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An investigation of context clues, initial letter cues, configuration and work frequency as factors affecting reading comprehension of 11 and 15 year old secondary school children

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AN INVESTIGATION OF CONTEXT CLUES,

INITIAL LETTER CUES, CONFIGURATION

AND WORD FREQUENCY AS FACTORS AFFECTING

READING COMPREHENSION OF 11 AND 15

YEAR OLD SECONDARY SCHOOL CHILDREN

by

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A B S T R A C T

One hundred and twenty first year secondary school pupils and one hundred and twenty fourth year pupils of both sexes were tested in an attempt to evaluate the relative contributions made by context clues, initial letter cues plus context, configuration cues plus context and word frequency in reading comprehension. The tests were based upon a variation of the Cloze test of reading comprehension, and the reading material utilised was newspaper articles and adult literature of the type issued by official government agencies. It was found that the ability to fill in missing items in the Cloze test was assisted by configuration cues plus context, initial letter cues plus context and context alone, in that order.

The ability to use context clues, initial letter cues and configuration cues was found to increase with age during the secondary stage of education. A positive correlation was found to exist between the frequency of occurrence of a word and its accuracy of prediction. When items of special difficulty arose pupils tended to concentrate upon cues within words to the detriment of clues within sentences.

Three types of context became apparent, (1) convergent, i.e. directing the reader's attention to a narrow area of search, (2) obtuse, i.e. presenting the reader with a wide area of search, and (3) misleading, i.e. focusing the reader's attention upon an erroneous area of search.

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C O N T E N T S

PART 1

INTRODUCTION

GENERAL

During the reading process words must be identified
and recognised. Numerous theories have been presented
dealing with the cues which help to facilitate this
process. It has been suggested that words are recognised
as wholes (Cattell, 1886 and Smith, 1928) by geometric
shape, outline, or configuration (Bell, 1939, Tinker and
Paterson, 1941) by grapheme - phoneme correspondences
(Gibson, Pick, Osser and Hammond, 1962); by ascending and
descending letters (Wilson and Fleming, 1938); by initial
and terminal letters (Levin, Watson and Feldman, 1964, and
Marchbanks and Levin, 1965). However, "in spite of the
quantity of research on this topic, the bases of word
recognition are not yet well understood" (Williams,
Blumberg and Williams, 1970).

Goodman (1965) describes a partial list of twenty-
two systems which operate to cue or miscue a reader
during his interaction with written material. Included
in this list are "letter-sound relationships ....
function order of words .... the referential meaning
of prior and subsequent language elements and whole
utterances, the reader's experimental background (the
reader responds to cues in terms of his own real or
vicarious experience) .... those reading attack skills
and learning strategies the reader has acquired or been
taught". Such an extensive partial list emphasises the
scope and diversity of this field of study and the necessity
of restricting an investigation such as this to a relatively
small area. The author decided to focus this investigation

upon the various contributions made by context clues,
initial letter cues, configurational cues and word
frequency in reading comprehension.

The choice of test population was governed by the fact
that the author was currently engaged in teaching school
children of Secondary age, i.e. 11 years to 15 years of
age, and therefore this age range was of the greatest
interest to him. Secondly, this population was chosen as
no studies had previously dealt specifically with the
combination of this age range and the four types of chosen
cues.

The author believes that pupils should have mastered
the basic elements of reading prior to their entering the
secondary stage of education, and that during this latter
period of education pupils should be weaned away from
dealing exclusively with school text book material and
trained to assimilate the literature of the adult world,
e.g. newspaper articles, income tax forms, National Health
forms, safety regulations, etc. The author decided that
random samples of adult literature should serve as the
content media for this study so that knowledge could be
obtained concerning the level of efficiency reached by
secondary school children when attempting to comprehend
this type of literature.

CUES

For the purpose of this study a cue is defined as any
characteristic which helps to set a word apart from any
other word, e.g. a letter, letter group, word shape, etc.

Goodman (1967) in his paper "Reading, A Psycholinguistic
Guessing Game" states that "reading is a selective process.

It involves partial use of available minimal language cues selected from perceptual input on the basis of the reader's expectations. As this partial information is processed, tentative decisions are made to be confirmed, rejected or refined as reading progresses ...... The ability to anticipate that which has not been seen, of course, is vital in reading." It would appear that Goodman is suggesting that to be an efficient reader one does not need to perceive and identify every element, but rather to be skilled in selecting the least number of productive cues necessary to elicit correct guesses.

CONTEXT CLUES

When faced with the problem of completing a mutilated sentence, e.g. when a word has been omitted, the reader examines the remaining context and from it attempts to extract clues upon which is based the deduction as to what the missing item may be.

$$\underline{\text{Example}} \quad \text{A.1} \quad \text{Fish and} \qquad .$$
$$\text{A.2} \quad \text{Knife and} \qquad .$$

Few English-speaking people require the printed stimulus to insert the omitted items in A.1 and A.2 which are 'chips' and 'fork' respectively. This is partly because they are collocates, i.e. words frequently associated together in everyday speech. Thus collocation is a factor which determines word sequence expectancies and so helps the reader to fill in missing detail. In general people tend to fill in missing items by inserting those words which they have encountered in similar circumstances previously, i.e., they base their guess upon past experience.

However, these guesses based upon the habitual association
of a word in a language with other particular words,
i.e. collocation, must also fit into the grammatical
structure of the sentence.

   <u>Example</u> B.1 He   .

       B.2 She is wearing her new .

It is obvious that the missing item in B.1 must be a
verb and equally obvious that a noun is required in B.2.
The grammatical features therefore limit the range of words
that can be inserted; but another restriction is also
imposed upon the choice of words that could be utilised to
fill in the missing items. This additional restriction is
imposed by the semantic field which operates in a rather
similar way to collocation except that it is concerned
with associations between groups, or categories of words
within which the item may be said to belong, rather than
with pairs of single words. This type of restriction is
well illustrated in example B.2 on page 4 in which it is
obvious that the missing item has feminine association and
is worn. This represents a massive restriction for now
the reader is able to limit his area of search to articles
found on a woman's person.

From the above it is possible to discern a pattern in
which the reader's responses to context clues appear as
hierarchies of expectancies related to frequencies of co-
occurrence in the previous experience of the reader. As
each of the factors, i.e. collocation, grammatical structure
and semantic field, act, interact and combine, they place
limitations upon the range of words that may be utilised to

fill in the missing item. The degree of limitation, however, is subjective for it depends upon the linguistic competence of the reader. It is hoped that this present study will reveal the degree to which secondary school children are able to make efficient use of context clues.

CONFIGURATION CUES

For the purposes of this investigation configuration is defined as the outline, or overall shape of a word.

Example C.1   stopped   stopped

C.2   blackboard   blackboard

C.3   largely   largely

Examples C.1, C.2 and C.3 illustrate how words are blocked in to produce their characteristic outline shapes. The ascending and descending letters together with the genaral pattern of horizontal and vertical planes, when viewed in conjunction with the length of the blocked-in outline, combine to provide an excellent cue. The casual inspection of a few pages of a dictionary will reveal that a large majority of words have such a characteristic word form that their discrimination is a relatively easy task if the word is part of the reader's sight vocabulary.

The difficulties which are presented by this type of cue, e.g. similarity of blocked-in outline of such sets of letters as a, o, e, and b, d, k, etc., are partly over-come by the addition of context clues.

Example D.1 The ⬛ ran after the ball.

D.2 The ⬛ picked it up.

In D.1 the ascender of 'b' and the descender of 'y' are excellent cues whilst the context places so many limitations upon the choice of words that the vast majority of readers

will, no doubt, have 'boy' high up in their list of guesses.
Example D.2 is much more difficult, but even so the reader's
area of search is restricted to a five letter noun containing
no ascending or descending letters, and this entity must
be able to pick up a ball.

Numerous studies concerning configuration have been
published but many of them appear to arrive at differing
conclusions. Cattell, in 1886, published studies which
appear to have led to the present day belief that beginning
readers use the whole word as a main cue in word recognition.
His major findings were that a reader could recognise a
short common word in less time than it takes to recognise
a single letter, and that in a fixed exposure time two un-
connected letters, or, two unconnected words, could be
recognised. These studies demonstrate that skilled readers
do not engage in letter by letter processing, for if they
did, the time taken to recognise a word would be the sum of
the times necessary to recognise each of the letters.

Erdman and Dodge (1898) (in Samuels 1970) concluded that
word length and shape were the primary cues used by skilled
readers in word recognition. They arrived at their con-
clusion after finding that skilled readers could recognise
words even when the letters were too small to be recognised
individually. They also found that skilled readers could
recognise words that were so far from the fixation point
that individual letters could not be recognised. The
'fixation point' is the area of clearest vision and is a
unit of less than $1\frac{1}{2}$ inches in length. Visual acuity drops
off sharply as the image moves away from the centre of

clear vision towards the periphery where the resolution is less acute.

More recently Tinker and Paterson (1941), Anderson and Dearborn (1952) and Hildreth (1958) have concluded that young children learn to recognise words as wholes and that a start to reading is best made with the 'word' or 'look and say' method.

Since the 1960's research has tended to discredit the findings of those who suggest that for beginning readers word configuration is the major cue in word recognition. Williams, Blumberg and Williams (1970) and Samuels (1970), stress that Cattell, and Erdman and Dodge, used skilled adult readers in their investigations and therefore their findings cannot be assumed to apply to naive readers. However, Williams, Blumberg and Williams (1970) did confirm that adults sometimes used word configuration as a major cue in word recognition, even if beginning readers do not.

INITIAL LETTER CUES

The importance of initial letters in the identification of words is based on the fact that the initial part of the word contains more information; the more information is given in a word part, the more easily a word is identified. Words appear to be retrieved from memory in sequential patterns, the initial letters being the obvious starting point (after Broerse A.C. and Zwaan E.J.: 1966).

Example E.1 I drove to the match in my c . (car)

E.2 He s   the log into 3 pieces. (sawed)

Examples E.1 and E.2 illustrate initial letter cueing in which

only the initial letter of the item is inserted and the rest
of the letters are omitted. The massive restrictions
imposed by collocation, grammatical structure and semantic
field limit the reader's area of search to such an extent
that the probability of the correct answers being chosen by
an average reader is quite high.

Indeed, since the 1960's many investigations have con-
cluded that the initial letter is the cue most used for
word identification by beginning readers. A study by
Marchbanks and Levin (1965) in which they attempted to
determine which cues non-readers and beginning readers use
in word recognition allowed the children to select on the
basis of word shape or letter cues. Their results indicate
that the children preferred to use initial letters, final
letters, middle letters and word shape, in that order, as
cues to word identification. Williams, Blumberg and
Williams (1970) found that their results replicated those
of Marchbanks and Levin (1965) in that "children do not
match words on the basis of configuration as much previous
data and a good deal of lore would have it ...... but on the
basis of individual letters, the initial letter being
particularly salient. Even those children with less
acquaintance with the alphabet show no 'natural' tendency
to regard shape as a salient cue". Other investigators,
including Nodine and Hardt (1970), have also published
findings that strongly indicate that beginning readers
prefer to use initial letter cues in preference to con-
figuration cues in word recognition.

It is important to note that Cattell (1886) and

Erdman and Dodge (1898) used skilled readers in their investigations, whilst Marchbanks and Levin (1965), Broerse and Zwaan (1966), and Nodine and Hardt (1970) all used young, non, or beginning readers.

A clue to the solution of this controversy between the relative merits of initial letter cues and configuration cues may be supplied by Williams, Blumberg and Williams (1970) when they infer that the value of initial letter cueing is at a maximum for beginning readers and decreases in value as reading proficiency increases; whilst the value of configuration cues increases in direct proportion to reading proficiency. It is hoped that this study will indicate if any such changes in value take place as readers become more efficient during their growth from eleven to fifteen years of age.

WORD FREQUENCY

Studies concerning word frequency have confirmed that a small number of words constitute the bulk of the words that we write. Dale (1965) stated in general terms that fifty words and their repetitions constitute about 50% of the words written by adults and children; one thousand words make up 90%; two thousand words 95%; three thousand words 97%, and four thousand words 98%. Tinker (1965) appears to have the most pertinent explanation of the importance of word frequency. He explains that configuration, i.e. external outline of a word shape, operates as an efficient word recognition cue only for those words which he designates as 'sight words', i.e. words that have become thoroughly familiar to a reader because he has met

them frequently in his reading. Tinker obviously believes that as a person continues to read he is constantly adding to his 'bank' on sight words those words which have become so familiar that they are recognised at a glance. Consequently adult mature readers have a large store of sight words and naturally the more familiar a word the greater is the cue value of its shape.

Word frequency studies have proved that high frequency words tend to be dissimilar, i.e. differ markedly from each other in configuration as well as being irregular in shape. Therefore, one would expect these high frequency words to be recognised quickly and accurately and this has been verified by a number of experiments (Howes and Solomon, 1951; Solomon and Postman, 1952; King-Ellison and Jenkins, 1954; Baker and Feldman, 1956; Broerse and Zwaan, 1966; and Samuels and Jeffrey, 1966). Perhaps an apt summary of the findings of the above investigators is to be found in the following statement by Klare (1968) when he states that people "recognise more frequent words more rapidly than less frequent, prefer them, and understand and learn them more readily".

Word frequency studies by acknowledged authorities such as Thorndike, Dale, Dewey, Vernon, Watts and more recently McNally and Murray (1962) have emphasised the need for adequate vocabulary control so that children are not forced to attack reading material that is too difficult for them. The difficulty level of the vocabulary of school text books has been lowered and simplified even to the extent of re-writing literary classics. Smith (1967) points

out "a writer's vocabulary for children's reading would appear to be necessarily limited in comparison to that of a writer for adults .... Children have a more limited range of experience than adults."

It is indisputable that the language of school children differs from the language of adults but it also is an indisputable fact that children eventually become adults. It is the author's hope that this present study will reveal points of practical educational importance connected with the transition between those stages designated respectively 'schoolchild' and 'adult'.

ADULT LITERATURE

For the purposes of this study two classes of adult literature have been designated. The first may be defined as that reading material that all adults should be able to read and comprehend, e.g. Income Tax Forms, Ballot Notices, Social Welfare Notifications, etc. The second of the two classes is termed 'newspaper articles', for it was felt by the author that this represented the one common body of reading material read by the vast majority of the adult population.

Reading may be defined as a process of association between symbols and experiences. The efficient reader is the one who possesses the ability to associate the appropriate word with the perceived symbol. Teachers are interested in the 'readability' or, 'reading difficulty level', of material presented to them by publishers for they realise that to present to pupils material that is too difficult for them may cause them to lose interest or develop bad

reading habits. Teachers are supposedly training their pupils to be efficient adult readers and therefore one would hope that upon leaving school the ex-pupils should have been trained so that they are able to comprehend adult literature as opposed to school text books. However, it is well known that the language of school children differs from that of adults and as Ruddell (1965) concluded, "Reading comprehension is a function of the similarity of patterns of language structure in the reading material to oral patterns of language structure used by the children". This study by Ruddell revealed that children gained higher comprehension scores on reading material that contained high frequency patterns of their oral language as compared with that material which utilised low frequency patterns of their language structure.

Dolch (1949) pointed out that the ideas contained within reading material may be remote from the reader's past experience. He also drew attention to the fact that although individual word meanings may be familiar to a reader they may be put together in such a way as to make a statement that has little relation to a reader's experience or thinking.

It is also well proven by 'word frequency' or 'vocabulary' studies, that different fields of interest possess different vocabularies. The author believes that this present study will indicate the level to which children of secondary school age are able to assimilate and comprehend the vocabularies contained within these two categories of adult literature.

READING COMPREHENSION

For the purposes of this study the author has defined
reading comprehension as a function of the reader's
language competence, the subject matter of the language
message and the syntactic complexity of this language
message. It is generally recognised that comprehension
is differentially affected by material in different con-
tent areas, e.g. categories of newspaper articles and
school text books. In terms of the above definition of
comprehension this effect may be a function of the necessary
background information required by the reader, the author's
writing style, the vocabulary specific to a content area,
the interests and attitudes of the reader concerning the
subject matter of each content area and the linguistic
complexity of each content area, (after Acquino, Mosberg
and Sharron, 1969). Efficiency in reading comprehension
may be expressed as the degree to which the thinking of
the author and the reconstruction of his thoughts by the
reader approaches a one to one relationship. It is for
this reason that the author decided to use the Cloze Test
Procedure in this investigation.

CLOZE TEST PROCEDURE

The task of choosing a suitable comprehension test
format proved to be an exceptionally easy one, as only
one test met the following criteria of suitability. The
author wished to test comprehension in a continuous prose
passage in such a way that not only could specific word
meanings be dealt with, but also the full range of con-
textual interrelationships, so that the total range of

language abilities of the testees could be examined. The
chosen test format had also to be suitable for pupils
differing widely in comprehension ability, yet at the same
time provide the author with as much information as
possible of the readability of the test passages. Prior to
1953 it would have been an impossible task to attempt to
find a single test format which incorporated all of the
above criteria. It would have been necessary to use a
battery of tests which would have resulted in so many con-
founding variables that the statistical analysis would have
proved to be extremely complicated.

W. L. Taylor (1953) in his paper "Cloze Procedure: A
New Tool for Measuring Readability" introducted a test
format which has revolutionised and revitalised that area
of research concerned with reading comprehension and read-
ability. Sentence completion exercises were at that time
a familiar, well established technique for assessing com-
prehension, but Taylor modified the principles involved in
this technique and presented his new test format under the
title of the 'Cloze Procedure'. "At the heart of this
procedure is a functional unit of measurement tentatively
dubbed a 'cloze'. It is pronounced like the verb 'close'
and is derived from 'closure'. The last term is one
gestalt psychology applies to the human tendency to complete
a familiar but not-quite-finished pattern - to 'see' a
broken circle as a whole one, for example, by mentally
closing up the gaps. One can complete the broken circle
because its shape or pattern is so familiar that, although
much of it is actually missing, it can be recognised anyway.

The same principle applies to language. Given 'chickens cackle and ..... quack', almost anyone can instantly supply 'ducks'. If that word really is the same as the one omitted the person scores one cloze unit for correctly closing the gap in the language pattern." (Taylor, 1953)

Taylor continues by explaining that there are many subpatterns present in the sentence pattern such as the pattern of symbol-meaning relationships, patterns of letters, meanings of any given combination of the five words in the above example, plus the fact that the omitted word must parallel 'cackle' but be associated with ducks instead of chickens. The reader must guess what the mutilated sentence means as a whole unit before attempting to complete the sentence pattern.

Taylor (1953) defines a cloze unit as "any single occurrence of a successful attempt to reproduce accurately a part deleted from a 'message' (any language product) by deciding, from the context that remains, what the missing part should be". He continues by defining the cloze procedure as "A method of intercepting a message from a 'transmitter' (writer or speaker), mutilating its language patterns by deleting parts, and so administering it to 'receivers' (readers or listeners), that their attempts to make the patterns whole again potentially yield a considerable number of cloze units".

The cloze procedure appears to deal with more than just specific word meanings or contextual inter-relationships, it appears to reflect the global total of all those influences and elements which interact to affect readability;

whilst simultaneously reflecting the total language abilities of the reader. This duality occurs as a result of both reader and prose being evaluated simultaneously by the same test, i.e. the reader's performance is measured on samples of the material to be read. Prior to the introduction of the cloze procedure most methods of assessing readability had involved the use of one set of tests for assessing the reader and another set of tests for assessing the reading material.

