*THE LAD WAS A LADY, OR THE MOTHER OF ALL LANGUAGE LEARNING:
A REVIEW OF MOERK'S FIRST LANGUAGE: TAUGHT AND LEARNED*¹

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It happened many years ago, when Noam Chomsky was champion of all language explication and many psychologists' knowledge of Skinner's (1957) *Verbal Behavior* was restricted to reading that linguist's lopsided review (Chomsky, 1959). At a professional meeting, yet another speaker was holding forth about how children acquire language by bringing each rudimentary sentence into compliance with the rules that allowed a perfect fit for their language acquisition device (LAD) and that spit out each nonsense for failing to conform. Back in those days, linguists and psycholinguists considered a LAD to be a conceptual/physiological structure containing the universal rules that made the learning of language so supposedly easy for children. I raised my hand after the speaker had finished his talk and asked how the parent's behavior related to this acquisition of language. I was informed, in no uncertain terms, that parents had no effect on the acquisition of grammar. The behavior analyst who sat next to me sneered: "What did you expect him to say? That he analyzed the speech samples and looked at the interaction of parent and child behavior?" I admitted I had not expected that but I was hoping for some modesty on the speaker's part, something akin to "We have not yet examined all those relationships as carefully as we need to in order to answer your question." This was the era of "learning is unnecessary, indeed impossible when it comes to something as complex as the acquisition of language." A few of us tried to point out that no innate language acquisition device could account for the variety of languages that children learned, but we were told that this related only to meaning and not to the essence of language, namely grammar. Many of those who believe that language is

impossible for animals still present a similar argument because, well, animals simply do not have a language acquisition device.

Some of us persisted in arguing strongly against such appeals to a language acquisition device, citing both indirectly related data and what we felt was obvious logic to demolish it (e.g., Bruner, 1979; Salzinger, 1975, 1979). Bruner (1979) even wrote optimistically what he called a necrology for LAD.

Nonetheless, appeals to LAD persisted, with empirical support from a data set furnished by Brown (1973) and his fellow travelers. They believed in LAD, and set about collecting and analyzing the data after their own fashion. Brown's book, and indeed the papers that preceded it, marked an important milestone in the study of language acquisition at that time. Brown accomplished the difficult task of tape recording and incidentally writing down as much as possible while the child (Eve) and her mother were speaking so as to make certain that all was recorded exactly as the child and mother had said it.

Any attempt to disagree with Brown's (1973) generalizations required that the person disagreeing take the trouble to examine the data in detail. To his credit, Brown apparently was generous in making the data available for such reexamination. Ernst Moerk refined and extended the analysis of Brown's data, especially with respect to the interrelationship between the parent's and the child's verbal behavior. He is the prototype of the empirical scientist, who, as far as I can see, has stumbled on behavior analysis because of this thorough, unrelentingly empirical exploration of the data. By saying that he stumbled, I hasten to add that I do not mean he was blind to behavior analysis; on the contrary, I mean that because he kept his eyes open to the data, he came upon behavior analysis. As we shall see later, he did not therefore embrace behavior analysis, but at least he considered it very seriously. It is important to reiterate here that Moerk's analysis is based on the same data that Brown,

¹ Moerk, E. L. (1992). *First language: Taught and learned*. Baltimore, MD: Paul H. Brookes.

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his students, and colleagues used to arrive at very different conclusions. Thus, the occasion of the present review is the celebration of a new and still more compelling basis for declaring the demise of LAD as a tenable concept in an account of the acquisition of language.

Data and Theory

If we needed proof that one's theory at least partially determines what one finds, a clear case can be made by referring to the conclusion that Brown (1973) drew from his analysis of Eve's data:

In sum, then, we do not presently have evidence that there are selection pressures of any kind operating on children to impel them to bring their speech into line with adult models. It is, however, entirely possible that such pressures do operate in situations unlike the situations we have sampled, for instance, away from home or with strangers. (p. 412)

Brown then asserts an alternative that he and other cognitive psychologists have found most convincing: "that children work out rules for the speech they hear" (p. 412). I want to be clear about the use of the word "rule" before quoting Moerk about selective pressures on grammar, admitting along the way that Brown's choice of the word "selective" (although he denies its existence in language acquisition) is very much on the mark, given the effect of reinforcement.

