Oral and written behaviour of junior children in stimulus-controlled and stimulus-free verbal situations

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ORAL AND WRITTEN BEHAVIOUR OF JUNIOR CHILDREN IN STIMULUS-CONTROLLED AND STIMULUS-FREE VERBAL SITUATIONS

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ABSTRACT

The study was concerned chiefly with the problems of the slightly backward reader. The performance skills and strategies of unselected samples of 7-8 year olds were compared on a range of verbal tasks, requiring subjects to deal with isolated letters, words and pseudo-words, and words in context. The speed and accuracy with which subjects could both generate lists of items, and read or write items provided by the experimenter, were examined. Modifications of these tests required subjects to give words as quickly as possible when either the length or one letter of the word was designated, and secondly, copying and spelling situations were employed with the response sheet indicating either the number of letters in the word, the position of one of the constituent letters, or both.

The superiority of above-average readers extended to all types of task. Inter-test correlations between ranked positions were higher for Poor readers with regard to speed and for Good readers with regard to accuracy. Results suggested that Poor readers selectively employed impulsive strategies on tests they perceived as too difficult. Overall, this group were characterized by a number of minor difficulties rather than by a particular deficiency in one area of functioning, although the tests highlighted their relative inability to use visual word imagery. Conditions drawing attention to aspects of word structure improved the copying accuracy of Poor readers. Sex differences in performance were only significant on written tasks. Further analysis of whole-item and intra-item errors are reported, together with observations of behaviour during test performance. With only one subject having a Reading Age more than two years below his Chronological Age, findings are discussed chiefly in terms of possible differences in socialization and reinforcement experience, and implications for general aspects of classroom control and communication are considered.

PREFACE

The establishment of universal elementary education in most Western countries during the latter part of the nineteenth century brought a heightened awareness of the fact that all children do not learn to read and write with equal ease. It was at first assumed that any faults must lie in the child rather than in the education he was receiving, and early studies were chiefly concerned with discovering why some children failed rather than how others succeeded. More recently, however, there has been increasing interest in the adequately progressing child, and concern with aspects of the school environment that can help or hinder progress. The aim of the first three chapters of the present report is to give an outline of contemporary knowledge and ideas about these various areas of verbal skill development - what processes are involved in learning to read and write successfully, what are the possible causes of backwardness, and the current beliefs about the way in which these skills should be taught. Chapter Four gives an account of some of the methods proposed for making a detailed analysis of the child's reading and writing performance.

Research suggests that the child's manifest level of performance is affected by two factors : the level of development of the perceptual and cognitive skills necessary for accurate reading and writing, and his general behavioural approach to the tasks. Included in the former are various discriminative skills, perceptuo-motor control of writing movements, and knowledge of structural and semantic redundancies in the language, which allow the reader to recognize and anticipate words in text and the writer to spell words accurately. Involved in the latter are attitudes towards task completion, and appreciation of the value and purpose of these activities. The present study, reported in Chapters Five to Eight, was concerned to look at the interaction of these two aspects of performance in a sample of 7-8 year olds that included children reading at above- and below-average levels for their chronological age (as indicated by scores on a standardized test).

Comparison of Good and Poor readers in the sample was aimed at defining the ways in which their abilities and performance strategies differed, and seeing to what extent the Poor readers' failure was due to the adoption of idiosyncratic and maladaptive techniques. In the final chapter the results are related to previous findings in this field, and a particular attempt is made to consider variables in the classroom situation itself that have affected the adoption, development and maintenance of both general and specific performance strategies by the individual child.

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CHAPTER ONE

LEARNING TO READ AND WRITE

1.1 Oral and Written language compared

1.2 Writing system characteristics

1.3 Coding Processes in Reading and Writing

1.4 Verbal storage systems

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1.1. ORAL AND WRITTEN LANGUAGE COMPARED

Listening, talking, reading and writing are part of the child's continual attempts since birth to organize and comprehend his environment. Chapter One begins with a brief comparison of oral and written language systems and the activities associated with them.

Oral and written language codes are equally arbitrary (K.S. Goodman, 1970), and, whilst it is commonly assumed that written language is derived from spoken language, many writers now stress that written language is not merely speech written down but differs both in terms of syntactic structure and the types of information conveyed (Geyer & Kolers 1972; Gillooly 1973; F. Smith 1973, Vigotsky 1962).

Fundamental to the use of written language is an understanding of the concept of a 'word'. The device of using extra space at appropriate intervals to create segmental units did not become common practice until about 1100 AD, when the already existent term 'word' was applied to these units. Like spelling patterns, word boundaries stabilized and conventions grew up which were, in fact, much more resistant to change than comparable phenomena in oral language (Goodman 1969b). Recent research indicates that beginning readers frequently neither have any concept of a word as a meaningful unit, nor perceive written words as natural units in speech (Holden &MacGinitie 1972; Huttenlocher 1964), and there is no evidence that these abilities are necessarily acquired automatically (McNinch 1971). Moreover, many school beginners confuse the terms number, letter and word, or make assumptions that length of words or height of letters are determinants of word boundaries (Meltzer & Herse 1969, Reid 1966).

Written language, furthermore, tends to be out of situational context. By contrast, speech has an immediate relevance and is normally addressed to a known audience who are able to supplement what they hear with non-verbal

gestural and other contextual information. Resulting differences in the abstract and precise qualities of speech and print are reflected in the nature of their inherent redundancies. Listening and reading must therefore employ different strategies to cope with the characteristics of the two forms (K.S. Goodman 1970). The permanence of the written word allows greater flexibility with regard to certain aspects of its comprehension, removing some of the rigours of sequential processing and permitting of experimental distortions of temporal order (Kolers 1968, Reinvang 1972).

The conditions under which an individual normally learns to use oral and written language differ in many ways. The use and comprehension of speech has a direct bearing on the child's immediate needs, and he has little difficulty in appreciating the efficacy of this form of communication. In contrast the school beginner may have little idea of what reading and writing are, and often no idea of their potential value. Staats & Staats (1962), among others, have also pointed out that learning to read is characteristically undertaken in relatively short and intensive instructional sessions. In oral language learning, on the other hand, the child "learns hour by hour over years in situations where language referents and meanings are in one system". (Weaver & Kingston 1972). One important consequence of this is that whilst most children display little anxiety in learning to talk, individual variation in speed of learning to read and write frequently results in worry on the part of parents and teachers that rapidly communicates itself to the child. Notions of 'punishment' and 'blame' may also attend the formal learning situation (Athey 1971; Wardhaugh 1971).

Although receptive skills generally develop ahead of generative skills, it should not be assumed that speaking and writing ever become 'mirror-images' of listening and reading (K.S. Goodman 1970). Indeed, whilst the normal child never learns to understand speech without also learning to speak, it is not so clear that a child never learns to read without learn-

ing to write (Crosby & Liston 1968). In the learning of associations between particular phonemes and spellings that represent them, learning the association in one direction does not necessarily cause it to be learned in the opposite direction (Simon & Simon 1973; Peters 1967a). Smith also draws attention to the fact that, for both oral and written language, ease of production seems opposed to ease of discrimination and comprehension (F. Smith 1973), and Fairbank (1970) makes the point that some adults are even rather proud of their illegible handwriting, although few would wish to boast of mumbling when they speak.

Questions have been raised as to whether oral and silent reading are identical (except for loudness) or whether they are distinct processes from the beginning (Weber 1968). Psycholinguists argue that oral reading involves encoding to speech subsequent to, rather than prior to, decoding to meaning (Goodman 1969a). Differences in the processes involved in reading and writing have also been highlighted by several writers. Peters (1967a) outlines three main dimensions of contrast. (1) reading skill permits performance flexibility according to the purpose for which one is reading, (2) reading permits successive approximations to the word being read before committment, and (3) skill in reading improves progressively with practice whilst spelling is much more an all-or-none activity.

The alphabetic nature of our language makes different demands on the reader and writer. It is not only easier to recognize a word than to write it, but the form of a written word is also more easily recognised by the reader than it is recalled by the writer. Secondly, the reader is processing from the 'surface structure' of the written symbol to the 'deep structure' of meaning, whilst the writer must work in the opposite direction. Only the reader can therefore make full use of the various types of redundancy in the language (F. Smith 1973).

At the time a child normally begins to learn to read and write he

is still expanding his oral language skills. However, although his oral skills will affect his early reading performance, the two processes must diverge; as Weaver & Kingston state

> "In fact, if the child's reading ability does not soon grow beyond his oral language capacity in terms of speed and processing, and volume and accuracy of information, his learning facility is questioned". (Weaver & Kingston 1972, p.624).

1.2 WRITING SYSTEM CHARACTERISTICS

The oldest known example of a complete alphabet dates from 1400 BC (Fairbank 1970). Modern European systems have reduced the number of visual symbols required, but in so doing increased the number and complexity of the rules governing grapheme-phoneme relationships (Geyer & Kolers 1972).

The evolution of the Greco-Roman alphabet was largely determined by ease of production of forms on stone (Fairbank 1970), and much recent research has looked at the confusability of these symbols. Ratings of letter discriminability have been produced (e.g. Dunn-Rankin 1968; Dunn-Rankin, Leton & Shelton 1968; Tinker 1963) and also of imagery value (Bowers 1932). Gibson and her colleagues have proposed a predictive explanation of letter confusions in terms of relational distinctive features. Between the ages of 4 and 8 years the child learns the 'dimensions of difference' between letters (there is no evidence he need be taught them), but he is likely to have most problems with those letters having the greatest number of features in common with other letters (Gibson 1965; Gibson, Gibson, Pick & Osser 1962). Similar ratings have been reported for words or other multi-letter groupings (Bowers 1932, Zechmeister 1969). Landauer & Streeter (1973) have found that common as opposed to rare words are confusable with a greater number of other words by the substitution of a single letter.

Smith (1973) has suggested that our alphabet may be regarded as a compromise, in which anything tending to make writing easier will make

reading more difficult, and vice-versa. English orthography does not transmit certain information relevant to pronounciation and for this reason has been labelled irregular or graphemically inadequate. However, more recent analyses, particular those undertaken from a psycho-linguistic viewpoint, have shown that when traditional orthography (t.o.) departs from strict phonetic regularity it frequently does so to preserve meaning-related information (Chomsky 1970, Venezky 1967). It also permits greater 'dialectal adaptability' (Gillooly 1971, 1973). Nevertheless, numerous attempts have been made to introduce an orthography with greater emphasis on phonetic regularity, and probably the best known today is Pitman's initial teaching alphabet (i.t.a.). There is an increasing body of data suggesting that children can master beginning skills more rapidly when using i.t.a. or some other system providing additional phonetic information (e.g. Downing 1967, Oliver, Nelson & Downing 1972). However, Gillooly points out that the advantages of such systems are largely confined to improvement of word recognition skills which, beyond a certain limit, do not improve reading comprehension. He states.

> "It would seem that whilst writing system characteristics affect the early and intermediate stages of learning to read, they do not influence the reading process once skill is attained".
> (Gillooly 1973, p.186).

Psycholinguistic opinion is that, as a system designed for readers who already speak the language and thus have knowledge of its surface structure, t.o. is nearly optimal for the lexical representation of English words (Chomsky & Halle 1968; Sampson 1972).

1.3 CODING PROCESSES IN READING AND WRITING

What is reading? Many definitions have been offered, of which the following may serve as examples:

" Reading is translating graphic symbols into sound according to a recognized system".

(Crosby & Liston 1968)

"It is receiving communication; it is making discriminative responses to graphic symbols, it is decoding graphic symbols to speech; and it is getting meaning from the printed page".

(E.J. Gibson 1965)

" Reading involves word perception, comprehension, reaction to what is read and assimilation of the new ideas with previous knowledge".

(Grey, quoted in Robinson 1966)

"Reading involves the recognition of printed or written symbols which serve as stimuli for the recall of meanings built up through the reader's experience".

(Bond & Tinker 1967)

" Reading is the process whereby the sensory input is transformed, elaborated, stored, recovered and used".

(Neisser 1967)

Recently, many writers have stressed the independence of the production of an oral response and the process through which the text is understood (e.g. Crosby and Liston 1968; Kolers 1969; Reed 1965; Robers & Lunzer 1968), although such a view is not new:

> "... 'reading aloud' is entirely subordinate to silent reading. While oral expression is subject to laws of its own, its excellence depends upon the success of the reader in comprehending the thought of the author". (Farnham 1881, quoted in Fries 1963, p.11).

Much of the theoretical confusion seems to result from a failure to differentiate between (1) the processes required for reading and (2) the skills and abilities used (Robinson 1966). The present and subsequent sections are therefore separately orientated around these two aspects of reading and writing.

Smith & Holmes (1971) argue that past preoccupation with the unskilled rather than the skilled reader resulted in a failure to appreciate the complexity of the reading process. This disinterest had been furthered by a common acceptance of two assumptions that identification of individual letters is a necessary preliminary to word identification, and that identification of words is a prerequisite for comprehension. Rather, it is

suggested.

> "... evidence is that the deep level process of identifying meaning either precedes or makes unnecessary the process of identifying individual words". (Smith & Goodman 1971, p.180).

The psycholinguists claim support for their ideas from two major sources. Firstly, they offer evidence that, in reading, word identification is too fast for letter-by-letter analysis. Smith defines redundancy as present whenever the same alternatives can be eliminated in more than one way (F. Smith 1971, p.19), and calculations in Information Theory terms indicate the enormous redundancy in a word recognition strategy incorporating identification of every letter. Furthermore, whilst a word can be identified under conditions of partial obliteration, or text understood with every fifth word deleted, word identification becomes very difficult if letters are presented successively. Also, they point to the impossibility of 'seeing' a visual configuration as both a word and a sequence of letters at the same time (Kolers 1970, Smith & Holmes 1971). A suggested alternative is that printed text is subjected to some form of featural analysis that makes use of information about sequential probabilities and other forms of redundancy inherent in written language. As this analysis makes use of <u>relational</u> information about letters, not all features will be distinctive at all times. Furthermore, as the aim of sampling text is to reduce uncertainty about items to be subsequently scanned, different features will fluctuate in value with regard to the maximization of processing speed. Further discussion of the various perceptual strategies observed or proposed is given in 1.5. However, it is generally concluded that.

> "Words can be identified with only half the featural information that would be required if letter identification were necessary, provided that the features sampled are taken from different locations within the configuration".
>
> (Smith & Holmes 1971, p.57).

It is argued that the skills involved in extracting information from text in order to comprehend it can be considered independent of additional

skills needed to read the text aloud. In discussing both reading and writing, Smith writes that

> "...the connections between written language and speech matter far less than is often assumed ... the sound-spelling relationship has practically nothing to do with immediate writing and immediate reading... the alphabetic principle has rather more relevance to some mediated writing and reading systems, but the relationship is complex and by no means always advantageous".
> (F. Smith 1973, pp 129-130).

Smith and others have concluded that there is no support for the view that the individual listens to his own (sub)vocalizations in order to comprehend what he is reading (Baron 1973; Smith & Holmes 1971). It has been found that even the most skilled readers cannot identify more than two unrelated words a second; on the other hand, speech becomes more difficult to comprehend at rates below 100 words per minute. As the average skilled reading speed is much higher than this, the reader must be doing something other than converting writing to sound. These arguments are related to the situation where the child meets an unknown word in reading; Smith writes:

> " the child does the same as a fluent adult reader in similar circumstances - he tries to ignore the unknown word, or else he guesses. Unless he is under the watching eye of an expectant adult he will not try to sound out an entire word a letter at a time". (F. Smith 1973, p.122).

The observation that many fluent readers tend to subvocalize when confronted with unfamiliar material represents, Smith says, nothing more than a regression to classroom-induced behaviour. It seems possible its function may also be to slow down an over-eager scanning rate.

The second major source of data arises from attempts to find out what processes <u>are</u> involved in silent reading. Ideas are based on the fundamental premise that recognition is not a reproductive but a constructive process (Kolers 1969). The term 'meaning identification' is used to encompass both comprehension and the use of semantic redundancy, with the assertion that it is generally a prior operation to word identification because it

reduces word uncertainty and therefore permits word identification on minimal visual information (Smith & Holmes 1971). Reading should therefore be viewed as a process of conversion and impletion of the visual sample, involving the projection forward and imposition of stored information on the visual scene (Geyer & Kolers 1972). The prepotence of his previously stored knowledge in determining what the reader expects to see on the page, and in controlling the technique he adopts for sampling the text, suggests the value of operationally defining comprehension as uncertainty reduction rather than in terms of the sequential perception and coding of written words.

The reader is therefore using information from two sources. perceptual information directly available from the text, and his stored knowledge of orthographic, syntactic and semantic constraints. However, there are several explanations, developing from Cattell's original ideas on 'whole word' perception, as to the precise way in which knowledge of redundancy is involved in reading. It has been suggested by Gibson, for example, that as redundancy is added to a sequence of letters, the good reader 'picks up' progressively bigger information units (Gibson 1965). In contrast, Smith & Holmes argue that Miller's original notion did not assert that such 'chunking' could occur prior to perception in order to increase span of apprehension, but that it was rather a feature of subsequent coding, designed to facilitate recall. They propose instead that, rather than the visual system picking up progressively more information, the additional information can be increasingly supplied by the reader himself

> "the additional information is there because the observer can decompose his word percept into letters, not because he constructs it from letters". (Smith & Holmes 1971, p.58).

