

# REPETITIVE NAMING AND THE DETECTION OF WORD RETRIEVAL DEFICITS IN THE BEGINNING READER

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It has often been claimed that many elementary school children with reading disorder experience word retrieval problems, a difficulty they share with most adult aphasics (e.g., Goodglass, 1980; Howes, 1964). Support for the claim derives largely from studies of children's performances on object-naming tasks. The most widely used procedure for testing naming is by a so-called confrontation naming test. The subject is presented with objects one at a time and is required to name each item as it appears. Generally, each pictured object is presented only once. Reading disabled children have been found to make a greater number of errors on this task than normal readers (Denckla and Rudel, 1976a; Jansky and deHirsch, 1973; Mattis, French and Rapin, 1975).

Other studies, however, have failed to find evidence of naming problems in poor readers. Response times of less-skilled readers have been found not to differ from those of skilled readers on objects, colors, or digits (Perfetti, Finger and Hogaboam, 1978; Stanovich, 1981); less-skilled readers responded as quickly and as accurately even in studies using letters as stimuli (Stanovich, 1981; Wolford and Fowler, 1984). The choice of subjects may partially account for these discrepant findings. The first-mentioned studies obtained subjects from learning disability clinics whereas the latter recruited poor readers from ordinary school classes. Thus, it is possible that these studies tested children with more severe reading disability and more severe associated cognitive deficits than the second series. The task employed may also account for the variability in the results. It is possible that naming deficits may exist even in the more moderately impaired poor readers, but that confrontation naming tasks

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are not sensitive enough to detect them reliably.

This possibility is suggested by studies using another procedure. An alternative naming task involves continuous rapid naming of a small set of repeated pictured items, typically drawn from a single category. The task requires the subject to scan the display of pictures arrayed in horizontal rows and to name each picture in succession as rapidly as possible. Each item occurs several times and at various positions in the display. Such a repetitive naming test was used by Denckla and Rudel (1976b) to compare normal readers with a group of severely disabled readers selected from special school programs and clinics. The results indicated that the overall response times of these poor readers were longer than those of normal readers on every category of item tested (objects, digits, colors, and letters).

It is apparent that the two types of naming tasks are quite different in the demands they make, and that each provides us with different information. The repetitive naming task is the focus of our interest here because of the discovery that response times on this task reliably differentiate normal and poor readers even on producing response words of high frequency (Denckla and Rudel, 1976b). These findings raise the possibility that some less-skilled readers have a general problem in word retrieval that could not have been discovered using the apparently less-sensitive confrontation naming test. But to date, only one study (Blachman, 1981) has tested repetitive naming with a whole (first-grade) school class. It was found that color naming and letter naming correlated with reading ability, but object naming did not. However, the age of the subjects in the Blachman study limits the conclusions that can be drawn. Tested in the first grade, these children may not have been old enough to permit the reading problem cases to be identified.

The purpose of the present study was to examine whether there is a relationship between naming times on a repetitive naming task and reading ability among second-grade children selected from ordinary school classes. Naming ability was tested with the following categories of items: pictured objects, pictured animals, colors, letters, and words. If the less-skilled readers have consistently longer naming times than the skilled readers, then they may have general word retrieval deficits. If, on the other hand, a relationship between reading ability and naming time holds only for selected categories of items, then it may be possible to delimit specific explanations for why the less-skilled readers are slower at repetitive naming of these types of test materials and not others. In the latter case, some potential explanations, such as differential familiarity with the classes of stimulus items, should be considered. Other explanations, based solely on the mechanical aspects of repetitive naming, such as efficiency of scanning, could be ruled out.

## MATERIALS AND METHOD

*Subjects*

The subjects were the 18 children from two second-grade classes in a suburban Connecticut public school, for whom parental permission for testing was granted. Of these, two were excluded from testing because English was a recent second language. The remaining 16 children were given the word identification and word attack subtests of the *Woodcock Reading Mastery Tests* (Woodcock, 1973) and the *Peabody Picture Vocabulary Test* (PPVT) (Dunn, 1959) near the end of the school year. The eight children (6 females, 2 males) with the highest combined raw scores on the two Woodcock subtests were designated the skilled readers.<sup>2</sup> The eight remaining children (5 females, 3 males) were designated the less-skilled readers.

