Less is Not More: Further Observations on Nonlinguistic Strategies

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In an attempt to clarify the role of nonlinguistic preferences in children's responses to the words more and less, children 3-4 years of age were administered three tasks. Two of these required the child to indicate which of two arrays had more or less items, as instructed; the third task required the child to point to any one of two arrays. Children consistently selected the arrays with more items on all three tasks. The present finding of a response bias necessitates a reinterpretation of earlier studies of more and less. The results are discussed in terms of the full and partial semantics hypotheses as articulated by E. Clark.

The claim that young children, some time prior to their understanding of the word less, treat less as a synonym of more (Donaldson & Balfour, 1968; Donaldson & Wales, 1970; Palermo, 1973, 1974) has generated considerable theoretical interest in the realm of semantic development. In fact, generalizations from these data comprise an integral part of one prominent theory of the acquisition of word meaning (E. Clark, 1973a). Regarding the "less is more" case as a prototype of relational adjective pairs H. Clark (1970) and E. Clark (1973a) have proposed that such inappropriate usage stems from an incomplete understanding of less which links the term to the appropriate dimension, in this case, quantity (+Amount), but to the inappropriate polarity, positive (+Polar) rather than negative.

Examination of the data which form the basis for the child's apparent semantic confusion (Donaldson & Balfour, 1968; Palermo, 1973, 1974) suggests that alternative interpretations of these data are not only possible but plausible. In each of the experiments which reported the "less is more" phenomenon children were requested to respond to questions or commands which contained the word more in some cases and less in others. While children's responses to more questions were consistent with possible comprehension of the term, these responses could not definitively prove that children clearly understood this word. One alternative...

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explanation which can account for these responses to more questions as well as observed responses to less questions is that children simply attended to the arrays with greater perceptual salience, that is, the arrays with more items. Thus, children might have been selecting the larger of the two arrays in spite of, rather than because of the experimenter's instructions. That such nonlinguistic preferences may be operative has been suggested by Huttenlocher (1974) and by Holland and Palermo (1975).

E. Clark (1973b) has offered a reinterpretation of the data in terms of the child's partial understanding of more and less coupled with these nonlinguistic preferences. The partial understanding refers to the child's presumed knowledge that more and less denote some or quantity (+Amount); the nonlinguistic strategies refer to the child's presumed tendency to choose the greater of two objects in terms of numerosity or extension, making it appear that he has the feature (+Polar). In short, E. Clark's shift of emphasis comes in her deletion of the feature (±Polar). This modification has been termed "the partial semantics hypothesis" (p. 163) in contrast to "the full semantics hypothesis", which interpreted less as more.

Given the increasing theoretical prominence of nonlinguistic factors in the child's acquisition of language (Clark, 1973b; Sinclair, 1975; Slobin, 1973) it is indeed surprising that these have not been the object of much empirical investigation. With respect to relational adjective pairs Klatzky, Clark, and Macken (1973) have postulated a conceptual basis for their finding that children 3–5 years of age more readily learned nonsense-syllable designations for the positive ends of the dimensions of size (big), height (tall), length (long), and thickness (thick) compared to their negative counterparts (small, low, short, thin). Similarly, Estes (1976) found that children 4–7 years of age mastered discrimination problems more rapidly when the stimulus card with more rather than fewer elements was designated positive.

Although the Klatzky et al. (1973) and Estes (1976) studies suggest that nonlinguistic strategies or biases do operate to facilitate certain kinds of learning these studies do not bear directly on the preferences which may be operative in the typical tasks of the more–less studies.

Accordingly, the objective of the present investigation was to provide empirical confirmation of the nonlinguistic preferences postulated by Clark (1973b) with respect to children's responses to more–less questions. This was accomplished by ascertaining whether children who err on less questions show a behavioral preference which predisposes them to select arrays with a greater number of items rather than those with fewer items. Their performance was assessed in two types of situations, one in which they were required to indicate the array with more or less items, and the second in which they were merely required to point to any one of the arrays. Since the words more and less were
not employed in the latter task a predominance of responses to either array would be indicative of a response bias. Moreover, a comparison of performance in these two situations would reveal the extent to which non-linguistic preferences might be presumed to account for the responses to more and less questions.

**METHOD**

*Subjects*

The subjects were 18 children 3 years, 6 months to 4 years, 2 months of age (mean age 3 years, 11 months) who attended a private nursery school in suburban Toronto. There were nine girls and nine boys.