However, these disagreements may arise in part at least from different conceptions as to the amount and type of information that visual displays are assumed to contain (see J.J. Gibson 1968). Additional support for the

view that comprehension can precede word identification has come from subliminal perception data, showing that an individual can react to the meaning of a word presented too briefly for its identification (Coltheart 1972). Dixon (1971) has suggested that the systems mediating phenomenal experience are separate from, and parallel to, those subserving overt behaviour (see below). In this context, therefore, recognition may be better conceptualized as a "process end result" - an awareness that matching has occured (Bannatyne 1971). A final assumption that derives from this approach is that there is no fixed amount of visual information that is required to identify words (F. Smith 1973), the amount of visual information needed varying with context - that is to say, with the uncertainty of the reader or the amount of non-visual information he can contribute.

Our expectations and predictions therefore make it possible for us to read as rapidly as we do. Models deriving from Information Theory and Cybernetics emphasize the hierarchical organization of these various information processing systems, controlled at every stage by various feedback loops (J. Mackworth 1972). However, one important difference between humans and machines is that attention (and failure of attention) is essentially a feature of human processing mechanisms (N. Mackworth 1972). The crucial role of attention in reading has been stressed by Hochberg

> "The reader does not merely regard a block of text and immediately realize its message. He must <u>intend</u> to read the display, must "pay attention" to its meaning if he is to be able to respond to its contents".
>
> (Hochberg & Brooks 1972, p.50).

Neisser (1967) has defined attention as the allotment of analyzing mechanisms to the visual field. Both Hochberg and Neisser emphasize the involvement of 'preattentive' mechanisms which in some way recognize which features seen in peripheral vision are uninformative. Feedback from the anticipatory scan then controls subsequent eye movements, allowing foveal fixation of important detail. Inadequate attentive sampling will result in

predictive and coding errors. These two aspects of a skilled reader's highly selective sampling can be demonstrated in situations where the written text contains inaccuracies. Thus he is both more likely to overlook discrepancies in the material, and more able to compensate for distortion as in the following example (Merritt 1969b, p.54):

If yuo are a fl--nt reodur yu will heve no diftiellty reod ng th:s

This greater reliance upon anticipatory and predictive skills is illustrated in a comparison of the error correction behaviour of good and poor readers. Good readers typically do not correct their mistakes (in reading text aloud) at once, the word incorrectly read having contributed to an anticipation concerning later words which is only subsequently proved to be incorrect. If the poor reader corrects his mistake at all, he is more likely to do so immediately, indicating that he is tending to deal with the words as unrelated units (F. Smith 1973).

It is the factor of intention that accounts for the very wide range of behaviours possible within the very general term 'reading' (Geyer 1972). To learn and remember, tne individual must not only be in a suitable state of arousal but also be able to direct his attention appropriately. The learning to read stage necessitates greater attention to all levels of intake, and consequently there may be little attention available for comprehension (J. Mackworth 1972). Nevertheless, the views expressed above would suggest that certain sacrifices need to be made in this respect in order that the objective of 'reading for meaning' (which appears to be the way the child naturally approaches the reading task) is never obscured. This point will be discussed further in Chapters Three and Four. An implication here is that, if the material or the general learning situation is boring, even a desire to pay attention may be overwhelmed by the intervention of complementary physiological processes of habituation (J. Mackworth 1972). Attention may similarly be affected for motivational or other physiological

reasons. Appreciation of such uncontrollable inattention may be valuable in examining the frequently reported observation of impaired concentration in backward readers.

1.4 VERBAL STORAGE SYSTEMS

To discuss information storage with particular reference to reading and writing, it is necessary to consider the roles of three proposed memory 'compartments' . a very brief Iconic Store, a limited short term memory store (STM) and a long term store (LTM) of unlimited capacity.

Contemporary memory models include the concept of very short term storage systems. Tachistoscopic studies suggest that visual input first gives rise to a primary sensory trace lasting for about 250ms - which in reading is approximately the length of a single eye fixation. To enable collective processing of several separate inputs, and thus to allow reading by phrases, an Iconic Store is proposed that can hold material for about one second before decay. Geyer & Kolers (1972) point out that the control of eye movements is largely independent of input, due to the buffering action of the Iconic Store, and this is highlighted in oral reading by the phenomenon of the eye-voice span. It is believed that Iconic memory holds visual and spatial information, which then needs to be processed for storage in some more stable form.

The processing of surface structure details is continued in STM. There is still considerable disagreement as to the nature and multiplexity of coding in this system. Central to this issue is the question of whether decoding to speech (overtly or covertly) is an essential stage in comprehension of visual verbal input (see 1.3). It has also been suggested that silent reading might involve the verbal coding of only the more important words, in order to increase reading speed (J. Mackworth 1972). Geyer & Kolers (1972) conclude that emphasis on acoustical coding in STM may be in

part a function of the types of stimuli experimentally employed. Exclusion of the use of other more powerful language systems, operative in reading text, may have led to an over-estimation of the importance of auditory information. The most recent data tend to support the idea that STM is not exclusively concerned with acoustic and/or articulatory coding, but that visual information is also reorganized into a more durable form (J. Mackworth 1972).

The development of psycholinguistics has encouraged much recent speculation about the way in which verbal material is finally stored in LTM. It seems useful to look firstly at the proposed nature of the long term store or 'internal lexicon' around which the individual organizes his language experiences, and secondly at the role of LTM in the performance of ongoing verbal activities.

Research findings have suggested that LTM codes many features of verbal material (e.g. Anisfield & Knapp 1968, Nelson, Brooks & Fosselman 1972; Underwood 1969; Wickens 1970). Nelson has suggested that the process of coding a word essentially consists of priming one or more of its features within the context of the current learning task, and that at least the following distinctive features may be involved. orthographic, phonetic, associative, semantic and imaginal (Nelson 1973). Syntactic attributes may possibly be added to this list. Wickens (1972, 1973) reports a list of twenty one attributes used by subjects in experimental recall situations. Psycholinguistic theory sees LTM as concerned with the deep structure of language (Ruddell 1969). There is also evidence that LTM organization takes word frequency into account, and that some separation of high and low frequency word storage may assist forward or peripheral anticipatory scanning, affecting the availability of responses rather than stimulus discriminability (Foote & Havens 1967; Hochberg & Brooks 1972; Postman & Conger 1954; Venezky & Calfee 1970). Moreover, it seems probable that information

concerning factors external to the word (environmental features) are coded in addition to its intrinsic attributes (Nelson 1973). There is some controversy as to whether these and other generalized features of items are stored separately and then linked inferentially at recall (Collins & Quillian 1969) or whether all information is stored together and generalizations coded with every appropriate word (Conrad 1972). Meyer (1970) has alternatively suggested that some semantic generalizations may not be stored but are rather 'computed' when needed from other types of stored information. Somewhat similar proposals have been made by Buschke that words need not even be stored as unitary, indivisable elements, but are instead coded as multi-component units, being generated in retrieval by the operation of linguistic rules and interacting with items with whom they share common features (Buschke & Lenon 1969, Buschke & Ronsch 1972).

It should be stressed that the operation of LTM in experimental recognition and recall tasks may not reflect the processes involved in reading and writing (or speaking and listening). However, data have suggested that paying attention to meaning rather than pronounciation facilitates recall of verbal material (e.g. Gibson, Bishop, Schiff & Smith 1964; Nelson, Brooks & Fossleman 1972). Kolers suggests, for example, that when isolated words are tachistoscopically presented a person sees the concepts the words represent and not just the words themselves. For a person who knows them, words will be perceived and remembered preferentially in terms of their meanings rather than their appearance or sound (Kolers 1970). Studies requiring subjects to reproduce text (e.g. Bartlett 1932; Slobin 1965, cited in Smith & Holmes 1971, p.61), showed that both adults and children reproduce meaning rather than the precise words or sentence structure. Kolers' work with mixed French and English text similarly indicated that bi-lingual subjects, when reading aloud, paid attention to encoding the meaning of the passage at the expense of accuracy with regard to reading the

words in the language in which they were presented (Kolers 1966a, 1966b). The function of LTM in listening or reading therefore, is ultimately to make the situation meaningful to the individual. This basically involves relating input to previously stored thoughts or knowledge. In the course of reading text, it appears that after the deep structure of a sentence is processed the underlying meaning is retained with little regard for syntactic structure. Actual words will not be stored unless they are very striking or need to be retained for some particular purpose (Athey 1971). Carver (1971,p.460), points out the advantages of such a system.

> "The reader will be better able to meet future information needs by sacrificing efficiency of retrieval for a greater variety and a larger quantity of stored information or experience".

There has been considerable argument as to whether meaning-related information is retrieved primarily through activation of visual or of auditory coding systems. Experiments investigating recognition memory for non-verbal stimuli suggest that both verbal and visual representations may be stored (e.g. Bahrick & Bahrick 1971; Kaplan, Yonas & Schurcliff 1966; Posner, Bois, Eichelman & Taylor 1969). This supports the view that it is wrong to consider long term storage of <u>verbal</u> material as being confined to spoken language features. The psycholinguistic approach stresses the use of visual coding to access meaning directly, denying the necessity of a phonemic decoding stage (F. Smith 1973). Tasks involving the identification of pseudo-words showed performance improvement with greater stimulus approximation to English (Miller, Bruner & Postman 1954); separating the letters of each item produced performance decrement, suggesting that stored visual information relating to both transitional probabilities and whole word patterns was important in word recognition (for adults).

In expressive as opposed to receptive verbal tasks, there is some evidence that visual information may not be spontaneously retrievable, at least in the earlier stages of learning. Simon & Simon state

> "The word recognition information that a reader gradually accumulates with experience is available only in an indirect way to help him spell. If he can produce a spelling close enough to the correct one so that he recognizes the word in question, he can then retrieve, by recognition, such information about its form as is stored in memory".
>
> (Simon & Simon 1973, p.22).

Mastery of spelling may perhaps come at the point when visual information becomes directly accessible, or at least available before an incorrect response is made. However, this information is supplemented by the storing of 'integrated movement sequences' enabling words to be written as units (F. Smith 1973). Schonell had described words as becoming, for the good speller, "engram complexes dependent for their stimuli upon dozens of muscles which have been co-ordinated with definite strength, sequence, accuracy and rapidity". (Schonell 1942, p.278). The importance of this information has been demonstrated by H.D. Brown (1970) who found that subjects spelt familiar irregular words more accurately than regular but unfamiliar ones. The frequency of occurence of plausible alternatives in English spelling clearly necessitates the use of visual- and motor-sequence knowledge in addition to acoustic or articulatory information. Fairbank, although concerned chiefly with handwriting style, has pointed out that print-script, whilst useful for teaching infants, does not develop naturally into a running hand (Fairbank 1970), and this holds certain implications for the development of spelling skills.

There would seem, therefore, to be considerable evidence for storage of written language knowledge in other than some phonemic form, Frank Smith (1973) cites the anecdotal example of the ability to immediately recognize a long and/or unfamiliar word (and presumably to be aware of any instance of its mis-spelling) without ever having attempted its full pronounciation. Weber and Bach (1969) have reported that subjects can even make very definite statements about the position 'inside their head' of their visual imagery when asked to visualize letters of the alphabet. Interest has,

however, also focused upon non-verbal visual representation in LTM. It was previously held that, once the child had mastered spoken language, all material presented visually would be recoded and stored in verbal form. More recently it has been shown that independent visual and verbal retention of information may occur. Bahrick & Bahrick (1971) further concluded that organizational class characteristics and item-specific aspects could be stored as independent visual traces, thus reflecting an independence of the accessibility of the visual trace from its accuracy. Independence of visual and verbal stores was demonstrated by Deno et al. who found frequent and considerable differences in the free associations elicited by a given word and those elicited by a simple line drawing intended to represent the same concept (Deno, Johnson & Jenkins(1968), cited in N. Mackworth 1972, p.688).

Several studies report better performance on experimental retention tasks for words given high visual imagery ratings (e.g. Paivio & Csapo 1969). Differences between people rated as high and low imagers are thought to be a function of retrieval rather than storage differences (Hebb 1968), whilst the mere emergence of vivid visual imagery need not be associated with a tendency to use such images (Short 1953).

Interaction between verbal and visual storage has also been illustrated in clinical studies by Mackworth, Grandstaff & Pribram, who found that aphasic children with severe speech difficulties did not show habituation of gaze to a novel stimulus over a one minute period in contrast to normal children who looked away after several seconds. Mackworth concludes that

> "All visual data that can be recognized must be stored in the brain, but the cue or category that allows us to find these data when they are required may often be verbal".
>
> (J. Mackworth 1972, p.708).

Many of the findings already cited have referred to the important

feedback systems operating between LTM and STM. LTM therefore influences both the selection of material for processing (J. Mackworth 1972) and, in conjunction with situational variables, the nature of the features processed (Nelson & Davis 1972). As a result, not only the content of STM, but also the lexical organization of LTM are constantly changing (Weist & Crawford, 1972).

Future research has to concentrate upon establishing the psycholgical reality of the various storage systems and coding mechanisms that have been postulated. More information is also needed of the way in which affective factors influence cognitive strategies and the organization of semantic knowledge. With greater knowledge of STM-LTM interaction questions concerning the commonality of recognition and retrieval processes may then be resolved : there is still argument as to whether the same storage systems are involved or whether the attributes of letters and words used for these two purposes are different enough to necessitate separate stores. Conclusions reached in most studies seem to indicate preference for the view that storage systems involved are the same. Rather more controversy centres around the differences in manipulation of this stored information that the two processes involve. Many suggest that the main difference between recognition and recall is that the former involves retrieval only to a minimal degree, or not at all. For example, Bower et al. (1969, p.329) state that recognition tests "clearly bypass the search and retrieval process by which S generates his recall"; Kintsch (1970) proposes a single process for recognition (storage) in contrast to two processes for recall (storage and retrieval). However, there are those, most notably Tulving, who claim that recognition memory also involves a substantial retrieval process. Much of the problem seems to arise from lack of consensus on use of the term 'retrieval' Tulving defines this as any utilizing of "information stored in the past to meet the demands of the present", and states there is nothing inherently different about the processes of recognition and recall

(Tulving & Thomson 1971, p.116). Freund et al. (1969) similarly consider the term in a fairly wide sense, covering the stages of (i) search, (ii) recovery and (iii) response generation, as incorporated in the model of Atkinson & Shiffrin. Thus whilst most experiments suggest that recall and recognition do not involve fundamentally different storage systems, it appears they may represent substantially different memory processes and are differentially sensitive, presumably at the retrieval or decoding stage, to a number of independent variables (see Anderson & Bower 1972; Freund, Brelsford & Atkinson 1969; McCormack 1972, Tulving & Thomson 1971). On the other hand, it seems more certain that a structural distinction can be made between systems relating to storage and the response aspects of language skills, and those involved in conceptualizing and thinking (Bannatyne 1971).

1.5 DEVELOPING SKILLS IN READING AND WRITING

This section outlines some of the attempts made to delineate the main auditory, visual and motor skills involved in learning to read and spell, the nature of the perceptual and coded units involved, and the cues readers use, as they become more proficient, that enable them to be selective in the type of information they utilize.

Venezky & Calfee have outlined some of the skills required in an acquisition model that assumes initial reading is oral (Venezky & Calfee 1970, p.287). Whilst the need to distinguish between comprehending written symbols and being able to pronounce them has been stressed in previous sections, it is nevertheless the case that, whether one believes oral production in reading to represent a decoding or an encoding stage, the assessment of early reading skills at present demands that the child be able to say aloud the written words he sees. The following discussion therefore considers oral and comprehension skills as separate but complementary aspects of normal reading development. Abilities thought to be prerequisite for the initiation of reading instruction are discussed in Chapter Three.

The preliminary skills proposed by Venezky & Calfee (1970) are . knowledge of the left-to-right, top-to-bottom arrangement of English print, awareness that writing can be translated into speech, and ability to discriminate letters and words. At all levels the interdependence among skills for their successful development should be emphasized. Appreciation of the arrangement of text will have been learnt by many children before coming to the formal reading situation, as the result of seeing adults point to words in order as they read them. However, crucial to the development of fluent eye movements in reading is the encouragement of anticipatory habits. If the child is 'guessing what comes next', and using graphic information taken in peripherally in order to direct saccades to the most relevant information, then strong and efficient scanning habits will be developed (Schiffman 1972). Similarly many pre-readers will already be aware that written language can be translated into speech. The problem of helping all children to gain an appreciation of this relationship, and of the purpose and value of the written word has been discussed elsewhere (1.1).

There is evidence that the well-motivated beginner will work with semantic and syntactic information if the reading material is fully formed language (Goodman 1969a). Nevertheless, it is argued that children must experience a phase of substantial attention to graphic cues in order that the word forms become familiar and analytic procedures for identifying unknown words are developed (see 4.2). However, there still remains considerable controversy as to whether early reading instruction should concentrate on developing such skills before the child is helped to 'read for meaning ' (e.g. Reed 1965) or whether such learning will occur experientially whilst a 'reading for meaning' approach maintains the child's desire to read (e.g. F. Smith 1973). As there is an overabundance of visual information in the printed text it is also argued that encouraging the

child to attend to all of it may even impede progress. However, an important point would seem to be that, whilst the skilled silent reader may be able to comprehend with minimal attention to the text, he needs skills that involve rather closer reference to the written material if he is to read it aloud with accuracy and fluency. Furthermore, if he is also to become a proficient speller he needs a repertoire of even more detailed knowledge of word structure and function, and there is evidence that reading aloud, because it necessitates closer attention to the auditory structure of words, does assist spelling progress (Peters 1967a).