The skilled readers had a mean combined Woodcock score of 140.2 (range: 129 to 164), compared with the less-skilled readers' mean of 92.6 (range: 50 to 128). Moreover, the two reading groups achieved significantly different scores on each of the two component parts. On the word identification subtest (which tests the reading of single words) alone, the skilled readers' average reading grade level was 3.9 (range: 3.3 to 5.6), whereas the less-skilled readers' average was 2.8 (range: 2.2 to 3.6),  $t = 4.1$ ,  $d.f. = 14$ ,  $p = .002$ . On the word attack subtest (which tests the reading of pseudowords), the skilled readers' mean reading grade level was 5.8 (range: 4.1 to 12.9), compared with the less-skilled readers' mean of 2.6 (range: 1.2 to 6.1),  $t = 4.6$ ,  $d.f. = 14$ ,  $p < .001$ . IQ scores derived from the PPVT yielded the following results: the skilled readers obtained a mean IQ of 118.6 and the less-skilled readers 94.4,  $t = 4.7$ ,  $d.f. = 14$ ,  $p < .001$ . A difference in the mean age of the members of the two groups was evident also; the skilled readers' mean age was 7 years, 9 months, whereas the mean for the less-skilled readers was 8 years, 4 months,  $t = 3.9$ ,  $d.f. = 14$ ,  $p = .002$ . In anticipation of the results, we should mention that the differences in IQ and age, which distinguished the two reading groups, were apparently of no consequence.

*Tests*

The test stimuli (printed words, letters, colored squares, and line drawings of objects) were arrayed in consecutive rows in a manner similar to that of Denckla and Rudel (1974, 1976b). Each array consisted of five items of a single category, each of which was presented a total of 10 times in a matrix of 5 rows of 10 on white cardboard. The order of the items was random with the constraints that no item immediately succeed itself and that each item appear twice in every row. The categories, and the specific stimulus items in each, were: 1) line drawings of animals (*bird, cow, dog, goat, pig*); 2) objects (*ball, box, door, hat, table*); 3) colors (*blue, green, red, yellow, black*); 4) lower-case letters (*a, d, o, p, s*); and 5) common words (*ball, box, door, hat, table*). For each chart, a practice sequence consisting of the five items was constructed.

*Procedure*

Each child was tested individually in one 30-min. session. At the beginning of the session, the child was given the Woodcock and PPVT. Following a brief

<sup>2</sup>The use of combined scores seemed justified in light of the high correlation between the children's scores on the two Woodcock subtests,  $r = .89$ ,  $d.f. = 14$ ,  $p < .001$ .

memory test, the naming tests were given. The charts were always presented in the following order: objects, colors, letters, words, animals. Before being tested on a chart, the child was asked to name the five items in the practice sequence in order to ensure that standard names could be elicited to each item. Every child was able to do this without hesitation.<sup>3</sup> Then the subject was instructed to name each item on the chart as rapidly as possible without making any mistakes, following along the rows from left to right. The child began the task on a signal from the experimenter. The experimenter responded to hesitations with the injunction to "Keep going". A stopwatch was used to measure the time from the child's first response to the last response.

## RESULTS

The first point to be noted is that naming errors occurred infrequently, as was expected. Accordingly, the data base consisted of the naming times on each class of items. These are shown in Table I. It can be seen from the table that the naming time varied considerably with item type. The order of response times across item types is generally consistent with that of previous repetitive naming studies (Biemiller, 1977-1978; Blachman, 1981; Denckla and Rudel, 1974, 1976b). Moreover, it is a standard finding that it takes longer to identify pictured objects than to read the objects' names. This result has been obtained both with adults (Cattell, 1886; Potter and Faulconer, 1975) and with children (Ligon, 1932; Seymour and Porpodas, 1980). It is of interest to discover that it applies even to readers so near the beginning stages of skill acquisition. Examining the effect of reading ability, we note that there was only a small overall difference in mean naming time between the skilled and the less-skilled readers. This was due to the fact that the less-skilled readers tended to be faster than the skilled readers on objects and animals, but slower on letters and words.

TABLE I  
*Mean Naming Time (secs.) for Each Item Type by Reading Level*

Item type	Skilled readers	Less-skilled readers
Animals	53.3	50.2
Objects	56.2	52.1
Colors	44.6	46.0
Letters	26.3	31.9
Words	29.1	35.8
Mean	41.9	43.2

<sup>3</sup>All the children were also very accurate at naming the items, except for one boy who consistently read the word "ball" as "bell".