The cloze procedure is not just another readability formula; indeed the cloze method is not a formula at all. It ignores 'element counting', e.g. short or common words, short or simple sentences, parts of speech, etc., which are associated with the theory that assumes a high correlation between ease of comprehension and frequency of occurrence of certain kinds of language elements. As Taylor (1953) points out ".... the formulae are insensitive to a particular population's previous knowledge of the topic being discussed. They cannot allow for the effects of non-idiomatic uses of common words, nonsense combinations of words, awkward and confusing sentence structure, or pronouns without definite antecedents". Different people express the same meaning in different ways, conversely the same language pattern may mean different things to different people. The cloze method resembles an index which indicates the extent to which the language patterns used by the writer are anticipated by the reader.

Taylor admits that the cloze procedure is an amalgamation of extracts from theories concerned with 'total

language context', 'dispositional mechanisms' and statistical random sampling. The total context of any language behaviour includes verbal factors, symbols, grammatical skills, intelligence, past experience, desires and fears, in fact everything that motivates language behaviour. He includes word redundancy, transitional probabilities and dispositional language habits under the umbrella term of 'dispositional mechanisms'. Word redundancy is a term for the process in which words are deleted from a sentence without destroying the essential information value of that sentence, e.g. 'The train is coming this way now' could be reduced to 'Train coming' without any loss of essential information. Transitional probabilities are concerned with the fact that some words are more likely than others to appear in certain patterns or sequences, e.g. a mother is more likely to say to a child 'Don't forget to brush your <u>teeth</u> after your meal' than 'Don't forget to brush your <u>coat</u> after your meal'.

Dispositional language habits involve the complex verbal skill patterns which a person develops because of his unique circumstances and experiences. Communication is an easy task if an individual's language habits are similar to those of the other individual for this implies that they have both learned similar meaning-language relationships through the media of common experiences. However, language mechanisms can alter considerably even within the same culture and when the language is formed in unfamiliar sequences comprehension becomes much more difficult and slower.

The cloze procedure involves a random deletion method, or every -nth, which ignores the differences between specific words. The theory is that if enough words are struck out in this manner then they will represent proportionally all words to the extent that they occur. Taylor also stresses that "... cloze procedure deals only with words as they actually occur in larger patterns which stand for particular meanings at the time they are transmitted or received. The result is that infrequently used words may not be hard to replace at all; and supposedly unimportant words may become extremely so."

Taylor reported that deletions of ten and twenty per cent produced similar results but the vast majority of researchers have resorted to deleting every fifth word. This is supported by Macginitie (1961) who found that cloze test items were statistically independent when surrounded by four words of context. Bormuth (1969) concluded that "... cloze tests made by deleting every fifth word measure skills closely related or identical to those measured by conventional multiple choice reading comprehension tests." Earlier Bormuth (1963) had concluded that cloze tests made by deleting every fifth word were valid and uniform measures of reading comprehension ability as well as being valid and highly reliable predictors of the comprehension difficulties of the passages. He also found that cloze tests were appropriate for use with individuals and groups which vary widely in comprehension ability. Gallant (1965) concluded that cloze tests were valid and reliable measures of reading comprehension for beginning

readers. Weinstraub (1968) reported eight studies con-
firming that cloze readability scores correlated highly
with standardised reading comprehension tests or other
comprehension measures and that they were valid and reliable
predictors of the comprehension difficulty of prose
passages.

The above represents only a very small proportion of
those who have produced research in connection with the
cloze procedure.

The vast majority of these investigators have adopted
the twenty per cent deletion rate, but Smith and Dechant
(1961) concluded that the rate of deletion should be no
less than ten per cent when the cloze procedure is applied
to children. However, the present author decided to
adopt the almost universally accepted twenty per cent rate
of deletion because in this investigation the fifteen
year old pupils are considered semi-adult as their term of
full time education is nearing completion. It was not
considered desirable to introduce the extra variable in-
volved in presenting the eleven year old pupils with a ten
per cent rate of deletion whilst testing the older pupils
at the twenty per cent rate of deletion.

The problem of whether or not to award marks for
synonyms does not arise in this investigation as the test
formats include initial letters and configurations of the
test words. It would be nonsense to consider marking
synonyms in the context clue format when they could not
possibly be considered for the other two test formats.
However, the fact that synonyms are not utilised is in line

with the findings of Bormuth (1965) who concluded that when "... cloze tests are used as a measure of individual differences in reading ability, scores obtained by counting responses exactly matching the omitted word seem to yield the most valid scores." Also when "... cloze tests are used to measure the comprehension difficulty of a passage, scores obtained by counting responses exactly matching the deleted word yield the greatest amount of discrimination among passages".

It is usual to administer the cloze test untimed and without the subjects first reading the passages from which the test items were extracted.

AIMS OF THE INVESTIGATION

From its first conception the author intended this study to be of practical educational importance and so lead to conclusions that would be of practical use to practising teachers. Many investigations have been carried out using adult subjects whose trained perception with written language is very probably different from the immature perception of a school child. Numerous studies have utilised tachistoscopic devices for presenting words. As a practising teacher the author is interested in methods of word recognition which are applicable to school children and ordinary prose reading. For years the author has listened to verbal battles in school staff rooms concerning the relative merits of initial letters, configuration and the use of context in reading. The findings of Williams, Blumberg and Williams (1970) are in line with the author's beliefs that perhaps initial letters could be of prime

importance to readers with a low level of reading ability but later when reading efficiency increases the prime cue becomes configuration. The author has always believed that the use of context as a comprehension clue has been taught inefficiently and used even more inefficiently by children in school. Therefore the author devised the following hypotheses in an attempt to confirm, or revise, his beliefs concerning these points.

Hypothesis - 1

At the beginning of the secondary stage of education a pupil's ability to fill in missing items in a Cloze Test is facilitated by knowledge of the initial letter plus context, configuration plus context and context clues alone, in that order.

Hypothesis - 2

At the end of the secondary stage of education a pupil's ability to fill in missing items in a Cloze Test is facilitated by knowledge of the configuration plus context, initial letter plus context, and context clues alone, in that order.

Hypothesis - 3

The ability to utilise configuration cues, initial letter cues, and context clues increases with age during the secondary stage of education.

The author has also been intrigued by the use of reading schemes devised by authors who appear to be obsessed by 'word frequency counts', e.g. Ladybird Reading Scheme. It would appear that the vast majority of teachers

have simply accepted all of the claims put forward by the
'frequency count' school of authors; but this author has
reservations concerning the use of such a scheme beyond the
initial stages of beginning reading and is doubtful if
word frequency counts are of practical use once this stage
is overcome, and even more doubtful of their use when
applied to adult literature. Nevertheless the following
hypothesis is proposed:

Hypothesis - 4

The accuracy with which a word may be predicted
increases with its frequency of occurrence.

PART 2

PLAN of

INVESTIGATION

SUBJECTS

The test population was drawn from three towns in the central area of Durham County in the North-East of England. Each of the towns differed in character, for one was an old established market town which served a large rural community; the second had been a predominantly mining community but was currently developing into a light engineering area; whilst the third was a recently developed 'overspill' new town.

The test population was drawn from comprehensive schools within these three towns. In an attempt to gain a representative sample boys and girls covering the whole range of ability from G.C.E. streams downwards were tested in each of the schools. The author administered a National Foundation for Educational Research (N.F.E.R.) test, Secondary Reading 2————— Reading Comprehension (Appendix p.1) to all pupils beginning their secondary stage, i.e. approximately eleven years old, and to all pupils who were about to end the secondary stage or continue to G.C.E., i.e. approximately fifteen years old.

From the results of this initial grading test those pupils who had equal scores were grouped into sets of three, e.g. if four people had scores of 111 then one person was discarded, if eight pupils had scores of 97 then two sets of three were made and two pupils were discarded. This arrangement resulted in forty groupings of three within each of the age ranges, i.e. (40 x 3) = 120 first year and (40 x 3) = 120 fourth year pupils. There was an equal division between the sexes in the first year,

but sixty-four fourth year boys compared with fifty-six
fourth year girls. It was then necessary to test to
ensure that the first and fourth year pupils were represen-
tatives of a single population, and below is set out a
summary of the statistical computation showing that the
difference between the two mean scores can be attributed
to the effects of random sampling.

RESULTS OF GRADING TEST (N.F.E.R.) SECONDARY READING 2

FOR FIRST AND FOURTH YEAR PUPILS

1st Year mean for 120 pupils   93.935

4th Year mean for 120 pupils   93.425

                 Mean difference   0.5*

* The difference between means is not significant
at the 5% level.

(For full computation see Appendix pp 2-4)

The author suggests that the low mean scores of both
the first and fourth year pupils are because the compre-
hensive schools from which the test population is drawn
do not contain the full range of pupils. Those pupils
within the higher stratum having been 'creamed off' by the
local public and grammar schools. This deficiency of
approximately half a standard deviation must be borne in
mind when evaluating the results and conclusions.

CORPUS

A sample of reading material from newspapers was obtained
in the following way. Eight daily newspapers were selected
on the gounds that they had the largest circulations, and
copies were obtained for Monday, Wednesday and Saturday in

one and the same week. Similarly copies of eight Sunday
newspapers were obtained for the same week, so that
altogether thirty-two newspapers were available.

Each newspaper was then sub-divided into five sections
namely; 'Leaders', 'Sport', 'Front Page', 'Woman's Page',
and 'Advertisements'. The author believes that these
section headings are self-explanatory and are easily dis-
criminated in virtually every newspaper. Each newspaper
was divided into sub-sections, and then each piece was
numbered. From each of these sub-sections a passage con-
taining 125 words was randomly chosen by reference to a
table of random numbers, thus giving a total of 625 words
(five sections x 125 words per section) per newspaper.
This resulted in a grand total of 20,000 words (thirty-
two newspapers x 625 words per newspaper).

To obtain a sample of 'official' adult literature the
author collected forty-three items of official literature
from the Post Office, P.A.Y.E., Ministry of Health and
Social Security, etc. etc.. These items were of the type
the author considered it was probable that most adults
would at some time need to be able to read and comprehend
if they were to lead a responsible adult life. Each item
was assigned a number and then by reference to a table of
random numbers five articles were then selected. This
random choice technique resulted in the following items
being included in the investigations:-

    1.   P.A.Y.E. Guidance Form, (as issued to all adults).

    2.   Official Poll Card, (issued to all voting adults
          at General Elections).

3.   Department of Health & Social Security Form

      B.F. 11D (Notes on sickness or industrial

      injury benefit and increases for dependants).

4.   'Tyres and Your Safety', (Ministry of Transport

      Publication).

5.   Ministry of Social Security Graduated National

      Insurance Contributions Statement.

PREPARATION OF TEST BLANKS

Articles from each of the newspaper sub-sections, i.e.
an article concerning Sport, Front Page news, a Leader or
editorial comment, an article concerning Women's aspect of
life, and an Advertisement, were combined to form Test
Paper 1. The five articles chosen from the 'official'
adult literature were designated Test Paper 2.

From each of the ten chosen passages every fifth
word was omitted up to approximately the eleventh omission.
It was not always possible to make exactly eleven omissions
as in some cases this would have made the passage nonsensical,
but in no instance did the number deviate by more than one
omission, i.e. the omissions ranged from ten to twelve.
This resulted in a total of fifty-five omissions for the
Newspaper Articles (Test 1) and fifty-four omissions for
Official Adult Literature (Test 2). The author decided
that dates, e.g. 1966, abbreviations, e.g. can't, and
hyphenated words, e.g. cross-ply, were to count as single
words.

As the author had decided to test for three separate
categories of prompt, i.e. context clue, initial letter cue
and configurational cue, it was necessary to devise three

separate test forms which were designated 'A', 'B' and 'C'.

Test Form 'A' contained the initial letter of the word omitted, e.g. The ball was kicked i... the goal. Test Form 'B' contained just the dots indicating the spacing where the word was omitted, e.g. The ball was kicked .... the goal. Finally, Test Form 'C' contained the words omitted on Test Forms 'A' and 'B', but these words were blanked-out leaving only the ascending and descending lines as clues, e.g. The ball was kicked ▰▰▰ the goal. The blanking-out was carried out before the forms were copied so that no extra clues to the letters contained within the word could be perceived by holding the paper up to the light. (Samples of Test Forms 1A, 2A, 1B, 2B, 1C and 2C may be found in Appendix pp 5 to 10.)

The Test and Answer papers were integrated into a single unit with the appropriate number of answer spaces placed to the right side of each line of text, i.e. if there were two words omitted in a line of text then two answer places were indicated at the right hand side of that line of text, e.g. The ball was kicked i... the goal. That made t.. score ....

PROCEDURE

To avoid any form of bias in the distribution of the test forms the following technique was used. The names of the individuals selected as the test sample were written down in three columns and designated A, B and C for row one, C, A and B for row two, and B, C and A for row three, and then the sequence repeated until all of the testees had been allocated a test form. As there were two test forms

per person (Form 1 and Form 2) it was necessary to ensure
that row one completed Form 1 before attempting Form 2,
whilst row two completed Form 2 before attempting Form 1,
i.e. odd numbered rows completed Form 1 before Form 2 whilst
even numbered rows completed Form 2 before Form 1. Due to
administrative difficulties there was a period of one week
between the completion of each test.

The testees worked in their own schools in familiar
surroundings and care was taken to ensure that the test
period did not coincide with a popular lesson, e.g. sport,
woodwork, domestic science, as this could possibly have had
harmful side effects, e.g. deliberately doing badly because
of a sense of injustice etc. No time limit was imposed.
Before issuing the test forms the author explained what
the work entailed, and used the same language and examples
in each class and school. The author was extremely
fortunate in that all testees were present during both
test periods.

An answer was judged correct if it exactly matched
the omitted word, or, if an incorrect spelling, it did
not raise the problem of ambiguity. As previously noted
(page 19) the problem concerning the marking of synonyms
did not arise because of the initial letter and configuration
cues in the test formats.

PART 3

ANALYSIS and
DISCUSSION of
PUPILS RESPONSES

In this section of the investigation each of the passages is reproduced with the test words underlined. Reasons for the frequencies of correct response to individual items are suggested and these suggested reasons will, it is hoped, tend to fall into various patterns which will help the reader to understand more fully the strength and weaknesses of the three cue systems under investigation.

N E W S P A P E R   A R T I C L E S   —   T E S T   P A P E R   1

FRONT PAGE ARTICLES

Table 1

The frequency with which the words utilised in Test Paper 1 (Newspaper Articles) were accurately predicted by first and fourth year pupils

Test Word	Frequency of accurate predictions by:-								
	1st year pupils			4th year pupils			1st and 4th year pupils combined		
	'A'	'B'	'C'	'A'	'B'	'C'	'A'	'B'	'C'
to	40	33	38	40	36	40	80	69	78
Liner	3	1	XX	2	XX	4	5	1	4
over	18	2	4	19	6	11	37	8	15
Union	26	5	17	36	23	25	62	28	42
Rail	33	9	27	37	16	35	70	25	62
by	28	8	38	35	25	39	63	33	77
Transport	12	6	19	28	27	32	40	33	51
personal	2	XX	1	3	1	6	5	1	7
days	24	6	29	36	7	35	60	13	64
previous	2	XX	XX	XX	XX	4	2	XX	4

Where: 'A' = initial letter cue format

'B' = context clue format

'C' = configuration cue format

The first section of Test Paper 1 is a passage which represents 'Front Page' articles.

"The three year battle <u>to</u> get Britain's million pound <u>liner</u> train project moving is <u>over</u>. Peace between the National <u>Union</u> of Railwaymen and British <u>Rail</u> was announced last night <u>by</u> Mrs. Barbara Castle the <u>Transport</u> Minister. It was a <u>personal</u> triumph for her following three <u>days</u> of talks and two <u>previous</u> rebuffs from the Union."

The first test word, 'to' was more accurately predicted than any other word; probably because of excellent collocation allied to the fact that there is no suitable alternative word. 'To' is also a high frequency, familiar word, with a short irregular configuration. The second test word, 'liner', is an excellent example of a familiar word that is very difficult to predict accurately because of its specialised meaning within this particular context. It appears only three times in the 20,000 word sample and was accurately predicted by only ten pupils. Guessing is virtually useless with this type of specific noun; nor do the context, initial letter or configuration cues offer any help.. The specialised meaning of this word could only be assimilated by the testee by encountering it in a Current Affairs type of lesson at school; by reading it several times in newspapers, or, by watching the news programmes on television. Another possibility is that the pupil has

relatives who work on the railways and learns the specialised
meaning of the word incidentally through listening to
informal discussion within the family unit.

The third word, 'over', was correctly predicted by
eight of the pupils who had only the context clues to help
them; probably because there are a number of alternative
words which could possibly have been correct. Even with
the help of the configuration cue the word was accurately
predicted by only fifteen pupils; but the initial letter
cue proved to be much superior, for those pupils using it
correctly predicted the word thirty-eight times. The con-
figuration cue was inefficient because 'over' has a regular
outline; whilst the initial letter was the superior cue
because it greatly decreased the number of suitable alternative
words, as well as cueing the correct word.

'Union' was correctly predicted one hundred and thirty-
two times and once again the initial letter proved to be
the most effective cue; but the interesting point concerning
this word is the relatively large increase in the efficiency
of the context clue as revealed by the fourth year pupils'
results. This could be due to the fact that 'Union' is
rapidly becoming a familiar word, i.e. a word occurring in
everyday conversation, in songs and television programmes.
There is also the motivational aspect of the word, for pupils
about to enter the world as workers are much more likely to
be interested in unions than are eleven year old pupils to
whom the working world seems a life-time away.

'Rail', a lowly placed word according to its frequency
of occurrence ratings, was quite efficiently predicted.

However, it has excellent collocation, i.e. 'British Rail', and is constantly being advertised on hoardings and television. There is also a strong motivational aspect attached to this word, for most school children are fascinated by railways.

The next word, 'by', was efficiently predicted and the fact that fourth year pupils proved to be superior in the ability to utilise context clues could almost be termed 'normal progress'. 'Transport' was also efficiently predicted by the fourth year pupils, but with a great deal of help available from the context, i.e. 'Transport Minister'; the name of the Transport Minister, the involvement with the railways and Union, this relatively high level of accurate prediction could be expected. It could also be expected that both 'personal' and 'previous' would be inefficiently predicted as they may be termed difficult and unfamiliar. 'Days' was efficiently predicted by those pupils utilising initial letter and configuration cues, but inefficiently by those using context clues; probably this inefficiency is due to the large number of alternative words which could possibly have been correct.

LEADER ARTICLES

Table 2

The frequency with which the words utilised in
Test Paper 1 (newspaper articles) were accurately
predicted by first and fourth year pupils

| Test Word | Frequency of accurate predictions by:- | | | | | | | | |
| | 1st year pupils | | | 4th year pupils | | | 1st and 4th year pupils combined | | |
	'A'	'B'	'C'	'A'	'B'	'C'	'A'	'B'	'C'
done	34	13	22	36	31	31	70	44	53
exporting	4	2	6	6	2	13	10	4	19
the	21	31	37	29	37	40	50	68	77
that	5	5	30	12	3	36	17	8	66
than	22	21	32	33	29	38	45	50	70
observers	XX	XX	XX	1	XX	XX	1	XX	XX
home	3	XX	2	2	1	4	5	1	6
instead	5	XX	15	8	3	22	13	3	37
the	26	23	37	35	34	37	61	57	74
it	28	21	36	38	33	37	64	54	73
bouyant	XX	XX	XX	XX	XX	XX	XX	XX	XX
strong	XX	XX	5	1	XX	10	1	XX	15

Where 'A' = initial letter cue format

   'B' = context clue format

   'C' = configuration cue format

The second section of Test Paper 1 consists of part of an
article classified as belonging to 'Leaders' and is reproduced
below, once again with the test words underlined.