Typically, then, the child will first be required to learn the names of the alphabetic letters. Staats (1970) has emphasized the problems arising from stimulus generalization effects, and several writers have stressed that ability to discriminate between different letters rather than to match-to-template is the crucial component of this skill (Ackerman & Williams (1969), cited in Williams (1970), p.40 , Gibson, Gibson, Pick & Osser 1962; F. Smith 1973). The child has to learn the 'dimensions of difference' that will allow reliable discrimination between different letters whilst tolerating the differences between different forms of the same letter (Gibson, Schapiro & Yonas 1968; Merritt 1969a). Gibson and her colleagues suggest that children improve their ability to discriminate letter-like forms as a result of two processes. (a) learning to detect the invariant features of the forms, and (b) becoming more sensitive to these features. However, its arbitrary and rote-learning nature is a hindrance to mastery of this skill. Another more general issue is that children have to learn that orientation is an important feature of two-dimensional written symbols. Earlier beliefs that children at the beginning reading stage were unable to deal with orientation have proved incorrect (Deich 1971, Wohlwill & Weiner 1964). Rather, the problem seems to be the 'unlearning' of a previous set to regard objects in the environment as unchanging regardless of their orientation to the perceiver (Bryant 1968, Merritt 1969a).

However, knowledge of letter names is not a sufficient condition for reading. Most writers agree that adoption of a letter-by-letter word recognition strategy cannot be successful, firstly because such a procedure is not fast enough to permit comprehension (Smith & Holmes 1971), and secondly because the sounds contributed by letters when in words are not the same as their sounds when pronounced as separate phonemes (Halle 1969, Staats 1970). On the other hand, a whole-word approach seems even less successful (Bishop 1964; Staats 1970). Attention therefore focused upon the identification of multi-letter groupings that could act as discrete perceptual or coding units.

Most research of this kind was done originally within a theoretical framework incorporating a necessary decoding-to-sound stage in reading. In S-R theory terms, the process involved is described as "the learning of a repertoire of stimulus-response units which in the presence of new stimuli result in novel (combinations of) responses". (Staats 1970, p.476). However, despite Staats' recent inclusion of cummulative-hierarchical learning processes into the instrumental learning model, the enormity of the learning task implicit in such an approach has led many workers away from a search limited to the isolation of simple grapheme-phoneme correspondences.

Gibson and her co-workers suggested that the learning of spelling-to-sound correlations is more closely related to concept formation than to simple association learning. Whilst no single relationship exists between single letters and sounds in English, higher-order rules governing the pronunciation of letter combinations are stable, and these constitute the functional graphic unit (Gibson, Pick, Osser & Hammond 1962; Gibson, Osser & Pick 1963). Other units proposed include the 'Vocalic Center Group' (Hansen & Rodgers 1968) which, although frequently identical to the syllable as normally defined, is fundamentally described according

to phonological rather than semantic criteria. Venezky et al. (1972) have suggested the involvement of morphophonemic generalizations in learning to read, the morphophoneme representing an intermediate unit between the phoneme and the morpheme. An important element is knowledge of all the alternative pronunciations for the vowel letters and the graphemic environments which specify these pronunciations. They suggest that simultaneously with the syntactic-semantic integration of what has just been scanned, forward scanning is directed towards the location of the next LMU (Largest Manageable Unit) which may be a single letter, strings of letters, words or phrases (Venezky & Calfee 1970). Aderman & Smith (1971) and Neisser (1967) have also stressed the fact that the size of the unit chosen depends upon the predictions the reader is able to make.

However, Venezky has emphasized the need for a distinction between spelling-sound patterns based on the spelling system and those based on phonological habits (Ruddell 1970). Other writers have pointed to reasons for rejecting spelling-to-sound correspondences as the major source of information used in reading. For example, Williams has criticized Gibson's concept of 'spelling-to-sound invariants' on the basis of the latter's own later work showing that deaf children behave in the same way as normals in various experimental situations (Gibson, Shurcliff & Yonas 1970; Williams 1970). A process of extracting orthographic invariants is now proposed (Rosinski & Wheeler 1972), and Williams concluded that what it actually is that makes certain 'spelling patterns' or letter clusters more easily recognized than others may not turn out to depend heavily on the spoken language (Williams 1970). Moreover, it is argued that no set of rules of phoneme-grapheme correspondence, however complex, could tell us how to pronounce all graphic configurations or how to spell all spoken forms (Reed 1965). Kenneth Goodman (1970) and Frank Smith (1973) state that it is unlikely that spelling-to-sound correspondence rules are used to any

large extent to establish the association between the visual form and the meaning already associated with the acoustic representation. Immediate word identification implies the identification of words on the basis of visual feature relationships in the configuration as a whole and not by the synthesis of information about individual letters or letter groups. Smith is here in greater agreement with the more recent Gibson formulations of an invariant feature analysis not essentially linked with pronounciation. Goodman suggests that a graphophonic cue system, not using phoneme-grapheme correspondences but operating on morphophonemic levels, is only used by the reader in the absence of sufficient syntactic and semantic information. Within high contextual constraints an initial consonant may be all that is needed to identify an element and allow the confirmation of prior predictions and the formulation of new ones (K.S. Goodman 1970). Reed has suggested the notion of a 'linguistic form', which links "a unit of meaning to a physical representation in terms of a conventional system ... it is preferable to think of linguistic forms as simultaneously having semantic and physical features, neither of which is paramount". (Reed 1965, p.225).

These ideas reflect a shift from models of visual pattern perception to models of perceptual processing, in which the use of various levels of contextual information and the imposition upon the perceived material of the reader's stored knowledge play fundamental roles. In the development of reading skills the child is thus seen as learning to use his previous knowledge more fully, progressively reducing the need to rely upon information from the printed page. This ability relies upon a hierarchy of knowledge of graphic, syntactic and semantic redundancies. The level of this knowledge the reader can use will depend upon the type of material being read (how much he already knows or can anticipate about its structure and content) and upon the purpose for which he is reading. Tulving & Gold

(1963) have suggested that sources of stimulus and contextual information can be considered complementary and interchangeable. It is argued that only the banality of the semantic content and the syntactic structure of many basal readers force children to resort to non-anticipatory 'sounding-out' strategies in the early stages of reading.

Support for this latter view has come from a number of experimental studies, some by the protagonists themselves and others by workers who have not explained their findings explicitly in these terms. In general, study of the cues used by readers in identifying words suggest that children tend to select the easiest available (Williams 1970). Marchbanks & Levin (1964) and Levin, Watson & Feldman (1964) showed that, using pseudo-words or an artificial orthography, beginning readers tended to use the first letter/symbol as the most salient cue in recognition, as indicated by false recognition errors. The first letter was found to be less important in this experimental situation when pseudo-words were present aurally (Kuenne & Williams 1973). Smith has suggested that use of the first letter reflects the greater value of this letter in reducing uncertainty. However, its preferential use in certain experimental situations does not preclude the use of featural (ascender and descender) or other statistical (sequential redundancy) information in normal reading. Even beginning readers could use implicit knowledge of sequential restraints in identifying letters in 3-letter words (Lott & Smith 1970). Hershenson (1969) has suggested that letter order redundancy may also be involved in an internal attentional mechanism for organizing input. The minimal importance of attending to overall word shape in the development of these skills is reflected in the failure of children to use shape as a cue in these experimental tasks (Marchbanks & Levin 1964), a finding also confirmed for a pre-reading sample (Williams, Blumberg & Williams 1970). In a recognition situation involving words that beginners had been taught how to pronounce, Wolpert

(1972) found that the concrete imagery value of the word had a greater influence on ease of learning the correct oral response than did word shape. Kolers has examined the ability of adults to deal with transformed verbal material, with the assumption that the performance of mature readers under such distorted conditions can tell us something of what the beginner has to learn. The results for speed of reading transformations indicated that knowledge of the geometry of the letters was not sufficient to explain their recognition. By developing an 'orientation set' for a particular transformation, subjects needed only to identify one or a few letters to be able to guess at a whole word or even a complete phrase. These predictive behaviours were disrupted if direction of letter orientation and direction of scan were opposed (Kolers 1968, Kolers & Perkins 1969a, 1969b).

Finally, these findings are related to the development of spelling skills. Staats has outlined the S-R approach, which includes the gradual organization of letter-order response patterns culminating in the control of the writing response by the sound of the letter which the writer has said himself (Staats 1970). The same problems are raised again, however Spache (1970) queries how some individuals can read well yet spell poorly if the images they have stored are letter-orientated. Venezky et al. (1972) similarly state that one problem connected with any theory based on the storage of spelling patterns is that it implies that poor spellers are poorer readers than good spellers (assuming other potentially confounding variables are partialled out), although they can find no evidence to support such a conclusion. Nevertheless, the finding that spelling ability may vary amongst good readers would not seem to preclude the supposition that over the whole ability range there will be a fairly high correlation between manifest reading and spelling abilities. However, as mentioned elsewhere, such comparisons do highlight the fact that any spelling-to-sound rules the child may learn in the reading situation may not help him generate the

correct written form of a word, at least at the first attempt. Furthermore, whilst long words are almost always more difficult to spell, some may cause far fewer reading problems than many shorter words (Landauer & Streeter 1973, F.Smith 1973, Spache 1970). Attention to these differences in the reading and spelling situations is necessary both for explanation of the skills involved and for any recommendations for instruction. These points are discussed further in Chapter Three.

1.6 FURTHER MATURATIONAL CONSIDERATIONS

The previous sections have briefly outlined some contemporary theoretical statements concerning the development of reading and spelling skills. The present section aims to relate these to other empirical findings concerning the maturation of perceptual and cognitive skills during the early school years.

A number of studies have pointed to developmental changes in the way children 'naturally' approach certain cognitive tasks. For example, Bach & Underwood (1970), on the basis of false recognition errors, suggested age changes in storage attribute dominance, in terms of the features most likely to be used in encoding. Whilst both acoustic and associative qualities appeared to be stored, the former were more salient for younger children (7-8 years) whilst the latter became more important in the behaviour of older children. Bach & Underwood interpreted the increase in associative encoding as resulting from the increased availability of associations, whilst Felzen & Anisfeld (1970) suggested their similar findings were due to the increasing prominence of semantic features. Using similar procedures Freund & Johnson (1972) report that school beginners were more likely to use orthographic than acoustic features in word recognition while this difference disappeared for 8-9 year-olds. This may be in part a function of the longer iconic store reported for

young children, which could allow more detailed processing of visual features (Gummerman & Gray 1972). Hall & Halperin (1972) have criticized the limitations of the false recognition technique; using different procedures they found evidence of heavy involvement of the verbal associative attribute in the encoding of verbal material by children as young as three years of age. The importance of the acoustic attribute was also demonstrated in 4 and 5 year-olds. Furthermore, they found no evidence of increase in the prominence of the verbal associative attribute over the age range sampled, either in absolute terms or relative to the role of the acoustic attribute. They interpret the Bach & Underwood and Felzen & Anisfeld findings as resulting from an increase in the subject's store of associations rather than the development of a mechanism by which these associations are elicited and employed. Rather, such mechanisms seem operational at a very early age if the material the child is dealing with is highly familiar or meaningful. Locke & Locke (1971) have also reported that the symbolic value of words is a salient feature in the perceptual memory behaviour of three year olds. These results appear to offer further support for the psycholinguists argument that beginning readers are ready to 'read for meaning', and should be encouraged to do so. Studies reporting developmental changes in oral reading errors are discussed in Chapter Four.

As discussed elsewhere, two major theoretical disputes have arisen. whetner the mature reader has learnt how to use more of the information on the printed page or how to manage with less, and whether decoding to sound is essential in the earlier stages of learning to read. Some further implications of these questions may be considered. It has been recognized that the activity of 'reading' involves two surprisingly separate abilities ability to understand written material and ability to produce a spoken version of it. Observations of people dealing with unfamiliar subject

matter or text in a foreign language show that ability to pronounce the words correctly in no way guarantees comprehension. On the other hand, mature skimming techniques show that the reader can achieve a general appreciation of a text whilst paying little or no attention to most of the words of which it is composed. From these facts a major problem emerges.

As many writers have pointed out, once the child can read simple prose the learning task is by no means finished. Further improvement must take place in two directions, increasing both ability to deal with more difficult material and ability to process material more quickly (Carver 1971). The child must therefore learn to discriminate between information that will be of more and less use to him (Goodman 1967). Moreover, he must become able to understand the author's intention and be able to react critically or emotionally to the material (Harris 1962; Robinson 1966; H.K. Smith 1967). Thus he acquires skills which allow him to adapt his reading technique to the demands of the particular situation. He uses strategies which allow him to read (or to write) either with very little attention to comprehension or without close attention to the individual words involved. Indeed, particular concern with one of these elements probably necessitates some relegation of attention to the other. Kolers has concluded that at least three different stages of competence or types of performance in the skilled reader can be revealed: (1) the visual operations resulting in the recognition of letters and individual words, (2) a sensitivity to the grammatical relationships between words in connected text, and (3) the direct imposition and manipulation of meanings. Whilst the third stage represent optimal reading, a skilled reader could operate at any level for a particular task (Geyer & Kolers 1972; Kolers 1970). However, our problem is that it seems unlikely that such sophistication can be successfully developed in the absence of some intermediate stage in

which attention to all elements of the situation is attempted, so that the value of this combination of skills is appreciated as essential to fluent and accurate reading and writing. A major task of research is therefore to examine the ways in which instructional methods and other external factors can influence this development, and the extent to which the processes and skills involved in reading and writing interact developmentally in the Junior school child.

1.7. REWARD AND PUNISHMENT

The development of systems of feedback and self-maintenance of goal states is fundamental to the performance of complex behaviours. The ease with which oral language behaviour becomes intrinsically rewarding has already been mentioned, and it seems reasonable to suppose that any child capable of acquiring normal speech should also be able to learn to read. On the other hand it seems that, exclusive of personal deficit, there are several very real reasons why some children do not under usual circumstances learn to read (Staats 1970, p.472). Some of the factors affecting reading acquisition are now discussed in more detail.

If behaviour has to be emitted before it can be reinforced, how can the child be motivated to learn in the first place? An initial premise must be that it will prove impossible to teach a child anything he does not wish to learn. It is not yet certain whether a 'drive to learn' within the child develops simply as a function of reinforcement experience, or whether this may be confounded with 'critical' or 'sensitive' period factors . there is some evidence that the child is just ready to become an autonomous learner at the 'Why' question stage (Havighurst 1964). Provision of reinforcement for the beginning reader, it would seem, is best centred around the child's desire to communicate rather than around perfection of perceptual, cognitive and motor skills per se. This does

not imply, however, that any self-rewarding quality that the acts of reading and writing thus acquire will necessarily improve performance accuracy; it is therefore essential to consider how the provision of reinforcement can influence this. The child's gradual development of a hierarchy of skills culminating in fluent and accurate performance, has been studied in this way chiefly from an operant point of view, which stresses that (1) development of higher-level skills is only possible after mastery of lower-level skills, (2) the use of successive approximation or 'shaping' techniques are valuable in the development of verbal behaviours and require consistent and appropriate reinforcement in the early stages, (3) maintenance of skills at intermediate levels may best be served by intermittent schedules of reinforcement, and (4) that an intrinsic reinforcement system based on information feedback will only develop if the child has initially been reinforced for behaviour which matches against some adult model or standard (Bloom 1973; Gagne 1970, Staats 1970). The behaviour involved in acquiring a complex repertoire such as reading is not therefore immediately self-reinforcing and involves arduous training. At the early stages some type of extrinsic reinforcer system must be introduced and many reinforcement systems that might compete with those present in the classroom be removed (Staats 1970).

It is suggested that the ability of a word to elicit conditioned sensory responses (images) that have reinforcing value enables reading behaviour to become intrinsically or self rewarding. Storytelling is at least in part the art of putting together words that will elicit such responses, which are strong reinforcers for many people (Staats 1970, p.533). This does not say that intrinsic reinforcement is 'unlearned' on a biological level, but that the reading behaviour has come to elicit reinforcing responses within the individual. The nature of the individual's reinforcing system therefore depends to a great extent upon his past experience for words to have reinforcing value like that of actual objects or

events, the individual must have the appropriate conditioning history. Staats writes

> "The individual who has a full reading repertoire is prepared to be controlled by printed verbal stimuli in a way that will produce reinforcement for him".
>
> (Staats 1970, p.536).

Moreover, the very exercize of habitual behaviour seems to be able to reinforce and consolidate the habit irrespective of the initial incentive or motivation (F. Smith 1971).