The data were subjected to an analysis of variance with one between-groups factor (reading ability) and one within-groups factor (item type). The analysis indicated that the main effect of reading ability was not significant,  $F < 1$ , whereas the main effect of item type was highly significant ( $F = 74.3$ ; *d.f.* = 4, 56;  $p < .001$ ). Furthermore, the interaction between reading ability and item type was significant ( $F = 3.5$ ; *d.f.* = 4, 56;  $p = .013$ ). Fine-grained analyses of this interaction were conducted using protected *t*-tests (Cohen and Cohen, 1975). These analyses indicated that for objects, animals, and colors the naming times of skilled and less-skilled readers were not significantly different: animals,  $t = -.6$ , *d.f.* = 14,  $p > .5$ ; objects,  $t = -.8$ , *d.f.* = 14,  $p = .409$ ; colors,  $t = .3$ , *d.f.* = 14,  $p > .5$ . In contrast, significant differences were found on both letters,  $t = 2.5$ , *d.f.* = 14,  $p = .026$ , and words,  $t = 2.8$ , *d.f.* = 14,  $p = .015$ .<sup>4</sup>

It could be maintained that the analysis of variance obscures a general relationship between reading ability and naming time, since the children were divided into only two levels of reading ability, thus eliminating fine distinctions in actual reading skill. A correlational analysis was therefore carried out to assess the degree of relationship between the children's actual reading scores and their naming times. These correlations, which are shown in Table II, form two groups of clustered variables. The first cluster consists of animals, objects, and colors; the second is formed by the reading score, letters, words, and colors. The variables in the first cluster have little relationship with reading score. Moreover, with the

TABLE II  
*Correlations between Naming Times and Reading Score*

Variable	1	2	3	4	5	6
1. Reading score	-	.04	.12	-.07	-.58*	-.70**
2. Animals		-	.87***	.87***	.43	.31
3. Objects			-	.74**	.42	.30
4. Colors				-	.52*	.34
5. Letters					-	.62*
6. Words						-

\* $p < .05$

\*\*  $p < .01$

\*\*\*  $p < .001$

<sup>4</sup>The skilled readers' mean naming times were affected by the extreme times of one subject. Contrary to the expectations based on previous findings, this child took several seconds longer than any other subject on the object, color, and animal charts. With her data eliminated, the mean times of the skilled readers are somewhat faster: animals, 48.9 secs.; objects, 53.0; colors, 41.1; letters, 25.1; words, 28.7. Nevertheless, the statistical effects reported here are maintained.

exception of colors, the variables in one cluster correlate relatively little with those in the other cluster. The correlations clearly indicate, as did the previous analyses, that there is a strong relationship between reading ability and the naming times for letters and words, but not for objects, animals, and colors.

## DISCUSSION

The purpose of the present experiment was first to examine whether word retrieval ability (independent of the reading process *per se*) is related to reading ability. Second, we wished to discover whether any difficulties that might be found are of a general nature or are circumscribed, becoming manifest in the retrieval of only certain classes of stimuli. The results of our study of rapid naming of repetitively presented items indicated that the less-skilled readers were slower than the skilled readers at naming letters and words, but responded as quickly on objects, animals, or colors. Thus, the less-skilled readers were slower only on orthographic material.

The pattern of results obtained in this study raises two questions. First, why are less-skilled readers slower than skilled readers at repetitive naming of orthographic material but not on pictorial material? Because less-skilled readers responded as quickly as skilled readers on some classes of items, we can rule out those arguments that invoke reading-related differences in scanning rates, response strategies, use of peripheral information, response interference, or visual-verbal association. Similarly, although the less-skilled readers had lower IQ scores than the skilled readers, this relationship cannot account for the results. The lower IQ scores would have been expected to lengthen the naming times of the less-skilled readers on all five classes of stimuli. Although it is possible that lower IQ scores led to longer naming times on letters and words, other findings make this implausible. Other tests of repetitive letter naming using skilled and less-skilled readers with equivalent IQ scores (Biemiller, 1977-1978; Staller and Sekuler, 1975) also found an effect of reading skill on naming time.

