buyed a dinosaur book.	I buyed a dinosaur book.
That's the only else thing.	That's the only else thing.
Yesterday I have hamburger for supper.	Yesterday I had a hamburger for supper
I putted it on the table last night.	I putted it on the table last night.
	M.R.
She boughts a blue dress.	She <u>bought</u> a blue dress.
	R: She bought a blue dress.
I knowed the answer.	I know the answer.
	R: I <u>know</u> the answer.
Me went to the show.	<u>I</u> went to the show.
	R: <u>I</u> went to the show.
She seed a yellow car.	What? Is that right? (I repeated the sentence)...She watched a yellow car.
	R: She <u>seeee</u> the yellow car.
Last night I have hamburger for supper.	Last night I <u>had</u> hamburger for supper.
	R: Last night I had hamburger for supper.
Mommy working.	Mommy <u>is</u> working.
	R: Mommy is working.
Clean up it.	Clean up it.
	R: Clean up it.
He go to the grocery store.	He goes to the grocery store.
	He goes to the grocery store.
I have both book.	I have both books.

Robbie catched the ball.	Robbie catch the ball.
What Robbie draw?	What did Robbie draw?
They buyed some new books.	They buyed some new books.
She told me he run away.	She told me he run away.
Is four here.	(long pause, frown) Is four here?
He runned fast.	He runned fast.
We're both the same big.	We're both the same big.

E.K.

I runned through the sprinkler.	I run through the sprinkler.
I like read my book.	I like to read my book.
I weared my new dress yesterday.	I weared my new dress yesterday.
Why the dog won't eat?	Why the dog won't eat?
They goed to the mountains.	They go to the mountains.
Michael be here on Fridays.	Michael are only here on Fridays.
They didn't went to the playground.	They didn't go to the playground.
She taked me to the movie.	She took me to the movie.
Lisa draw two houses.	Lisa draw two houses.
She boughts a new dress.	She boughts a new dress.
Would you draw my name?	Would you draw my name?
If we're hungry, Mommy fix lunch.	If we're hungry, Mommy fix lunch.
Who gived me the puzzle?	Who gave me the puzzle?
I eat my cereal yesterday.	I ate the cereal yesterday.
Someone tooks the records.	Someone tooks the records...someone took the records.

Appendix C Sentences with "Baby" mistakes and responses to correction task

A.P.

Timmy has two book.	Timmy has two books. Timmy has two books.
Lisa can't find her shoeses.	Lisa can't find her shoes. Lisa can't find her shoes.
What you doing?	What are you doing? What are you doing?
Her go school.	I go to school. Her...She's going to school.
That a chair.	That's a chair. That's a chair.
This is himz chair.	This is his chair. This is tim's chair.
That's mine book.	That's my book. That's my book.
Him a girl.	She's a girl. He's a girl...he's a boy.
Can her play?	No. Can she play.
What's for it?	Uh...it's for you, Sally.
Mommy eat apples.	Mommy eats apples. You eat apples.
I have lots of animal.	I have lots of animals.
He sat in Mommy chair.	In Mommy's chair.
I no like that.	I don't like that.
I want a piece celery.	I want a piece of celery.
Put truck window.	Put truck on the window.
Milk's on table.	The milk's on table.
Where pencil?	Where's the pencil?
No do that.	Don't do that.
I be happy.	I'm happy.
Hand hurt.	The hands hurt.
Big Bird go store.	Big Bird goes to the store.
She's a nice Daddy.	He's a nice Daddy.
I writing numbers.	I'm writing numbers.
Mommy sit table.	Mommy sits at the table.
The mans are over there.	The men are over there.
Where Big Bird is?	Where is Big Bird?
I are not sleepy.	I am not sleepy.
I want a water.	I want a glass of water.
The cat chased two mouses.	The cat chased two mouses.

T.C.