A further consideration emphasized by the operant approach is that whilst a skill is, typically, learnt slowly through repeated reinforced practice, related attitudes and other general performance characteristics may be acquired very rapidly - perhaps as the result of a single reinforcing experience (there is evidence that information about the general environment is stored with the material being learned . (J. Mackworth 1972). This points to the possibly crucial role (beneficial or detrimental) that can be played by random or unintentional reinforcing incidents in the learning context.

In the light of these suggestions we may consider how learning can be influenced by affective elements in the situation, and also how children differ in their responsiveness to different types and schedules of reinforcement. Entwisle states·

> "Diffuse affective factors, like self-confidence, feelings of ability to control the environment, and hope in the future are probably of enormous importance in cognitive development... Less diffuse ... factors like the effectiveness of material rewards compared to verbal reward, the ability to delay gratification, and feelings of hostility toward adults are also important because they govern the conditions of practice".
>
> (Entwisle 1971, p.125).

Reported research has suggested that lower-class children characteristically respond more readily to immediate material reward than to the teacher's smile or the hope of a good mark. On the other hand, it has been suggested that additional social reinforcement is of most value

in motivating retarded children. However, in both normal and retarded populations the power of different reinforcers may vary for different individuals, tasks and reinforcement schedules (Goyen & Lyle 1971a, 1971b, Woods 1974). A relevant point is whether children trained to read with various external reinforcers will later be able to read without them (Staats 1970). It has been proposed that the higher incidence of reading retardation in boys may be in part a function of differences in the way teachers treat boys and girls in the classroom learning situation (see also 2.8). Skinner (1953) has also mentioned more general potential dangers of having educational institutions too closely attached to economic or religious agencies, which may distort some of the aims of the educational process.

Several writers have emphasized the unprofitable effects of excessive or unreasoned punishment, or of continual experience of failure, on the learning process (e.g. Hildreth 1954, Schonell 1934; Skinner 1953). To the extent that the school situation is aversive, it will be reinforcing to 'escape' from it. Any behaviour, such as teasing or talking to other children, doodling or daydreaming, will be strengthened by providing an escape from the training situation (Staats 1970, p.473).

To summarize : within the formal learning environment we need to be aware of certain facts about acquisition and reinforcement processes. As Skinner writes.

> "In an American school if you ask for the salt in good French, you get an A. In France you get the salt. The difference reveals the nature of educational control. Education is the establishing of behaviour which will be of advantage to the individual and to others at some future time".
>
> (Skinner 1953, p.402).

In this learning situation we need to define three types of reinforcement. (1) the reinforcement system under which reading is acquired, (2) the development of a stage of intrinsic reinforcement, and (3) the system of

natural reinforcers for reading activity pertaining to everyday life - a system of extrinsic reinforcement (Staats 1970). Educationally, we have to know how to incorporate knowledge of these processes into teaching practices, and how to adapt the latter to fit the past history and present needs of the individual child.

1.8 SUMMARY EVALUATION OF READING MODELS

Chapter One has been concerned to present an eclectic discussion of various aspects of reading and writing development. An exhaustive theoretical review is beyond the scope of this study . Geyer (1972) has recently reviewed no fewer than forty eight comprehensive or partial models of the reading process (see also Athey 1971; Williams 1973). However, a brief critique is now presented, summarizing the major contributions and limitations of some contemporary standpoints. Most writers agree that we are still a long way from constructing a model that can incorporate all the necessary perceptual, cognitive, linguistic and other elements of the reading process. Nevertheless, certain positions have shed light upon particular aspects of the problem.

The concern of operant theory has been to provide a 'fine-grained' quantifiable analysis of the course of reading acquisition by placing emphasis on an objective definition of response units which are to be reinforced (Bloom 1973, pp. 154-155). As was the case for the theoretical contemplation of language acquisition, these ideas have been rejected as too simplistic by psycholinguists, although attempts have been made recently to combine these two positions (Samuels 1973). Stimulus-control factors have also been incorporated into certain cognitive theory approaches (e.g. Gibson 1965, 1970). However, the most practical contribution of operant theory may be its illumination of the role of reinforcement in the general learning situation (see 1.7).

Whereas operant theory sees reading as a set of behaviours that can be elicited by a prescribed set of stimuli, and has as its eventual goal the specification of environmental events sufficient to allow control over the reading process, the cognitive approach sees reading primarily as a problem-solving process and lays emphasis on the formulation of theoretical accounts of internal processing behaviour (Bloom 1973, Fleming 1969). The implication is that with greater understanding of the way cognitive skills are developed, children may be provided with experiences that will challenge their thinking ability (Athey 1971). Learning to read need not be seen as a tedious skill to be mastered before the child can function intellectually, but rather as a concomitant to the expansion of other organizational and communicative abilities. Such an approach emphasizes the worth of the child being able to bring a rich store of learning experiences to the reading situation, without which the ability to recognize printed symbols will remain a meaningless one. To take Geyer & Kolers' (1972) illustration why should we expect the meaning of the sentence 'Cows eat grass' to be anything other than vague to the city child who "had never seen a cow and thought of grass as something the older boys smoked".

The major contribution of psycholinguistic models has been the conceptual distinction of surface and deep structure. This approach has emphasized 'reading for meaning', raising doubts about the essential nature of certain widely accepted classroom practices and stressing that contact with text, rather than practice of any verbal sub-skills, is paramount.

> "Learning to read is akin to any other skill; there are perhaps some specialized activities that one can undertake to iron out particular difficulties, but there is no substitute for engaging in the activity itself".
>
> (F. Smith 1971, p.209).

The psycholinguistic approach has also borrowed certain concepts from Information Theory and cybernetics. The three most important are the use of redundancy in processing information, the importance of a long term information store and the operation of feedback systems that permit two-way interaction between stored knowledge and immediate input (Athey 1971; Carver 1971). However, Mackworth has suggested that such models have perhaps been of most use in highlighting the differences between human and computer data processing (N. Mackworth 1972).

In their present state of development, almost all models are subject to certain very general criticisms. Firstly, it remains necessary to prove that many have relevance to normal reading, having been derived from observation of verbal performance in laboratory situations. What the beginning or skilled reader can do in these circumstances may not indicate what he does when reading normally (Geyer & Kolers 1972, Williams 1970). Secondly, any model of the reading process will always be limited by its inability to take the effect of countless group and individual variables into account (Athey 1971). Major factors involved here are the omission of affective aspects from most theoretical statements and lack of consideration of social group differences. Entwisle states that the involvement of psycholinguistic theory in discussion of reading development stresses the need to make provision for dialectal and other social class differences. However, she also deals with the more fundamental issue that reading models without exception aim at an explanation of reading as an activity of a single person, ignoring the social components of the act of reading and its frequent social context (Entwisle 1971). One may suggest this latter point to be of particular relevance to the beginning reading situation, and there may be a stronger argument for its inclusion in any reading model, whilst recognizing the need to limit the incorporation of other variables that may be considered at the

most basic level 'nonrelevant' (Samuels 1973, p.207).

To conclude. Fleming has written that the main stumbling block to further understanding is a lack of clarity as to the sort of reading performance one is really after, or what evidence will satisfactorily indicate that this has been achieved (Fleming 1969, pp. 3-4). Nevertheless, as George Miller reminds us.

> "If the hypothetical constructs that are needed seem too complex and arbitrary, too improbable and mentalistic, then you had better forgo the study of language. For language is just that - complex, arbitrary, improbable, mentalistic - and no amount of wishful theorizing will make it anything else".
>
> (Miller 1965, p.20).

CHAPTER TWO

THE CHILD WITH READING AND WRITING PROBLEMS

2 1 INTRODUCTION

Large-scale surveys suggest that despite all the time, energy and money devoted to the teaching of reading, between 10 and 25% of American school children are seriously retarded (Bond & Tinker 1967) Clark (1970) reports 15% of 7-year olds in her Scottish sample to be without any independent reading skill and Rutter Tizard & Whitmore (1970) found 6 6% of 9-10 year olds in their Isle of Wight study reading at least two years behind their chronological and mental ages. Reading retardation is generally estimated to be about five times as common in boys as in girls, and it has also been reported that 75% of the juvenile delinquents of New York in 1955 were illiterate (Critchley 1970), pointing to the possibly tragic outcome in Western society of failure to learn to read

Although research now pays more attention to the normal development of reading and writing skills, most of our present knowledge comes from the study of children who are failing Chapters Two and Three offer a survey of the literature discussing individual and social reasons why skills development may be inadequate Although not of direct relevance to the present study, some mention is made of the problems and proposed causes of severe reading backwardness, to provide a better perspective for the consideration of less severe difficulties Overall, two major features of theoretical and empirical development are taken into account in presentation· firstly the historical trend that encompassed the movement away from the search for causal factors within the child towards research into the role of environmental influences on progress To some extent there has been a recent revival of interest in neurologically-orientated approaches to reading and writing backwardness, however, the contemporary multi-faceted attack reflects the second major development in this field, which is an appreciation of the need to distinguish between mild and severe retardation of formal language skills The two following chapters therefore discuss, respectively, some of the constitutional and environmental factors that may be involved

2 2 NEUROLOGICAL CONSIDERATIONS

For many years the goal of research workers was to establish one-to-one relationships between particular defects and definable causes Early theories of reading retardation centred almost exclusively around ideas of neurological damage or dysfunction However, some causal factors which in the past were considered important now receive less attention, and theoretical statements have not only moved towards a multi-factor approach to explain different types of manifest disability, but also towards an emphasis on multiple causation, assuming all but the mildest cases to be caused by the interaction of a number of adverse factors

At the end of the nineteenth century the syndrome of 'dyslexis' was first described, which stressed the role of an intrinsic neurological dysfunction of some kind Its currently recommended definition by the World Federation of Neurology is

> "a disorder manifested by difficulty in learning to read despite conventional instruction, adequate intelligence and socio-cultural opportunity.. dependent upon fundamental cognitive disabilities which are frequently of constitutional origin."
>
> (Critchley 1970, p.11)

It is necessary to keep clear the distinction between reading failure despite educational opportunity, and illiteracy, although Money (1962, p.9) has suggested that ageing beyond a critical developmental period before learning to read may itself induce some kind of dyslexia. However, many writers argue that labelling an individual 'dyslexic' is of little use in telling us why he is failing or how he may be helped. Much of the current confusion has also been ascribed to defects in experimental design and methodology, a failure to take account of the heterogeneity of most clinical samples, and the use of small groups with inappropriate controls (Belmont & Birch 1966, Samuels 1973, Satz & Sparrow 1970, Wedell 1973) Furthermore, accurate diagnosis of different types of specific reading disability remains very difficult in all but extreme cases This problem is particularly highlighted by comparative figures whilst reports

of dyslexia are received from most countries of the world, reported cases of failure because of some cerebral defect are twelve times higher in the U.S than in Japan, and twenty two times higher in Austria than Japan, indicating considerable classification difficulties (Samuels 1973, p.204)

It is also commonly reported that 'dyslexics' have familial history of reading problems, and it has been suggested (Hallgren 1950) that primary reading disability may be inherited as a unitary Mendelian trait, although there is obvious difficulty in differentiating genetic and environmental influences in this situation. Johnson & Myklebust (1967) concluded that hereditary factors can be assumed to be the most important causal element in very few cases of severe difficulty, and Shankweiler (1964b) suggested that a genetic predisposition to reading problems may only be important when environmental conditions are also unfavourable. However, Bannatyne (1971) has collected together a considerable amount of research implicating genetic factors in the development of general verbal abilities, and spelling skills in particular, and warns against any "head-in-the-sand" educational policy that tries to ignore or wish away these factors The important task is to identify the interactions between inherited ability and early environment and thus to provide the specialist remedial help that genetically less well-endowed individuals will need He concludes that children's learning problems seem to be based on genetic and environmental factors rather than upon neurological abnormality in all but a few cases.

The relationship between general intelligence and reading difficulty is unclear, but average or above intelligence is frequently stated as a diagnostic criterion for dyslexia. Vernon (1957, 1968) has concluded that specific reading disability cannot be directly attributed to low intelligence, although it is suggested that there may be an indirect relationship in that the dull child is likely to suffer in the normal classroom situation if instructional methods are not adjusted to his slower rate of learning (Bond & Tinker 1967) Clark (1970) reported that the majority of children in her study (sample size 1544) who were

backward in reading at the age of seven were of low-average intelligence, and that girls seemed to be in little danger of being severely backward in reading unless they were also dull. Correlation between intelligence and reading achievement probably becomes greater in later school years when reading becomes a more abstract activity, although it has been suggested that the nature of the Verbal/Performance IQ relationship may be a better predictor than general intelligence at this stage (Rourke & Telegdy 1971). Retarded readers who have a high IQ are found to make greatest gains in remedial programmes (Clark & Karp 1970).

Kawi & Pasamanick (1959) presented evidence of a much greater frequency of pregnancy complications and premature births in retarded readers than in controls, and similarly a higher incidence of birth injury and illness in post-natal life Hormonal abnormalities and pre-natal malnutrition can also cause alteration in cerebral as well as skeletal development (Goldberg & Schiffman 1972, Harris 1956, Robinson 1946).

Emphasis has frequently been laid on other manifest problems of retarded readers, in particular poor motor co-ordination or general hyperactivity (e g Griffiths 1970, Martin 1971, Naidoo 1971, Orton 1937, Rutter, Tizard & Whitmore 1970) Hunter & Johnson (1971) conclude that the most apparent deficit of the retarded reader is his inability to focus upon anything for a substantial period, his attention span being not merely shortened but also inappropriate and unpredictable Dykman et al (1970) suggest that deficits in cortical inhibitory processes, rather than defective arousal levels, account for the distractibility of the child with learning problems, and Hunter (1971) draws similar conclusions for children with specific reading disability. Black (1973) suggests that the behavioural variables of hyperactivity and distractibility themselves are of more use in differentiating learning disabled children than techniques aimed at confirming the presence or absence of specific neurological impairment.

Whilst severe sight or hearing problems as such may well affect reading

progress, there is little contemporary support for a perceptual deficit hypothesis of reading disability, although it may have some relevance in the early stages of skill development (e g. Benton 1962, Katz & Wicklund 1972, Nielsen & Ringe 1969, Reed 1969). Vellutino et al state that whilst veridicality of perception may be inferred when the correct oral response is made to a written verbal stimulus, it may not be justifiable to infer that an inaccurate response is a necessary indication of nonveridical perception or that the response signifies the nature of the percept apprehended (Vellutino, Steger & Kandel 1972, p.107). The preferred explanation is generally expressed in terms of storage and retrieval problems However, difficulties in dealing with visual items sequentially have frequently been reported (e g Doehring 1968, Guthrie & Goldberg 1972, Noelker & Schumsky 1973), and likewise auditory sound-blending (e g Kass 1963, Myklebust & Johnson 1962, Schilder 1944), although it has been suggested that the latter may be an effect rather than a cuase of reading difficulty (Crosby 1968, Naidoo 1971) Cotterell (1972) reported that those retarded readers whose main problem seemed to be remembering auditory-vocal sequencing were the most difficult to teach to read

Other writers have suggested that if one assumes no difference between the perceptual processes of normal and retarded readers, the problem may rather lie in the associative areas, resulting in comprehension difficulties (Fuller 1973) Rudisill (1956) tachistoscopically presented short phrases describing objects to advanced and retarded readers, who either had to read the phrase or point out a model of the object in an array Greater group difference on the latter task was interpreted as indicating a particular difficulty of the poor readers in grasping the meaning of words

Similar studies have suggested that one of the retarded reader's main problems may be an inability to identify and attend to the distinctive features of stimuli Goyen & Lyle (1973) concluded that poor readers' performances on a shape discrimination task did not reflect a memory decay problem but a failure to notice the critical differences which differentiated the two stimuli.