"The motor industry had <u>done</u> a splendid job in

exporting cars last year under the most adverse

conditions. But that total is, alas, fewer than in

1966 as sensible observers forecast. The squeeze on

home sales has reduced exports instead of stimulating

them as the Government expected. Once again it has

been demonstrated that buoyant exports depend on a

strong domestic market."

'The' and 'it' were very efficiently predicted because

they are high frequency, familiar words, of short, irregular

outline, have excellent assistance from collocation and there

are very few suitable alternative words available. 'Than'

and 'done', although less familiar and with lower frequency

of occurrence ratings than 'the' and 'it', were also

accurately predicted because of the very helpful context,

their collocation and the relatively small choice of

alternative words.

'Observers', 'buoyant' and 'exporting' may be classified

as being difficult words and the results reflect this;

although 'exporting' should be well known by fourth year

pupils if they receive adequate lessons in Current Affairs.

'Instead' and 'strong' were both inefficiently predicted;

but the configuration cue proved to be superior to that

supplied by the initial letter cue. This is probably due

to the characteristic irregular outline of the words.

'That' is another instance of configuration cueing proving

to be massively superior; probably because the ascending

final 't' differentiated between 'this' and 'that'. The

majority of pupils having only the context or initial letter

to help them choose 'this'. The final word 'home' was very

inefficiently predicted despite the fact that it is well known to all pupils of secondary age. However, the rest of the context and its collocation not only offer little help, but are positively misleading, unless the pupils are acquainted with sales jargon.

ADVERTISEMENTS

Table 3

The frequency with which the words utilised in
Test Paper 1 (newspaper articles) were
accurately predicted by first and fourth year pupils

Test Word	Frequency of accurate predictions by:-								
	1st year pupils			4th year pupils			1st and 4th year pupils combined		
	'A'	'B'	'C'	'A'	'B'	'C'	'A'	'B'	'C'
the	25	23	34	36	22	39	61	45	73
fast	XX	XX	1	XX	XX	2	XX	XX	3
tried	15	7	33	16	15	35	31	22	68
it	27	26	37	37	32	40	64	58	77
day	32	33	35	36	32	40	68	65	75
dances	18	3	11	26	7	23	44	10	34
its	20	2	24	31	3	32	51	5	56
paper	22	7	22	31	16	36	53	23	58
got	27	4	32	37	7	39	64	11	71
hour	22	8	23	31	23	25	53	31	48
the	30	29	35	38	33	39	68	62	74

Where 'A' = initial letter cue format

'B' = context clue format

'C' = configuration cue format

The third section of the Test Paper is devoted to articles classified as 'Advertisements'. The test words are underlined.

"You just can't make the jacket of a Shape Fast suit look shabby. We tried for months. We mistreated it. It was worn every day, at work, at parties, dances, bowling alleys. We stuffed its pockets with loose change, paper backs, cigarette packets. It got crushed in the rush hour, it got soaked in the rain."

Once again, and for the same reasons, 'the' and 'it' were very efficiently predicted. 'Day' was also well predicted because of the very helpful context, its short irregular outline and the fact that it is a very familiar word. It could have been expected that 'paper', as part of the expression 'paper backs', would have been well known to teenagers, but this was not so, for its high accuracy of prediction score is a product of initial letter and configuration cue results. 'Fast' is another example of a short familiar word being very inefficiently predicted because of unusual context. Unless the pupils were acquainted with the trade name 'Shape Fast' their area of search would be so wide that only a poor result could be expected, for one does not normally associate the capital 'F' with 'fast' in the middle of a sentence, anymore than one would normally associate 'fast' with the description of a suit.

By way of contrast 'hour', as part of the term 'rush hour' was efficiently predicted because these two words

are well known collocates. 'Tried' was reasonably well
predicted, especially by those pupils utilising configuration
cues; probably because of the characteristic shape of the
word with its beginning and ending ascending letters, plus
the dot in the middle. It is surprising that 'dances'
was accurately predicted by any of the pupils utilising
context clues, as the word is part of a list of activities
and therefore the context is of minimal help to the pupils.
'Its' is another example of rather misleading help being
supplied by the context, for 'the' is the more common
alternative if one is to accept the results of those pupils
utilising context clues. As to be expected with such a
short irregular, familiar word, the initial letter and con-
figuration cues were enough to provide very efficient,
accurate predictions for those pupils using them. The
final word 'got' is a very similar case to 'its', for in
this instance the context appears to have suggested that
'was' could have been the omitted word. Once again the
addition of the other cues resulted in efficient accurate
predictions.

SPORTS ARTICLES

Table 4

The frequency with which the words utilised in
Test Paper 1 (newspaper articles) were
accurately predicted by first and fourth year pupils

Test Word	1st year pupils			4th year pupils			1st and 4th year pupils combined		
	'A'	'B'	'C'	'A'	'B'	'C'	'A'	'B'	'C'
on	26	4	7	28	8	19	54	12	26
at	27	16	21	39	25	35	66	41	56
and	34	36	36	40	37	40	74	73	76
one	20	8	15	28	15	28	48	23	43
want	16	4	10	15	7	22	31	11	32
Wales	21	7	27	31	14	35	52	21	62
again	25	18	33	34	29	39	59	47	72
be	33	27	33	36	29	39	69	56	72
Welsh	10	3	23	17	2	29	27	5	52
when	17	6	27	22	10	33	39	16	60
in	32	28	32	36	36	39	68	64	71

Where 'A' = initial letter cue format

'B' = context clue format

'C' = configuration cue format

The test article in the fourth section is drawn from the 'Sports' category and the test words are underlined.

"The women's hockey international on the county cricket ground at Old Trafford between England and Wales last Saturday was one which England would

probably <u>want</u> to forget and which <u>Wales</u> would like
to <u>play</u> again. The result, too, must <u>be</u> an Umpire's
nightmare. The <u>Welsh</u> Umpire gave the goal <u>when</u>
Ruff got the ball <u>in</u> the net."

'and', 'be' and 'in' are short, familiar words
surrounded by very helpful context, so it is not surprising
that these words were very efficiently predicted. The con-
text surrounding 'at' could possibly be interpreted by the
testees in such a way as to suggest 'on' or 'in' as being
the correct answer; therefore the accuracy of prediction
score for this word is slightly depressed.

One of the anomalies is 'on', as this very familiar
word was relatively inefficiently predicted. The reason
for this could be that the context allows the testees the
choice of two other familiar words 'in' and 'at' and these
were chosen in preference to 'on'. Even with the additional
help of the configuration cue only twenty-six pupils chose
the correct word, whereas fifty-six pupils made the correct
decision using the initial letter cue.

The testees were posed a similar problem by the word
'want' for they had to decide between 'want' and 'wish'.
However, neither of the other two cues were superior for
this word as the initial letters of the two words are the
same and both configurations are identical as well.
Therefore, although this word is classified as being familiar
it was accurately predicted by only seventy-four pupils.

The context surrounding 'when' is such as to allow the
choice of several alternative words and therefore it was
inefficiently predicted by those pupils utilising context

clues alone, but because of the ascending 'h' it was efficiently predicted by those pupils who had access to the configuration cue.

The final two words in this section are 'Wales' and 'Welsh' and their contrasting accuracy of prediction results emphasises how vitally important context can be. 'Wales' is preceded by very helpful context and the word appears twice within fifteen words. It is therefore not surprising that it was predicted by one hundred and thirty-five pupils and that both the initial letter and configuration cue results are high ones. The context surrounding 'Welsh' is such that any word describing a person from any country, area, city, etc., could be equally well substituted. The testee's area of search is so extensive that it comes as no surprise to find that only five pupils utilising context cues accurately predicted the word. Obviously the initial letter cue narrowed the area of search and prompted the twenty-seven pupils who accurately predicted the word to think that one of the teams, Wales, provided the Umpire. The configuration cue with its very irregular outline proved to be the superior cue for fifty-two pupils utilising it accurately predicted the word.

WOMEN'S PAGE ARTICLES

Table 5

The frequency with which the words utilised in
Test Paper 1 (newspaper articles) were
accurately predicted by first and fourth year pupils

| Test Word | Frequency of accurate predictions by:- | | | | | | | | |
| | 1st year pupils | | | 4th year pupils | | | 1st and 4th year pupils combined | | |
	'A'	'B'	'C'	'A'	'B'	'C'	'A'	'B'	'C'
so	32	8	13	35	11	16	67	19	29
with	25	16	33	31	26	37	56	42	70
matter	8	2	8	11	2	2	19	4	13
time	27	11	25	28	14	36	55	25	61
Kate	14	XX	23	22	1	27	36	1	50
for	30	21	27	33	27	35	63	48	62
their	23	17	21	23	26	30	46	43	51
neighbours	19	3	12	26	14	28	45	17	40
insurance	1	XX	XX	5	XX	2	6	XX	2
problem	28	24	30	30	30	39	58	54	69
patriotism	XX	XX	XX	XX	XX	XX	XX	XX	XX

Where 'A' = initial letter cue format

'B' = context clue format

'C' = configuration cue format

The final section of the test paper is a sample of those
articles classified as belonging to the 'Women's' page. The
test words are underlined.

"Ian Bell's problem wasn't <u>so</u> much the keeping up
<u>with</u> the Jones's! More a <u>matter</u> of out-pacing them. Every

time Ian and his wife Kate chose a new colour for the

front door of their new semi-detached home the

neighbours copied it. Ian, an insurance worker,

finally solved the problem with a splash of

patriotism."

There are five words in this section which are surrounded

by helpful context, have good collocation, and present the

testee with a very limited choice of possible alternative

words; consequently these words (with, time, for, their,

problem) were efficiently predicted. 'So' follows a pattern set

in other sections, for it has an alternative word which has

an identical configuration. As with other words of this

type both the context and configuration results are

relatively poor, whilst the initial letter cue score is

very high. 'Matter' was inefficiently predicted, probably

because it is used in a rather unfamiliar context. However,

it is not so unfamiliar as 'patriotism' which also has the

additional handicap of being preceded by misleading context,

i.e. context that actually directs the testee to an erroneous

area of search. No combination of cues proved capable of

overcoming these two handicaps.

'Kate' was accurately guessed by one of the pupils

utilising context clues. It cannot have been any other than

a guess, for with this type of specific name it is impossible

to gain any help from the surrounding context other than

that it is a woman's name that is required. (the author is

quite willing to concede that this could be an instance of

classroom copying.) The fact that eighty-six pupils did

accurately predict 'Kate' is a tribute to their efficiency

in utilising the other two cue systems. 'Insurance' was accurately predicted by a total of eight pupils, but as it is a long, unfamiliar word with a regular configuration, plus the fact that the context offers no help whatsoever, its lack of accurate predictions is to be expected.

O F F I C I A L   A D U L T   L I T E R A T U R E

T E S T   P A P E R   2

The first section of Test Paper 2 is an extract from page 2 of Form BF.11D, "Notes On Sickness Or Industrial Injury Benefit And On Increases For Dependants" issued by the Department of Health and Social Security.

"The amount of benefit <u>shown</u> on any order you receive is paid on the <u>understanding</u> that you have been <u>incapable</u> of work during the <u>period</u> it covers and that <u>you</u> have reported any change <u>or</u> the receipt of any <u>other</u> payment which may affect <u>your</u> benefit as described in <u>these</u> Notes."

Table 6

(overleaf)

Table 6

The frequency with which the words utilised in section one
of Test Paper 2 were accurately predicted by first
and fourth year pupils

Test Word	Frequency of accurate predictions by:-								
	1st year pupils			4th year pupils			1st and 4th year pupils combined		
	'A'	'B'	'C'	'A'	'B'	'C'	'A'	'B'	'C'
shown	5	1	6	11	2	10	16	3	16
receive	6	3	3	10	6	6	16	9	9
understanding	4	2	15	13	3	28	17	5	43
incapable	1	XX	1	6	XX	13	7	XX	14
period	10	5	19	19	7	29	29	12	48
you	27	18	36	32	28	38	59	46	74
or	XX	XX	2	2	XX	1	2	XX	3
other	9	1	18	16	8	22	25	9	40
your	27	19	36	31	29	38	58	48	74
these	3	3	12	9	8	17	12	11	29

Where 'A' = initial letter cue format

'B' = context clue format

'C' = configuration cue format

In this section configuration cues proved to be the most
effective for eight of the ten words, whilst for one of the
two exceptions, 'shown', the configuration cue was equally as
effective as the initial letter cue. The exceptional word was
'receive', whose long, regular outline proved to be no more
helpful to both first and fourth year pupils than did the context

clues alone. 'Shown' was predicted equally accurately by those utilising initial letter and configuration cues, but at a depressed level of efficiency. This low level of correct prediction is emphasised by the combined 'context' score of three. 'Shown' is not a long, difficult, unfamiliar word, nor would it be the first test word encountered by the testees for half of them would have already completed Test Paper 1 (Newspaper Articles). The cause of the depressed score could be the number of available alternative words, plus the fact that a context containing 'amount', 'benefit', 'order' and 'paid' could possibly have misled the testees, for these pointer words appear to indicate 'stated', 'gives', etc. as being the omitted word.

The fact that configuration cues appear to have been the most effective for 'understanding', 'incapable', 'period', 'you', 'other', 'your' and 'these' coincides with the fact that these words also possess irregular outlines. It also emerges that the word with the most irregular outline, 'understanding', also produced the largest differential between the initial letter and configuration test scores.

A point of interest concerning 'these' is that the initial letter cue appears to have been unhelpful to those utilising this cue, for they scored only one more than those pupils utilising context cues alone. This could be due to the number of available alternative words. Two of these words, 'those' and 'these', possess identical outlines which could explain the relatively low configuration test score of this short, familiar word of irregular outline.

Two words were not correctly predicted by any of the

testees utilising context clues alone, i.e. 'incapable' and 'or'. It is hardly surprising that no-one correctly predicted 'incapable' for it is a long, difficult un-familiar word: indeed it is rather surprising that twenty-one pupils did accurately predict this word using the other two cue systems. 'Or' was predicted accurately by a grand total of only five pupils, despite being a short, familiar word. The fact that there are a number of alternative words could have produced a low score by those utilising context clues alone, but a nil score suggests that the testees were persuaded by the context that 'or' was not a reasonable choice. The author suggests that the phrases, "in the receipt of", "and the receipt of", and "on the receipt of" were selected as being more suitable than "or the receipt of". This would appear to be another example of the context completely misleading the testees. The addition of the initial letter 'o' failed to persuade more than two testees to choose 'or', whilst the short regular configuration cue persuaded only one testee to choose the correct word.

The second section of Test Paper 2 is an extract from "Tyres and Your Safety" issued by the British Tyre Industry, Ref. R 6/6.

> "Do not in any <u>circumstances</u> have radial-ply tyres on <u>the</u> front with cross-ply tyres <u>on</u> the rear. There are <u>no</u> exceptions to this and <u>it</u> applies whether the rear <u>tyres</u> are standard tread cross-ply or winter tread cross-ply. Do <u>not</u> mix cross-ply and radial-ply <u>tyres</u> on the same axle."

Table 7

The frequency with which the words utilised in
section two of Test Paper 2 were accurately predicted
by first and fourth year pupils

| Test Word | Frequency of accurate predictions by:- | | | | | | | | |
| | 1st year pupils | | | 4th year pupils | | | 1st and 4th year pupils combined | | |
	'A'	'B'	'C'	'A'	'B'	'C'	'A'	'B'	'C'
circumstances	20	21	15	23	26	24	43	47	39
the	28	37	37	37	39	39	65	76	76
on	31	18	27	38	28	33	69	46	60
no	31	24	29	38	27	38	69	51	67
it	26	25	36	34	32	38	60	57	74
has	25	13	27	36	27	38	61	40	65
drive	14	6	10	23	18	23	37	24	33
tyres	24	12	34	32	29	38	56	41	72
or	13	10	15	20	24	21	33	34	36
not	35	28	34	35	37	40	70	65	74
tyres	22	11	35	28	27	38	50	38	73

Where 'A' = initial letter cue format

'B' = context clue format

'C' = configuration cue format

The test words within this section appear to be easier to
predict accurately than those listed in the previous section,
for Table 7 contains no nil scores, a much narrower range
of scores and higher mean scores for all three test con-
ditions. An analysis of the test words contained within
Table 7 reveals the reason for this higher level of correct

prediction for there are seven short, familiar words, two
fairly short common words of irregular outline, and one
long word.

The initial letter cue proved marginally more helpful
than did the configuration cue for 'on' which is a short,
very familiar word of regular outline. There are a number
of alternative words suitable to this context, but none of
regular outline, which leads the author to conclude that the
initial 'o' proved a more positive cue than the negative
discriminatory deduction that the alternative words do not
possess a regular configuration and therefore are incorrect.
'No' is another short, very familiar word of regular out-
line which was predicted accurately by a very high percent-
age of the testees on all three test conditions. As in
many previous instances of this type the initial letter
cue proved to be marginally more helpful. In contrast 'has',
'it' and 'not', all short, familiar words, but of irregular
outline, were also very efficiently predicted, but for these
words the configuration cue proved to be the more helpful.

'Tyres' appears twice in the list of test words and on
both occassions is complemented by excellent collocation,
i.e. 'rear tyres' and 'radial-ply tyres', which probably
explains the relatively high level of correct prediction by
those pupils utilising context clues alone. The irregular
outline of 'tyres' appears to have been a more helpful cue
than the initial letter for both first and fourth year pupils.
'Drive' also has an irregular outline but was predicted
marginally more efficiently by those first year pupils
utilising the initial letter cue. The author concludes that

the collocation of 'rear wheel' does not give a strong enough
pointer to school pupils, especially as half of them are
girls. This appears to be an example of unfamiliarity
with an adult technical term.

There are three words within this section which
gained unusual scores in that those pupils utilising con-
text clues alone gained higher scores than pupils utilising
the other two test conditions. It is possible to conclude
that the initial letter of 'or' caused those pupils utilising
it as a cue to include 'on' and 'of' as possible alternative
answers. This would imply that these pupils were concen-
trating upon solving the small unit instead of back-tracking
and attempting to deal with the complete sentence as an
entity as those having only context clues alone must do.
This also appears to have been the case with those utilising
the configuration cue for they were only marginally more
accurate with their predictions.

The author is unable to offer any explanation for the
depressed level of the score of those first year pupils
who utilised the initial letter cue when attempting to pre-
dict 'the'. The first and fourth year pupils utilising the
other two test conditions and the fourth year pupils utilising
the initial letter cue all gained the extremely high scores
which could be anticipated, as 'the' is a short, very fam-
iliar word of irregular outline surrounded by very helpful
context.

