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ABSTRACT

After consideration of difficulties and shortcomings in the field of research in reading retardation, the evidence about specific factors contributing to reading achievement is reviewed. Factors considered include intelligence and patterns of scores on intelligence subscales, processing of verbal and auditory stimuli, and personality characteristics. (AA)

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DIFFERENCES BETWEEN GOOD AND POOR READERS

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It seems logical to expect that two apparently ready and equally endowed learners will emerge from the same instructional program with not significantly different levels of achievement. It is possible to argue that the basal reader approach, managed by three or four groups, is predicated on this logic: Treat them all pretty much alike and they will come out pretty much alike. Accumulated experience, if not the relevant research, has taught us that this logic does not always apply. In fact, often the reverse seems to be true and a given instructional program will produce wide diversity between the individual learners in the group. Further, in-depth study of the individuals participating in the same instruction program reveals that they differ from each other in ways other than gross achievement. Some learners respond to certain facets within a program and other learners to other facets. In reading, some learners emerge from a program better at word attack skills than at comprehension beyond recall, while other learners will exhibit the reverse of this profile. Instruction, instead of producing similarity, produces diversity. Why?

We now realize that defining two learners as equal on the basis of total scores on tests (reading readiness tests, visual-motor skills tests, total IQ scores, for example) is not accurate or adequate. We believe that there are subtle, not easily observable, differences between learners who appear identical or similar on gross measures or total scores. These subtle differences account for a variety of responses to the same learning environment. In our efforts to understand and explain these differences, especially in the case of those learners who achieve less well than we had predicted, we have attempted to study and describe these subtle differences.

Through the use of some well designed and carefully controlled statistical studies, a larger amount of empirical data, observations in the field, and just plain conjecture, we have derived a list of factors which supposedly differentiate the more successful from the less successful learners in a given instructional program. We find such labels as distractability, differences in learning modality, differences in the structure of intelligence, self-concept, and so on, included on this list. Unfortunately, there is not complete agreement as to the contents of the list and no assurance that the labels actually designate the same factor from one list to another.

Wiener and Cromer (28) have written about the problems associated with doing meaningful research on the factors associated with reading difficulty, and they give considerable emphasis to the fact that there has not been a coordinating conceptual framework about reading available to researchers. Their analysis of the diverse definitions of reading and the wide variety of explanations given to assign cause for reading difficulty led them to attempt the formulation of a better conceptual framework. They point out, for example, that in some studies reading is defined as identification of words (correctly saying words), and in other studies it is defined as comprehension. The word "reading" can mean acquisition of skills or it can mean the use of skills after they are acquired. Reading achievement is sometimes described in terms of specific performance criteria (so many words per minute), or in relative terms such as comparison with a normative group. Finally, reading may be described as a separate skill or as one of several language skills.

Wiener and Cromer go on to discuss the various points of view used in the analysis of reading difficulty. They indicate that a variety of assumptions can be used as a basis for explaining failure to learn to read; defect, deficiency, disruption, and difference. These ideas are important because the

point of view taken by the researcher largely determines the design of the study and the variables that are given consideration. Perhaps someday significant multi-disciplinary studies will approach a group of children from all points of view. Maybe then we will begin to get some data that will give us guidance.

Applebee (1) both supports and expands the Wiener and Cromer viewpoint. He notes the long history of conflicting results from research studies but adds the point that education is not the only discipline which studies reading retardation. He adds medicine and his own field, psychology. He notes that research has not made it possible to predict reading failure in advance of the fact, that research has not assigned causes for reading failure, and that research has not developed remedial measures specifically suited to the individual student. Applebee sees two causes for this failure. The first is the lack of a good operational definition of what is being studied, and the second is the problem of research design; the statistical model versus the inferential model which may describe the underlying relationships.

Serious reading of Wiener and Cromer, and Applebee, would seem to be a must for the research worker considering the study of reading retardation. Clearly each research study must be clear as to its orientation, the definition of reading it uses, the point of view it has adapted on comprehension, and the selection of its statistics so that the comparison of similar and identical research studies is possible and meaningful data is accumulated.