The word "rule" in linguists' accounts of grammatical utterances differs from the word "rule" in the behavior analyst's phrase "rule-governed behavior." For behavior analysts, rules describe relations between actions and their consequences. For linguists, however, or for cognitivists more generally, rules do not describe, but are hypothesized to be operative principles of processes thought to underlie the behavior (Hineline & Wanchisen, 1989). Thus in grammar, rules are said to be the means by which simple declarative sentences are produced by a hypothesized cognitive mechanism. Miller (1981), who for a time at least accepted the Chomskyan approach, characterized rules in the following way: "Rules describe what people know, not what they do" (p. 89). To a behavior analyst, that description is flawed to the extent that the word "know" is not what we usually mean by that word. It is a way of describing sentences in a way somewhat sim-

ilar to describing the fall of a body through space. The rule does not tell you what causes the body to fall; it simply provides a detailed description of the fall. Whatever else the child does in uttering these first grammatical utterances, they are not under the control of other verbal utterances that the child makes to herself. For the cognivist, rules are conflated with operative principles in the child's first grammatical utterance. Moerk separates these two meanings as follows: "Descriptive rules need to be formulated that pertain to interaction processes and information utilization, but not for internally located competence or for a linguistic theory of the child" (p. 141).

But let us turn to the response that Moerk gives Brown on selective pressure. At the end of his book, Brown (1973, p. 368) asserts: "In sum, there is no clear evidence at all that parental frequencies influence the order of development of the forms we have studied. I am prepared to conclude that frequency is not a significant variable." In the analyses supporting that statement, Brown used general frequencies of parent input and the child's order of acquisition for the 14 earliest morphemes, including such prepositions as "in" and "on," to obtain a correlation of .26 (not statistically significant at the .05 level). To this, Moerk responds that he found "impressively high correlations between input frequency (parent usage) and age at acquisition, ranging from .50 to .80 when cause and effect data from *adjacent* time periods were related" (p. 49). As for the specific grammatical form to which Brown referred in the above quotation, Moerk found that the mother had been intensively modeling the construction shortly before Eve produced it. Moerk found "modeling, corrective feedback, massing" at various points in the protocols where apparently Brown did not. The same verbal response by the mother is called an "expansion" by Brown and "corrective feedback" by Moerk. And, I might add, we would call the same event a reinforcer, particularly for the cases in which the verbal response from the mother was accompanied by delivery of some object (or event) to the child following her utterance.

Many of Eve's utterances given as examples by Moerk in his book (and he presents many of them in table form as well as in the text) are plainly what Skinner (1957) would have called mands that were specifically reinforced

by consequences such as receipt of juice or a toy, appearance of a person, occurrence of an activity, or a remark that said that the activity was coming or that some other desirable event was about to happen. What is more, the "expansion" that the mother used was also selective, contrary to what Brown contended; it was not selective in the way usually expected by cognitive psychologists. What the mother did was to *shape* the grammatical utterances of the child, for when Eve said something almost correct, the mother regularly said something like "yes" and then presented what was essentially a discriminative stimulus for the fully correct response, thus both reinforcing the approximation to the correct response and providing a stimulus (the mother's verbal response) whose imitation would lead to the entirely correct response by the child. Eve's mother typically did this in an age-appropriate way as well, a commentary on her acumen. Apparently, Brown's rejection of parental effect is based on a view of conditioning as an all-or-nothing process in which only the entirely correct response warrants reinforcement and in which only obvious events (such as the presentation of candy) are accepted as signifying the occurrence of reinforcement. With such a definition of reinforcers, it is no wonder that Brown could have concluded that reinforcement failed to occur or had no effect.

Brown's (1973) assertion that frequency is irrelevant to the learning of language is challenged not only by Moerk but also by a study of artificial language in adults (Salzinger & Eckerman, 1967). Accepting Chomsky's (1957) declaration of the independence of grammar and meaning, that study used 10 nonsense syllables and function words to form simple declarative sentences (e.g., "The boy threw the ball," or in the study version, "And the piqy kews were beboving the nazer zumaps dygly") and passive negative queries (e.g., "Wasn't the ball thrown by the boy?" or in the study version, "Weren't the nazar zumaps dygly beboved by the piqy kews?"). The nonsense syllable sentences corresponding to the two grammatical forms mentioned above and their randomly ordered versions constituted the verbal material that subjects memorized. According to Chomsky, and Miller's (1962) interpretation of generative grammar, the sentences of greater complexity should have been more difficult to remember than the less complex

sentences; in fact, no significant differences arose that could be assigned to the different structures of the sentences. Rather, as in Moerk's analysis of Eve's speech, frequency of presentation turned out to be the critical variable in explaining the differences in recall for the sentences and the sentence elements.