One might also suppose that the obtained response time differences may be a function of familiarity with stimulus items. Since the less-skilled readers have read less extensively, they may well be less practiced than the skilled readers in identifying letters and printed words; this is less likely to be the case with objects, animals, or colors. Such experience-related effects could be expected to work against the less-skilled readers when tested on letter naming and word naming. It may be the case that differential familiarity with letters and words creates differences in the attentional resources needed by skilled and less-skilled readers to name

items selected from these categories. Although the performance of skilled and less-skilled readers on naming letters presented singly has been found to be equivalent (Stanovich, 1981; Wolford and Fowler, 1984), the members of the two reading groups may still differ in the extent to which letter naming is automatized (LaBerge and Samuels, 1974). Thus, a less-skilled reader may have to invest a large share of processing capacity in order to name a letter as quickly as a skilled reader, who may have to devote relatively less attention to the task. Such differences in degree of automatization might be expected to become manifest only on repetitive naming tasks, since these require that subjects do more than simply retrieve a single name. The additional task requirements of scanning and responding sequentially, may be sufficient to expose reading-related differences in the rate at which certain types of items can be named. That is, naming letters, unlike naming pictured objects, is a somewhat fragile skill in poor beginning readers. It is easily disrupted when other factors related to sequential responding complicate the task. This possibility could account for the difference in outcome between our results on repetitive letter naming and those on naming single letters (Stanovich, 1981; Wolford and Fowler, 1984).

A second question that must be entertained concerns the source of the differences between our results and those of other studies that might be considered comparable. A comparison of our results with those of Blachman (1981) and Wolf<sup>5</sup> (1981) suggests that the relationship between repetitive naming and reading scores varies with grade level; it is most robust at the very early stages of learning to read, after which it diminishes. Conceivably, this pattern of results is indicative of a developmental trend in which the less-skilled reader recovers from a general slowness in naming or acquires an increasing level of automatization for processing certain types of items. One may wonder, then, whether less-skilled readers who are slightly older than those studied here will show equal letter naming times relative to skilled readers of the same age. Previous studies (Biemiller, 1977-1978; Staller and Sekuler, 1975; Wolf, 1981) suggest that they will not, but additional research is needed to clarify the matter.

Our findings show that the less-skilled readers, compared with the skilled readers, were not characterized by a general slowness on repetitive naming. Therefore, the results indicate that less-skilled readers do not have a general problem in retrieving names. Rather, their word retrieval deficits may extend only to orthographic items.

It should be noted that neither the present study nor earlier studies that exploited the repetitive naming paradigm permit any definitive conclusion concerning possible deficiencies in the general ability of skilled and less-skilled readers to access their mental lexicons. The stimuli

<sup>5</sup>Wolf's findings only recently came to our attention. Although the motivation for her study differed from ours, the results largely support our findings.

employed were limited to a small set of very common items. Moreover, since the items were known to the subjects prior to testing, it is likely that their names were stored in a temporary short-term buffer. Lexical memory may not have played an important role. Thus, the requirements of repetitive naming may differ from those of confrontation naming. In the latter, names must be retrieved from the lexicon itself because the test items are not made known to the subject beforehand. Research has shown that good and poor readers do indeed sometimes differ on confrontation naming (Denckla and Rudel, 1976a; Jansky and deHirsch, 1973; Katz, 1985; Mattis et al., 1975; Wolf, 1981). Furthermore, data obtained on a confrontation naming task (Katz, 1985) suggest that poor readers are able to access the lexicon adequately; it was hypothesized that the naming problems arise because of deficiencies in processing phonological information stored at specific lexical addresses and possibly also because of deficiencies in the quality or completeness of the phonological specifications.

#### ABSTRACT

The claim has been advanced that children with severe reading disability are generally deficient in word retrieval compared with normal readers. Support for the claim is based largely on studies of rapid naming of repetitively presented pictured objects or other nameable stimuli, a task which is apparently more sensitive to retrieval problems than the confrontation naming of items presented singly. The purpose of this study was to examine whether there is a general relationship between word retrieval speed and reading ability in beginning readers. Although such a relationship has not been detected with confrontation naming, repetitive naming may provide a more sensitive test. Accordingly, second-grade children were required to name as rapidly as possible repeated presentations of five pictured items drawn from a single category. Separate naming tests were made for objects, colors, animals, letters, and words. The results showed that there was no relationship between reading ability and naming times when the test items were selected from sets of objects, colors, or animals, whereas on letters and words, a significant relationship was found. The less-skilled readers were not, therefore, consistently slower in all repetitive naming situations. Instead their word retrieval deficits extended only to the orthographic materials.

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