A significant proportion of research into the factors related to reading disability employs a design which uses a coefficient of correlation to evaluate the degree to which two or more factors are related or present at the same time. One problem with this statistic is that it does not indicate the degree to which one factor is caused by the presence of another; it is

not a cause-and-effect relationship. While it may make good sense to study the degree to which scores on two tests are related to each other, scores on reading rate and comprehension, for example, we do not know for certain that it is not some other unstudied factor that is responsible for the relationship. Experience may eventually answer that question, but the statistic will not. Since most good researchers are well aware of this weakness, overinterpretation of this statistic is now not so prevalent as it was once. Perhaps more important questions can be asked about the validity of test labels. A test section may be labeled "main idea" but that label is operationally defined by the test items. Do they all measure the same thing in the same way? Is there wide agreement about the meaning of the label? These are difficult questions, but we cannot safely compare the results of several studies until we are certain that all labels mean the same thing (23).

In our desire to understand why some children who apparently should learn to read do not, we have overstudied the failures without paying much attention to those who met with success. Most of the studies concerned with reading failure have not evaluated a group of successful readers on the same factors. We don't know as much about the performance of successful readers on auditory discrimination tests, for example, as we do the performance of unsuccessful readers. If we are looking for causative factors to remediate so that the unsuccessful will be changed, then perhaps we must develop a better understanding of the successful--what have they got the others haven't?

One last item about the research deserves mention. Almost all of the studies are group studies; groups of learners are studied, or compared, or whatever. Seldom are the studies of assumed causative factors followed up by remedial therapy or teaching. A few case studies are to be found in the

literature, but when they are carefully examined, it is not difficult to understand why there are not more studies of that design. They are terribly time consuming, and the conclusions must always be related to the individual case. Helen Robinson's (18) monumental study is obviously the best example. She studied a small number of cases on seven different factors. She attempted to identify "causes" for severe reading disability through treatment, education, or therapy with the idea that if the factor under consideration was a cause, then when it "is eliminated or compensated for, improvement in reading occurs." Her study took over ten years from inception to publication. She did not study successful readers to determine if they might be burdened by the same factors.

This lengthy exposition of the shortcomings of most of the research related to retardation in reading is presented so that the reader will understand why it is impossible to take a clearly justified stand on this question, or draw many conclusions about the multitude of factors which may influence success in learning to read. The material which follows will consider some of the factors which show considerable promise. The relationship of intelligence and reading achievement will be examined, as well as what little we know about the processing of stimuli (not necessarily words) in both successful and unsuccessful readers. Are [illegible]r personality characteristics associated with reading retardation and are they reflections of or causes of the problem?

The Structure of Intelligence

Singer (25) points out that a very influential study was reported by Morphett and Washburne in 1931. These two researchers recommended that a child would learn beginning reading much faster if instruction was postponed until the child attained a mental age of six and one half years on the Detroit First Grade Intelligence Test, or a mental age of seven years and six months on

the Stanford Binet. At this time the standardized testing movement was gaining in momentum and influence, and many readers did not heed the limitations stipulated in the study--a particular test and a particular method of teaching. Acceptance of a gross mental age score as evidence of intellectual readiness for beginning reading instruction became almost universal. But some children of apparent equal readiness, when gauged in this manner, became retarded readers. Gradually the concept of readiness was broadened to include other factors, but as the techniques for the evaluation of mental age expanded and became more sophisticated and as the interpretation of mental age data became more refined, we learned that something more than gross scores must be involved.

Wechsler operationally defined adult intelligence in terms of verbal and performance (generally non-verbal) tasks. Eventually his work was expanded downward to the evaluation of young children. Today, his WISC--Wechsler Intelligence Scale for Children--is well known and respected. Today, the question is not about the verbal, performance, or total test scores, but is about the patterns of subtest scores obtained by normal and retarded readers. Is there a pattern of WISC subtest scores that differentiates the two groups?

Any reader deeply interested in this topic should know the IRA publication authored by Evelyn F. Searls (24) entitled "How To Use WISC Scores In Reading Diagnosis." This succinct little book may just provide the necessary first step in the much needed communication breakthrough between school psychologists on the one hand and classroom and reading teachers on the other. On pages 39 and 40, Searls states two important points in today's thinking when she says, "Don't be satisfied with reports only of the Full Scale and Verbal and Performance IQs, and Do insist on a report of the subtest scaled scores; look for the highs and lows of a student's performance." Why not be satisified with full scale scores? What is the pattern of subtest scores

which differentiates normal and retarded readers on the structure of intelligence? A number of researchers have considered this question. A few representative studies, in chronological order, are reviewed in the following paragraphs.