'Circumstances' proved to be an even more exceptional
word, for those pupils utilising context clues alone gained
higher scores than those utilising either of the other two

test conditions. All three test conditions produced much
higher scores than could have been anticipated with a word
as long, difficult and unfamiliar as 'circumstances'. It
can only be concluded that the word is neither difficult
nor unfamiliar and that the surrounding context is in common
usage with pupils at secondary schools. If the total
context unit is familiar to the pupils then, as with 'or'
above, it may be hypothesised that the addition of the
initial letter or configuration caused the pupils to concen-
trate upon the word as a unit to the detriment of the whole
sentence as a unit, i.e. upon cues within words to the
detriment of clues within sentences, and that this inefficient
strategy resulted in inaccurate predictions.

The third section of Test Paper 2 is an extract from
Leaflet GR.20A, 'Graduated National Insurance Contributions',
issued by the Ministry of Social Security.

"If you think the statement is incorrect, you

should notify your local office of the Ministry of

Social Security, giving your full name and address

and national insurance number, the names and

addresses of your employers for the tax years in

question, the dates of your employment with them

and, if possible, the amount of graduated contributions."

Table 8

Overleaf

Table 8

The frequency with which the words utilised in
section two of Test Paper 2 were accurately predicted
by first and fourth year pupils

| Test Word | Frequency of accurate predictions by:- | | | | | | | | |
| | 1st year pupils | | | 4th year pupils | | | 1st and 4th year pupils combined | | |
	'A'	'B'	'C'	'A'	'B'	'C'	'A'	'B'	'C'
statement	2	3	7	8	4	12	10	7	19
notify	7	XX	13	19	1	18	26	1	31
the	23	31	38	32	33	40	55	64	78
giving	14	2	33	19	3	38	33	5	71
address	28	24	30	34	31	37	62	55	67
the	22	22	34	33	24	37	55	46	71
your	31	26	36	35	26	38	66	54	74
years	1	XX	8	10	XX	7	11	XX	15
of	18	18	37	22	28	39	40	46	76
and	22	13	34	20	30	39	42	48	73

Where 'A' = initial letter cue format

'B' = context clue format

'C' = configuration cue format

The first word, 'statement', is a fairly long, difficult,
unfamiliar word of irregular configuration which was
predicted inefficiently by pupils utilising all three test
conditions, but the irregular outline proved to be a much
more helpful cue than did the initial letter cue. 'Notify',
another difficult word of irregular configuration was
predicted accurately by only one pupil utilising context

cues alone. This low level of accurate prediction could be
anticipated, as could the fact that the very irregular out-
line cue proved to be more helpful than the initial letter
cue.

'Giving' was very inefficiently predicted by those
testees utilising context cues alone, and as it cannot be
termed difficult or unfamiliar the author believes that
the number of suitable alternative words available caused
this depressed score. The descenders of the initial and
terminal letters proved to be massively more potent as cues
than did the initial letter cue. 'Address', with the
excellent collocation of 'name and', was efficiently predicted
in all test conditions with its irregular outline being the
marginally more potent cue. 'You' was also predicted
efficiently in all test conditions and once again the
irregular configuration proved to be the strongest cue.

'Years' was not predicted accurately by any pupil
utilising context cues alone, but the other two test con-
ditions also resulted in very depressed scores for the vast
majority of testees chose the singular 'year' in preference
to the correct plural 'years'.

'Of' is a short, very familiar word of irregular outline
and, as could be anticipated, those pupils utilising con-
figuration cues predicted this word very accurately. What
probably could not be anticipated is that those pupils
utilising context cues alone gained higher scores than those
pupils who had the context clues plus the initial letter cue
to help them. These surprising results were replicated with
'and' and 'the' and these results tend to suggest a pattern

which appears throughout these tests. It would appear that the testees tend to concentrate upon cues within words to the detriment of clues within the total sentence structure. This pattern will be discussed more fully at the end of this present chapter.

The fourth section of Test Paper 2 is extracted from the "P.A.Y.E. Coding Guide 1969/70", (P.3 1969), 52-5943 6/68 HPB.

"General

In reckoning the <u>amount</u> of tax to be <u>deducted</u> from pay, effect is <u>given</u> to your allowances by <u>the</u> use of a code <u>number</u>. A list of the <u>codes</u> is given at the <u>end</u> of this guide.

The <u>allowances</u> which will ultimately be <u>due</u> to you for the <u>year</u> will depend upon your <u>circumstances</u> and the law in <u>force</u> for the year."

<u>Table 9</u>

overleaf

Table 9

The frequency with which the words utilised in
section two of Test Paper 2 were accurately predicted
by first and fourth year pupils

| Test Word | Frequency of accurate predictions by:- | | | | | | | | |
| | 1st year pupils | | | 4th year pupils | | | 1st and 4th year pupils combined | | |
	'A'	'B'	'C'	'A'	'B'	'C'	'A'	'B'	'C'
amount	14	10	19	29	25	29	43	35	48
deducted	8	5	8	27	16	25	35	21	33
given	5	3	32	15	10	38	20	13	70
the	25	30	34	32	31	38	57	61	72
number	20	7	16	31	21	23	51	28	39
codes	16	1	XX	19	13	8	35	14	8
end	25	18	23	32	17	38	57	35	61
allowances	7	XX	8	7	4	9	14	4	17
due	7	XX	5	15	1	16	22	1	21
year	18	2	19	25	3	28	43	5	47
circumstances	6	XX	2	11	2	6	17	2	8
force	4	XX	XX	12	3	11	16	3	11

Where 'A' = initial letter cue format

'B' = context clue format

'C' = configuration cue format

The very helpful context surrounding 'amount' resulted

in a relatively high score by those pupils utilising con-

text clues alone, whilst the configuration cue proved to be

marginally more helpful to the first year pupils than did

the initial letter cue. The scores gained by the fourth
year pupils are noticeably higher than those of their
younger colleagues. The margin is even wider for 'deducted'
where, rather surprisingly, the initial cue proved to be
more helpful than did the very irregular configuration.

'Given' is a fairly easy, relatively familiar word
which was predicted inefficiently by pupils utilising con-
text clues alone. The configuration cue proved to be
massively superior to the initial letter cue. The vast maj-
ority of pupils utilising the initial letter cue chose
'going' which is nonsense within the total context of the
sentence. The author concludes that the testees concentrated
upon the line which contained the omitted word, in which
case 'going' makes sense in the context of 'is going to your ..'
This error could not be committed by pupils utilising the
configuration cue for 'given' has an initial ~~terminal~~ descender.

The pattern established by 'the' in previous sections
re-appears again, as the pupils utilising context clues alone
gained more correct predictions than did those pupils who
had the extra initial letter cue to help them; whilst those
pupils utilising configuration cues scored the most correct
predictions. 'Number' was predicted much more accurately
by pupils utilising the initial letter cue than by those
utilising the configuration cue. This is possibly because
the ascender is in the middle of the configuration and so
does not serve as a potent cue, whereas the initial 'n'
allied to the collocation 'code' presents a very potent cue.

The next word 'codes' is the only test word which was
predicted more accurately by the pupils utilising context

cues alone and initial letter cues than by those utilising
configuration cues. The initial letter cue is superior to
the configuration cue by a very wide margin indeed. It
is quite normal for pupils utilising context cues alone to
choose numerous alternative words but usual for pupils
utilising configuration cues to select a much smaller range
of alternative words, however in this instance no less than
twelve alternative words were selected (code, numbers, words,
allowances, works, sales, notes, items, values, unless,
people and names). 'Code', the singular of the correct word,
was chosen by only one more pupil than 'numbers', whilst
'words' came third in the list of incorrect predictions.
The author believes that the configuration posed a difficult
problem and that the testees attempted to solve this problem
by using an incorrect strategy. Instead of encompassing
the whole passage as a single unit the pupils concentrated
their attentions upon the immediate context surrounding
the test word for ten of·the incorrect predictions 'fit'
the immediate context and are indicated by the immediate
collocation. 'Unless' is obviously an attempt to solve the
problem posed by the single word configuration puzzle to
the exclusion of all other factors, whilst 'names' reverses
this process by ignoring the single word configuration
puzzle and attempting to fit a word into the sentence con-
text.

'End', a short, fairly familiar word surrounded by
good collocation, was predicted quite efficiently with the
configuration cue proving marginally more superior than
the initial letter cue. The next word, 'allowances', a
long, difficult, unfamiliar word with unhelpful context,

was, not surprisingly, predicted inefficiently. None of
the final five words in this section were predicted
efficiently by the pupils utilising context cues, i.e. scores
of four, one, five, two and three. The author feels that
these scores indicate that the final sentence was difficult
to comprehend and this could have cumulative effects,
e.g. feelings of frustration from dealing with difficult,
unfamiliar words in complex context. This could be ex-
pected to affect the first year pupils to a greater extent
than it would affect the older pupils. It is noticeable
that the first year pupils gained five nil scores with the
test words in the final sentence, but 'due', 'year' and
'force' cannot be thought of as being unduly difficult
words. It is also very noticeable that for these five
test words the initial test condition scores tend to be
equal or superior to the configuration test scores.

The fifth and final section of Test Paper 2 is a
passage extracted from the "Official Poll Card" issued
for a parliamentary election, reference G.B. and S. 2/64.

"Mark your vote on <u>the</u> ballot paper secretly
in <u>one</u> of the voting compartments. <u>Put</u> one X in
the space <u>to</u> the right opposite the <u>name</u> of the
candidate for <u>whom</u> you wish to vote. <u>You</u> may only
vote for <u>one</u> candidate. If you put <u>any</u> other
mark on the <u>ballot</u> paper, your vote may <u>not</u> be
counted."

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Table 10

overleaf

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Table 10

The frequency with which the words utilised in
section two of Test Paper 2 were accurately predicted
by first and fourth year pupils

Test Word	Frequency of accurate predictions by:-								
	1st year pupils			4th year pupils			1st and 4th year pupils combined		
	'A'	'B'	'C'	'A'	'B'	'C'	'A'	'B'	'C'
the	28	36	35	32	36	39	60	72	74
one	25	16	26	33	25	30	58	41	56
put	23	18	20	36	23	33	59	41	53
to	31	11	34	35	7	38	66	18	72
name	15	13	15	28	18	27	43	31	42
whom	10	12	11	16	16	13	26	28	24
you	30	31	34	36	30	39	66	61	73
one	23	23	25	33	30	36	56	53	61
any	14	12	27	20	19	32	34	31	59
ballot	22	19	28	29	27	39	51	46	67
not	27	30	28	34	30	39	61	60	67

Where 'A' = initial letter cue format

'B' = context clue format

'C' = configuration cue format

The test words in this, the final section of the test
paper, are all relatively short and quite familiar, which
resulted in a high level of correct predictions. As could be
anticipated the first word 'the' was predicted very efficiently,
but as in previous sections the pupils utilising context clues

gained more correct predictions than did the pupils who had
the extra help of the initial letter cue. An analysis of
the incorrect predictions reveals that there were only two
alternative words predicted and that twelve testees chose
'to', whilst three testees chose 'top'. Both of these
incorrect choices collocate extremely well with 'on',
i.e. 'on to', and 'on top'. Both fit the preceding context
equally well, i.e. 'Mark your vote on top', and 'Mark your
vote on to'. It is reasonable to assume that both of these
words were chosen without any attempt to include the
remainder of the sentence into the comprehension unit
i.e. the testees concentrated exclusively upon the context
immediately preceding the test word. Those pupils utilising
the context clues were, of necessity, forced to consider a
much larger unit of the sentence and consequently predicted
the omitted word only marginally less efficiently than did
those pupils utilising the configuration cue.

'One' is a short, familiar word of regular outline
which was predicted marginally more efficiently by those
pupils dealing with the initial letter cue. It could be
anticipated that the short, regular outline would serve as
a less efficient cue than the initial letter, but with the
next word, 'Put', the initial letter cue was the more helpful
cue even though 'Put' has a very irregular configuration.
An analysis of the incorrect predictions of those pupils
utilising the configuration cue revealed that nineteen
pupils chose 'But'. This word does not fit into the overall
context of the sentence. The author assumes that the
testees siezed upon the cue supplied by the initial and

terminal ascenders whilst disregarding the sentence unit context clues.

'To' is a very short, very easy, very familiar word of irregular configuration which was predicted relatively inefficiently by those pupils utilising context clues alone. The depressed score could be caused by the number of alternative words available and the addition of the extra cue resulted in high scores for the other two test conditions. 'Name' has a regular outline and is surrounded by helpful context and, as in examples of this type, the two cue systems proved to be almost evenly matched.

'Whom' produced an extraordinary result, for those pupils utilising context clues alone proved more accurate with their predictions than pupils utilising the two cue systems. This freak result was not due to pupils choosing 'who' as the alternative word for the testees utilising the initial letter cue chose 'which' and 'what' as the popular incorrect choice, whilst the pupils utilising the config- uration cue chose 'when' and 'which' as the most popular incorrect alternative. Once again it would appear that the extra cue resulted in the testees concentrating upon the immediate context surrounding the test word to the exclusion of the overall sentence clues.

The rest of the words in this section, i.e. 'you', 'one', 'any', 'ballot' and 'not', were all predicted quite efficiently and in each instance the configuration cue proved to be the more helpful.

It is obvious that there are numerous reasons why words

are, or are not, accurately predicted. Within the limits
specified by the title of this investigation the author
has decided that the following is the most rational way
of explaining the obvious anomalies, i.e. why familiar
words with high frequency of occurrence ratings are in-
efficiently predicted and vice versa; why some words are
very accurately predicted by those pupils utilising one
type of cue, yet are inefficiently predicted by those
pupils utilising another cue, etc. For the sake of sim-
plicity context has been divided into three categories,
convergent, obtuse, and misleading.

CONVERGENT CONTEXT

Convergent context is that which directs the reader's
attention towards a narrow area of search. It contains
good collocation, i.e. words that are frequently associated
together, and is composed of common, everyday expressions
and language. It is the type of prose that provides few,
if any, alternatives to the sought after test word. If the
context contains words rated 'difficult' or unfamiliar',
then convergent context will either have repetitions of
these words, or, explanations of the words to help the
testee limit the area of search for the specific word.
Numerous words were accurately predicted with a high level
of efficiency because one, or more, of the above rules for
convergent context applied to them. It is noteworthy that
many of these words are contained within the high frequency
blockings of McNally and Murray. They are usually short
words, i.e. contain few letters, and most are irregular in

shape, i.e. possess a combination of ascenders, descenders
and dots.   A longer word 'problem', does not appear in
McNally and Murray's list of familiar words and has a
frequency of occurrence of 6; but because it has such ex-
cellent convergent context help, i.e. "solved the problem",
allied to its distinctive configuration, it was accurately
predicted by one hundred and eighty-one pupils.

OBTUSE CONTEXT

In contrast to the above, that context classified as
obtuse, offers the testee a wide area of search and a wide
choice of alternative words which could possibly be correct,
e.g. 'over' could be replaced by many words that describe
the termination of a battle.   Therefore although 'over' is
classified as a 'familiar' word it was accurately predicted
by only eight pupils who used context clues.   Lists of words
are also included in the category of obtuse context for
they give very little help to the testee, e.g. 'dances' in
the context of ".... at work, at parties, dances, bowling
alleys".   Also included within this category are descriptive
words which appear in isolation, e.g. 'Welsh' Umpire, and
'insurance' worker.   It is not surprising that both of these
words were very inefficiently predicted by those pupils who
had only the context to help them.   In the author's opinion
many words were inefficiently predicted by those pupils
using context clues alone because of obtuse context.
Several of these words are rated as 'familiar' by McNally
and Murray and this would appear to be true, for the maj-
ority of them were efficiently predicted by those pupils
utilising initial letter and configuration cues, e.g. 'got'

was correctly predicted by only eight pupils utilising context clues alone but was accurately predicted sixty-four times by those pupils utilising initial letter cues and seventy-one times by those pupils utilising configuration cues.

MISLEADING CONTEXT

The third category of context is that which the author has termed 'misleading', as it prompts the testee to concentrate upon an erroneous area of search. The most blatant example of this type of context concerns 'patriotism'. The whole of the relevant paragraph is devoted to colours and the painting of houses and then is concluded by the phrase ".... a splash of patriotism". The reader's expectancy would indicate an area of search concerned with decorating and the names of colours, so that it is not surprising that no pupil accurately predicted this word. Another example of unusual collocation concerns 'home' in the context of "home sales". The article in which this example appears is concerned with the manufacture and the sale of cars by the motor industry; therefore the reader's area of search would be biased towards this, and consequently although 'home' may be termed a familiar word its accuracy of prediction result is extremely low. A further example, 'Fast', has already been dealt with earlier in this section.

CONFIGURATION CUES

The results would appear to indicate the following facts concerning configuration cues. Configuration cueing proved to be massively superior for the following words:-
that, instead, Welsh, tried, strong, understanding, giving,

given, any. It is noticeable that each of these words
has a relatively irregular outline. The irregularity is
caused by ascending and descending letters and ~~that~~ these
tend to occur at the beginning and ending of the words.
The vital importance of ascending and descending letters
is illustrated by the word 'that' where the final ascending
't' proved to be the decisive factor in discriminating
between 'this' and 'that'. The reverse of the above is
also true, for words of regular configuration, i.e. 'over',
and 'so', and 'on' were relatively inefficiently predicted
by pupils utilising configuration cues.

INITIAL LETTER CUES

However 'over, 'so', 'on', 'receive', and 'codes'
were much more efficiently predicted by those pupils
utilising initial letter cues. This is also true for
'insurance' which was accurately predicted by only eight
pupils, but six of these had access to the initial letter
cue. It would therefore appear that the initial letter
cue is superior to the configuration cue only for those
words whose configuration offers the testee very little
assistance, or when there is a choice to be made between
two words with identical outlines.

LOW FREQUENCY WORDS

There remains the problem of those long, difficult
words which tend to occupy the lower levels in the
accuracy of prediction ratings. No combination of cues
or clues was successful with these words because they are
unfamiliar words, i.e. words not encountered frequently
enough by secondary pupils to have yet become part of their

vocabulary, e.g. 'buoyant', 'observers'.

NEWSPAPER ARTICLES v ADULT LITERATURE ARTICLES

Prior to analysing the results the author firmly
believed that the testees would gain substantially higher
scores on those articles designated Newspaper Articles
than they would on those designated Adult Literature
Articles, but this belief was proved false. First year
pupils scored marginally better on the test paper comprised
of Official Adult Literature Articles than that comprised
of Newspaper Articles - average difference per pupil 0.283.
Fourth year pupils slightly increased this average difference
per pupil but as the differences are so minimal it can be
concluded that the test population found both sections of
the Test Paper almost equally difficult to comprehend.

RESTRICTED UNIT STRATEGIES

Throughout the ten sub-sections of the test papers
there appears to be a definite pattern associated with
many of the incorrect predictions. These inaccurate pre-
dictions do not fit into the general context of the overall
sentence structure, i.e. the large unit, but they do fit
the smaller semantic or collocation unit, i.e. small unit,
or just into the single word unit. The present author
decided that these types of inaccurate predictions which
fit only into the smaller units are caused by the use of
incorrect comprehension strategies being used, and for the
purposes of this investigation these strategies have been
termed 'restricted unit strategies'.

There are many instances of these restricted unit
strategies of which the following are typical examples.

Initial Letter /Small Unit:-

"Mark your vote on <u>the</u> ballot paper secretly in
one of the voting compartments."

The test word is 'the' but the two incorrect choices
were 'to' and 'top'. These words both collocate extremely
well with 'on', i.e. 'on top' and 'on to', as well as
fitting into the preceding context, i.e. 'Mark your vote on
to....' and 'Mark your vote on top ...'. However, neither
of these words fit into the overall sentence structure.