*Experimental Tasks*

Three different tasks were used, two of these to assess the child's understanding of the terms more and less and the third, to assess the possibility of a response bias. Although two of these tasks were essentially replications of the static inequality tasks of earlier studies various procedural changes were introduced in order to heighten the child's interest. All three tasks involved the presentation of two arrays, one with six items, the other with three items. In the Point More-Less task children were requested to point the array with more (less) items with the following instruction, "Here are two piles of Xs. Point to the one with more (less)." In the Animal More-Less task children were given one of a set of rubber toy animals (e.g., horse, cow, zebra, giraffe) and were requested to make the animal perform a specified action (e.g., run, jump, lie down). They were then asked to make the animal perform that action in relation to the array with more (less) with the following instruction, "Here is one pile of Ys and here is another one. Make the horse (cow, zebra, etc.) run to (jump over, lie down on, etc.) the one with more (less)." In the Point Any task children were told to point to one of the arrays with the following instruction, "Here is a pile of Zs and here is a pile of Zs; point to one of them."

There were eight questions for each of the Point More-Less, Animal More-Less and Point Any tasks for a total of 24 questions. For the Point More-Less and Animal More-Less sets of questions half of these involved more, the other half, less in the instructions. There were 24 sets of arrays for the experimental questions with additional sets for sample trials. The materials in the arrays consisted of small objects like band-aids, miniature plastic flowers, wooden figures, unshelled peanuts, lima beans, sticks, macaroni, etc. In the case of very small objects like macaroni and lima beans these were glued to cardboard cards. The arrays were not linear nor were they patterned in particular ways; instead they varied unsystematically from trial to trial.
Procedure

After a familiarization period in the nursery school classroom during which both experimenters participated in classroom activities the experimenters then invited individual children, in turn, to play some games in a specially designated game area outside the classroom. Each child was seated at a small table facing a seated experimenter. An assistant seated beside the experimenter placed two arrays of objects in front of the child. The experimenter then determined whether children would readily point to one array when requested to do so. For those children who did not readily point, a series of different pairs of arrays were set out in succession until the children responded appropriately. In similar fashion the experimenter used sample tasks to ensure that children could perform the responses required in the other tasks.

The experimenter then proceeded to the 24 experimental questions in randomized order. For each of the 24 questions the assistant placed different sets of materials in random order on the table. The arrays were placed on the table such that the array with a greater number of items occurred with equal frequency in right and left position. Following the completion of each testing session the experimenter and assistant exchanged roles. Each testing session was approximately 30 minutes in duration. Data gathering for the entire sample was completed within a 2-week period.

RESULTS

Of the 18 children tested, 8 of these made no errors on any of the less questions. These subjects also made no errors on more questions. In fact, error-free performance on one of the more–less tasks was always associated with error-free performance on the other.

The distribution of responses on all three tasks is presented in Table 1.

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<tr>
<th>Instruc-</th>
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<td>Less</td>
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<td>Point any</td>
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Considering first the 10 children with less errors, it can be seen that in the case of the two more-less tasks an overwhelming proportion of the total responses were more choices, both to more and to less questions. Specifically, when children were asked to point to the array with less items, 87.5% of their responses consisted of pointing to the array with more. Similarly, when instructed to make the animals act on the array with less items they proceeded to act on the array with more items on 92.5% of all trials. Moreover, it is also apparent that on the Point Any task in which the comparative terms more and less were not employed choices of the array with more items predominanted. Specifically for 10 children with less errors on the other tasks 91% of their responses on the Point Any task were choices of the larger array. In fact each of these children selected the larger array on five or more of the eight Point Any questions (p = .002, binomial expansion).

For these subjects with less errors a chi-square analysis was employed to evaluate the relation between the instructional set for each task (selecting the array with more or less or selecting any array) and the incidence of choosing the array with a greater or fewer number of items. Results of this analysis indicated that children’s responses were independent of task instructions ($\chi^2 = 0.84, p > .90$).

It can be seen from Table 1 that subjects with no errors on the more-less tasks also displayed an apparent tendency to select the array with more items on the Point Any task. An examination of the data from the subjects in this category revealed that the larger array was selected on 68.75% of all trials, a value which differs significantly from the percentage of more responses (91) made by the 10 subjects with errors ($z = 3.33, p < .01$). Of the eight correct responders six chose the larger array on five or more trials. Thus the apparent response bias for this subgroup was not significant ($p = .29$, binomial expansion). There were no age or sex differences for the subgroups of children with and without errors.