In 1961, Neville (13) reported a study which compared the WISC subtest patterns of male retarded readers having IQs of 90 or above, with male non-retarded readers, also of average or higher IQs. He used a matched pairs design, and out of his population, all of whom had been referred to a clinic because of suspected reading problems, he obtained 35 pairs. Neville concluded that the scores of the two groups differed significantly on both Performance and Verbal tasks. The retarded readers were low on Information, Arithmetic and Digit Span and higher on Picture Arrangement and Block Design than the comparison group. Neville used Cohen's factorial analysis of the WISC as a basis for considering the relationship between the WISC subtests and the activities and skills involved in learning in the regular classroom. He noted that his retarded readers were low or lacking in ability in the factors related to Comprehension I and Freedom from Distractability. They showed some strength in Perceptual Organization and Quasi Specific (measured by Coding and Picture Arrangement), and he generally felt that retarded readers do poorest in those subtests most nearly resembling school tasks and those requiring concerted attention. He speculated that retarded readers are not inherently less endowed but that they did not develop in some areas because they were poor readers.

Lyle and Goyen (11) felt that their data did not support Neville's suggestion. They matched 54 retarded readers of average intelligence with an equal number of non-retarded readers. They noted that their retarded readers showed wider variability on both the Verbal and the Performance scales of the

WISC than did their controls. Consistent with other studies the retarded readers tended to score lower on the Information, Arithmetic and Coding subtests and better on Comprehension, Picture Arrangement, and Block Design. This group also scored less well on supplementary tests of spelling and arithmetic computation. Lyle and Goyen felt that their design answered Neville's question.

Huelsman (6), writing in 1970, first gathered data on the WISC subtest patterns of 101 underachieving and 56 normally achieving fourth grade readers. He then contrasted his results with 20 previously published studies so his article is also a good bibliographic reference. Huelsman's evidence indicated that the low Information, Arithmetic and Coding subtest pattern is characteristic of groups of disabled readers but not of individuals. He also noted that significantly higher Performance IQs were characteristic of about 20% of underachievers. This seems to be at variance with the usual assumption. It is important to note that while a relatively large number of studies were identified--over 20--none provided satisfactory evidence regarding subtest patterns applicable to individuals. The studies did give a pattern analysis of low scores on Information, Arithmetic, and Coding. There was also evidence that some of the retarded readers were low on Digit Span (a supplementary test not always given), and high on Picture Completion.

Kender (8) suggested in 1972 that the varied nature in the design of some eight studies he examined does not permit generalizations about a WISC profile for poor readers. Kender's article is a survey of the literature and not a research study. He seems dissatisfied with this approach and suggested that future research focus be shifted from studying the performance of groups of poor readers to attempting to understand the implications that the WISC subtests have for the reading process itself. This, of course, requires knowledge of what each subtest measures, how like a school activity it is, and what the

implications for teaching are. The Searls book can give some help with this matter, but the question is very complicated and probably would require an inter-disciplinary team approach.

In early 1974, Rugel (21) used Bannatyne's recategorization of the WISC subtests to evaluate some 25 studies. Bannatyne, in studying "genetic dyslexic readers" classified the various subtests as Spatial, Conceptual, and Sequential. Rugel's disabled readers showed the same profile of abilities that Bannatyne found for genetic dyslexics. Are they the same population? Here we come face to face with the problems of definition noted by Wiener and Cromer. As is so often the case, we end up being uncertain as to just what bird we have in hand. Later the same year, Rugel (22) again worked out of the same orientation. He used some data provided by other researchers plus his own. He concluded that the lower scores of disabled readers on Digit Span and Coding cannot be accounted for in terms of a single underlying short-term memory ability.

It currently appears that the job is not yet complete. Can we rely on the WISC subtest patterns of individual disabled readers to give us guidance on how to teach them? Apparently not. We don't yet know what the pattern is for individuals, and we don't know how the contents of the tests relate to everyday classroom activities.