Configuration /Word Unit:-

"A list of the <u>codes</u> is given at the end of this
guide."

The test word is 'codes' but 'unless' was offered as
a prediction. The testee cannot have considered even the
immediate collocation before offering this word as an answer
and it appears to be an attempt to fit any word into a
specific configuration.

It is possible that the addition of the extra initial
letter and configuration cues may have caused some testees
to treat the test as a game and that these pupils simply
concentrated upon the within word cues. However the
author found no evidence of this in subsequent discussion
with testees. It is the author's personal belief that many
pupils became 'stuck' in their efforts to fill in the test
words, and as their desperation increased they discarded the
large unit clues and focused their attention more and more
upon the test word until they found a word that fitted the
cue. In their relief they quickly passed on to the next
word, instead of using the correct strategy of re-checking

with the large unit by attempting to fit their chosen word
into the overall sentence structure. The above is purely
subjective conjecture and must be treated as such by the
reader. However, there is no doubt concerning the fact
that many pupils did use a restricted unit comprehension
strategy, and this is indicative of a deficiency in their
training in the use of comprehension clues.

PART 4

RESULTS

RESULTS 1 - RELATIVE IMPORTANCE OF TYPES OF CUE

This section of the investigation attempts to determine if significant differences exist between the two age ranges (first and fourth year secondary pupils) in respect of each of the three test conditions, 'A' (initial letter cues), 'B' (context clues) and 'C' (configuration), as well as between each of the test conditions as entities in their own right. It must be borne in mind that the test results for the three test conditions 'A', 'B' and 'C' are associated and that they belong to sets of three pupils, the pupils in each set having been matched on an appropriate reading comprehension pre-test. The data consists of scores obtained by 'triplets' of pupils, the members of each triplet having been randomly assigned to different test groups, 'A', 'B' or 'C'.

The test results (listed in the Appendix pp 11-14) were subjected to an analysis of variance (for full computation see Appendix pp 15-27) to discover if statistically significant differences exist between the two main effects, i.e. the two age groups, and between each of the test conditions 'A', 'B' and 'C'.

A summary of the results is contained in Table 11.

Table 11

SOURCES OF VARIANCE AND 'F' RATIOS IN THE DATA ANALYSED

Source of Variance	Sum of Squares	Degrees of Freedom	Variance
Between test conditions	27,838	2	13,919
Between age ranges	14,680	1	14,680
Interaction	270,473	2	135.2
Within sets (error)	72,395	234	311.2
Total	115,183.437	239	

'F' RATIOS

		Required 'F'	
		5%	1%

'F' for Test Conditions $= \dfrac{13,919}{309,4} = 44.987$ 3.04   4.7

'F' for Ages $= \dfrac{14,680}{309.4} = 47.446$ 3.89   6.75

'F' for Interaction $= \dfrac{135}{309.4} = 0.436$*   3.04   4.7

* The substitution of the modified within sets (error) variance which is applied when the 'F' for Interaction is not significant, results in such a relatively small change that the 'F' for Interaction still fails to achieve significance at the 5% level. Interaction variations are those attributable not to either of two influences acting alone but to joint effects of the two acting together.

The 'F' ratios for 'Test Conditions' and 'Ages' both achieve significance at the 1% level, indicating that significant differences exist within each of these two main effects. However, the analysis of variance is not designed

to indicate significant individual mean differences within these two factors. The next stage is to subject all possible combinations of pairs of means to an 'F' test in order to identify those pairs of means which possess significant differences. The full computation of these comparisons is to be found in the Appendix pp 29-37 and the results are summarised in Table 12.

Table 12

Comparison of Pairs of Means for Test Conditions
Within and Between the Two Ages

Ages	Tests Compared	Means M_1 and M_2	Differences between the means $M_1 - M_2$	'F'	't'	P
First Year Pupils (O)	A v B	47.625 - 33.675	+13.95	8.74	2.9565	1%
	A v C	47.625 - 57.75	-10.125	4.03	2.0095	5%
	B v C	33.675 - 57.75	-24.075	39.8067	6.309	1%
Fourth Year Pupils (P)	A v B	65.15 - 46.35	+18.8	27.722	5.2651	1%
	A v C	65.15 - 74.475	- 9.325	7.8122	2.795	1%
	B v C	46.35 - 74.475	-28.125	88.744	9.4205	1%
O - P	A v A	47.625 - 65.15	-17.525	12.7837	3.575	1%
	B v B	33.675 - 46.35	- 12.675	7.8	2.7928	1%
	C v C	57.75 - 74.475	-16.725	22.3909	4.7319	1%

Table 12 is divided into three strata the first stratum of which is devoted to first year pupils' results. Each of the test conditions 'A', 'B' and 'C' are compared one against the other. The results indicate that test conditions 'B', i.e. context clues alone, is the least effective of the

three comprehension aids, and that test condition 'C', i.e.
configuration cues plus context, is revealed as the most
effective comprehension aid, whilst test condition 'A',
i.e. context plus initial letter cues, occupies the inter-
mediate position. The margin of superiority that configuration
cues (C) have over initial letter cues (A) is limited to
the 5% level of significance.

These results refute the statement contained within
hypothesis 1 for it would appear that for these particular
pupils using these particular samples of newspaper articles
and essential adult literature the ability to fill in
missing items in a Cloze Test is not facilitated primarily
by knowledge of the initial letter cues plus context, but
by configuration cues plus context, i.e. the initial letter
cues are ranked second in degree of importance. However,
hypothesis 1 does correctly rate context clues alone as
being inferior to the other two cue systems.

The results achieved by the fourth year pupils are con-
tained within the second stratum of Table 12. The comparison
for all three pairs of means achieves significance at the 1%
level and the relative rankings of the three test conditions
are similar to those obtained by the first year pupils.
This means that the margin of superiority of the configuration
cues (C) over initial letter cues (A) is extended to the 1%
level of significance. The 'F' and 't' results also indicate
that the initial letter (A) and configuration cue (C) test
conditions have increased their levels of superiority over
context clues alone (B).

These fourth year results confirm hypothesis 2, which

states that "At the end of the secondary stage of education
a pupil's ability to fill in missing items in a Cloze Test
is facilitated by knowledge of the configuration plus con-
text, initial letter plus context, and context clues alone,
in that order".

The third stratum of Table 12 is devoted to the com-
parison of the test conditions between the ages to reveal
significant differences between the first and fourth year
pupils for each of the three test conditions 'A', 'B' and
'C'.

The difference between the three pairs of means achieves
significance at the 1% level and in all three instances the
fourth year pupils prove to be superior to their younger
colleagues. These findings confirm the statement contained
within hypothesis 3, i.e. "The ability to utilise config-
uration cues plus context, initial letter cues plus context
and context clues alone increases with age during the
secondary stage of education".

RESULTS 2 - WORD FREQUENCY

The eight newspapers with the largest circulation for
Monday, Wednesday, Saturday and Sunday were chosen to represent
the section concerned with newspaper articles. Each news-
paper was divided into five sections, namely 'Sport',
'Leaders', 'Woman's Page', 'Front Page' and 'Advertisements'.
The newspapers were then divided into sub-sections each con-
taining one hundred and twenty-five words. Each sub-section
was numbered and by refferring to the Table of Random
Numbers contained within 'Statistical Analysis in Educational
Research' (Lindquist E. F., 1940), one sub-section from
each of the five main sections was chosen. This produced a
total of six hundred and twenty-five words from each news-
paper (125 words per section x 5 sections per newspaper).
This resulted in a grand total of 20,000 words (625 words
per newspaper x 32 newspapers). The author, in collaboration
with a computer technician, devised a programme which
allowed these 20,000 words to be computerised so that a
frequency count could be obtained for each word within each
of the five sections, i.e. to list each word according to
its frequency of occurrence in each of the five sections.

In the tests concerning newspaper articles (Test Paper 1)
there were fifty-one words that were utilised in the Cloze
Test procedure. It was necessary for the author to discover
if these fifty-one words are a representative sample of
words in general. It was decided to analyse these words in
accordance with the findings of McNally and Murray (1962)
who divided their word list into frequency blocks. The ·

figure 12 is used to denote that the respective word is included in their most frequent twelve words; the figure 32 denotes that the word is included in their next most frequent words; similarly 100 denotes that the word is contained within their next most frequent sixty-eight words; whilst 250 means that the word appears in their next most frequent one hundred and fifty words. McNally and Murray do not itemize the remaining 19,750 words.

Table 13

Relative Frequencies in 20,000 Word Sample and Frequency
Blocking According to McNally and Murray of the 51 words
used in Test Form 1 (Newspaper Articles)

(1) 51 test words	(2) 'f' in 20,000 words	(3) McN and M frequency blocking	(1) 51 test words	(2) 'f' in 20,000 words	(3) McN and M frequency blocking
the	1,262	12	instead	6	
to	505	12	problem	6	
and	494	12	done	5	
in	395	12	want	5	100
for	205	32	Welsh	5	
it	190	12	personal	4	
that	162	12	Wales	4	
on	153	32	liner	3	
at	138	32	transport	3	
be	131	32	matter	3	
with	120	32	neighbours	3	
by	112	100	Fast	2	250
their	77	100	hour	2	
one	76	32	rail	2	
when	57	100	previous	2	
so	49	32	paper	2	
its	38		insurance	2	
over	37	100	patriotism	1	
than	35	250	tried	1	
time	33	250	Kate	1	
day	16	250	dances	1	
got	11	250	strong	1	
home	11	250	buoyant	1	
again	10	250	observers	1	
union	7		exporting	1	
days	7				

Where column (1) contains the words used in Test Form 1

(Newspaper Articles)

Where column (2) contains the frequency of occurrence of

the word in 20,000 word sample

Where column (3) contains the 'blocking' as per

McNally and Murray

Table 13 is designed to analyse the fifty-one words in

the manner described above; for column 1 (51 test words)

lists the words as decreed by their frequency of occurrence

in the 20,000 word sample, which is listed in column 2

('f' in 20,000 words); whilst column 3 (McN. and M.frequency

blocking) denotes the frequency blocking of the word in

accordance with the findings of McNally and Murray.

An analysis of Table 13 reveals that six of the words

are contained within McNally and Murray's most frequent

twelve words; a further seven words are to be found within

their next most frequent twenty words, five are contained

within their next most frequent sixty-eight words, and a

further seven within their next most frequent one hundred

and fifty words. This results in a total of twenty-five

of the fifty-one words, i.e. approximately half of them,

being rated as 'familiar words', and leads the author to

believe that the words utilised in the Cloze Test are fairly

representative samples of printed words in general.

The next logical step was to attempt to discover if a

positive relationship exists between the frequency of

occurrence of these words and the accuracy with which they

are predicted by pupils of secondary age. In order to com-

pare these two factors it was necessary to design Table 14

in which 'the' appears four times and 'it' appears twice. This is due to the fact that these words were utilised that number of times in the Cloze Test and so have varying accuracy of prediction results. Therefore it was decided that the four versions of 'the' and the two versions of 'it' should be represented as separate entities in Table 14.

Table 14

The word frequency and accuracy of prediction results
of the 55 words utilised by the cloze test procedure
on newspaper articles (Test Paper 1)

1	2	3			4			5			6	7
The words used in Test Paper 1	Frequency of occurrence in 20,000 words	No. of times predicted by:-									Total No. of accurate predictions	Rank According to accuracy of prediction
		1st year pupils test form			4th year pupils test form			1st & 4th year pupils				
		A	B	C	A	B	C	A	B	C		
1 the	1,262	21	31	37	29	38	40	50	68	77	195	8
1 the	1,262	26	23	37	35	34	37	61	57	74	192	10
1 the	1,262	25	23	24	36	22	39	61	55	73	189	11
1 the	1,262	30	29	35	38	33	39	68	62	74	204	4
5 to	505	40	33	38	40	36	40	80	69	78	227	1
6 and	494	34	36	36	40	37	40	74	73	76	223	2
7 in	395	32	28	32	36	38	39	68	64	71	203	5
8 for	205	30	21	27	33	27	35	63	48	62	173	15
9 it	190	28	21	36	38	33	37	66	54	73	193	9
9 it	190	27	26	37	37	32	40	64	58	77	199	6
11 that	162	5	5	30	12	3	36	17	8	66	91	37
12 on	153	26	4	7	28	8	19	54	12	26	92	36
13 at	138	27	16	21	39	25	35	66	41	56	163	19
14 be	131	33	26	33	36	29	39	69	56	72	197	7
15 with	120	25	16	33	31	26	37	56	42	70	168	17
16 by	112	28	8	38	35	25	39	63	33	77	173	15
17 their	77	23	17	21	23	26	30	46	43	51	140	23
18 one	76	20	8	15	28	15	28	48	23	43	114	33
19 when	57	17	6	27	22	10	33	39	16	60	115	31
20 so	49	32	8	13	35	11	16	67	19	29	115	31
21 its	38	20	2	24	31	3	32	51	5	56	112	34
22 over	37	18	2	4	19	6	11	37	8	15	60	42
23 than	35	22	21	32	33	29	38	55	50	70	175	14
24 time	33	27	11	25	28	14	36	55	25	61	141	22
25 day	16	32	33	35	36	32	40	68	65	75	208	3

1	2	3			4			5			6	7
26 got	11	27	4	32	37	7	39	64	11	71	146	21
26 home	11	3	XX	2	2	1	4	5	1	6	12	48
28 again	10	25	18	33	34	29	39	59	47	72	178	13
29 union	7	26	5	17	36	23	25	62	28	42	132	27
29 days	7	24	6	29	36	7	35	60	13	64	137	24
31 instead	6	5	XX	15	8	3	22	13	3	37	53	43
31 problem	6	28	24	30	30	30	39	58	54	69	181	12
33 done	5	34	13	22	36	31	31	70	44	53	167	18
33 want	5	16	4	10	15	7	22	31	11	32	74	41
33 Welsh	5	10	3	23	17	2	29	27	5	52	84	40
36 personal	4	2	XX	1	3	1	6	5	1	7	13	47
36 Wales	4	21	7	26	31	14	35	52	21	62	135	25
38 liner	3	3	1	XX	2	XX	4	5	1	4	10	49
38 transport	3	12	6	19	28	27	32	40	33	51	124	29
38 matter	3	8	2	8	11	2	5	19	4	13	36	44
38 neighbours	3	19	3	12	26	14	28	45	17	40	102	35
42 fast	2	XX	XX	1	XX	XX	2	XX	XX	3	3	52
42 hour	2	22	8	23	31	23	25	53	31	48	132	27
42 Rail	2	33	9	27	37	16	35	70	25	62	157	20
42 previous	2	2	XX	XX	XX	XX	4	2	XX	4	6	51
42 paper	2	22	7	22	31	16	36	53	23	58	134	26
42 insurance	2	1	XX	XX	5	XX	2	6	XX	2	8	50
48 patriotism	1	XX	XX	XX	XX	XX	XX	XX	XX	XX	XXX	54
48 tried	1	15	7	33	16	15	35	31	22	68	121	30
48 Kate	1	14	XX	23	22	1	26	36	1	50	87	39
48 dances	1	18	3	11	26	7	23	44	10	34	88	38
48 strong	1	XX	XX	5	1	XX	10	1	XX	15	16	46
48 buoyant	1	XX	XX	XX	XX	XX	XX	XX	XX	XX	XXX	54
48 observers	1	XX	XX	XX	1	XX	XX	1	XX	XX	1	53
48 exporting	1	4	2	6	6	2	13	10	4	19	33	45

Column 1 of Table 14 lists the fifty-five words contained in the newspaper articles test paper. Each word is listed in accordance with its frequency of occurrence in the 20,000 word sample as stated in column 2. Section 3 (1st year pupils) is divided into three columns, 'A', 'B' and 'C'. The figures in column 'A' denote the number of accurate predictions of each word by those first year secondary pupils who attempted to complete the test paper concerned with initial letter cues. Column 'B' reveals the accurate predictions of those first year secondary pupils who attempted

to complete the test paper devoted to context clues, whilst column 'C' contains the results appertaining to the configuration cue test paper. Section 4 deals with the fourth year pupils' accuracy of prediction results in an identical manner to that outlined above for section 3. The combined total of accurate predictions for each of the separate cues is presented in 5 'A' and 5 'C'; whilst section 6 contains the grand total of accurate predictions for each word, i.e. 5 'A' plus 5 'B' plus 5 'C'. The final column lists the relative position of each of the fifty-five words according to its accuracy of prediction result as stated in column 6.

In order to compare the frequency of occurrence of a word in the 20,000 word sample with the accuracy of its prediction it is necessary to look down column 1 to find the specific word. Next to it, in column 2, will be found its frequency of occurrence in the 20,000 word sample. Column 6 will reveal the number of times that the word was accurately predicted, and its relative position by virtue of its accuracy of prediction score is to be found in column 7, e.g. 'over' has a frequency of occurrence score of 37 which places it in twenty-third position, but was accurately predicted by only sixty pupils, which places it forty-second in the accuracy of prediction rankings. This represents a rating change of twenty positions (22 - 42 = 20).

In order to determine the correlation between the two sets of rankings, i.e. ranking according to frequency of occurrence in 20,000 word sample and ranking according to

accuracy of prediction, it was decided to compute a Spearman's rank correlation coefficient which was found to be 0.725 (for full computation see Appendix pp 38-41).

Confirmation of the substantial correlation between the two sets of rankings is supplied by the fact that if Table 14 was to be halved only eight of the higher frequency words would be relegated to the lower half of the table by virtue of their accuracy of prediction results. It is also quite obvious that those words which were not accurately predicted by any pupil are clustered in the lower levels of Table 14.

When discussing frequency of occurrence it must be noted that the twelve most frequent words account for 3,867 frequency counts, i.e. approximately 19.5%, whilst the other thirty-one words amass only 531 frequency counts, i.e. 2.7% of the total 20,000 frequency counts. (It must be noted that 'the' and 'it' are only included once each in the above calculation.) With only two exceptions, 'that' and 'on', the twelve most frequent words have very high accuracy of prediction results.

In view of the evidence provided by the above, especially the high Spearman's rank correlation coefficient of 0.725 there would appear to be grounds for believing that hypothesis 4 could be true, i.e. the accuracy with which a word may be predicted increases with its frequency of occurrence.

PART 5

DISCUSSION and CONCLUSIONS

It must be firmly borne in mind that this investigation
is concerned with eleven and fifteen year old school
children, and that any conclusions resulting from this
study are applicable only to this age range. Furthermore,
it must be remembered that the testees were not naive, non,
or beginning readers, but that half of them had undergone
a minimum of six years formal education; whilst many of the
fourth year pupils were preparing for their G.C.E. 'O'
Level examinations.

Numerous investigators have concluded that the initial
letter is the prime cue used in word identification by
beginning readers: whilst others have concluded that con-
figuration is sometimes used by adults as the prime cue.
The author was swayed by these two sets of findings when
defining hypothesis 1, in which the initial letter is
proposed as the prime cue used by eleven year old school
children when identifying missing items in a Cloze Test
procedure. The results indicate that this was an erroneous
supposition and that eleven year old pupils are better
able to utilise configuration cues in this type of sit-
uation.

The margin of superiority attained by the configuration
cue system over the initial letter cue system is stat-
istically significant at the 5% level for the first year
pupils but this increases to the 1% level for the fourth
year pupils. Hypothesis 2 is therefore confirmed as it
correctly forecast the superiority of the configurational
cueing system over the initial letter cueing system for the
fourth year pupils.