Weinstein & Rabinovitch (1971) reported that poor readers were unable to use appropriate cues for the recall of syntactically structured word lists Moreover, Steiner et al (1971) indicated that these children did not simply fail to pick up cues during reading but seemed unable to use them even when brought to their attention It is suggested that retarded readers may have a particular difficulty in retrieving various modality traces concurrently for reading and writing (French 1953), and Guthrie & Goldberg (1972) have pointed out that when tests fail individually to show up deficiencies, a problem may still emerge when the child needs to employ different skills simultaneously

At present, knowledge of the physical state of an individual enables us to make only very general inferences about what he will and will not be able to do However, because many psychologists and neurologists refuse to subscribe to the view that all reading disorders result from defective or inappropriate instruction, research continues The most persistent hypothesis has developed around the concept of cerebral dominance As originally conceived, dominance referred to a normal pre-eminence of one cerebral hemisphere over the other, whilst both hemispheres stored all information and could mediate all behaviour, the Left hemisphere was seen as controlling the performance of Right-handed individuals, and vice versa However, lesion studies showed that speech difficulties in Left-handers arose as frequently from Left- as from Right-hemisphere damage, and the idea developed that Left-handed or ambidextrous individuals typically failed to develop normal hemispheric dominance Orton observed an above-average incidence of Left handedness and ambidexterity amongst retarded readers He hypothesized that the storage of memory images ('engrams') of letters and words at first takes place in both hemispheres, the process of learning to read entailing both the suppression of the confusing engrams of the non-dominant hemisphere (which are in reverse-form order) as well as the selection of those which are in correct orientation The Left-hander's incomplete suppression of the former was the cause of reading retardation (Orton 1937) His work therefore concentrated upon the study of single-letter

and letter-order reversals in reading, however, many writers have pointed to the inability of this theory to explain any but lateral inversion errors. Krise (1952) reported no relationships between tendency to reverse and a tendency to scan right-to-left, also it seemed that reversal tendency does not simply disappear with maturation, but that 'growing out of it' is really learning to inhibit a disregard for orientation and direction when dealing with specific materials Other studies have also reported patterns of handedness to be unrelated to proneness to make reversals in reading or in non-verbal perceptual tasks (Allison 1966, Birch & Lefford 1963, Lyle 1969, Sawitz 1964, Wechsler & Hagin 1964). Errors in writing are considered further in Section 2 5. Several writers (e.g Fabian 1945, Wechsler & Pignatelli 1937) believe that different types of reversals should be considered to have different causal factors, and it would seem that greater distinction between possible receptive and expressive impairment is needed Also, more information concerning the extent to which 'reversals' are caused by insufficient sampling of cues or by STM or LTM impairment rather than by orientational or sequential troubles in dealing with items perceived

A basic assumption of these early theories was that the degree of manifest lateralization, as indicated by hand, eye and foot preference, was an accurate reflection of the extent to which language behaviours were under the control of one or other hemisphere Some support for the notion of a direct link between these two factors has persisted, although the majority of contemporary opinion is sceptical of such a relationship (e.g Chakrabarti & Barker 1966, Clark 1970, Hillman 1956, Rutter, Tizard & Whitmore 1970) Belmont & Birch (1963) and Reinhold (1963) consequently preferred the view that lateralization and reading disability might be independent manifestations of an underlying disturbance in neurological organization The present status of cerebral organization theories seems uncertain. Mushl (1963) and Koos (1964) have suggested that handedness or mixed laterality may become a more important factor in reading disability

when the individual is also of low intelligence. Other writers have argued that any connection between laterality and reading progress merely reflects the fact that the left-handed or ambilateral child, whilst now seldom being forced to use his right hand, is nevertheless still having to operate in a right-handed world and, more specifically, with a writing system (in Western society) designed for the right-handed (Bond & Tinker 1967, Crinella, Beck & Robinson 1971, Sabatino & Becker 1971)

2.3 THE MATURATIONAL LAG HYPOTHESIS

Reading and writing can involve the combined use of visual, auditory, tactual and general kinaesthetic (motor feedback) information, and a great deal of work, mostly dating from the mid-1960's has proposed that defective intermodal functioning is the central feature of the retarded reader's problem Herbert Birch has constructed a hypothetical model of the stages through which new afferent organization may proceed, and which relates these to new levels of motor control appearing in the course of development of a particular skill. The model covers three aspects of inter- and intra- modal maturation firstly, the three consecutive stages of recognition, analysis and synthesis through which perceptual and perceptual-motor development normally proceeds. Complementary to this, the sensory systems are seen as forming a hierarchy, achievement of dominance by the visual system being essential for reading and writing readiness The third aspect is the development of an ability to respond in an equivalent manner to different channels of sensory input (Birch 1962, Birch & Lafford 1963).

The importance of establishing visual dominance is consistent with Schonell's (1934) finding that those with spelling difficulties seem to rely characteristically on auditory rather than visual recall of words, and the very recent results of Mackworth & Mackworth (1974) which showed poor readers (C A 15-17 years) to have greater difficulty with a task requiring decisions as to whether or not a word was correctly spelt than with one asking them to say whether two words presented together sounded alike. Roberts & Coleman (1958) also found that poor readers show less efficient learning of new materials than

normals when the visual modality is dominant, but show improved efficiency when tactual elements are added The question for teaching is whether to design programmes that develop visual dominance or ones that make the most of the child's natural preferences. Wepman (1962) has suggested that individual differences in modality maturation (assumed to be largely genetically determined) should be allowed for in the teaching situation

However, development of intersensory functioning has received the most experimental attention. Birch & Belmont suggested that intermodal integration is normally achieved by approximately CA 11 years, although auditory-visual (A-V) integration is already in an active phase before CA 5 years (Birch & Belmont 1964, Birch & Lefford 1963). Blank & Bridger (1966) emphasize that the typical experimental situation involving the recognition of analogous stimuli is quite different from recognition of the same stimuli through different modalities, as is the case when appreciating the equivalence of the spoken and written word They suggest that quite separate perceptual and cognitive processes may be involved in handling spatial and temporal stimuli, and the backward reader's problem may not be a difficulty in intermodal transfer but rather in establishing temporal and spatial equivalence - which would extend to dealing with stimuli even when presented within the same modality Verbal mediation, in young children at least, does not seem to be essential for cross-modal performance (Blank & Klig 1970, Blank, Higgins & Bridger 1971), and these authors have recently proposed that the major obstacle in poor cross-modal learning may be a difficulty in storing tactual perceptions (Ross, Blank & Bridger 1972). Others have suggested that the intersnesory mediational process probably involves a form of visual imagery (e g Abravanel 1968, Hurley 1968, Scagnelli 1970). However, Steger, Vellutino & Meshoulam (1972) propose that poor readers may have a specific integration problem in auditory-visual pairing, and possibly that this problem may be limited to difficulty in the integration of linguistic stimuli (Vellutino, Steger & Pruzek 1973) Support for this hypothesis comes from the

findings of MacKinnon & McCarthy (1973) although their poor readers were only slightly below average, whilst Bryden (1972) reports no such specificity of defect and prefers a general verbal-coding explanation Reilly (1972) has additionally concluded that any relation between A-V integration ability and reading success appeared to depend upon developmental level, economic background and probably sex The role of more general intellectual deficit in poor cross-modal performance is still unclear (see MacKinnon & McCarthy 1973)

Birch did not imply that his three concepts encompass the entire range of disturbances that might cause reading problems, but suggested that they might "focus attention upon some aspects of the functional demands that reading makes upon the organism, and pose certain hypotheses as to the nature of some processes which may be interfered within development and so result in a disturbance in functional product" (Birch 1962, p 169) However, his model and the experiments it inspired gave considerable impetus to a theory that saw reading retardation as one of the results of a delay in the development of perceptual and cognitive activities A maturational lag is defined as

> " slow or delayed development of those brain areas (left hemisphere) which mediate the acquisition of developmental skills which are fundamentally age linked "
> (Satz, Rardin & Ross 1971, p 2012)

Such a theory is based on the concept of maturation of <u>functional</u> areas of the brain and in the personality which develop longitudinally according to a predictable pattern (Bender 1957) For the majority of writers this view implies that the pattern of deficits observed in 'dyslexic' children does not represent a unique syndrome of disturbance but rather a retarded but essentially normal development that tends to be 'self-correcting' Delay may occur, for example, at any of the stages outlined by Birch, but not all children suffering impairment will necessarily be delayed at each successive stage However, Hunter et al have reported the relative immaturity of poor readers on certain autonomic physiological measures in addition to problems in the language sphere (Hunter, Johnson & Keefe 1972), and other writers have suggested that immaturity in

personality and emotional development may also be present (Vernon 1968)

The cause of such developmental delay is as yet unspecified, the approach remaining essentially descriptive. Most writers wish to avoid the concept of minimal brain damage in the context of maturational lag because of its vagueness and implications of poor prognosis, and prefer the idea of genetic transmission of a 'predisposition' to delay (De Hirsch, Jansky & Langford 1966, Satz & Sparrow 1970) However, there is again the need to distinguish between familial genetic and environmental factors, and to consider the critical period hypothesis (Money 1966, 1969) Cohn (1961) stated that there appears to be a time-series pattern in the organization of language function that makes certain language habits, if not developed within a certain time range, remarkably more difficult to acquire Further support for the maturational lag hypothesis has come from studies of perceptual performance for example, Lyle & Goyen (1968, 1969) reported that the relative inadequacy of retarded readers was significantly greater at younger age levels for a number of perceptual tasks They conclude that whilst this approach would imply that deficits existing at the earlier stages will eventually disappear with maturation, they may reduce the initial rate of learning so much that the child will be unable to benefit from later schooling

Nevertheless, whilst the maturational lag hypothesis continues to be an attractive one, certain points remain in dispute. Gordon (1972) suggests it is wrong to consider any great rigidity in the developmental pattern of perceptual and cognitive abilities, and Wepman (1962) argues that the mature state will not be identical in every individual Crosby has emphasised the need to make a clearer distinction between maturation and readiness, the former being related only to the development of capacities taking place in the demonstrable absence of specific practice experiences He also concluded that the maturational lag approach fails to deal satisfactorily with the observation that dyslexia is diagnosed far more frequently in boys than in girls, although Alexander & Money (1967) have suggested this could be due to the greater likelihood of problems

in males resulting from the relatively greater complexity of male physical and psychosexual development Several other writers have also concluded that children who fail to make adequate progress do not merely perform in a manner identical to younger1 normally progressing children, from a study involving the perception of transformed words, Clay (1970) hypothesized that retarded readers have a different approach to integrating the processes of fluent reading Wussler & Barclay (1970) report retarded readers and normals to have significantly different patterns of psycholinguistic function in auditory, visual, visual-motor, vocal-encoding and motor-encoding abilities as measured on the ITPA Cromer & Wiener (1966) support the idea that poor readers characteristically show idiosyncratic response patterns in various tasks of verbal skill, they appeared to elaborate cues differently to good readers, this resulting from either a failure to learn consequential response patterns well enough or learning idiosyncratic response patterns too well.

2 4 REFLECTIVITY-IMPULSIVITY

Reference has already been made to studies suggesting deficient attention to be a central problem in reading difficulty However, a number of these writers (e g Hunter et al. 1972, Johnson & Myklebust 1967) propose that this usually reflects the dysfunctioning of an intact capacity to attend This may be manifest as an overdependency on the saliency of various stimulus dimensions or a tendency to direct attention inappropriately for optimal performance (Blank, Higgins & Bridger 1971, Katz & Deutsch 1963, Senf 1969) Schonell (1934) reported that speech and spelling difficulties were more common in children whose performance on perceptual-motor tasks was characterized by a general lack of attention to detail Bennett (1942), in a word recognition task, concluded that the most pronounced characteristic of poor readers was the tendency not to inhibit associated responses until a word was seen clearly in all its parts Similarly, Muehl (1963), in comparing the perceptual performance of pre-readers and adequately progressing readers, suggested that what the readers had learnt was

the habit of orienting to a total stimulus pattern before responding to it. Lachmann (1960) emphasises that perceptual-motor functioning involves not only visual perception, but also the expression of that perception, the result reflecting the quality of the perception plus the motor impulsivity and attempts at its control Caldwell & Hall (1969) have argued that many studies discussing poor readers' lack of attention to detail have failed to ensure that subjects understood various concepts (such as 'same/different') held by the experimenter Nevertheless, a wide variety of studies have stated impulsive responding in the word recognition situation to be a general performance characteristic of retarded readers (see Kagan & Kogan 1970)

Kagan has reported a series of studies demonstrating the intra-individual and inter-task generality of a response disposition he termed 'reflection-impulsivity'. At a given age-level, the more reflective the subject is, the more differentiated and adequate the scanning strategy he employs during the interval between stimulus presentation and his initial response in a task involving a variety of response alternatives (Kagan 1965, Kagan, Rosman, Day, Albert & Phillips 1964). Using a number of perceptual tasks, and pooling the errors thought to be connected with impulsivity, he found that a score on this dimension was significantly related to reading achievement one year later for children just entering school, those with highest error scores on word recognition tests tending to have high impulsivity scores More recently Kilburg & Siegel (1973) have suggested that the performance differences between impulsive and reflective subjects are due not to differences in the nature of the search process but to a quantitative rather than a qualitative difference in the thoroughness of the process of feature analysis These proposals reflect the current question of whether poor readers cannot, or merely do not, make use of appropriate and sufficient cues in the reading situation

Kagan has pointed out that his measures have predictive value, relating to the child with potential problems and thus being unaffected by the various

emotional and motivational factors involved when studying children already experiencing failure in the reading situation Nevertheless, a preferred disposition for reflection or impulsivity is maximally influential at an intermediate level of mastery, when the basic skills have been learnt but not mastered to a point where multiple hypotheses are no longer elicited by a new symbol (word) Kagan concluded that the fact that brain-damaged, reading retarded, and possibly 'culturally-deprived' children are more prone to be impulsive than reflective suggests that it may be a misconception to attribute their inferior performance on certain perceptual and intellectual tests to perceptual-motor deficit or inadequate verbal knowledge resources, rather, an impulsive disposition might account for the type of error made Therapeutic routines should therefore consider the potential value of training reflection as a general conceptual habit, independent of the specific substantive content of the material to be mastered (Kagan 1965, 1966)

Shankweiler (1962) has made a similar proposal that poor readers can be divided into two performance groups, one in which individuals tend to recognize words correctly but take a relatively long time to respond, and another in which recognition is characteristically rapid but faulty In a study of the recognition of transformed words by 7-year olds, Payne (1971) found RTs of poorer readers in the sample to be significantly either much faster or much slower than those of the average and above readers. Further breakdown into reflective, impulsive, fast-accurate and slow-inaccurate groups has also been used (Ault 1973) However, Kagan vigorously stresses that anxiety over the probability of making a mistake is to be distinguished conceptually from expectancy of failure, which can be the cause or the effect of impulsive responding He suggests there is likely to be a curvilinear relationship between these two variables, with maximum values for the anxiety variable associated with moderate values of expectancy of failure (Kagan 1966) Such a distinction is presumably also inherent in Smith's contention that willingness to risk errors, to test hypotheses, is one of the most crucial aspects of learning to read (F Smith 1971,

p.67) Ball & Deich have attempted to apply to the reading situation Bruner & Postman's (1948) hypothesis that individuals under stress tend to form premature perceptual hypotheses, and that such misperceptions become stereotyped and resistant to change However, findings to date with normal and retarded readers performing at third grade level have failed to offer statistically significant support, and the authors suggest the need for further longitudinal study (Ball & Deich 1972)

Most studies concerned with response impulsivity have linked the problem to the maturational lag hypothesis, the ability to inhibit impulsive responding being considered an important developmental stage, and the establishment of a reflective cognitive style essential for the effective retrieval and recoding of information (Blank 1968, Nuessle 1972) Kagan (1965) reported that children become increasingly more reflective as they get older, although this did not carry the implication that children with impulsivity problems would automatically 'grow out of' their difficulties Douglas (1972) has reported that results at present suggest that there is little hope that maturation will restore the seriously hyperactive child to normality, although Kallan (1970, 1972) relates some success for methods imposing an external rhythm on the hyperactive child, and Edelstein (1971), who found retarded readers to have problems with conventional units of time - seen as reflecting attentional difficulties - also reported children responding well to intensive training However, whilst Douglas suggests that the same abilities are involved in the reflective-impulsive dimension for hyperactive as for normal children, there seems to be a need to consider behavioural and intellectual impulsivities as other than just two aspects of the same trait (Garner, Percy & Lawson 1971). These authors also found that intermediate and high levels of behavioural impulsivity were associated with better WISC performance for girls whilst low impulsivity was associated with higher performance scores for boys No sex differences on intellectual impulsivity measures were found, and although Nuessle (1972) reported girls as more inhibited in intellectual performance than boys, analysis showed that their longer RTs

did not produce more effective performance, being the result of response inhibition rather than active consideration of alternative solutions Garner et al. concluded that the general behavioural differences observed between boys and girls are probably the result of differences in socialization rather than in basic cognitive functioning Alternatively, there is a possibility that measures of impulsivity have been somewhat confounded with intelligence, and in a recent paper Massari & Massari (1973) report that accuracy measures of reflection-impulsivity and field dependence-independence are positively related to intelligence for girls but not for boys, suggesting that, at the pre-school level at least, these cognitive style dimensions may not be functionally equivalent for both sexes.