Data Analysis

To return to the book under consideration, Moerk used the data collected by Brown and colleagues, who recorded Eve's and her mother's (occasionally, her father's and/or the observer's) interactions as Eve matured from 18 months of age for a period of some 10 months. As early as page 26, when Moerk is analyzing Eve's development of the present progressive (as in "What's the horsie doing" followed by Eve saying, "Horsie doing?"), he is led to conclude "These findings suggest extensive reliance upon immediate conversational cues, partial reliance upon rote formulas and they argue against rule-based performance." Psycholinguists quite often make much of the creativity or productivity of the early speech of children, but again and again, Moerk finds that it is the immediate model that the child copies, and copies often, that accounts for much of her performance. In other words, much of what the child does consists of echoic responses (Skinner, 1957). To document this, Moerk presents complex tables showing the distances between Eve's responses and her mother's modeling of that response, measured in number of intervening utterances. Moerk also alludes to pragmatic aspects of her speech, by which he seems to mean the emission of words as tacts (to use Skinner's classification system).

When Eve's mother asks her what she is doing, Eve replies with a grammatically incorrect response—"dance" instead of "dancing"—and Eve's mother immediately corrects her: "Oh, you're dancing." Moerk points out that even though Eve had said "dancing" in an earlier sample when cued by immediately preceding material, she failed to emit that form later, even when cued by the mother's similar progressive present: "What are you doing?" He cites this as more evidence against rule-based performance on Eve's part. The other correct present progressives are what he calls "formulas," by which he apparently means that independent phrases are occasioned by particular situations (are we talking about tacts

here?). In other words, Eve's activity of dancing occasioned Eve's verbal response to the mother's question about what she was doing, without benefit of a rule (*à la* Brown) to generate the correct grammatical form; Eve merely responded with the all-purpose word "dance," which apparently was controlled by the mother's question together with what Eve was doing. All of this occurred despite the fact that at other times Eve was able to emit all sorts of words ending in "-ing" as echoic responses.

Moerk presents raw data showing that the mother consistently supplied grammatical corrections for Eve's utterances. For example, in one sequence of 38 episodes, she provided missing elements for prepositional phrases in 33. These corrections, as we have already pointed out, can be viewed as shaping procedures, because the mother always seems to reinforce positively and then presents a model for the completely correct response. "One Fraser" says Eve, and the mother responds, "One for Fraser?"

Inspired by the above observation, Moerk appropriately asks: If the mother's corrections (reinforcers and discriminative stimuli for subsequent responses) occur with such frequency, do they, in fact, teach the child? He uses a very conservative index of the effectiveness of the mother's behavior by inspecting Eve's immediate response to what the mother said. Here is an example (p. 65):

Eve: "Cathy spill grape juice on plate."

Mother: "Cathy spilled grape juice on the plate."

Eve: "Cathy spill grape juice on the plate."

Eve's second utterance is not completely correct, but it is responsive to the mother's speech. The mother is a good shaper because she does not require, as Moerk points out, absolutely correct responses; she corrects a little at a time. Our author concludes (p. 68): "An evaluation of Eve's mastery levels from these samples again indicates that her performance does not rely on consistent application of a rule or pattern, neither of which is influenced by minor semantic changes." The immediately preceding utterance of the mother is critical.

In a chapter cleverly titled "Speaking of Time," Moerk again illustrates the importance of immediate repetition (echoic responses) in Eve's language acquisition. She

gets it right much of the time when her mother says it first, but she often returns to the incorrect form until she has uttered a relatively large number of correct repetitions. The sudden transition that would constitute evidence for rule learning is clearly absent. The word "did" in her mother's questions often acts as a discriminative stimulus for Eve to use the past tense verb form, and her mother's use of the exactly correct form (such as "_____ed") much more consistently leads to repetition of that form. We find many exchanges between mother and child (Table 1, p. 79) in which the mother tries valiantly to correct the meaning of what Eve is saying, only to find ultimately that she relents and, at the expense of meaning, finally settles for Eve's correct grammar. Immediacy in stimulus control of Eve's utterances was often salient, as illustrated by her responses to questions of the form "Did you _____ [containing a verb without the "-ed" ending]?" It resulted in the incorrect form (present tense), once again showing the supremacy of direct imitation over following a rule. Thus, in an example on page 86, Eve says, "Because I caught _____"; her mother responds, "You caught? What did you catch?" Responding to her mother's word "catch" as a grammatical correction of the word "caught," rather than as an attempt to find out what she caught, Eve responds, "I catch my bicycle." Eve responds to what sounds to her like a grammatical correction because that is apparently exactly what the mother usually engaged in. According to Moerk, grammatical corrections were quite frequent in the interchanges.