The author believes it is quite possible that initial letter cues are superior to configuration cues for non and beginning readers, and that Tinker (1965) is correct in his belief that configuration operates as an efficient word recognition cue only for those words designated as sight words, i.e. words met so frequently that they become part of the reader's sight vocabulary. If these conjectures are correct it is possible that the increase in importance of configuration cueing from 5% to 1% is the tail-end of the reversal process in which the initial letter cues cease to be of prime importance and are superseded by the configuration cue system.

The above is mere unsubstantiated conjecture on the part of the author, but if the initial letter is the prime cue for beginning readers and configuration the prime cue for eleven and fifteen year old readers then there must be a period of prime cue reversal. However, it is beyond the scope of this present study to do more than indicate that this could be a fruitful area for a future research project. Certainly the trend set by the first and fourth year secondary pupils is continued by the first and third year students at teacher training colleges. In an extension of this present study, which was carried out by the author with sixty first year and sixty fourth year students, the results indicate that configuration cues retain their superiority over initial letter cues.

The findings of this investigation tend to confirm hypothesis 4, i.e. that the accuracy with which a word may be predicted increases with its frequency of occurrence.

This, once again, is in line with the theory that the more frequently a word is encountered the more quickly it becomes a part of the reader's sight vocabulary. The author assumes that as a word is encountered in numerous contexts so a reader builds up a global concept of that word and this global concept will enable the reader to more accurately predict that word in a Cloze Test. This implies that the reader builds up expectancies concerning the reading material and the more fluent the reader the larger will be the unit upon which the expectation is based. The author believes that readers do not incorporate only individual words into their sight vocabulary, but also those words associated with specific, frequently encountered words, i.e. a specific word may become part of a reader's sight vocabulary but that word also acts as a nucleus for all of the various phrases in which that word is encountered by the reader. Consequently, when the reader encounters one of these phrases in a Cloze Test situation it triggers off a search for the specified word within a restricted area.

The author suggests that the beginning reader relies almost exclusively upon the initial letter to cue a relatively unfamiliar word, and then gradually as that word becomes more familiar it and its collocates, i.e. words that it is most frequently associated with, become part of the reader's sight vocabulary bank. After many encounters in various contexts the word, together with its associated phrases, i.e. large unit collocation, become assimilated by the reader. At this stage the initial letter is no

longer the prime cue but has been replaced by context clues and configuration cueing. It may be, however, that when the word is encountered in unusual context, or in context not previously encountered, then the reader reverts back to basic learning technique and once again becomes dependent upon the initial letter cues. Thus a reader is constantly employing both cue systems allied to context clues and as their sight vocabulary and associated bank of phrases expands the average reader depends upon the initial letter less frequently.

An exception to this latter generalisation occurs when a reader encounters an unfamiliar literary style which implies a multitude of new factors, e.g. new words, unfamiliar collocates, a new variation in sentence length, a new variation in syntax, etc. When a reader encounters new words in a familiar literary style the new words are quickly assimilated; but when the reader is dealing with an unfamiliar literary style the author believes that there is a substantial decrease in the reader's level of comprehension. The author is convinced that this is what occurred when the pupils were confronted with the test papers containing extracts from newspaper articles and from official adult literature. This study is not designed to investigate literary style and therefore any comments by the author must be treated as unsubstantiated conjecture, but whilst working on this thesis the author has become aware of the vital importance of literary style in connection with reading comprehension. A future research topic involving school leavers and the three literary forms designated

respectively newspaper articles, official adult literature and text books, is indicated.

Hypothesis 3 is confirmed, i.e. that the ability to utilise configuration cues, initial letter cues and context clues increases with age during the secondary stage of education. It is inevitable that those pupils attempting test 'B', i.e. context clues alone, should fare less well than their colleagues who were assisted by either configuration or initial letter cues as well as context. However, in the opinion of the author the standard of comprehension left much to be desired, although it must be borne in mind that the test population pre-test scores were half a standard deviation below the national average. McCullough, (1958) states that the process of using context clues remains ".... an area of considerable ignorance amongst us", and fifteen years later the results of this investigation suggest that there has been little practical improvement in the situation. The results of this study remind the author of Dolch, (1954) who was ".... discouraged by investigations which have shown that adults get half, or less, of the ideas of any selection read".

It is obviously not enough that a person is able to read the individual words in a passage, for these words may be put together in such a way as to make a statement that has little relation to a reader's experience or way of thinking, i.e. the reader has no global concept of the larger thought units built up by the individual words. This type of situation occurred frequently in the tests and is revealed by the results tabulated in Table 4, e.g. 'got',

a familiar word, was accurately predicted eleven times on Test 'B' (context clues), but sixty-four on Test 'A' (initial letter cues) and seventy-one on Test 'C' (configuration cues).

This type of situation is also closely allied to the testees use of restricted unit strategies. In this situation the testees abandoned the clues offered by the whole sentence, i.e. large unit, and concentrated their attention upon the cues within the individual word, i.e. small unit. This is indicative of a deficiency in their training in the use of comprehension clues.

In education great attention is given to the teaching of beginning reading yet it is only when pupils have mastered the basic processes and progressed beyond this stage that reading becomes a really important medium of communication. It is only then that teachers require their pupils to read for meaning, e.g. extract facts and gain knowledge, whether it be in Geography, History or Civics lessons. Yet these same teachers expect their pupils to do this without adequate training; possibly because the teachers themselves were inadequately taught how to teach all the skills involved in reading comprehension.

As a head teacher the author has discussed this problem with many teachers and students, and as a result of these discussions feels sure that teacher training colleges should expand their programmes dealing with the teaching of reading so that student teachers about to enter both Primary and Secondary schools are more adequately trained in the teaching of comprehension skills. It is

imperative that all teachers become aware that their pupils
are reading inefficiently unless they have knowledge of
individual word meanings, understand the main ideas of a
passage, can attend to detail, yet make inferences and
draw conclusions. It is also suggested that teachers should
ensure that their pupils become familiar with as many
literary styles as is possible.

The author believes that it is worth considering the
suggestions of Gilliland, (1972) and use the Cloze Test
procedure as a means of checking the extent to which pupils
have grasped instructions, set passages out, etc.
Perhaps then in five years or ten years McCullough, (1958)
will no longer find ignorance concerning the use of context
clues and Dolch, (1954) will have ceased to be discouraged
because people will then be able to grasp more than 50%
of the ideas in what they read.

The results of this investigation suggest the following
conclusions:-
1.   Hypothesis 1 is incorrect and should be amended to
read that at the beginning of the secondary stage of
education a pupil's ability to fill in missing items in a
Cloze Test is facilitated by knowledge of the configuration
plus context, initial letter plus context and context clues
alone, in that order.
2.   Hypothesis 2 is confirmed, i.e. at the end of the
secondary stage of education a pupil's ability to fill in
missing items in a Cloze Test is facilitated by knowledge
of the configuration plus context, initial letter plus
context and context clues alone, in that order.

3. Hypothesis 3 is confirmed, i.e. the ability to utilise configuration cues, initial letter cues and context clues increases with age during the secondary stage of education.

4. Hypothesis 4 is confirmed, i.e. the accuracy with which a word may be predicted increases with its frequency of occurrence.

5. In a Cloze Test accurate prediction of missing items is assisted by familiar collocation and convergent context, i.e. context which strongly directs the reader's attention towards a narrowly defined area of search which contains the required word. It is also of great assistance if the required word is a high frequency, familiar word which appears in close proximity to its place of omission.

6. In a Cloze Test the accurate prediction of missing items is made more difficult by unusual collocation, misleading context, i.e. context which directs the reader to an erroneous area of search. Accurate prediction is also made more difficult by obtuse context, i.e. context which permits the reader a wide area of search containing many alternative words. It is also difficult to predict low frequency, unfamiliar words with specialised or 'jargon' meanings and words which are specific names, or are included in a list of items.

7. Many pupils revealed a deficiency in their training in the use of comprehension strategies in that they tended to rely upon cues within words to the detriment of clues within sentences.

PART 6

BIBLIOGRAPHY

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PART 7
APPENDIX

I N D E X

NATIONAL FOUNDATION FOR EDUCATIONAL RESEARCH
IN ENGLAND AND WALES

N⁰ 66930

SECONDARY READING TESTS 1-3

by S. M. BATE, B.A.

TEST 2. COMPREHENSION.

DO NOT WRITE IN THIS SPACE		
AGE		
Years		Completed Months
Raw Score		
Standardised Score		
Marker's Initials		

Name... Boy/Girl.........................

School.. Class.........................

Date of Birth.. Today's Date.........................

Read the paragraphs on each page of this test, and answer the questions that follow them.

Where there are five possible answers *underline the correct one*. Where there is a space left for your answer, *write along the line provided*.

1. On the afternoon of Tuesday a river of fire poured down Ludgate Hill. Flames encircled St. Paul's Cathedral, the highest and noblest building in London. For hours they played round its walls but with no effect, and then some burning wood fell on the roof. Instantly it caught fire; the lead pipes and the metal of the bells melted in the heat and ran down in burning streams. The very stones broke with the heat. Then with a crash the roof fell in, and in a few minutes the great cathedral was a heap of smoking ashes.

A. Which is the best title for this passage:

   Ludgate Hill / London's Burning / The Burning of St. Paul's / The Great Plague / Smoke and Dust.   **A**

B. The passage says that the highest and noblest building in London :

   escaped the flames / was rebuilt / was flooded out / rang an alarm / was burned down.   **B**

C. The walls of St. Paul's Cathedral were built of :

   glass / stones / timber / thatch / metal.   **C**

D. Do you think this passage is out of a :

   history book / geography book / science book / scripture book / book of ballads.   **D**

E. Without saying so, the writer compares fire to water in this passage. In what three words does he do this?

   ....   **E**

TURN OVER AND GO STRAIGHT ON TO THE NEXT PAGE

4. Six boys came over the hill half an hour early that afternoon, running hard, their heads down, their forearms working, their breath whistling. They swept by the house and cut across the stubble field into the barn. And then they stood self-consciously before the pony, and then they looked at Jody with eyes in which there was a new admiration and a new respect. Before today Jody had been a boy, dressed in overalls and a blue shirt—quieter than most, even suspected of being a little cowardly. And now he was different.

A. The best title for this passage is :

Six Boys at Play / The Change in Jody's Fortunes / A Red Pony is Born / A Race over the Hill / Horses For Sale

    A

B. What was it that the boys came to see :

the barn / the house / the pony / Jody's sister / Jody's new clothes

    B

C. Why do you think Jody is said to be different ? Is it because :

he couldn't walk / he didn't live in the town / he had become a singer / he had grown up / he owned a pony

    C

D. Which words in the passage suggest that the six boys went regularly to Jody's home ?

They are : ....   D

E. What do you think " their forearms working " means ?

making digging movements / moving like pistons / waving hello / swinging loosely / linked together

    E

5. One man stood out from all the others for his fortitude in the face of hardship, Master Robert Hunt, the clergyman. He had boarded the ship at Blackwell, bringing with him his library of books, but the storms which they met even before they were clear of the Thames made him so ill that he was not expected to recover. When urged to give up the voyage, for his home was no more than twenty miles away, he refused, and by his uncomplaining example served to make some of the others lessen their wailings. Master Robert Hunt was to prove an example on many occasions, not least when a fire destroyed the wooden huts at Jamestown and he lost all he possessed, including his books—" yet none never heard him repine at his loss ".

A. The best title for this passage is :

A Brave Immigrant / The Soldier from Jamestown / Storms on the Thames / The Books of Robert Hunt / The Miserable Pilgrims

    A

B. What effect did Master Robert Hunt's example have on the other passengers?

They were amazed / they laughed at him / they grumbled more than ever / they tolerated him / they did not complain so much

    B

C. What reason do you think these people might have had for emigrating?

for religious reasons / to find a life of comfort / to write books / to earn lots of money / to be different

    C

D. Do you think this passage comes from :

an autobiography / the Bible / a play / a history book / a comic story

    D

E. Part of the last sentence is in quotation, because it is the sort of English which is not spoken today. Which two words come together there which you would not find together in modern English?

....   E

TURN OVER AND GO STRAIGHT ON TO THE NEXT PAGE

1st YEAR GRADING SCORES FOR 40 GROUPS (3 PUPILS PER GROUP) ON N.F.E.R. READING TEST 11.

f	X	$x = (m - x)$	x^2	$F x^2$
1	71	22.925	525.5556	
1	74	19.925	397.0056	
2	77	16.925	286.4556	
1	80	13.925	193.9056	
2	82	11.925	142.2056	
1	85	8.925	79.6556	
4	87	6.925	47.9556	
2	89	4.925	24.2556	
1	92	1.925	3.7056	
6	94	0.075	.0056	
3	96	2.075	4.3056	
4	98	4.075	16.6056	
2	100	6.075	36.9056	
2	102	8.075	65.2056	
2	104	10.075	101.5056	
1	106	12.075	145.8056	
1	107	13.075	170.9556	
1	109	15.075	227.2556	
3	111	17.075	291.5556	

$\sum = 11271$

$$f x^2 = 12608.322$$

$\underline{m_1 = 93.925}$

f = Number of pupils with that x

X = Reading quotient

x = Deviation of any score from that mean

x^2 = Square of deviation score

4th YEAR GRADING SCORES FOR 40 GROUPS (3 PUPILS PER GROUP) ON N.F.E.R. READING TEST 11.

f	X	$x = (m - X)$	x^2	$f\ x^2$
1	69	24.425	596.5806	
1	71	22.425	502.8806	
1	76	17.425	303.6306	
1	78	15.425	237.9306	
1	80	13.425	180.2306	
1	82	11.425	130.5306	
1	84	9.425	88.8306	
3	86	7.425	55.1306	
2	88	5.425	29.4306	
2	89	4.425	19.5806	
1	91	2.425	5.8806	
4	93	.425	.1806	
5	95	1.575	2.4806	
3	97	3.575	12.7806	
2	99	5.575	31.0806	
4	101	7.575	57.3806	
2	103	9.575	91.6806	
1	105	11.575	133.9806	
2	109	15.575	242.5806	
1	111	17.575	308.8806	
1	114	20.575	423.3306	

$$f\ x^2 = \underline{12563.322}$$

$\sum = 11211$

$\underline{m_2 = 93.425}$

f = Number of pupils with that x

X = Reading quotient

X = Deviation of any score from that mean

x^2 = Square of deviation score.

TEST FOR SIGNIFICANT DIFFERENCES BETWEEN MEANS OF
GRADING SCORES OF FIRST AND FOURTH YEAR PUPILS

Formula :-

$$t = \frac{M_1 - M_2}{\sqrt{\dfrac{x^2_1 + x^2_2}{n_1 (n_1 - 1)}}}$$

Where M_1 M_2 = Means of samples

" x^2_1 x^2_2 = Sums of squares

" n = Size of either sample

$$t = \frac{93.925 - 93.425}{\sqrt{\dfrac{12608.322 + 12563.322}{120 (120 - 1)}}}$$

$$t = \frac{.5}{\sqrt{\dfrac{25171.644}{14280}}}$$

$$t = \frac{.5}{\sqrt{1.7627}}$$

$$t = \frac{.5}{1.327675}$$

$$t = 0.37659$$

Critical Ratio = 0.37659 *

* This difference is not significant at the 5% level.

The three year battle t. get Britain's million pound l.... train
project moving is o...   Peace between the National U.... of
Railwaymen and British R... was announced last night b. Mrs.
Barbara Castle the T........ Minister.   It was a p....... triumph
for her following three d... of talks and two p....... rebuffs
from the union.

The motor industry has d... a splendid job in e........ cars last
year under t.. most adverse conditions.   But t... total is, alas,
fewer t.... in 1966 as sensible o........ forecast.   The squeeze
on h... sales has reduced exports i...... of stimulating them as
t.. Government expected.   Once again i. has been demonstrated that
b...... exports depend on a s..... domestic market.

You just can't make t.. jacket of a Shape F... suit look shabby.
We t.... for months.   We mistreated i.   It was worn every d..,
at work, at parties, d....., bowling alleys.   We stuffed i..
pockets with loose change, p.... backs, cigarette packets.   It
g.. crushed in the rush h..., it got soaked in t.. rain.

The women's hockey international o. the county cricket ground a.
Old Trafford between England a.. Wales last Saturday was o.. which
England would probably w... to forget and which W.... would like to
play a....   The result too, must b. an Umpire's nightmare.   The
W.... umpire gave the goal w... Ruff got the ball i. the net.

Ian Bell's problem wasn't s. much the keeping up w... the Joneses!
More a m...... of out-pacing them.   Every t... Ian and his wife
K... chose a new colour f.. the front door of t.... new semi-
detached home the n........ copied it.   Ian, an i........ worker,
finally solved the p...... with a splash of p.........

The amount of benefit s.... on any order you r...... is paid on the
u............ that you have been i........ of work during the p.....
it covers and that y.. have reported any change o. the receipt of any
o.... payment which may affect y... benefit as described in t....
Notes.

Do not in any c............, have radial-ply tyres on t.. front with
cross-ply tyres o. the rear. There are n. exceptions to this and i.
applies whether the car h.. front or rear wheel d...., or whether
the rear t.... are standard tread cross-ply o. winter tread cross-ply.
Do n.. mix cross-ply and radial-ply t.... on the same axle.

If you think the s........ is incorrect, you should n..... your local
office of t.. Ministry of Social Security, g..... your full name and
a...... and national insurance number, t.. names and addresses of
y... employers for the tax y.... in question, the dates o. your
employment with them a.., if possible, the amount of graduated
contributions.

General
In reckoning the a..... of tax to be d....... from pay, effect is
g.... to your allowance by t.. use of a code n..... A list of the
c.... is given at the e.. of this guide.

The a......... which will ultimately be d.. to you for the y... will
depend upon your c............ and the law in f.... for the year.

Mark your vote on t.. ballot paper secretly in o.. of the voting
compartments. P.. one X in the space t. the right opposite the
n... of the candidate for w... you wish to vote. Y.. may only vote
for o.. candidate. If you put a.. other mark on the b..... paper,
your vote may n.. be counted.

... project moving is ....   Peace between the National ..... of
Railwaymen and British .... was announced last night .. Mrs.
Barbara Castle the .... Minister. It was a .... triumph
for her following three .... of talks and two .... rebuffs
from the union.

The motor industry has .... a splendid job in .... cars last
year under ... most adverse conditions. But .... total is, alas,
fewer .... in 1966 as sensible .... forecast. The squeeze
on .... sales has reduced exports .... of stimulating them as
... Government expected. Once again .. has been demonstrated that
.... exports depend on a ...... domestic market.

You just can't make ... jacket of a Shape .... suit look shabby.
We ..... for months. We mistreated ..   It was worn every ...,
at work, at parties, ..., bowling alleys. We stuffed ...
pockets with loose change, ... backs, cigarette packets. It
... crushed in the rush ...., it got soaked in ... rain.

The women's hockey international .. the county cricket ground ..
Old Trafford between England ... Wales last Saturday was ... which
England would probably .... to forget and which ..... would like
to play .....   The result too, must .. an Umpire's nightmare.
The ..... umpire gave the goal .... Ruff got the ball .. the net.