In conclusion, it has been suggested that the child who responds impulsively tends to be less accurate not only as the direct result of his initial insufficient appraisal of available data but also because of a poorer ability to sustain attention on perceptual tasks Most workers in this field would wish to argue for a constitutional predisposition towards impulsivity that is not completely overcome with maturation, nevertheless there is some evidence that modification of impulsive and attentional difficulties can be achieved with training in order to improve problem-solving performance (Zelniker, Jeffrey, Ault & Parsons 1972). However, Egeland (1974), who attempted to train impulsive children to respond reflectively, reported that on difficult problems the children encountered during training and posttesting they appeared to revert to an impulsive way of responding More needs to be known about the effects of the amount and patterning of success and failure on the development of reflective and impulsive strategies In an experimental situation manipulating S's experience of (1) failure and (2) frustration (induced by inconsistent success and failure), Weiner & Adams (1974) showed that response latency but not accuracy could be altered. They suggest that although failure in the short-term experimental situation made Ss more reflective, this type of responding is likely to develop over the long term as the result of periods of consistent success, for failure does not automatically

promote reflectivity since impulsive children experience substantial amounts of it They conclude therefore that small, meaningful amounts of failure may foster reflectivity, and continuous failure or noncontingent failure produce impulsivity

2 5 WRITING DIFFICULTIES

The writing process may be regarded as a compound of two skills spelling (involving correct choice and sequence of letters) and hand-writing (concerned with the correct formation of letters) Impairment may occur in either or both activities, and specific defects have been associated with particular clinical syndromes (Kinsbourne & Warrington 1966)

The nature of the relationship between reading, spelling and hand-writing disability is unclear However, reading and writing not only require competence in speech, language, visual and motor skills but rest ultimately on associations made between them (Naidoo 1972, p 18) The accuracy of our writing, for example, is largely controlled by feedback from reading it (Goldiamond & Dyrud 1966), it being common for reading skills to be ahead of spelling among Junior children (Naidoo 1972) In children classed as dyslexic there is always found a gross spelling defect, and this is usually more severe than the reading disability (Reinhold 1963). Adams (1969) reported findings that 79% of a sample of 84 educationally handicapped children showed handwriting difficulty as well as reading and spelling problems (cited in Wedell 1973, p 94) Naidoo found it useful to distinguish two groups within her dyslexic sample, one group characterized particularly by their very severe reading problems, and a second group, less backward in reading, for whom poor spelling was the major concern On assessment, the Reading group was found to include a significantly greater number of children who had shown early language difficulties, and their scores were also lower than those of the Spelling group on WISC Information, Arithmetic and Block Design sub-tests, and on Left-right discrimination tasks (Naidoo 1972). Whilst most poor readers are also poor spellers, difficulty with spelling is observed throughout the whole range of reading ability (Peters 1967a). Hartmann

(1931) reported spelling ability correlating only slightly with most visual and auditory reading tests Lewis & Lewis (1964) found no correlation between scores on the Matching sub-test of the Metropolitan Reading Test and standard of handwriting in school beginners, and results generally indicate motor organization disability rather than poor visual discrimination as the main dysfunction underlying poor handwriting

Naidoo (1972) reported a significantly greater occurrence of a familial history of spelling difficulties in her Spelling retarded than in a control group Ability to reproduce visual patterns from memory also appears to be an important factor in spelling, particularly when dealing with phonetically irregular words where sound alone is an insufficient cue to the written form (Naidoo 1972, p 18), and Lyle (1969,1970) has suggested that dysfunction of such abilities may often result from minimal birth injury However, Schonell (1942) considered the major factors influencing spelling achievement to relate to school experiences, and it seems most profitable to search for extrinsic reasons for a child's failure in spelling (Peters 1967a)

There is considerable evidence to suggest that children having reading problems may frequently have copying difficulties, although there is disagreement as to whether the latter extend to the reproduction of non-literal forms (Keogh & Smith 1967, Saunders 1962, Shepherd 1956, Walters 1961) Reversal errors in copying and spelling have been widely investigated, some writers recalling the habit in early Greek and Roman times of alternating the direction of writing (Boustrophedon), and thus the orientation of letters, from line to line (Fairbank 1970, Fries 1963). Whilst reversals are considered normal when the child first begins instruction, it is generally accepted that the persistence of such mistakes above CA $7\frac{1}{2}$-8 years is indicative of a writing problem (Schonell 1942).

The majority of written reversals are found to be vertical axis rotations that still represent correctly shaped letters (Chapman & Wedell 1972). The cause of this difficulty has not been fully explained, the perceptual-deficit notions

of Orton are largely discounted, and even earlier Stern had already proposed that the finding that Left-handers tend to have particular reversal problems might be better explained in terms of their desire to start on the right side of the page in order to see what they are writing (Stern 1909, cited in Howard & Templeton 1966, p 347) Zaslow (1966) concluded that most reversals appear to result from a fixed motor set which initiated movements towards the body midline Letters written with the first movement away from the midline would therefore suffer most Zaslow also believed that the greater 'motor reactivity' in boys which led them to make more reversal errors than girls is due to real sex differences in make-up rather than to factors concerned with maturational rates. It may also be suggested that the inherent awkwardness of a left-to-right writing system amy combine with such body midline factors for the Left hander to render him more prone to make written reversals These views also serve to draw attention to features in the letters as any in the child that may relate to reversal errors Certain letters are almost never reversed, and Bannatyne comments that "it is as if some letters have an unambiguous configuration constancy which renders them less susceptible to being reversed" (Bannatyne 1971, p.393)

Whilst there is some evidence that a reversal problem is a typical feature of certain clinical conditions (e g Abercrombie 1964), the majority of writers consider it to be the manifestation of faulty or incomplete learning (probably failure to attend to or remember orientation as a critical feature of forms), and thus responsive to corrective instruction (Bond & Tinker 1967, Frith 1971). However, it may be appreciated that the theoretical view held will have considerable influence on the approach taken to remediation (Smith & Lovitt 1973) Naidoo (1972) has stressed that assessment of reversal tendency in a single testing session is far less reliable than examination of the child's everyday school work Discussion of the more detailed investigation and classification of spelling errors is to be found in Chapter Four

It used to be asserted that the young child's inadequate copying of a

stimulus reflected a failure to discriminate sufficient distinctive features of the stimulus (Rand 1973), but, as mentioned with regard to oral expressive errors, contemporary theory deems it necessary to assume that the kinds of mistakes a child may make in visual perception and those he makes in visual-motor reproduction need not be related Cutler et al found preschool children to be frequently able to distinguish between stimuli that differed only in subtle distortions whilst simultaneously making very gross mistakes in their reproduction (Cutler Cicirelli & Hirshoren 1973) Asso & Wyke (1970) also reported no correlation between the young child's ability to make spatial discriminations and the developmental level of his ability to understand the spatial concepts involved On the other hand, Birch & Lefford (1967) found visual-kinaesthetic integration highly correlated with level of free-hand copying, and it may be concluded that well-developed sensory and motor organization is likely to help the child in the initial acquisition of spelling skills, and that this initial advantage is in itself likely to foster further progress (Wedell 1973) By the time spelling failure is recognized, the child will often have developed certain habits that are perpetuating the problem Quite commonly, for example, he will have an illegible hand-writing style, which precludes the use of normal visual self-corrective procedures (Goldiamond & Dyrud 1966, Saunders 1962) The sensitive child may also try to cover up his failing by restricting his written vocabulary, for this reason his work may be a poor indication both of his oral competence and his potential powers of written expression (Naidoo 1972, Peters 1967a, Saunders 1962)

It was found that approximately 12% of boys and 5% of girls aged $7\frac{1}{2}$ - $8\frac{1}{2}$ years in a random sample of children from ordinary schools were unable to write recognizably one or more of ten test letters (Chapman, Lewis & Wedell 1970) A variety of instructional procedures for the teaching and improvement of hand-writing skills have been reported, many of which seem to be effective (see 3 5) Handwriting and copying problems can result from both conceptual and sensory or

motor difficulties, the role of sensory and motor organization functions being likely to vary according to the way handwriting is taught - or to whether the child is taught at all (Wedell 1973). If the child is taught there is likely to be from the start an emphasis on hand and arm movement patterns, with encouragement to attend to the 'feel' of movements being made This approach is aimed at building up short movement sequences which can then be incorporated as units into longer sequences in hierarchical organization Such a child, when asked to copy a word or sentence will tend to 'represent' rather than reproduce what he is asked to copy. In contrast, the child who is not taught handwriting will be much more concerned with the visual discrimination of letter shapes - in early stages copying a word will be analogous to copying a pattern. He will construct his 'patterns' as best he can, with whatever movements he finds necessary. Children referred for handwriting problems often show indications that they started to write in this way and were not able to solve the problem on their own (Wedell 1973, p.97).

2.6 SUMMARY

The studies reported in this chapter have been chiefly concerned with the investigation of individual differences between children that may be determining, at least in part, their rate of progress in the beginning reading and writing situation. This research is concerned not only with the effects of abnormality or injury on skills development but also with the definition of normal variability along a number of functional dimensions, such as distractibility and impulsivity Many educationalists disagree with, or choose to ignore, the possible role of constitutional differences in the learning situation, and a great number of teachers - perhaps the majority - are unaware of these findings and their implications. However, whilst those responsible for the instruction of children in the normal classroom situation need not have specialist knowledge of those specific verbal difficulties apparently traceable to an inherited or acquired physiological defect of some kind, wider appreciation of general constitutional variability would be of great value. It is likely, for example, that considerable

inter-individual differences will be present with regard to ability to attend and ability to respond reflectively (at a given chronological age level).

Much still needs to be done to investigate the extent to which such personal characteristics are the result of innate individual differences or the outcome of socialization or formal learning experience. To some extent, it is reasonable to suppose that the causal factors behind the problems of many slightly backward readers will largely fall into the latter rather than the former category. However, without returning to the dogmatically neurological approach of earlier decades, the applicability of functional distinctions made in the diagnosis of the seriously retarded reader to the description and interpretation of less severe backwardness needs to be more fully explored Consideration of the interaction of normal constitutional differences with individual learning experiences may help to explain the development and persistence of many maladaptive behaviours that impede optimum progress.

The following chapter discusses some of the major areas of socialization and formal learning experience which may affect verbal performance. Further comment on the possible multiple causation of reading and writing difficulties, particularly with regard to the slightly backward reader, will be made in Sections 4.4. and 5.1.

CHAPTER THREE

HOME AND SCHOOL INFLUENCE ON SKILLS DEVELOPMENT

3 1 INTRODUCTION

In her 1959 study Joyce Morris reported the replies of head teachers in S.E England asked to list the factors they considered most important in reading failure. Their answers were grouped into three broad categories causes within the child, within the home and within the school Analysis showed over half the reasons to pertain to the first category, the roles of school and home assuming secondary importance. Causes within the child related predominantly to low intelligence and less to physical disability, personality factors and a lack of desire to read. The majority of educationalists would probably be in general agreement with this assessment, nevertheless the present cahpter discusses some of the factors in the preschool and early school environment that may affect those aspects of performance to be examined in the experimental study. These factors involve both the establishment of general attitudes to school and more specific areas of skills development.

3.2 INFLUENCE OF HOME BACKGROUND

One of the most important effects of the preschool environment on early school progress obviously lies in the extent to which oral language skills have been fostered and developed. Over and above individual differences in amount of parent-child linguistic interaction, Bernstein has suggested that success in learning may be closely linked to the type of language learnt in the early years. He relates differences in style of oral language used chiefly to differences in social class rather than in intelligence (Bernstein 1958, 1961a, 1961b). Similarly, Richmond (1960) states that socio-economic variables, particularly as reflected in the child's oral language skills, play a greater role in early spelling progress than do intellectual abilities as measured non-verbally. Institutionalized children, twins, those with depressed or disinterested mothers, and all who are more frequently left to amuse themselves, are also likely to be at risk with regard to oral language development (Bannatyne 1971).

Some writers also believe socio-cultural factors to be chiefly responsible

for the findings that far more boys than girls in our society become retarded readers. It is argued that explanations in terms of physiological or rate of maturation factors are generally insufficient to account for all the results. It has been reported that most children, at all school levels, rate reading as a feminine activity (Stein & Smithells 1969). It seems that both boys and girls who see reading as an activity appropriate to their own sex tend to be better readers (Dwyer 1973, Mazurkiewicz 1960), although one might wish to know more about how these factors interact to reinforce each other Dwyer concludes that

> "Whilst the traditional female sex role may preclude intellectualism, it does encourage many of the personality traits which are conducive to learning at the elementary level."
>
> (Dwyer 1973, p.460)

Garner, Percy & Lawson (1971) have reported that passive boys and active girls produced better WISC performances, and explained these results in terms of attentional behaviours developed as the consequence of type of sex-role training given by parents Development of active or passive tendencies is seen as linked to parental conformism or non-conformism, the unifying feature of passive boys and active girls being that both groups have been subject to parental pressures that counter the broad cultural norms, which the authors further equate with greater parental concern and higher levels of parent-child interaction.

Once the child begins to experience failure within the education system, the type of compensatory behaviour displayed will be considerably influenced by the home situation The anxieties and frustrations of unsuccessful learners may be intensified by the less encouraging or even derogatory attitudes of their parents. On the other hand, parental over-concern can be equally antagonistic to successful school adjustment Shifting population, quarrelling parents, broken homes, and unhealthy sibling rivalry have also been suggested as factors likely to induce formal learning problems In cases where the pre-school environment has been unfavourable, the very first attitudes the child develops towards school assume a critical importance.

3 3 BEGINNING SCHOOL

When the child first goes to school both the home and the school itself have a great influence upon his emotional adjustment to the new social situation with which he is faced. With more specific regard to the development of formal language skills, educationalists from the time of Rousseau have been aware of the need for a concept of 'learning readiness', although in America in the immediate post-war period a fear of beginning instruction 'too soon' assumed almost obsessional proportions Diack observed

> " .the actual teaching of reading has been so much delayed that many a child, instead of getting ready to read, gets bored with waiting to be taught "
>
> (Diack 1960, p 89)

In the 1960's came the inevitable revolt, and some teachers adopted the view that for reading as for talking we should not worry too much about waiting for a 'right time' to begin (Chall 1967, p.57) Several writers suggested that the child should, in fact, begin to learn to read as soon as he starts to talk.

Many authors have listed the abilities or developmental states thought to be prerequisite to the beginning of reading instruction on a formal basis (e.g. Downing & Thackray 1971, Schonell 1952, Strang 1964, Tansley 1967, Tinker & McCullough 1962). The most important skills relate to oral language development, such as ability to attend and listen to and evaluate speech, and comprehension of the concepts of 'letter', 'word' and 'sentence'. The amount and type of readiness testing that is desirable has been the subject of much dispute (Barrett 1965a, Calfes & Venezky 1969, Lessler & Bridges 1973, Lowell 1971) Most writers seem to prefer tests of perceptual abilities to the use of intelligence tests (Barrett 1965a, 1965b, McNinch & Richmond 1972) and consider the most important aspect of testing to be an educationally relevant assessment of the child's relative levels of functioning in the different modalities (De Hirsch, Jansky & Langford 1966, Hartlage & Lucas 1973b, Katz & Deutsch 1963, Smith & Ringler 1971). However, the dangers of classifying children as 'auditory' or visual' learners have been stressed (Wolpert 1971), and there seems to be some uncertainty as to

whether additional programmes should be designed primarily to foster the child's 'strengths' or to develop his 'weaknesses' De Hirsch et al. (1966) have stressed that the use of predictive tests should not tempt the teacher to abandon methods of straightforward observation, rather, she should be trained to look for signs of the child's physical and emotional development as well as of his educational capabilities

There will be some children who, for a host of reasons, are likely to be 'at risk' in the beginning reading situation. Two main types of disadvantaged child may be identified first of all, the child whose physiological development is delayed so that, on entering school, he does not have the necessary perceptual skills at his disposal There is some disagreement as to the importance of maturational factors in readiness to read, but it has been suggested that those born prematurely (approximately 4% of the population) may be particularly at risk (De Hirsch, Jansky & Langford 1966). Secondly, whilst there may not be a direct causal relationship between socio-economic class and reading readiness (Downing & Thackray 1971), it is realized that the child from the lower-class home is less likely to have had pre-school access to books, experience of being read to, or the opportunity to explore many of the possibilities of oral language usage. It is for such children that the concept of delaying exposure to reading until they are 'ready' may be most dangerous (Chall 1967). Their need for kindergarten experience is vehemently stressed (e.g. Deutsch 1965), and possibly for time in 'transitional classes' between kindergarten and school (De Hirsch, Jansky & Langford 1966) As Mason (1967) has pointed out, until the child has some notion of what reading is about, he will be unable to develop much enthusiasm for learning Havinghurst (1964) emphasizes that compensation for the socially disadvantaged child should include experimentation with the structure of the school and classroom as well as with the actual content to be studied, so that the child can learn his 'roles' as a pupil

Studies in reading readiness have therefore highlighted the need to assess

the school beginner's capabilities thoroughly, but at the same time to take a searching look at the methods assumed to be 'best' for him to learn to read. They have outlined successful methods for the preschool identification of children facing potential reading difficulties, emphasizing the crucial importance of early diagnosis and the role of informal language experience in the home prior to admission to the formal learning situation.

3.4 SCHOOL EXPERIENCE (1) BACKWARDNESS AS A LEARNING PROBLEM

Many writers remind us that we are not far from the times when most people did not learn how to read, and that finding out why today's children fail is of less use in solving contemporary problems of universal education than concentrating upon aspects of the instructional process which will facilitate learning. This involves appreciation of the need for specific instruction in the development of such complex skills, and of the importance of adequate opportunity and motivation to learn (Gordon 1972). Whilst accepting the possible role of brain damage or genetic factors in particular cases, such workers therefore stress that reading backwardness is more often an acquired disability. Moreover, Samuels argues, many assumptions made in the definition of specific reading disability are probably false, one of the more important of these inaccuracies being the assumption of 'adequate instruction' He suggests there are likely to be a number of important skills and concepts essential for reading development that are seldom included in instruction because the teacher either assumes them to be already mastered or else is unaware they are important (Samuels 1973). Wedell states that, for the educator, an explanation of specific learning disabilities in terms of functions underlying the impaired performance shown by the child is likely to be of most help. We can attempt to identify the functions from two angles (1) the task on which the child fails can be analysed into some of its functional components, and (2) reference can be made to psychological analyses of functions such as perception, memory and motor skills. Whilst it may be protested that such detailed analysis of particular problems threatens to obscure a view of the child 'as a whole', Wedell argues

that this is merely a hazard affecting the beholder rather than the child himself (Wedell 1973, pp.3-4)

Most of the impetus for this approach has come from the operant theorists. Starting from Skinner's (1953) definition of operant behaviour as behaviour whose rats or form is affected by its consequences, the cause of reading failure is looked for in the areas of possible breakdown in these relationships "Any condition or event which can be shown to have an effect upon behaviour must be taken into account." (Skinner 1953, p 23).