Does overall intelligence influence the development of reading skills? It seems reasonable to assume that it does. Neville (14) compared three reading groups, poor, average, good, on five intelligence measures: Lorge-Thorndike, WISC Verbal, Performance, and Full Scale, and the Peabody. He concluded that

> "....lack of reading ability does tend to negatively influence scores on verbally oriented group intelligence tests for pupils in grade five. The poor readers obtained IQs on individual tests that were significantly higher than their scores on group tests. Average readers tended to obtain comparable IQs on both group and individual tests, and good readers tended to obtain higher IQs on the group test."

Neville also indicated he felt that a 4.0 reading grade level was a necessary minimum level for obtaining reasonably valid IQs for children in the intermediate grades.

Black (3) studied 100 consecutive referrals to the psychology department at the Kennedy Memorial Hospital where they were evaluated psychometrically. He found no significant effect of intelligence on level of reading retardation. This study suggests that factors other than WISC Full Scale intelligence must play a significant role in reading problems.

Another significant study on the role of intelligence was that reported by Lohnes and Gray (10). They investigated the role of intelligence in the well-known Cooperative Reading Studies. They make the point that seldom is the role of intelligence considered when homogeneous groups of children are compared and that intelligence accounts for much of the difference that is observed--not the factor being measured. They conclude that the USOE studies are saturated with general intelligence and imply that the observed differences are not nearly so great as believed.

It has been repeatedly suggested that no clear-cut conclusions can be drawn from the data which considers the relationship between intelligence and achievement in reading, nor can we confidently make suggestions for how to teach reading in the classroom on the basis of individual differences. It appears, however, that the focus of needed research is becoming clearer. How we will manage to get the more sophisticated longitudinal studies that are necessary remains the unanswered question.

Processing Verbal and Auditory Stimuli

When the field of psychology studies the differences between normal and retarded readers, it does so through an investigation of the accuracy with which visual, auditory, and cross-modal stimuli are processed and integrated. Usually, the stimuli are artificial ones such as a sequence of tapping sounds made with a pencil on the edge of a table and a series of dots on a paper. Here the task is to match the series of dots with the sequence of taps. Flashes of lights can be used in the same manner, but the purpose of the experiment, whatever the task employed, is to determine if the task differentiates the two groups of readers.

Birch and Belmont (2) used tap patterns and dots on paper to compare intellectually normal children with and without a problem of reading retardation. Their retarded readers obtained a significantly lower number of correct responses on this task. The problem of the study is that their controls for intelligence were not good. They used a self-administered group intelligence test, and they contend that it is well known that retarded readers tend to have lower IQs than normal readers. However, they did remove some of the cases with lower IQs and found this did not influence their results. They concluded that "the ability to treat visual and auditory patterned information as equivalent is one of the factors that differentiates good from poor readers." There seems reason to challenge that point of view. Blank's (4) study found much the same results when normal and retarded readers were presented with intramodal (different stimuli within the same modality) tasks. The reaction time of the retarded readers was longer (thus slower) than the time of the normal third-graders. The study suffers from problems of sample size--N = 20--and no control for intelligence. Katz and Deutsch (7) investigated the hypothesis that retarded and potentially retarded readers

would exhibit difficulty in rapidly shifting attention between auditory and visual stimuli. They considered the possibility that age differences might also be involved in this behavior, so their sample was made up of children in first grade who had not received reading instruction, third and fifth grade Negro males from New York City. The reaction time to a series of lights and sounds were obtained. It was found that at all ages poor and good readers (lower and upper 30th percentile on Gates Advanced Primary) differed significantly in the ease with which attention was shifted between modalities. They chose their sample because that group contains a high incidence of reading disability but is a relatively homogeneous group. Unfortunately, the two groups differed significantly on intelligence as measured by the Lorge-Thorndike. Katz and Deutsch did check and found that the behavior was not significantly related to intelligence. They suggested that perhaps poor readers took longer at this task because they are generally poorer at response generalizations, but they did not ask questions about whether or not this behavior is related to personality structure.