Ian Bell's problem wasn't .. much the keeping up .... the Joneses!
More a ...... of out-pacing them. Every .... Ian and his wife
.... chose a new colour ... the front door of ..... new semi-
detached home the .... copied it. Ian, an .... worker,
finally solved the .... with a splash of ....

7

The amount of benefit ..... on any order you .... is paid on the
.... that you have been .... of work during the ......
it covers and that ... have reported any change .. the receipt of any
..... payment which may affect .... benefit as described in .....
Notes.

Do not, in any ...., have radial-ply tyres on ... front with
cross-ply tyres .. the rear. There are .. exceptions to this and ..
applies whether the car ... front or rear wheel ....., or whether the
rear ..... are standard tread cross-ply .. winter tread cross-ply.
Do ... mix cross-ply and radial-ply ..... on the same axle.

If you think the .... is incorrect, you should ...... your local
office of ... Ministry of Social Security, ... your full name and
.... and national insurance number, ... names and addresses of
.... employers for the tax ..... in question, the dates .. your
employment with them, ... if possible, the amount of graduated
contributions.

General
In reckoning the ...... of tax to be .... from pay, effect is
..... to your allowances by ... use of a code ......   A list of the
..... is given at the ... of this guide.

The .... which will ultimately be ... to you for the .... will
depend upon your .... and the law in ..... for the year.

Mark your vote on ... ballot paper secretly in ... of the voting
compartments. ... one X in the space .. the right opposite the
.... of the candidate for .... you wish to vote. ... may only vote
for ... candidate. If you put ... other mark on the ...... paper,
your vote may ... be counted.

The three year battle ▬ get Britain's million pound ▬▬ train
project moving is ▬▬. Peace between the National ▬▬ of
Railwaymen and British ▬▬ was announced last night ▬ Mrs.
Barbara Castle the ▬▬ Minister. It was a ▬▬ triumph
for her following three ▬▬ of talks and two ▬▬ rebuffs
from the union.

The motor industry has ▬▬ a splendid job in ▬▬ cars last
year under ▬▬ most adverse conditions. But ▬▬ total is, alas,
fewer ▬▬ in 1966 as sensible ▬▬ forecast. The squeeze
on ▬▬ sales has reduced exports ▬▬ of stimulating them as
▬▬ Government expected. Once again ▬ has been demonstrated that
▬▬ exports depend on a ▬▬ domestic market.

You just can't make ▬▬ jacket of a Shape ▬▬ suit look shabby.
We ▬▬ for months. We mistreated ▬. It was worn every ▬,
at work, at parties, ▬▬, bowling alleys. We stuffed ▬
pockets with loose change, ▬▬ backs, cigarette packets. It
▬ crushed in the rush ▬▬, it got soaked in ▬▬ rain.

The women's hockey international ▬ the county cricket ground ▬
Old Trafford between England ▬▬ Wales last Saturday was ▬ which
England would probably ▬▬ to forget and which ▬▬ would
like to play ▬▬. The result, too, must ▬ an Umpire's nightmare.
The ▬▬ umpire gave the goal ▬▬ Ruff got the ball ▬ the net.

Ian Bell's problem wasn't ▬ much the keeping up ▬▬ the Joneses!
More a ▬▬ of out-pacing them. Every ▬▬ Ian and his wife
▬▬ chose a new colour ▬▬ the front door of ▬▬ new sem-
detached home the ▬▬ copied it. Ian, an ▬▬ worker,
finally solved the ▬▬ with a splash of ▬▬.

The amount of benefit ▮▮▮ on any order you ▮▮▮▮ is paid on the
▮▮▮▮▮▮▮▮ that you have been ▮▮▮▮▮▮ of work during the ▮▮▮▮
it covers and that ▮▮▮ have reported any change ▮▮ the receipt of any
▮▮▮▮ payment which may affect ▮▮▮ benefit as described in ▮▮▮▮
Notes.

Do not in any ▮▮▮▮▮▮▮▮▮, have radial-ply tyres on ▮▮▮ front with
cross-ply tryes ▮▮ the rear. There are ▮▮ exceptions to this and ▮▮
applies whether the car ▮▮▮ front or rear wheel ▮▮▮▮, or whether
the rear ▮▮▮▮ are standard tread cross-ply ▮▮ winter tread cross-ply.
Do ▮▮▮ mix cross-ply and radial-ply ▮▮▮▮ on the same axle.

If you think the ▮▮▮▮▮▮▮ is incorrect, you should ▮▮▮▮▮▮ your local
office of ▮▮▮ Ministry of Social Security, ▮▮▮▮▮ your full name and
▮▮▮▮▮▮ and national insurance number, ▮▮▮ names and addresses of
▮▮▮▮ employers for the tax ▮▮▮▮ in question, the dates ▮▮ your
employment with them ▮▮▮, if possible, the amount of graduated
contributions.

General
In reckoning the ▮▮▮▮▮ of tax to be ▮▮▮▮▮▮▮ from pay, effect is
▮▮▮▮▮ to your allowances by ▮▮▮ use of a code ▮▮▮▮▮. A list of the
▮▮▮▮ is given at the ▮▮▮ of this guide.

The ▮▮▮▮▮▮▮▮ which will ultimately be ▮▮▮ to you for the ▮▮▮▮ will
depend upon your ▮▮▮▮▮▮▮▮▮▮ and the law in ▮▮▮▮ for the year.

Mark your vote on ▮▮▮ ballot paper secretly in ▮▮▮ of the voting
compartments. ▮▮▮ one X in the space ▮▮ the right opposite the
▮▮▮▮ of the candidate for ▮▮▮ you wish to vote. ▮▮▮ may only vote
for ▮▮▮ candidate. If you put ▮▮▮ other mark on the ▮▮▮▮▮ paper,
your vote may ▮▮▮ be counted.

FIRST YEAR PUPILS' ACCURACY OF PREDICTION SCORES ON THE THREE DIFFERENT FORMS OF THE TEST PAPERS.

N.F.E.R. Quotient	Test Form 'A'			Test Form 'B'			Test Form 'C'		
	Part 1	Part 2	Total	Part 1	Part 2	Total	Part 1	Part 2	Total
111	23	28	51	24	29	53	42	42	84
111	43	35	78	19	23	42	33	44	67
111	30	36	66	31	33	64	33	37	70
109	43	40	83	17	25	42	33	37	70
107	41	37	78	19	20	39	38	38	76
106	36	41	77	20	20	40	42	43	85
104	44	42	86	22	20	42	39	42	81
104	35	40	75	24	17	41	29	35	64
102	33	42	75	27	26	53	20	38	58
102	34	31	65	19	21	40	38	38	76
100	39	39	78	19	18	37	36	40	76
100	37	29	66	10	22	32	38	35	73
98	13	10	23	16	19	35	39	40	79
98	30	34	64	12	3	15	40	38	78
98	20	15	35	23	23	46	37	40	77
98	33	34	67	13	18	31	26	24	50
96	38	37	75	16	22	38	28	24	52
96	36	38	74	9	18	27	33	32	65
96	31	27	58	26	25	51	34	27	61
94	36	33	69	9	12	21	30	36	66
94	6	23	29	15	13	28	19	24	43
94	24	21	45	25	23	48	31	39	70
94	15	19	34	8	18	26	27	27	54
94	9	9	18	14	16	30	25	21	46
94	8	5	13	15	28	43	27	28	55

·92	13	17	30	25	27	52	32	39	71
89	11	8	19	25	27	52	32	24	56
89	28	18	46	20	25	45	29	28	57
87	4	4	8	15	7	22	18	15	33
87	26	16	42	4	4	8	10	8	18
87	17	23	40	9	2	11	37	27	64
87	8	8	16	19	25	44	31	24	55
85	23	21	44	18	18	36	15	19	34
82	46	20	66	5	7	12	30	28	58
82	7	10	17	21	19	40	20	24	44
80	30	25	55	9	1	10	14	19	33
77	6	8	14	16	14	30	22	20	42
77	2	0	2	5	3	8	-	8	8
74	1	9	10	2	4	6	25	11	36
71	12	2	14	4	3	7	12	13	25
11271	971	934	1905	649	698	1347	1144	1166	2310

FOURTH YEAR PUPILS' ACCURACY OF PREDICTION SCORES ON THE
THREE DIFFERENT FORMS OF THE TEST PAPERS.

N.F.E.R Quotient	Test Form 'A'			Test Form 'B'			Test Form 'C'		
	Part 1	Part 2	Total	Part 1	Part 2	Total	Part 1	Part 2	Total
114	44	40	84	31	38	69	49	44	93
111	39	38	77	27	36	63	38	46	84
109	42	43	85	24	23	47	40	42	82
109	43	43	86	28	33	61	41	37	78
105	37	34	71	20	29	49	40	45	85
103	38	44	82	30	33	63	35	33	68
103	37	44	81	31	33	64	40	39	79
101	39	44	83	23	18	41	39	50	89
101	15	28	43	25	24	49	38	42	80
101	33	42	75	25	25	50	49	42x	91
101	31	36	67	22	22	44	41	41	82
99	28	23	51	19	32	51	37	39	76
99	37	35	72	28	26	54	41	47	88
97	37	34	71	21	23	44	39	46	85
97	39	38	77	21	19	40	36	39	75
97	26	47	73	28	33	61	38	38	76
95	39	42	81	16	21	37	42	46	88
95	30	33	63	16	30	46	44	42	86
95	29	28	57	28	37	65	40	32	72
95	37	41	78	21	23	44	34	38	72
95	26	34	60	18	18	36	36	44	80
93	40	46	86	18	32	50	44	42	86
93	45	46	91	31	19	50	38	40	78
93	37	26	63	19	22	41	37	39	76
93	37	44	81	26	30	56	40	35	75
91	32	31	63	19	24	43	36	40	76

89	24	27	51	23	30	53	28	33	61
89	26	15	41	11	28	39	32	25	57
88	36	35	71	24	29	53	39	44	83
88	34	18	52	30	29	59	38	29	67
86	13	13	26	21	15	36	41	27	68
86	32	25	57	38	40	78	24	27	51
86	32	32	64	5	24	29	34	36	70
84	25	29	54	19	14	33	37	32	69
82	25	19	44	20	11	31	28	35	63
80	26	24	50	8	7	15	37	39	76
78	36	34	70	17	21	38	21	15	36
76	30	19	49	22	30	52	28	34	62
71	32	32	64	6	–	6	26	30	56
69	6	6	12	3	11	14	23	35	58
11211	1294	1312	2606	862	992	1854	1468	1511	2979

SYMBOLIC SCHEME OF THE VALUES WHEN TABULATING ANALYSIS

OF A VARIANCE OF A TWO WAY CLASSIFICATION.

Row		Column			Sum of Rows	Mean of Rows
		1	2	3	X r	(mr)
0	1 - 40	X o 1	X o 2	X o 3		
		X o 1	X o 2	X o 3	X o	
	M	M o 1	M o 2	M o 3		M o
P	1 - 40	X p 1	X p 2	X p 3		
		X p 1	X p 2	X p 3	X p	
	M	M p 1	M p 2	M p 3		M p
Sum of Columns (Xk)		X 1	X 2	X 3	X i j	
Mean of Columns(Mk)		M 1	M 2	M 3		M t

Let.   X i j   = Any one of cell entries Xo1, Xp1, in row 'r' and column 'k'

Let.   Mrk   = Any one of cell means Mo1, Mp1, of row 'r' and column 'k'

   k   = Column

   r   = Row

   n   = 40 observations within each set.

   t   = Total distribution i.e. all sets combined.

   Mt   = Mean of the composite.i.e. overall mean

   xt   = deviation of any X from Mt.

   O   = 1st Year pupils.

   P   = 4th Year pupils.

COMPUTATION OF x^2 (SQUARES OF DEVIATIONS) OF FIRST YEAR PUPILS
ON EACH OF TEST FORMS 'A' 'B' AND 'C'.

Test Form 'A' (O A)			Test Form 'B' (O B)			Test Form 'C' (O C)		
X	M - X	x^2	X	M - X	x^2	X	M - X	x^2
14	33.625	1130.641	8	25.675	659.206	25	32.75	1072.563
69	21.375	456.891	7	26.675	711.556	71	13.25	175.563
75	27.375	749.391	45	11.325	128.256	66	8.25	68.063
67	19.375	375.391	52	18.325	335.801	79	21.25	451.563
75	27.375	749.391	38	4.325	18.706	73	15.25	232.563
77	29.375	862.891	35	1.325	1.756	85	27.25	742.563
66	18.375	337.641	41	7.325	53.656	84	26.25	689.063
8	39.625	1570.141	40	6.325	40.006	43	14.75	217.563
17	30.625	937.891	22	11.675	136.306	33	24.75	612.563
10	37.625	1415.641	15	18.675	348.756	57	.75	.563
35	12.625	159.391	6	27.675	765.906	34	23.75	564.063
29	18.625	346.891	8	25.675	659.206	18	39.75	1580.063
44	3.625	13.141	21	12.675	160.656	56	1.75	3.063
2	45.625	2081.641	36	2.325	5.406	78	20.25	410.063
45	2.625	6.891	28	5.675	32.206	67	9.25	85.563
78	30.375	922.641	42	8.325	69.306	61	3.25	10.563
46	1.625	2.641	37	3.325	11.056	70	12.25	150.063
74	26.375	695.641	48	14.325	205.206	65	7.25	52.563
64	16.375	268.141	46	12.325	151.906	70	12.25	150.063
75	27.375	749.391	27	6.675	44.556	42	15.75	248.063
55	7.375	54.391	53	19.325	373.456	54	3.75	14.063
19	28.625	819.391	12	21.675	469.806	77	19.25	370.563
42	5.625	31.641	26	7.675	58.906	52	5.75	33.063
30	17.625	310.641	30	3.675	13.506	81	23.25	540.563
86	38.375	1472.641	10	23.675	560.506	76	18.25	333.063
58	10.375	107.641	39	5.325	28.356	76	18.25	333.063

X	x	x²	X	x	x²	X	x	x²
83	35.375	1251.391	40	6.325	40.006	76	18.25	333.063
78	30.375	922.641	32	1.675	2.806	59	11.25	126.563
78	30.375	922.641	42	8.325	69.306	64	6.25	39.063
66	18.375	337.641	43	9.325	86.956	55	2.25	7.563
65	17.375	301.891	42	8.325	69.306	58	.25	.063
40	7.625	58.141	51	17.325	300.156	46	11.75	138.063
66	18.375	337.641	11	22.675	514.156	33	24.75	612.563
16	31.625	1000.141	31	2.675	7.156	55	2.75	7.563
13	34.625	1198.891	40	6.325	40.006	50	7.75	60.063
34	13.625	185.641	30	3.675	13.506	36	21.75	473.063
14	33.625	1130.641	53	19.325	373.456	8	49.75	2475.063
18	29.625	877.641	52	18.325	335.806	44	13.75	189.063
23	24.625	606.391	64	30.325	919.606	64	6.25	39.063
51	3.375	11.391	44	10.325	106.606	70	12.25	150.063
1905		25,811.39	1347		8922.785	2310		13,792.02
m = 47.625			m = 33.675			m = 57.75		

Where

X = Number of accurate predictions by each pupil

M = Mean of total accurate predictions on each Test Form

x^2 = Square of deviations from the mean

0 = First Year pupils

A = Test Form utilising initial letter cues

B = Test Form utilising context clues

C = Test Form utilising configuration cues

COMPUTATION OF x^2 (SQUARES OF DEVIATIONS) OF FOURTH YEAR PUPILS ON EACH OF TEST FORMS 'A' 'B' AND 'C'

Test Form 'A' (PA)			Test Form 'B' (PB)			Test Form 'C' (PC)		
X	M − X	x^2	X	M − X	x^2	X	M − X	x^2
86	20.85	434.723	44	2.35	5.23	76	1.525	2.326
71	5.85	34.223	43	3.35	11.223	68	6.475	41.926
84	18.85	355.323	36	10.35	107.123	76	1.525	2.326
85	19.85	394.023	64	17.65	311.523	88	13.525	182.926
82	16.85	283.923	36	10.35	107.123	70	4.475	20.026
83	17.85	318.623	34	12.35	152.523	76	1.525	2.326
71	5.85	34.223	53	6.65	44.223	63	11.475	131.676
81	15.85	251.223	50	3.65	13.323	80	5.525	30.526
91	25.85	668.223	78	31.65	1,001.723	76	1.525	2.326
64	1.15	1.323	56	9.65	93.123	72	2.475	6.126
70	4.85	23.523	65	18.65	347.823	83	8.525	72.676
49	16.15	260.823	61	14.65	214.623	88	13.525	182.926
12	53.15	2,824.923	44	2.35	5.523	80	5.525	30.526
26	39.15	1,532.723	63	16.65	277.223	86	11.525	132.826
57	8.15	66.423	61	14.65	214.623	89	14.525	210.976
63	2.15	4.623	53	6.65	44.223	79	4.525	20.476
64	1.15	1.323	54	7.65	58.523	78	3.525	12.426
77	11.85	140.423	41	5.35	28.623	67	7.475	55.876
63	2.15	4.623	37	9.35	87.423	78	3.525	12.426
72	6.85	46.923	59	12.65	160.023	62	2.475	6.126
67	1.85	3.423	6	40.35	1,628.123	61	13.475	181.576
52	13.15	172.923	14	32.35	1,046.653	58	16.475	271.425
81	15.85	251.223	52	5.65	31.923	36	38.475	1,480.326

63	2.15	4.623	50	3.65	13.323	68	6.475	41.926
60	5.15	26.523	41	5.35	28.623	58	16.475	271.426
86	20.85	434.723	47	0.65	0.423	62	12.475	155.626
77	11.85	140.423	69	22.65	513.023	51	23.475	551.076
75	9.85	97.023	49	2.65	7.023	82	7.525	56.626
51	14.15	200.223	50	3.65	13.323	86	11.525	132.826
71	5.85	34.223	40	6.35	40.323	93	18.525	343.176
57.	8.15	66.423	51	4.65	21.623	85.	10.525	110.776
41	24.15	583.223	46	0.35	0.123	57	17.475	305.376
81	15.85	251.223	49	2.65	7.023	80	5.525	30.526
73	7.85	61.623	39	7.35	54.023	85	10.525	110.776
43	22.15	490.623	41	5.35	28.623	75	0.525	0.276
50	15.15	229.523	38	8.35	69.723	91	16.525	273.076
44	21.15	447.323	31	15.35	235.623	69	5.475	29.976
51	14.15	200.223	51	4.65	21.623	76	1.525	2.326
78	12.85	165.123	33	13.35	178.223	75	0.525	0.276
54	11.15	124.323	15	31.35	982.823	82	7.525	56.626
$\sum$2,606		$\sum$11,667.119	$\sum$1,854		$\sum$8,208.25	$\sum$2,979		$\sum$5,696.79
m=			m=			m=		
65.15			46.35			74.475		

Where X = Number of accurate predictions by each pupil

M = Mean of total accurate predictions on each Test Form

x^2 = Square of deviations from mean

P = Fourth Year Pupils

A = Test Form utilising initial letter clues

B = Test Form utilising context clues

C = Test Form utilising configuration clues

VALUES WHEN TABULATING ANALYSIS OF VARIANCE

OF A TWO WAY CLASSIFICATION

Ages	Tests			Sums for rows (Ages) $\sum X r$	Means for rows (Ages) $M r$
	'A'	'B'	'C'		
First Year	X OA	X OB	X OC		
O $\sum X$	1,905	1,347	2,310		
x^2	116,497	54,283	147,185		
$\sum$	1,905	1,347	2,310	5,562	
M	47.625	33.675	57.75		46.35
Fourth Year	X PA	X PB	X PC		
P $\sum X$	2.606	1.854	2,979		
x^2	181,448	93,214	226,831		
$\sum$	2,606	1,854	2,979	7,439	
M	65.15	46.35	74.475		61.992
Sums for Columns $\sum X k$	4,511	3,201	5,289	13.001	
Means for Column $m k$	56.388	40.013	66.113		54.171

COMPUTATION OF ANALYSIS OF VARIANCE

TOTAL SUM OF SQUARES

$$\sum x^2 t = \sum x^2 i j \quad - \quad \frac{(\sum X i j)^2}{N}$$

$$= 819,458 \quad - \quad \frac{13,001^2}{240}$$

$$= 819,886 \quad - \quad \frac{169,026,001}{240}$$

$$= 819,886 \quad - \quad 704,275$$

$$= \underline{115,183}$$

Correction figure $\frac{(\sum X ij)^2}{N}$

$$= \underline{\underline{704,275}}$$

COMPUTATION OF ANALYSIS OF VARIANCE

SUM OF SQUARES BETWEEN SETS.