Most, if not all, studies of the acquisition of language in the young child pay no attention to the physical environment as determining what the child is saying. Consistent with this, Moerk (constrained by Brown's observations) seldom mentions the role of the environment other than the mother's (or other's) speech in controlling Eve's verbal behavior, except in the case of the verb "spilled," for which the author points out, "spilling things is a common occurrence in the life of a small child, and also in the activities of a mother who spends much time in the kitchen" (p. 95). Here, we have an example of the multiplicity of control over verbal behavior, namely the physical events and the verbal stimuli supplied by the mother.

Further interesting reports of Eve's language acquisition take the form of inspecting

what is usually interpreted as overgeneralization when young children emit such responses as "goed" or "comed." Eve's emission of the word "came" first occurred as part of an overworked formula in the new context, "all came back." This was not a matter of following a rule, although Eve did use the verb "came" in another formula: "Down came baby, cradle will rock" (not quite right); she later reverted to "Fraser comed and Cromer comed" right after the mother said, "They did." Apparently, "did" served as a discriminative stimulus for Eve's use of the "-ed" ending for the verb "come." According to the author, the so-called overgeneralization occurred after the mother used the word "did" as well as the correct regular past tense verbs that required that "-ed" ending.

Moerk presents another example of the role that frequency plays in the correct learning of the past tense of irregular verbs. Eve eventually learned to emit the correct form of several irregular verbs, such as "came" and "went," that occurred frequently. She did not, however, say "fell," repeatedly insisting—it seemed—upon "falled." Moerk found that in over 20 hr of exchanges, the mother uttered "fell" only nine times, the father once, and the observer three times. As for the feedback, she received "did fall" or "is falling." Thus, when Eve showed no improvement in her speech acquisition, it could be attributed to the fact that she heard few models of it—another case in favor of frequency as a critical variable to explain learning.

In general, we can conclude that Moerk found no evidence for "rules" of either the cognitivist kind or the behaviorist kind, in the early acquisition of language (the behaviorist account predicts that rule-governed behavior comes much later in the acquisition of language): Eve continued to make some mistakes in her past tense verbs, which again indicates gradual learning based on frequencies of particular reinforced patterns.

The next chapter describes the acquisition of future tense. Without going into the same detail as we did for past tense, suffice it to say that Eve's and her mother's verbal behavior showed that the latter provided the model for the use of such words as "going to" or "gonna" or "will," and also provided the consequences for her daughter's utterances. Moerk found a gradual increase in Eve's emission of those

future tense markers both preceded and followed by the mother's indicators of the future. Again, we find evidence of the importance of the mother's frequency of use—this time of the future tense—affecting the speech of her daughter. Thus, once again, Moerk presents evidence for the gradual acquisition of the future tense forms of verbs without benefit of rules to manage her speech. If rules accounted for Eve's acquisition of the future markers, then there would have been an abrupt change from incorrect to correct; instead we find here, as for other forms of grammar, incorrect followed by correct followed by incorrect followed by correct forms in an uncertain pattern, suggesting dependence on simple frequency instead of rule adoption by the speaker (very much like memory experiments such as the one mentioned above; Salzinger & Eckerman, 1967).

In his discussion of the acquisition of syntax, such as the sequencing of words, Moerk argues that nonverbal as well as verbal stimuli are critical in the talk one hears from young children. With respect to the former, he says (p. 149), "Young children talk almost exclusively about objects they see and play with, about pictures in books, and about observed or remembered events." All of which contradicts Chomsky's and many cognitive psycholinguists' view of language acquisition, for these theorists disavowed the importance of the verbal behavior and nonverbal environment that surround young children. Psycholinguists have stressed the concept of creativity or generativity, a concept suggesting that, instead of responding to their immediate verbal or nonverbal environment, children emit speech without benefit of stimuli. With respect to the verbal environment, Moerk calls our attention to studies of what has, inelegantly but descriptively, come to be called "motherese": Mothers apparently modulate their speech to instruct or at least to communicate and understand what their charges are saying. Lastly, Moerk also points to the rather large units of speech that children learn to imitate as complete units (Salzinger, 1973), the sayings and rhymes from poetry that are often recited to children and regularly imitated by them.