Timmy has two book.	Timmy has two books. Timmy has two books.
Lisa can't find her shoeses.	Lisa can't find her shoeses...shoes. Lisa can't find her shoes.
What you doing?	What are you doing? What are you doing?
Her go school.	Her goes to school. She goes to school.
That a chair.	That's a chair. That is a chair.
This is himz chair.	This is Hillwilliam's chair. This is his chair.
That's mine book.	That's my book. That's my book.
Him a girl.	He's a boy. She's a girl...uh...he's a boy.
Can her play?	Can he play? Can she play?
What's for it?	What's for it? What's for it?
Mommy eat apples.	Mommy ate apples.
I have lots of animal. He sat in Mommy chair.	I have lots of animals. He sat in Mommy's chair.
I no like that.	I don't like that.
I want a piece celery.	No. I want a piece of celery.
Put truck window.	Put truck under the door. Don't say "Put truck window"; say"Put truck out door" or "Put truck outside".
Milk's on table.	Milk is on the table.
Where pencil?	Where is a pencil?
No do that.	Don't do that.
I be happy. Hand hurt.	I am happy. My hand hurts.
Big Bird go store.	Big Bird goes to the store.
She's a nice Daddy.	She is a nice Mommy, 'cause 'she' isn't a he.
I writing numbers.	I am writing numbers.
Mommy sit table.	My mommy sits at the table.
The mans are over there.	The men are over there.
Where Big Bird is?	Where is Big Bird?

I are not sleepy.	I am sleepy.
I want a water.	Please may I have some water.
The cat chased two mouses.	The cat chased two mice.

M.R.

Timmy has two book.	Timmy has two books. Timmy has two books.
What you doing?	What are you doing? What are you doing.
Her go school.	Her goes to school. Her does go to school.
Lisa can't find her shoeses.	Lisa can't find her shoeses. Lisa can't find her shoes
That a chair.	That is a chair. That is a chair.
This is himz chair.	This is his chair. This is himz chair...(giggle) This is his chair.
That's mine book.	That's my book. R: That's my book.
Him a girl.	It is a girl.
Can her play?	No. Can she play?
What's for it?	What's for it?
Mommy eat apples.	Mommy does eat apples.
I have lots of animals.	I have lots of animals.
He sat in Mommy chair.	He sat in Mommy's chair.
I no like that.	I don't like that.
I want a piece celery.	I want a piece of celery.
Put truck window.	Put truck in the window.
Milk's on table.	Milk is on table.
Where pencil?	Where is pencil?
No do that.	Don't do that.
I be happy.	I be happy...no, I do be happy?...I do be happy.
Hand hurt.	Hand does hurt.
She's a nice Daddy.	She's a nice girl.
I writing numbers.	I'm writing numbers.
Mommy sit table.	Mommy's sitting on the table.
The mans are over there.	The mans are over there.

Where Big Bird is?	Where <u>is</u> Big Bird?
I are not sleepy.	I...I'm not sleepy.
I want a water.	I want some water.
The cat chased two mouses.	The cat chases two mouses.

<u>E.K.</u>

Timmy has two book.	Timmy has two books.
Lisa can't find her shoeses.	Lisa can't find her shoes.
What you doing?	What are you doing?
Her go school.	Her go to school.
That a chair.	That's a chair.
This is himz chair.	This is himz chair.
That's mine book.	That's my book.
Him a girl.	Him a girl.
Mommy eat apples.	Mommy is eating apples.
I have lots of animal.	I have lots of animals.
He sat in Mommy chair.	He sat in Mommy's chair.
I no like that.	I don't like that.
I want a piece celery.	I want a piece of celery.
Can her play?	Can her play?
Put truck window.	Put...what? Oh, I can't say that; it's too hard for me.

Appendix D - CORRECT SENTENCES

That yellow flower sure is pretty.

I like carrots.

The car is in the garage.

That's a big cat.

I want some more ice cream.

It's a yellow book.

I see a table.

I don't like that.

Show me a pencil.

The television is off.

The table is very big.

Today is Friday.

The big plant needs some water.

We can color.

Eggs are good for you.

Fish live in water.

The plant has a flower.

One is a number.

The sun is very bright.

Bats eat mosquitoes.

The red house is big.

Cookie Monster is hungry.

We have a car.

Daddy goes to work.

We sing songs at Montessori School.

It's a very big book.

We eat supper in the dining room.

That tree is very big.

Billy has blue eyes.

That's a yellow pencil.