First of all, problems can arise from a failure to establish basic skills or reading habits, including knowledge of letter names, primary word-attack skills and correct scanning habits, It is stressed that almost all children will be unable to develop these and other more advanced skills spontaneously without specific instruction. Secondly, the child needs to be exposed, at first hand or vicariously, to experiences that enable him to learn what words outside his common spoken vocabulary really mean. This must be followed by comprehension of sentences, paragraphs, and longer thought units so that reading comprehension gradually catches up with and overtakes listening comprehension (Bond & Tinker 1967, Weaver & Kingston 1972). Again, the child's potential ability to use contextual cues in reading has to be developed through appropriate and unobtrusive instruction. A well-organized educational system will therefore capitalize on both chaining and systematic sequences, and, at the widest level, enable the student to appreciate the relevance of his education to everyday life in society (Goldiamond & Dyrud 1966)

Another, more specific, aspect of reading development receiving considerable attention is that of reading rate - a feature of reading behaviour that can have a very drastic effect on progress. The mature reader's ability to vary his reading rate according to task demands has already been mentioned however, many writers stress also the need for beginning readers to maintain the highest

possible reading speed compatible with an acceptable level of accuracy, in order to increase overall comprehension of the text and thus provide greater reinforcement for the reading act (Staats 1970). Bond & Tinker point out that many children with no real reading problem may nevertheless develop a "congenial, meandering way of reading" that is considerably below the rate at which they might read with both understanding and pleasure (Bond & Tinker 1967, p.423). Another rather different notion is that the child who adopts a very slow reading rate (possibly through being encouraged by the teacher to tackle each word successively before going on to the next) may in fact suffer the additional effects of semantic satiation. It is a well-known phenomenon that mature readers experience subjective changes in the meaning and/or pronounceability of words after staring at or repeating them for more than a few seconds (see Amster 1964, Gorfein 1967, Kanungo & Lambert 1963, Lambert & Jakobovits 1960), and it seems reasonable to suppose that certain changes will also occur for the beginning reader in at least the physical properties of the word or possibly its constituent letters Cook & Smothergill (1971) have also suggested that a repetition satiation effect observed in 4-5 year olds might be due to non-specific orienting and attentional changes.

In the learning theory approach to reading development the role of adequate motivation is seen as a fundamental one, and it is suggested that not only perceptual test performance may be affected by motivational factors (e.g. Keogh & Donlan 1971) but that the cause of "many problems of human behaviour lie in early school failures which are of a motivational nature." (Staats 1970, p 540). What the child achieves will depend to a large extent upon what he wants to achieve. A behaviour as complex as reading is seen as depending not only upon the current ongoing reinforcement but also upon its relation to a complex sequence involving further reinforcers, as well as a history of past behaviours which have changed into the current one (Goldiamond & Dyrud 1966, p.108-109). Poor motivation to learn in the early stages and a growing history of failure produces a vicious circle of effects of its own. Thus it becomes difficult to assess, for example, whether inability to attend causes low reading achievement or whether

failure in reading produces inattention (Samuels 1973), or how emotional problems and reading disability may be causally related (Bond & Tinker 1967, Gates 1957). Moreover, if reading is assumed by the teacher to be learnable simply by diligence and will, the poor reader comes to feel even more defective, the reading situation becoming loaded with anxiety and expectation of failure (Brown 1972).

Taking this approach, the development of normal and remedial programmes centres around the need to eliminate anxiety from the reading situation by reducing the size of the damands made on the child at each level of skill acquisition This enables defects in any previous learning to be ironed out, and the amount of reinforcement in the learning situation to be optimized. However, it is vital that those reinforcers in the total situation which are in fact sustaining the child's reading can always be identified, and to ensure that the reading situation is developing intrinsic motivating value for the child. Remedially, it is emphasized that slow learners are not non-learners to acquire a given amount of information they have to apply themselves more intensively and for longer periods of time. Nevertheless, the appropriate help must usually mean not just 'more of the same' method under which they have already failed to learn (Brown 1972, Kinsbourne 1970) On the other hand, the point is also made that adaptation to an individual's particular disability may enhance the problem· for example, if deaf children are conceptually retarded it may be that the social environment, for understandably human reasons, programmes itself not to make verbal demands upon the child and thereby further retards his language development. (Goldiamond & Dyrud 1966). Unhelpful adult adaptation to reading problems when they first appear may similarly serve to exacerbate the verbal learning situation for some children.

Many writers emphasize that it is impossible to master a skill without a desire to use it for some purpose. Roberts (1969, p.49) writes that

> "It cannot be emphasized too strongly... that it would be dangerous for a teacher to take the sub-skills and proceed to exercize the child in each in quick succession in the hope of achieving a rapid rate of progress in learning to read... a child can only understand the intracasies of written language if his interest in the whole process is aroused."

Thus, most recent trends are towards the incorporation of definite instruction into an overall system that is conceived, not in terms of the imparting of knowledge but in terms of oppoitunities for practice (Fries 1963). In such a system the child is not expected to learn to read 'by magic', nor is it assumed that because so many children learn to read easily that a programme is unnecessary. To be effective, 'discovery' methods of learning require a grounding in certain basic skills, and the latter are unlikely to be successfully mastered unless the educational programme makes a detailed breakdown of the subskills involved and ensures these skills are subject to more than chance or haphazard practice (Fries 1963, Roberts 1969, Southgate 1972) Southgate (p.39) comments that

> ". .many of the strongest supporters of the incidental learning theory are advisers, inspectors, lecturers or writers on infant education, in other words, those who do not have to cope with the aftermath, in Junior classes and remedial groups, of children who have been left in infant classes to explore the reading environment "

She emphasizes the importance of well-organized schemes of instruction in an education system that is suffering increasingly from a rapid turnover of staff in Infant and Junior schools. More use can be made of vicarious learning from instruction in addition to direct learning from experience,and in this way it may be easier to ensure the child not only has a general idea of the purpose of his education but that both teacher and pupil are aware of the aims of each learning session.

Contemporary educational philosophy has also raised its own additional problems for the teaching of handwriting and spelling skills Most children find writing the most difficult form of communication, yet parents and the general public perceive spelling ability as an essential measure of educational achievement and typically evaluate the effectiveness of schools and teachers by the spelling proficiency of their pupils (Shores & Yee 1973). Peters (1967a)

defines good spelling as "an intangible but essential symbol of status". That this view persists raises considerable ideological pressures within the 'progressive education' philosophy, and has tended to result not only in teachers being uncertain as to the way to approach handwriting and spelling instruction, but also in discrepancies between their expressed attitudes and actual practices (Peters 1970).

Spelling skill, Peters writes, is not only a poor but a very distant relative of reading skill. It is poor in that its place in the school curriculum is ill-defined, it is distant because of the nature of the skill itself, involving encoding (recall) rather than decoding (recognition) processes. It is less able to take advantage of the redundancies in written language, for there are problems not only with irregular words but also with regular words having either homonyms or non-word homophonic alternatives

Even if they feel they ought to be giving spelling instruction, many teachers are uncertain of the skills that need to be taught. Traditionally, spelling study consisted entirely of learning from printed lists, provided for each age group. Decline of such methods came with research showing poor long-term retention, and with increasing ideological horror at the beliefs behind the system. It was feared that concern over correct spelling would interfere with the principle of letting the child write freely, and the hope grew that 'incidental learning' of spelling would be shown to be sufficient. It therefore became crucial to see whether or not spelling could be 'caught' simply by exposure to the written word and the enthusiastic encouragement of creative writing. In fact, it appears that

> "Far from being freed to write creatively by ignoring spelling and similar conventions, some children, and adults, are only freed to write when they have learnt to spell correctly"
>
> (Peters 1973, p.87)

Nisbet (1941) estimated that children are likely to learn to spell only about 4% of the words they see simply by reading them. Thus, while the role of incidental learning is now happily established in schools, and is more likely

to foster an appreciation of the need to learn to spell, there is danger for the development of good spelling skills in a total exclusion of regular and systematic drill (Peters 1967a) However, this does not imply the use of old rote-learning schemes, rather, what is taught pertains to developing skills that draw the child's attention to features in words that are important for the abstraction of spelling rules The following skills are thought to be particularly important good oral verbal abilities, knowledge of sequential probabilities, knowledge of grapheme-phoneme correspondence and positional phonemic attributes of letters and letter-groups, the development of visual imagery and immediate memory for visual material, the establishment of kinaesthetic motor traces through writing, and the development of powers of inductive reasoning (Jensen 1962a, 1962b, Peters 1967a, Radakar 1963, Richmond 1960, Wallach 1963). The development of such skills appears to be highly dependent upon sufficient opportunity for practice, with the child initially needing to be helped to make conscious use of sensory information in forming spelling strategies, even though the ultimate aim is for the process to become automatic (Hanna, Hanna, Hodges & Rudorf 1966). It seems that the teacher's role in the spelling situation, as related to the time she allows for specific instruction, is the most important single element in spelling success, overlearning - that is, repetition after perfect performance - being the secret of the automatization of language skill processes (Bannatyne 1971) However, whilst there is adequate research available for improving spelling instruction, the problem of how to get teachers to apply these findings to their classroom practices largely remains (Peters 1970).

The learning problems involved in the development of handwriting skills also need to be considered, the act of writing a word legibly and the amount of spontaneous writing children do being important factors in the development of spelling ability. Whilst attitudes towards handwriting skill today seem only to have regard for the aspects of legibility and fluency, proponents of methods continue to insist that handwriting "must be judged by aesthetic as well as utilitarian standards" (Inglis & Connell 1964, p.1)

Contemporary methods stress that fluency of style will only develop through the classroom provision of extensive instructional and practice sessions in handwriting skills per se, the teacher maintaining a state between obsession with correct spelling and neat writing and the ultimately frustrating situation where even the child cannot read his own work. Thus a pre-writing period, in which pre-requisite hand-eye co-ordination skills are developed, or later handwriting instruction, are not considered obsolete. However, once the child begins to write alphabetically he is instructed from the beginning in the use of whole words, phrases and sentences rather than in the meaningless practice of letters and parts of letters Emphasis is placed on writing with fluency and reasonable speed at all stages (Inglis & Gibson 1962) Thus careful but slow handwriting cannot truly be regarded as good writing, and the child must be taught how to make speed-quality judgements (Herrick 1955) There is a non-significant positive relationship between IQ and legibility of handwriting, with this being more marked for boys than for girls (Harris & Rarick 1963). It is also reported that lower-case letters are generally more difficult to write than upper-case forms (Fries 1963) and that lower-case letters requiring more than one 'stroke', and thus more delicate visuomotor control, are the most difficult for beginners to produce (Stennett, Smythe, Hardy & Wilson 1972). An early study by Newland (1932) reported that 45% of errors of illegibility in cursive writing at any level were contributed by difficulties with the four letters 'a', 'e', 'r' and 't'.

Taking a less individualized approach to learning problems, more general differences in instructional method can be assumed to affect the prevalence of some reading and writing difficulties Many writers have commented, for example, on the considerable differences in approach to reading instruction between the United States and Britain Chall (1967) and Southgate (1967) agree the major points of disparity to be the greater flexibility of the British system as compared to the American desire for consensus between schools, the greater reluctance on the part of British teachers to be slavishly bound to instructions

laid down by methods promoters, and an apparently stronger belief among American teachers that there is a right and a wrong way to teach reading. However, research findings from different countries are generally difficult to compare directly, and generalizations about reading methods hard to make (Lee 1972), although there is hope that some areas of research, such as the work of Gibson and her colleagues on letter-form discrimination, can have applicability for many language systems (Feitelson 1967).

Another important aspect of instructional approach is attitude towards errors. Programmed methods are typically designed to preclude error behaviour, but many writers (e g. Larsen 1967, F Smith 1973) argue this to be essential for rule-learning to take place

> " if a child makes a response, if he names an object or ventures an opinion about meaning, knowing that it is possible he might be wrong, then he will learn something whatever the outcome.. That is the way a child naturally tries to learn - by testing hypotheses - provided of course that he has not been taught that society places a high premium on being right."
>
> (F. Smith 1973, p.189)

The child's attitude can be greatly affected for better or worse by the teacher's approach to error correction. Her aim should be to strike the correct balance between increasing attention to spelling and reducing the number of 'careless' mistakes whilst holding back from practices that interfere with spontaneous and natural expression. Best methods therefore seem to involve attention to spelling <u>after</u> writing is completed, with correction incorporating the discussion of errors with the child rather than the marking of his books in his absence (Sealey & Gibbon 1962). Whilst the child should therefore be discouraged from a careless approach to written work, he should not be put in the position of being afraid to make a mistake There is some evidence that reading method affects the type of error a child makes in spelling, although the actual quantity of errors seems unaffected. Chall (1967) reported that the correction of errors is generally approached in a more enlightened way in classrooms where i t.a. is being used, the teachers being less critical of written

errors and praising children for 'intelligent' ones, as well as gaining an insight themselves into the nature of the children's common spelling difficulties.

The main point most writers wish to make is that it is ultimately the teacher and not the method that is most important (Chall 1967, Morris 1966), although it does appear justifiable to consider certain hazards as characteristic of particular approaches

3 5 SCHOOL EXPERIENCE (2) TEACHER AND PUPIL EXPECTATIONS

Defining the cause and effect relationship between emotional and intellectual problems that arise in school is a difficult and fundamentally complex task Many writers report retarded readers as significantly more impulsive and frivolous, more overtly interested in the opposite sex, and more inclined to delinquency than children making adequate progress (Bell, Lewis & Anderson 1971a, 1971b, Critchley 1970, Spache 1957) Others stress characteristics of apathy, withdrawal, anxiety and disorganization (Gates 1941, Monroe 1932, Norman & Darley 1959) Furthermore, it is clear that by the age of five or six years the child in a social context is well aware of his performance status in the group (Pollis & Doyle 1972), and improvement of the self-concept is generally seen as an important element of any remedial programme (Griffiths 1970) It seems correct to presume many of the above-mentioned personality traits to be the direct compensatory result of inadequate school performance, however, there will also be cases when a child has become emotionally unstable before beginning school, the source of the trouble being possibly constitutional or environmental, or the result of unfortunate incidents during the early preschool years. Too frequently, however, the school environment is antagonistic towards the child who, for one reason or another, begins to fall behind

> "Too many backward readers in our Junior schools are placed in the position of not really expecting, or being expected, to make any substantial progress in learning. Much of the work is so arranged that it merely proves over and over again to the child how little he knows, rather than showing him how much he is capable of learning "
>
> (Roberts 1969, p.90)

Other writers have also laid emphasis on the loss of social prestige suffered by both children and their parents in this situation, and that some parents may resent remedial attempts because they draw attention to the child's failure. Seigler & Gynther (1960) found that the anxieties and frustrations of unsuccessful learners were frequently intensified by the less encouraging or even derogatory attitudes of their parents. On the other hand, parental over-concern was equally antagonistic to successful school adjustment

In cases where the preschool environment has been unfavourable, the very first attitudes the child develops towards school therefore assume a critical importance. However, a crucial part of this adjustment is dependent upon the attitudes developed towards the child by his teacher It is regularly reported that teacher attitudes may serve to consolidate social-class differences by expecting, and being satisfied with, less from the lower class child. These expectations will determine in part what the child subsequently achieves and expects to achieve (Eisenberg 1966). These undesirable effects have been demonstrated in a study by Schiffman which found that whilst 78% of a remedial class of slow learners had WISC Performance scores in the average or better range, only 7% of their teachers rated tham as anything but dull and as a result 86% of the children saw themselves as dull or defective (cited by Eisenberg 1966, p.12). Goodacre (1968) reported that teachers in extreme social areas tended to have well-structured stereotypes of the type of pupil and home they could expect

It has also been suggested that reported sex differences in incidence of reading and writing difficulty stem in part from differences in teacher attitude towards, and expectations of, boys and girls. Other factors proposed as likely to affect the teacher's impression of the child as a learner are his physical appearance, general conduct, achievement to date and scores on any administered test, as well as what is known of his parents and of any older siblings who have already passed through the school. Some preconceived expectancies may be

more potent than others In general, Braun (1973) states that whilst the effects of teacher expectation on performance still have to be fully validated, the 'psychological credibility' of the self-fulfilling phenomenon maintains research interest, and despite theoretical controversies the practitioner needs to be aware that the child will read cues from the teacher that affect his view of himself as a learner. Braun emphasizes that for many primary school children the teacher's 'credibility rating' is high, and her communications to them, intentional or otherwise. are likely to be believed Educators must examine both the possible channesl through which differential expectations are implanted in the teacher's mind and the possible mechanisms through which cues then become available for the child to read and act upon (Braun 1973, p.706). Specifically, this demands greater insight into the operation of all levels of reinforcement used by the teacher in the control of classroom behaviour, and also into the intentional and subconscious aspects of her discriminative treatment of her pupils. Attention to social methods of control is particularly important, there is evidence to suggest that nor-attainment of a social reward affects performance in a manner equivalent to that of non-attainment of expected tangible rewards (Ryan & Watson 1968), and this has special implications for the effects of changing classes and teachers either at the end of each year or more frequently because of staff turnover.