Some readers may wonder why I keep stressing these rather similar and obvious points. If so, we must emphasize that the demonstration of these trends of environmental ef-

fects in a detailed and extensive empirical study runs strongly counter to the cognitivist literature, which is replete with statements about the independence of speech of everything but the language acquisition device planted firmly somewhere in the mind of the child. Early sentences or approximations of sentences seem to occur as requests by Eve, utterances that Skinner (1957) would have called mands. She asks her mother to read; she asks for juice, for cookies, for Fraser (an observer), and so on. In fact, Moerk asserts that much of Eve's language training took place while eating and drinking; he says that this must have helped Eve attend to the sentence forms. Can reinforcement have been absent here?

It may be of some interest to note here that the acquisition of language by children who do not acquire it without some special training has typically been aided by food reinforcers. In our own laboratory some years ago (Salzinger, Feldman, Cowan, & Salzinger, 1965), we trained a 4-year-old boy who had not yet acquired language by first conditioning his tact responses to pictures in books as well as to the physical environment around him by reinforcing his imitations of what we said. Eventually, we spent an entire session teaching him the mand, "Give me candy," which he imitated by saying "Gimme candy." Following that, he "inserted" many of his tacts into that sentence frame "Gimme _____," such that he said "Gimme book" when he wanted the book and "Gimme toilet" when he needed to go there, even though he had never been specifically trained to say those sentences, although we always talked about everything we were doing when we were doing it with our subject. And of course we reinforced his "new" responses as we had his original imitation. Eve apparently learned in a like manner (although clearly at an earlier age than our subject). We find such frame-filling behavior in Eve (Table 5, p. 167) as "Want lunch," "Want bibby," "Want more grape juice," "Want more . . . cheese sandwich." It is of interest to ask whether this kind of learning relates to the stimulus equivalence literature (e.g., Hayes, 1991); stimulus equivalence may well be a support for the formation of verbal stimulus classes and may also relate to the formation of verbal response classes (Salzinger, 1967).

In chapter 7, Moerk tries to show that both

psycholinguists and behavior analysts are wrong in the characterization of the language acquisition process. He correctly blames psycholinguists for burdening the child with "heavy processing demands," meaning that they have to be capable of learning that is too complex for the age at which they acquire language; on the other hand, he incorrectly suggests that behavior analysis assumes a passive-association kind of learning for explaining language acquisition. Although Moerk's analysis neatly fits the behavioral conception of learning, he appears not to be so well acquainted with it as to recognize its applicability. Instead, Moerk characterizes his approach as a skills-learning model to explain his careful analyses, without noting the relevance of behavior analysis to skills learning.

In his last chapter, Moerk unfortunately makes other misinterpretations of the radical behaviorist approach to verbal behavior (see Salzinger, 1978) when he says (p. 214), "In a typical behaviorist approach, learning is based on simple frequency of repetitions of input in an unchanged organism. . . . With cognitive progress, a 'different organism' encounters the new input." He goes on to say that the new organism "interprets the new input differently." Whereas we would not wish to appeal to a process of interpretation, we would, of course, state quite unequivocally that learning makes an organism respond differently to the same physical stimulus, or to a stimulus complex in different ways. Whatever else do we mean by the phrase "conditioned stimulus" or by acquisition of successively more complex repertoires?

I found myself somewhat frustrated as I read the final chapter of this book. The evidence so clearly points to the superiority of a behavioral approach over a cognitive one that the so-called middle path that Moerk takes in what he calls a skills model of language acquisition comes as a disappointment. The rejection of the behavior-analytic approach by Moerk stemmed, I am afraid, from his less-than-complete understanding. Given the fact of his superior empirical analysis, I should probably be willing to settle for that. Nevertheless, it is clear to me that we behavior analysts still have an educational job before us to make certain that when our approach is rejected (or perhaps more accurately not fully

accepted), we make certain that it is better understood so that further progress can make use of behavior-analytic systematization.

Despite my ending on a critical note, I think that behavior analysts have much to gain from reading this book and discovering what happens when data win out over theory. What Moerk has shown us is that the mother of all language acquisition in the child is, in fact, the child's mother.

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