**DISCUSSION**

It is clear that children who did not understand less selected the array with a greater number of items when requested to select the one with less. Moreover, they chose the array with a greater number of items when asked to choose the one with more. In this sense the present experiment confirms the findings of Donaldson & Balfour (1968) and Palermo (1973, 1974). No developmental trend was evident in the narrow age range studied. Rather, children with errors were the same age as those without errors.

However, the finding of greatest interest in the present study was that the selection of the larger array occurred not only in the aforementioned instances when the terms more and less were included in the instructions
to the child but also in cases where these terms were systematically excluded. In fact, children were as likely to respond in that manner without the terms *more* or *less* as with them. Thus the present authors, rather than acceding to the notion that children understand *less* as *more*, concur instead with E. Clark’s (1973b) revised view that children’s predilection to act on the world in particular ways has simply been misinterpreted as a case of semantic overextension.

A parallel instance of nonlinguistic strategies generating apparent semantic overextension has been reported by E. Clark (1973b) with respect to the locative terms *in*, *on*, and *under*. While the pattern of responses to *in* and *on*, for example, made it appear that children first had the features (+Locative) and (+Containment), evidence obtained in a situation in which the terms were not employed revealed that children were more likely to place an object inside rather than on a container. Accordingly, E. Clark argues that semantic knowledge of the locative terms is first restricted to an understanding that these terms refer to spatial location (+Locative). This feature, in conjunction with certain nonlinguistic strategies (favoring *in* over *on* responses, and *on* over *under* responses), is presumed to yield the observed pattern of results.

E. Clark’s characterization of children’s earliest semantic understanding of these locative terms with the feature (+Locative) is similar to her characterization of their semantic knowledge of *more* and *less* with the feature (+Amount). While children’s consistent construction of locative relations in response to instructions with *in*, *on*, and *under* lends weight to their possession of the feature (+Locative), there are no comparable data with respect to *more−less* which provide unequivocal evidence for possession of the feature (+Amount). In fact, the powerful response bias may well account for all responses on all tasks, at least in the case of children with errors.

One alternative interpretation of the present finding of a response bias is that children in the present study may have responded to all questions in similar fashion because of a procedure which involved Point Any questions being interspersed with *more−less* questions. In other words, children may have responded to Point Any questions as if they were *more−less* questions. In order to rule out this possible artifact an additional control group of 12 children 3 years, 6 months to 4 years, 3 months of age (mean age 3 years, 11 months) who had not been tested on *more−less* questions was tested on eight Point Any questions. In this case 71% of all responses were *more* responses, with 10 of the 12 children choosing the array with more items on five or more trials ($p = .04$, binomial expansion). In light of our earlier findings of greater bias for subjects with errors, it is likely that the bias of control subjects would be even larger if children who could perform correctly on the other tasks were excluded.
An unresolved issue concerns the difference in response preference between children with errors compared to those without errors. Does this represent a stable phenomenon of individual differences? Does the existence of such a bias increase the likelihood of error on any two-choice tasks? On the basis of the present data there is no way to ascertain whether the bias causes or results from inadequate comprehension. Clarification of this issue could be accomplished through developmental investigation.

Kavanaugh (1976) has recently pointed to inherent methodological weaknesses of the more–less tasks which preclude adequate evaluation of the less is more phenomenon. Nevertheless, he allows that the procedure can reveal which of the terms is easier to comprehend. However, the demonstrated perceptual biases make the evidence for relative ease of comprehension as unsatisfactory as that for synonymy.

On the basis of this and other investigations of more and less how can one characterize children’s understanding of these terms? Notwithstanding the fact that perceptual biases generated a pattern of responses which was identical to the pattern of responses on more–less tasks, the present authors do not propose that children have no understanding of more and less. Rather, it is argued that the bias makes it impossible to assess the meaning of these terms with the standard two-choice tasks. The response preference could conceivably obscure children's comprehension or lack of comprehension of these terms.

In addition to the perceptual biases which are relevant to these more–less tasks it is likely that other biases are operative in different language comprehension tasks with young children. For example, in a study of young children’s comprehension of locative relations Wilcox and Palermo (1975) demonstrated the existence of response biases which stem from motoric and contextual considerations as well as from response strategies of perseveration and alternation. In short, these biases argue convincingly against the usual practice of evaluating observed responses against chance performance where equal probability among alternative responses is assumed to prevail. Instead, investigators of child behavior are cautioned to establish empirically the distribution of response preference in tasks involving a limited number of response choices.

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