(Between 6 groups S.S.)

$$\sum d^2 r k = \sum \frac{(\sum X r k)^2}{n} - \frac{(\sum X i j)^2}{N}$$

$$= \frac{(\sum X \, 0A)^2 + (\sum X \, 0B)^2 \ldots \ldots (\sum X \, pc)^2}{n} - \frac{(\sum X i j)^2}{N}$$

$$= \frac{3{,}629{,}025 + 1814409 + 5336100 + 6791236 + 34{,}37{,}316 + 8{,}874{,}441}{40} - 704275$$

$$= \frac{29{,}882{,}527}{40} - 704275$$

$$= 747{,}063.175 - 704{,}275$$

$$= 42{,}788.175$$

COMPUTATION OF ANALYSIS OF VARIANCE

SUM OF SQUARES BETWEEN ROWS.

(Between Ages)

$$\sum d^2 r \;=\; \sum \frac{(\sum X\,r)^2}{nk} \;-\; \frac{(\sum X\,i\,j)^2}{N}$$

$$=\; \frac{(5,562)^2 + (7,439)^2}{40 \times 3} \;-\; 704,275$$

$$=\; \frac{30,935,844 + 55,338,721}{120} \;-\; 704,275$$

$$=\; \frac{86,274,565}{120} \;-\; 704,275$$

$$=\; 718,954.7 \;-\; 704,275$$

$$=\; 14,679.7$$

COMPUTATION OF ANALYSIS OF VARIANCE

SUM OF SQUARES BETWEEN COLUMNS

(S.S. Between Modes 'A''B''C')

$$\sum d^2_k = \frac{\sum (\sum X k)^2}{nr} - \frac{(\sum X i j)^2}{N}$$

$$= \frac{(4511)^2 + (3201)^2 + (5289)^2}{40 \times 2} - 704,275$$

$$= \frac{20,349,121 + 10,246,401 + 27,973,521}{80} - 704,275$$

$$= \frac{58,569,043}{80} - 704,275$$

$$= 732,113.038 - 704,275$$

$$= 27\ 838.038$$

COMPUTATION OF ANALYSIS OF VARIANCE

SUM OF SQUARES FOR INTERACTION

$$\sum d^2 r \times k = \sum d^2 rk - \sum d^2 r - \sum d^2 k$$
$$= 42,788.175 - 14,679.7 - 27,838.038$$
$$= \underline{\underline{270.437}}$$

SUM OF SQUARES WITHIN SETS

$$\sum x^2 s = \sum x^2 t - \sum d^2 rk$$
$$= 115,183 - 42,788.175$$
$$= \underline{\underline{72,394.825}}$$

COMPUTATION OF ANALYSIS OF VARIANCE

DEGREES OF FREEDOM (d.f.)

Source	d.f.
Between rows	$r - 1$
Between columns	$k - 1$
Interaction	$(r - 1)(k - 1)$
Within sets	$N - rk = rk(n - 1)$
Total	$N - 1$

'F' ratios

			required 'F'	
			0.05	0.01
'F' for Modes (Between columns)	$= \dfrac{13,919}{309.4}$	$= 44.987$	3.04	4.70
'F' for Ages (Between rows)	$= \dfrac{14,680}{309.4}$	$= 47,446$	3.89	6.75
'F' for Interaction	$= \dfrac{135.2}{309.4}$	$= 0.436$	3.04	4.70

From the above it may be seen that the 'F' for both 'Modes' and 'Ages' is highly significant well beyond the 0.01 level; whilst the 'F' for Interaction fails to achieve significance at the 0.05 level. It is therefore necessary to apply the "Modified Error Term" which only applies when the 'F' for Interaction is not significant.

COMPUTATION OF ANALYSIS OF VARIANCE

MODIFIED 'ERROR TERM'

Interaction S.S. (270.437) + Within Sets
S.S. (72,823)   = 73,093.437

Interaction d.f. (2) + Within Sets d.f. (234)
      = 236 d.f.

Estimated Within Variance   = $\dfrac{73,093.437}{236}$

      =*309.716

*This is such a trivial change that it has virtually
no effect on the computations of the 'F' ratios
and the 'F' for Interaction still fails to achieve
significance at 0.05 level.

SOURCE OF VARIANCE IN DATA ANALYSED

Source of Variance	S.S.	d.f.	Estimate of Variance	'F'	Required 'F' 0.05	0.01
Between columns (Modes)	27,838	(k-1)2	13,919	44.756	3.04	4.70
Between Rows (Ages)	14,680	(r-1)1	14.680	47.203	3.89	6.75
Interaction	270.437	(r-1)(k-1)2	135.2	0.434	3.04	4.70
Within Sets (Error)	72,395	rk(n-1)234	309.4			
TOTAL	115,183.437	239				

COMPARISONS WITHIN AND BETWEEN AGE GROUPS FOR

THE THREE TEST FORMS 'A' 'B' AND 'C'

DIFFERENCES BETWEEN MEANS

Ages	Tests	Means	Difference
First Year O	A v B A v C B v C	47.625 − 33.675 47.625 − 57.75 33.675 − 57.75	+ 13.95 − 10.125 − 24.075
Fourth Year P	A v B A v C B v C	65.15 − 46.35 65.15 − 74.475 46.35 − 74.475	+ 18.8 − 9.325 − 28.125
O−P	A v A B v B C v C	47.625 − 65.15 33.675 − 46.35 57.75 − 74.475	+ 17.525 − 12.675 − 16.725

Where O = 1st Year Pupils

P = 4th Year Pupils

Results of first year pupils initial letter and context clue tests.

MEANS OA v OB COMPARED FOR SIGNIFICANCE.

$$n \sum d^2 \quad = \quad \frac{n(m_1 - m_2)^2}{2}$$

$$= \quad \frac{40(47.625 - 33.675)^2}{2}$$

$$= \quad \frac{40 \times 13.95^2}{2}$$

$$= \quad \frac{40 \times 194.603}{2}$$

$$= \quad \frac{7784.12}{2}$$

S.S. of Squares $= 3892.06$ at 1 d.f.

Within S.S. $= 25,811.39 + 8922.785$

$= 34,734.175$ at 78 d.f.

Within Variance $= \dfrac{34,734.175}{78}$

$= 445.3076$

'f' ratio $= \dfrac{3892.06}{445.3076}$

$= 8.74$ *

'F' $= t^2$

t $= \sqrt{\text{'f'}}$

$= \sqrt{8.74}$

$= 2.9565$ *

*1 is significant at .01 level

*2 is significant at .01 level

Results of first year pupils initial letter and configuration
cue tests

MEANS   OA v OC COMPARED FOR SIGNIFICANCE.

$$n \sum d^2 \quad = \quad \frac{n (m_1 - m_2)^2}{2}$$

$$= \quad \frac{40(47.625 - 57.75)^2}{2}$$

$$= \quad \frac{40 \times 10.125^2}{2}$$

$$= \quad \frac{40 \times 102.516}{2}$$

$$= \quad \frac{4100.64}{2}$$

$$= \quad 2050.32$$

S.S. $\quad = \quad 2050.32$ at 1 d.f.

Within S.S. $\quad = \quad 25811 + 13792$

$$= \quad 39603 \text{ at } 78 \text{ d.f.}$$

Within Variance $\quad = \quad \dfrac{39603}{78}$

$$= \quad 507.731$$

'F' ratio $\quad = \quad \dfrac{2050.32}{507.731}$

$$= \quad 4.038 *$$

* Significant at .05 level.

Results of first year pupils context clue and configuration cue tests

MEANS OB v OC COMPARED FOR SIGNIFICANCE

$$n \sum d^2 \quad = \quad \frac{n(m_1 - m_2)^2}{2}$$

$$= \quad \frac{40(33.675 - 57.75)^2}{2}$$

$$= \quad \frac{40 \times 24.075^2}{2}$$

$$= \quad \frac{40 \times 579.606}{2}$$

$$= \quad \frac{23,184.24}{2}$$

S.S. $\quad = \quad 11592.12$ with 1 d.f.

Within S.S. $\quad = \quad 8922.785 + 13,792.020$

$$= \quad 22714.805 \text{ at } 78 \text{ d.f.}$$

Within Variance $\quad = \quad \dfrac{22,714.805}{78}$

$$= \quad 291.21$$

'F' ratio $\quad = \quad \dfrac{11592.12}{291.21}$

$$= \quad 39.8067 \quad *1$$

'F' $\quad = \quad t^2$

t $\quad = \sqrt{F}$

$$= \sqrt{39.8067}$$

$$= \quad 6.309 \quad *2$$

*1 is significant at .01

*2 is significant at .01

Results of fourth year pupils Initial Letter and Context Clue Test.

MEANS   PA v PB   COMPARED FOR SIGNIFICANCE

$$n \sum d^2 \quad = \quad \frac{n (m_1 - m_2)^2}{2}$$

$$= \quad \frac{40 (65.15 - 46.35)^2}{2}$$

$$= \quad \frac{40 \times 18.8^2}{2}$$

$$= \quad \frac{40 \times 353.44}{2}$$

$$= \quad \frac{14,137.6}{2}$$

S.S.   =   7068.8   at 1 d.f.

Within S.S.   =   11,667.119 + 8208.25

              =   19875.369   at 78 d.f.

$$\text{Within Variance} \quad = \quad \frac{19875.369}{78}$$

              =   254.8076

$$\text{'F' ratio} \quad = \quad \frac{7068.8}{254.8076}$$

              =   27.722   *1

'F'   = t^2

t   = $\sqrt{F}$

              = $\sqrt{27.722}$

              =   5.2651   *2

*1 is significant at .01

*2 is significant at .01

Results of Fourth Year pupils Initial Letter and Configuration Cue Tests

MEANS PA v PC COMPARED FOR SIGNIFICANCE

$$n \sum d^2 = \frac{n (m_1 - m_2)^2}{2}$$

$$= \frac{40 (65.15 - 74.475)^2}{2}$$

$$= \frac{40 \times 9.325^2}{2}$$

$$= \frac{40 \times 86.956}{2}$$

$$= \frac{3478.24}{2}$$

S.S. $= 1739.12$ at 1 d.f.

Within S.S. $= 11667.119 + 5696.79$

$= 17363.909$ at 78 d.f.

Within Variance $= \frac{17363.909}{78}$

$= 222.615$

'F' ratio $= \frac{1739.12}{222.615}$

$= 7.8122$ *1

'F' $= t^2$

t $= \sqrt{F}$

$= \sqrt{7.8122}$

$= 2.795$ *

*1 is significant at .01

*2 is significant at .01

Results of Fourth Year pupils Context Clue and Configuration Cue Tests.

MEANS PB v PC COMPARED FOR SIGNIFICANCE.

$n \sum d^2$

$$= \frac{n (m_1 - m_2)^2}{2}$$

$$= \frac{40 (46.35 - 74.475)^2}{2}$$

$$= \frac{40 \times 28.125^2}{2}$$

$$= \frac{40 \times 791.061}{2}$$

$$= \frac{31640.64}{2}$$

S.S.

$$= 15820.32 \quad \text{at } 1 \text{ d.f.}$$

Within S.S.

$$= 8208.25 + 5696.79$$

$$= 13905.04 \quad \text{at } 78 \text{ d.f.}$$

Within Variance

$$= \frac{13905.04}{78}$$

$$= 178.269$$

'F' ratio

$$= \frac{15820.32}{178.269}$$

$$= 88.744 \quad *1$$

'F'

$$= t^2$$

t

$$= \sqrt{F}$$

$$= \sqrt{88.744}$$

$$= 9.4205 \quad *2$$

*1 is significant at .01

*2 is significant at .01

First Year and Fourth Year Initial Letter Cue Test.

MEANS   OA v PA   COMPARED FOR SIGNIFICANCE

$$n \sum d^2 \quad = \quad \frac{n(m_1 - m_2)^2}{2}$$

$$= \quad \frac{40(47.625 - 65.15)^2}{2}$$

$$= \quad \frac{40 \times 17.525^2}{2}$$

$$= \quad \frac{40 \times 307.1256}{2}$$

$$= \quad \frac{12285.024}{2}$$

S.S. $= \quad 6142.512 \qquad$ at 1 d.f.

Within S.S. $= \quad 11667.119 + 25811.39$

$$= \quad 37,478.509 \qquad \text{at } 78 \text{ d.f.}$$

Within Variance $= \quad \dfrac{37,478.509}{78}$

$$= \quad 480.494$$

'F' ratio $= \quad \dfrac{6142.512}{480.494}$

$$= \quad 12.7837 \qquad *1$$

'F' $= \quad t^2$

t $= \quad \sqrt{F}$

$$= \quad \sqrt{12.7837}$$

$$= \quad 3.575 \qquad *2$$

*1   is significant at .01

*2   is significant at .01

First Year and Fourth Year Context Clue Test.

MEANS OB v PB COMPARED FOR SIGNIFICANCE

$$n \sum d^2 = \frac{n(m_1 - M_2)^2}{2}$$

$$= \frac{40(33.675 - 46.35)^2}{2}$$

$$= \frac{40 \times 12.675^2}{2}$$

$$= \frac{40 \times 160.6556}{2}$$

$$= \frac{6,426.224}{2}$$

S.S. $= 3,323.112$ at 1 d.f.

Within S.S. $= 8,922.785 + 8,208.25$

$= 17,131.035$ at 78 d.f.

Within Variance $= \dfrac{3213.112}{78}$

$= 41.194$

'F' ratio $= \dfrac{3213.112}{41.194}$

$= 7.7999$ *1

'F' $= t^2$

t $= \sqrt{F}$

$= \sqrt{7.7999}$

$= 2.7928$ *2

*1 is significant at .01

*2 is significant at .01

First Year and Fourth Year Configuration Cue Test.

MEANS   OC V PC   COMPARED FOR SIGNIFICANCE

$$n \sum d^2 \quad = \quad \frac{n(m_1 - m_2)^2}{2}$$

$$= \quad \frac{40(57.75 - 74.475)^2}{2}$$

$$= \quad \frac{40 \times 16.725^2}{2}$$

$$= \quad \frac{40 \times 279.7256}{2}$$

$$= \quad \frac{11,189.024}{2}$$

S.S. $= \quad 5,594.521 \quad$ at   1 d.f.

Within S.S. $= \quad 13,792.02 + 5,696.79$

$= \quad 19488.81 \quad$ at   78 d.f.

Within Variance $= \quad \dfrac{19488.81}{78}$

$= \quad 249.8565$

'F' ratio $= \quad \dfrac{5594.521}{249.8565}$

$= \quad 22.3909 \quad$ *1

'F' $= \quad t^2$

t $= \sqrt{F}$

$= \sqrt{22.3909}$

$= \quad 4.7319 \quad$ *2

*1   is significant at .01

*2   is significant at .01

SPEARMAN'S RANK CORRELATION COEFFICIENT APPLIED TO THE
55 WORDS UTILISED BY TEST PAPER 1.

The 55 Words used in Test Paper 1		D.	D^2
Rank Order according to frequency of occurence in 20,000 word sample	Rank Order according to Accuracy of prediction by 1st and 4th year pupils.		
R_1	R_2	$R_1 - R_2$	$(R_1 - R_2)^2$
2.5	8	5.5	30.25
2.5	10	7.5	56.25
2.5	11	8.5	72.25
2.5	4	1.5	2.25
5	1	4	16.
6	2	4	16.
7	5	2	4.
8	15.5	7.5	56.25
9.5	9	.5	.25
9.5	6	3.5	12.25
11	37	26	676.
12	36	24	576.
13	19	6	36.
14	7	7	49.
15	17	2	4.
16	15.5	.5	.25
17	23	6	36
18	33	15	225.
19	31.5	12.5	156.25
20	31.5	11.5	132.25
21	34	13	169.
22	42	20	400.
23	14	9	81.

SPEARMAN'S RANK CORRELATION COEFFICIENT APPLIED TO THE
55 WORDS UTILISED BY TEST PAPER 1.

The 55 Words used in Test Paper 1			
Rank Order according to frequency of occurence in 20,000 word sample	Rank Order according to Accuracy of prediction by 1st and 4th year pupils	D	D^2
R_1	R_2	$R_1 - R_2$	$(R_1 - R_2)^2$
24	22	2	4.
25	3	22	484.
26.5	21	5.5	30.25
26.5	48	21.5	462.25
28	13	15	225.
29.5	27.5	2	4.
29.5	24	5.5	30.25
31.5	43	11.5	132.25
31.5	12	19.5	380.25
33	18	15	225.
33	41	8	64.
33	40	7	49.
36.5	47	10.5	110.25
36.5	25	11.5	132.25
39.5	49	9.5	90.25
39.5	29	10.5	110.25
39.5	44	4.5	20.25
39.5	35	4.5	20.25
44.5	52	7.5	56.25
44.5	27.5	17	289.
44.5	20	24.5	600.25
44.5	51	6.5	42.25
44.5	26	18.5	342.25

SPEARMAN'S RANK CORRELATION COEFFICIENT APPLIED TO THE
55 WORDS UTILISED BY TEST PAPER 1.

The 55 Words used in Test Paper 1		D	D^2
Rank Order according to frequency of occurence in 20,000 word sample	Rank Order according to Accuracy of prediction by 1st and 4th year pupils		
R_1	R_2	$R_1 - R_2$	$(R_1 - R_2)^2$
44.5	50	5.5	30.25
51.5	54.5	3	9.
51.5	30	21.5	462.25
51.5	39	12.5	156.25
51.5	38	13.5	182.25
51.5	46	5.5	30.25
51.5	54.5	3	9.
51.5	53	1.5	2.25
51.5	45	6.5	42.25

$$\Sigma 7634$$
$$D^2$$

$$= \quad 1 \quad - \quad \frac{6 \quad D^2}{N(N^2 - 1)} \quad \text{(Rank Difference Coefficient)} \\ \text{(of Correlation} \qquad \qquad \text{)}$$

Where D^2 = sum of the squared differences between ranks and N = number of pairs of measurements.

$$= \quad 1 \quad - \quad \frac{6 \times 7634}{55(3025 - 1).}$$

$$= \quad 1 \quad - \quad \frac{45804}{166320}$$

$$= \quad 1 \quad - \quad .275$$

$$= \quad 0.725$$