Lyle and Goyen (12) worked with normal and retarded readers, who ranged in age from 7.0 - 8.5 years, to determine the effect of reinforcement on a learning task which involved assigning letter names to shapes which were not the common letter shapes. This population was chosen because other studies of younger children had found differences below this age level. Half of each group received some reinforcement during the learning section of the study. Lyle and Goyen obtained significant differences in the non-reinforced section of the study in favor of the retarded readers. They did not find significant differences between the treatments, but they did find that the normal readers improved significantly with reinforcement. They concluded that simple learning

of letter labels is not a problem in reading retardation, and they suggested that experiments which compare educationally retarded and normal achieving groups should pay particular attention to treatment variables.

A study related in purpose and design was reported by Vellutino and others (27) in 1975. They visually presented poor and normal readers randomly arranged Hebrew letters and asked their subjects to demonstrate retention of this stimuli immediately, 24 hours later, and six months later. These two groups were also compared with a group of normal readers already familiar with Hebrew letters. Retention in the non-Hebrew groups was equivalent under all conditions, but the first group was poorer than the Hebrew group under the immediate and 24 hour conditions. The researchers concluded that deficient visual memory is unlikely as a source of specific reading disability.

Two small groups of good and poor readers, ten years old, were studied by Farnham-Diggory and Gregg (5). The subjects were given memory span and memory scanning tests in both the auditory and visual modalities, plus a concept of letter pattern test. The results indicated that short-term memory deteriorated over time in the poor reading group, and further, the good readers seemed less inhibited by the previous stimulus when modalities were shifted. The good readers exhibited equal ability in memory scanning in both modalities, but among the poor readers, auditory speed gradually lagged relative to visual rates. Poor readers were more likely to lack the concept of letter pattern. The authors discuss their results as follows:

> "Overall, the role of auditory STM (short-term memory) capacity and a scanning ability appears to be a central one. Variation in these functions, even as measured by our simple tests, accounts for a major portion of the variance in three indices of reading skill: Number of words read correctly, number of whole word errors, and number of integration errors. This suggests that the overall process of reading is monitored by the auditory system. Note, we are not arguing that coding can

> only occur for sounds, or that visual information is always recoded into an auditory equivalent. In our own data, the fact that span emissions RTs and memory scanning RTs were faster for visual materials indicates that they probably were not recoded. Otherwise, visual RTs would have been at least as slow as RTs to the auditory stimuli (i.e., to materials known to be coded in auditory form).
>
> Our argument is a more general one: That attentional control processes for the reading task are vested in the auditory system. This may take various forms, depending upon the level of reading development. The poor reader, and/or the beginning reader, may be preoccupied with letter sounds, phonemes, or syllable sound patterns. The good reader and/or the more experienced reader may be preoccupied with syntactical sound cues (e.g., pauses, intonations) and with language meaning. In all cases, what has been sounded may serve (a) place-keeping functions, (b) eye-guiding functions, and (c) chunking functions, relieving the load on STM through language mechanisms of redundancy, familiarity, and sequential probabilities."

Certainly the authors of these last six studies are well aware that they have not studied the reading process or that they have formulated a model of that process. Quite legitimately they have attempted to operationally define what their logic tells them may be underlying sensory/perceptual processes and to attempt to determine whether or not, in fact, these factors differentiate normal from retarded readers. The number of such studies is relatively small, the samples studied are often very small, and all of the old problems of trying to compare the results of differently designed studies appear once again. Yet, in view of the monumental confusion which has resulted from our long history of attempting to study the reading process as such, perhaps this more fundamental and basic research approach is one that we must take. It probably is not the only alternative open to researchers, but this hard data approach must be followed to its scientific end, and it must be part of the basis for research concerned with the reading process itself.

It would be very satisfying if we could conclude from these studies dealing with sensory input modalities and facility in processing stimuli that it makes sense to discover which modality, auditory or visual, is used to best

advantage by a learner and to teach reading in a way that favors use of the preferred modality. This is not a new idea, and Robinson (20) points out that in fact such a recommendation is often made; that children with visual and auditory strengths and weaknesses should be given differentiated instruction. The purpose of her study "was to determine the relative progress in reading made by pupils with differing visual and auditory abilities when they were taught by two approaches to beginning reading." Robinson's subjects were divided into four groups: high visual--high auditory, high visual--low auditory, low visual--high auditory, and low visual--low auditory. The two instructional systems were a sight approach and the Hay-Wingo approach. Subjects with both modalities high scored the highest on reading tests at the end of the first year; those with both modalities low scored the lowest. Those learners with mixed high and low modalities scored between the extremes. Neither teaching approach was better than the other among pupils with strong or weak modalities. Robinson also concluded that auditory discrimination made a significant contribution to all reading while visual perception did not, regardless of the instructional method. Either the procedure used by Robinson to determine modality strength does not measure the same thing that is measured in the studies on modal processing, or the assumption that the modal processing studies are really related to reading are the unanswered questions. Are we back to the problem of labels, definitions, and so on? The all too familiar call for further research is sounded once again.

Personality Characteristics and Learning to Read

One last area of characteristics which may differentiate able and disabled readers is the relationship between personality characteristics and reading achievement. It is axiomatic that a learner must pay attention to what he is

learning. Learning, particularly of skills, does not just happen all by itself. In some children it is plain when they approach a learning task that they expect to succeed probably because they have been successful previously. If a learner sees personal value in what he is learning, he appears to try harder and learn faster. At least these are common impressions of the relationships between personality factors and reading achievement.

Noland and Schuldt (15) studied 20 matched pairs of fourth grade normal and retarded readers. They tested the hypothesis that the retarded readers would perform more poorly on detection of visual stimuli and that their rate of performance decrement would be faster than that of the normal readers. While it was true that the poor readers did, in fact, make more errors than the other group, and the performance of both groups did decline over a period of time, the rate of performance decrement of the two groups was not significantly different. The data of this study indicates that the behavior of retarded readers is consistent, they do sustain attention to a visual task, they are less efficient because of their higher error ratio. It is feasible to expect that under non-experimental conditions they might opt to leave a task because they obtain less satisfaction, but they do not perform less well because they do not pay attention.

Fifty caucasian junior high school boys were compared with 50 Negro boys in a study of personality and motivation factors and their relationship to reading retardation. This study by Lewis, Bell, and Anderson (9) submitted some 43 variables to a factor analysis procedure. The extracted factors indicated that inadequate readers had verbal defects (low scores on the Verbal subtests of the WISC), came from low socio-economic homes, and often adapted one of three adjustive patterns to their reading disability--aggressiveness, negativism, or passivity. While these impressions are interesting, they leave

more questions than they answer. One of the major problems of this type of study is the matter of sequence. Is the observed behavior the cause of or the result of the reading disability?

Employing a projective technique, the Rosenzweig Picture-Frustration Test, Spache (26) studied 125 children who were either one year below grade level or two years retarded if they were above third grade. Among the personality characteristics he assigned to retarded readers were that they were more aggressive and defensive, less self-insightful, poor in handling conflicts with adults, passive but defensive, negative toward authority figures, adjusted to adults poorly, and several others of a negative value. One of the problems with the use of such a projective technique is that interpretation of the data is closely related to the orientation of the examiner, and, in the case of this study, there apparently was no comparison group of normal readers. Are these characteristics typical of poor readers? Are they causes or the effects of failure in learning to read as well as might be expected?

At this point in time we find ourselves inundated with a mass of data that when carefully studied draws few conclusions. It is not the purpose of this paper to criticize the honest research efforts of so many scholars or to point the directions future research must take. We are not unaware of the problems. Speaking at this conference six years ago, Helen Robinson (19) described six problems that have remained unsolved for many years. At that time Robinson pointed out that interdisciplinary research teams offered the best possibility of ever finding answers to some of the knotty problems which have persisted so long. James Reed (17) made a sharper delineation of the effects of these problems when he said:

> "Teachers and reading specialists should view with considerable skepticism any statement pertaining to the so-called intellectual, cognitive, or perceptual deficiencies of retarded readers. Many of the statements are interesting speculations but nothing more. The particular pattern of deficits may represent only an artifact of the investigator's decision to use one measure of potential instead of another. A child's potential for reading is probably much more closely related to the materials and methods used for teaching than some arbitrary index of expectancy."

An editorial in the Reading Research Quarterly (16) made it abundantly clear that those professionals most aware of what research has not accomplished know why so little has been accomplished and, presumably, what must be done about it. To understand the processes of learning to read and of using reading skills to achieve comprehension, we must first understand the process of thinking. How soon will we accomplish this feat? Are we really ready for the implications of such a success?

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