Finally, comment may be made on teacher expectations of instructional materials. Many educational writers today seem to find it necessary to keep stressing that deeper understanding of what is involved in reading, and in learning to read, is far more important for the reading teacher than any expectation of better and more efficacious instructional materials. Moreover, as Frank Smith comments,

> "We have even failed to consider the possibility that when children learn to read today it might be despite all our sophisticated educational gimmickry, rather than because of it."
>
> (F Smith 1973, p.vii)

3.6 SUMMARY

There are several criteria which may be used to identify the child having difficulty with the development of formal verbal skills Whilst the generally accepted definition of reading backwardness relates to the achievement of scores on standardized tests at least two years below the chronological age norm, it is also meaningful to consider a problem to exist when there is a discrepancy between general intellectual and reading achievement, or between test and day-to-day school performance, indicating poor motivation, or between scores on tests of different reading subskills (Strang 1964).

There have been notable shifts of emphasis over the years in the 'popularity' of factors thought to cause learning problems during the early school years Morris writes that in the late nineteenth century the fact that children had been provided with education led people to assume that any subsequent failure must be due to the child himself. During the 1920's the spelling irregularity of English became a major target of recrimination, and in the 1930's and 1940's the trend towards acceptance of the multiple causality of failure drew attention to factors of home background More recently there has been a revival of 'intrinsic' hypotheses and the notion of dyslexia, whilst

> ". .the practice.. of looking everywhere else for the causes of reading difficulty but the place under our noses has still continued to a large extent "
>
> (Morris 1972, p.306)

Nevertheless, some authors have preached wariness in attributing blame to the child's home background or pre-school emotional troubles, and drawn attention to school factors as a major cause of reading problems (e g Cuszak 1972, Downing & Thackray 1971) Bond & Tinker (1967) summarize the most important areas of teaching failure as being (1) too rapid progress through the instructional schedule, (2) inappropriate emphasis on some technique or skill, (3) isolation of reading instruction from other school activities, and (4) treating reading only as a by-product of content studies Fries (1963) concluded that insufficient

opportunity to practise many of the "seemingly insignificant" subskills of reading lies behind much of the need for later remedial teaching. However, even a good teacher must be aware that children will each react differently to the same method and may respond in different ways to the personal aspects of her approach to teaching Undesirable emotional consequences may result either from the teacher ignoring the child in difficulty or from her acting in a hostile way towards his failures

Verbal learning problems cannot therefore be attributed to either the individual or his instruction alone. Severe disability seems to result when a child has a predisposition to difficulty in linking visual and auditory symbols and is exposed to an initial method that ignores his difficulty (Chall 1967), and a comparable interaction between ability and motivational factors may perhaps be typically revealed in any situation that is producing a slightly backward reader.

In conclusion, therefore, it may be stated that the discussion of individual differences in reading progress necessitates consideration of the following factors (1) the pupil's attainment of a state of 'reading readiness' at all levels of instruction, (2) his general learning capabilities, (3) his level of motivation, (4) the instruction he receives and the quantity and quality of reading materials to which he is exposed, and (5) the skill of his teacher The teacher must remember to make provision for individual assistance not only to her slow learners but also to the average and gifted pupils. She must also pay attention to sex differences, both from the point of view of girls and boys being likely to present somewhat different problems and with regard to the fact that she herself is likely to behave in differing ways towards them. Tinker & McCullough (1962) also stress that the teacher has to appreciate that there will be differences between parents as great as those between their children, which will be reflected in the adequacy with which they both prepare their children for school and are subsequently able to maintain a supportive role Realizing this,

it is disturbing to find reports that the inadequacy of teacher training in reading, as measured by trainee satisfaction, seems to be increasing (Goodacre 1969). Southgate (1967) describes the current approach to teacher training as general and intuitive rather than specific and scientific, and whilst Moyle (1971, p.439) suggests that the most important feature of a child's reading success lies in the enthusiasm, confidence and level of expectancy of his teacher, the above findings imply the necessity of equipping new teachers with something more than a sympathetic and enthusiastic attitude to their pupils Many writers describe this as a need for methodology to concern itself with the 'why' as well as the 'how' of teaching, and this requires the teacher training curriculum to devote more time to discussion of all the reasons for reading success and failure.

CHAPTER FOUR

RESEARCH AND THE CLASSROOM

4.1. Relating research to the classroom situation

4.2. Errors in reading

4.3. Errors in writing

4.4. Accuracy and the slightly backward reader

4.1. RELATING RESEARCH TO THE CLASSROOM SITUATION

Frank Smith (1973) has stressed that theoreticians do not demand the rejection of practices that seem theoretically cumbersome but which nevertheless help some children to read, although it can be suggested that certain practices are likely to work better than others. However, the uncertainty and insecurity generated by the claims of research workers and method promoters has frequently led to classroom ideologies being ruled by "emotion where reason should prevail". (Chall 1967, p.7). Eleanor Gibson has succinctly summed up the unproductive relationship that has long existed between laboratory and classroom empiricism:

> "The psychologists have traditionally pursued the study of verbal learning by means of experiments with .. materials carefully divested of useful information. And the educators, who found little in this work that seemed relevant to the classroom, have stayed with the classroom, when they performed experiments, the method was apt to be a gross comparison of classes privileged and unprivileged with respect to the latest fad. The result has been two cultures, the pure scientists in the laboratory, and the practical teachers ignorant of the progress that has been made in the theory of human learning and in the methods of studying it".
>
> (E.J. Gibson 1966, p.41).

Greater knowledge of research findings can help the teacher in two main ways firstly through bringing a greater understanding of the processes involved within the child when he is learning to read, and secondly by increasing her awareness of the implications of her own actions in the learning situation. The first major research goal, therefore, should be the formulation of acceptably rigorous methods of performance analysis that can either be used by the teacher herself in the classroom or provide laboratory results with direct instructional relevance. With this in mind, several recent studies have taken a new approach to error analysis as a method of obtaining information. Older studies conceived of errors as signs of imperfect learning marking the unsuccessful reader, the new approach is concerned more with the mistakes made by the successful reader as he matures, the aim being to help

the formulation of both remedial and basic reading programmes (Weber 1968).

A basic tenet of this approach is to assume that "nothing a child does when he reads orally is accidental or random" (Burke & Goodman 1970, p.231). It is also presumed that the child will be using the same strategies whether or not his response is fully accurate (Weber 1970). Mistakes or 'miscues' are therefore seen as being produced in response to the same cues that produce correct responses, providing clues to functioning when the child is right as well as when he happens to be wrong (Burke & Goodman 1970; Clay 1965, Y.M. Goodman 1970; Weber 1970). Yetta Goodman writes that

> "Miscues must be looked at not as mistakes which are bad and should be eradicated but as overt behaviours which may unlock aspects of intellectual processing".
>
> (Y.M. Goodman 1970, pp.455-456).

With an ability to make use of the information provided by the child's miscues, the teacher can make it "just as instructional to be wrong as to be right" (Smith & Goodman 1971, p.179), although her attitude to the situation is vital : the child encouraged to stay silent rather than risk a 'false alarm' by guessing at a letter or word before he is sure of it may develop a habit of setting his criterion too high for efficient reading (F. Smith 1971, p.25). The main questions raised by this approach therefore seem to be as follows (1) What is the developmental pattern of preference for the use of graphical and contextual information in reading? (2) Are there features of methods or materials that can be isolated as likely to lead to errors? and (3) What should be the teacher's and the child's attitudes towards errors made in reading and writing?

4.2. ERRORS IN READING

As Yetta Goodman (1970) remarked, "So much happens when a child reads", and an analysis of the errors he makes may indicate some of the cues in the

stimulus to which he is reacting. K.S. Goodman writes that

> "Only in rare special circumstances is oral reading free of miscues and that silent reading is never miscue-free. In fact, it appears likely that a reader who requires perfection in his reading will be a rather inefficient reader".
>
> (Goodman 1969, p.160).

This pertains to the psycholinguistic view that a proficient reader is one sampling and predicting from the least and not the most of the available information, and which believes there to be considerable difference between the processes of oral and silent reading (Goodman 1969, Weber 1968). These writers also argue that all miscues are by no means of equal significance, and that developmental information can only be obtained from a detailed qualitative rather than a quantitative analysis (Burke & Goodman 1970; Goodman 1969, Y.M. Goodman 1970). Whilst errors may result from the incorrect management of items perceived, they are considered more frequently to result from gaps in sampling which come out as what appear to be misreadings (Goodman 1969). Furthermore, they result from sampling strategies which vary in their sophistication according to the maturity of the reader, the difficulty of the passage and the purpose for which the material is being read (Kolers 1970). Approaching error analysis from this standpoint necessitates attention to contextual as well as graphic information, and to the notion that information comes from the reader as well as from the page - as Kolers (1969) put it "Reading is only incidentally visual". However, in her 1968 survey of the literature on the study of oral reading errors, Weber found a distinct lack of previous concern for the linguistic function of the errors, the latter being perceived only as failures to utilize graphic information correctly, and focusing primarily on the written word as an isolated set of letters representing sounds rather than as part of a sentence (Weber 1968, p.103). She argues that an analysis of errors showing the reader is violating the text at levels other than sounds and letters would give the necessary depth

to a diagnosis previously limited to statements about 'perceptual inadequacy' or 'poor sight vocabulary'. The present discussion now considers in turn some of the findings and proposed oral error taxonomies relating to graphic and linguistic features of written text.

Original 'graphic' error classification systems are typified by that of Swanson which listed six categories for adult's reading substitution, repetition, omission, insertion, mispronounciation and miscellaneous. In his system, substitution, omission or insertion may involve either a word, a syllable or a letter, thus, an error is described as a failure to perceive accurately a letter or a sequence of letters with little regard to the length of the sequence (Swanson 1937 cited in Weber 1968, p.102). Bennett (1942) used a nine-point system that was chiefly concerned with intra-item similarity of structure between the printed word and the response given. She found 31% of errors to have the first one or two letters the same as the stimulus, with a further 31% having either the same ending or being similar but for the median vowel. In a more recent study involving the teaching of specific words, Mason (1971) concludes that when a beginner or a poor reader miscalls a printed word, it is probable that the word he calls is one having visual similarity to the one miscalled. Mason argues that these results have important implications for the order of introduction of visually similar words into basal reading series, although one may question whether the limited procedure employed warrant such broad conclusions. Whilst Bennett had been concerned with the responses of retarded readers, Weber (1970) uses a 'graphic similarity' index in a more general study of beginning readers, although this is incorporated into an analysis concerned chiefly with grammatical classification of errors. Measurement of graphic similarity is undertaken for two of her four main categories of whole-word error, substitution and reversal or scrambling of words, the other two classes being omissions and insertions. Similarity was calculated only for those errors which shared letters with

the written word, otherwise a score of zero was given. Scores indicated that in terms of letters the better readers approached correct responses more closely than did the slower readers. More than half (53%) of the substitutions had the same first letter as the written word and 29% had the same two initial letters. 31% shared the last letter while only 14% shared the last two letters, thus agreeing with previous findings concerning first letter saliency for beginning readers. The better readers contributed two-thirds of errors differing from the printed word by only one letter (a quarter of all substitution errors), and with regard to position, the single letter was changed, omitted or inserted in 36% of cases at the beginning, 46% at the end (usually singular-plural changes) and 19% in the middle. Weber points out the difficulty of using this analysis with a limited amount of material, as the frequency of shared letter patterns depends on the possibility for that pattern to occur within the bounds of English sound and spelling patterns, attempts to estimate frequencies of shared letter patterns for all but the most common categories thus being unrewarding. Overall, substitutions of one word for another comprised 80% of the total, with the remaining errors being almost equally divided between omissions and insertions, and scrambles being rare for either good or poor readers. Although classifying 12% of errors as involving some degree of reversal mistake, Bennett (1942) reported none of the 34,274 errors recorded to be nonsense words.

Results from tests employing text rather than isolated words support the view that beginners bring their knowledge of grammatical structure to bear on their performance from the outset. In his study of beginner's responses to unfamiliar words MacKinnon (1959) found children to be far more sensitive to elements of grammatical structure in the sentences than to the visual features of words. Generally, it is evident that children attempt to read sentences as grammatical wholes Weber (1970) reports 91% of errors grammatically appropriate to preceding context, with no significant difference between good and poor readers, and about two-thirds of errors

conformed to the grammatical structure of the whole sentence. Many of the errors that were appropriate to preceding context, however, were also found to be graphically similar to the printed word.

There are difficulties in performing a parts of speech analysis on word substitution data since many words are not uniquely classifiable (Kolers 1970); however, allowing for some inaccuracy, results clearly show that the most frequent response to a given word was a word of the same part of speech. Such findings are reported by Bennett (1942), Goodman (1967), and Weber (1968) for school beginners, and by Kolers (1970) for adults performing with transformed texts. Kolers also draws attention to aspects of sensitivity to grammar revealed by considering what substitutions are not made. Clay (1965) reports 79% of reading errors belonged to an equivalent word class to that of the printed word, whilst only 41% of single word substitutions showed that the children might be responding to some visual characteristic of the letters. In the most detailed taxonomy of cues and miscues in reading to date Goodman (1969) has proposed a system of analysis operating at the sub-morphemic, bound morpheme, free morpheme, word, phrase, clause and sentence levels. Goodman contrasts his approach to statistical studies using many subjects, and an example of the system in use is Burke & Goodman's (1969) account of the analysis of a single subject's reading of a short story. Whilst agreeing that the system is complex and time-consuming Goodman has hopes that limited application of the concepts and insights involved may provide new diagnostic procedures for both the classroom and the clinic.

Thus far, the results have suggested that learning the optimal balance in the use of graphic information and structural constraints may be one of the main tasks for the beginning reader (Weber 1970, p.443), and Biemiller (1970) has analysed the developmental pattern of oral reading errors of first graders in terms of these two constraints. Response errors (sub-

stitutions, insertions and omissions) and non-response (NR) errors were tabulated. He identified three developmental phases in the use of cues. (1) predominant use of contextual information, (2) predominance of NR errors and a significant increase of graphically constrained errors, and (3) increase in the co-occurrence of graphic and contextual constraints. It was noted that the majority of errors made by children who were progressing poorly seemed to be contextually constrained, whilst most be satisfactorily progressing readers appeared to be NR errors. It is suggested that non-responses indicate that the child is attending carefully enough to a word to realize that he does not know it. The NR phase therefore represents a necessary stage of careful attention during which skill in using graphic information becomes consolidated, the child then being able to return to successful (accurate) use of contextual information. Over 70% of graphically similar substitutions made by children in the post-NR phase were also contextually constrained. Results indicated that the length of time the child remained in the NR phase was not related to reading performance at the end of the year, however, children spending a long time in the pre-NR stage, where they persist in minimizing the use of graphic cues by using information which has been learned aurally, tend to be the poorest readers. Biemiller suggests that transition to the NR phase may mark the child's grasp of the notion that one specific word is associated with each graphic pattern. Therefore, the major conclusions for teaching are that NR errors early in the year should be recognized as signs of progress rather than weakness, and that teachers should place greater stress on the use of graphic information in beginning reading. It may be seen that this argues <u>against</u> the encouragement of early use of contextual and picture cues currently recommended in most basal reading series, for the child's early use of contextual cues does not appear to greatly facilitate progress in acquiring reading skill. Biemiller emphasizes that his findings are restricted to the beginning reading situation, and points to evidence suggesting that in higher grades the over-use or

mis-use of graphic information is characteristic of retarded readers.

Omission errors at later stages of reading may not always be indicative of poor reading ability. They may arise not only from carelessness, poor comprehension, lack of attention, or an inferior sight vocabulary, but also from an attempt to make sense or grammatical regularity out of a passage that has been upset by other errors, or possibly from lack of practice in oral reading (McCullough, Strang & Traxler 1946 cited in Weber 1968, p 106) Omission errors do not imply the reader did not see the word but only that he did not pronounce it (Weber 1970). These comments, together with findings reported in this section, may be related to Kagan's findings on the response impulsivity of younger and poorer readers outlined in section 2.5.

Some studies have also been concerned to examine the relationship between error types and instructional method. Weber raised the possibility that children of the same age and grade level may show distinct error patterns because of differential training, and cites Elder's (1966) study showing differences in the amount of contextual-constraint errors made by Scottish and American children (Weber 1968, p.108). Barr (1972) compared the effects of two instructional conditions ('look-say' and 'phonics') on the developmental pattern noted by Biemiller. The major finding was that the percentage of NR errors (for first grade children) was significantly greater for the phonics than for the sight recognition group, the former also producing correspondingly more graphically-constrained errors. She concluded that Biemiller's NR stage, characterized by increased attentiveness to graphophonemic information may be precipitated and supported by certain instructional conditions, and also by an increase in the rate or number of new words introduced by the scheme. However, whilst phonics methods seemed to alert the child to the associations between graphic and phonemic cues, they did not show greater help in teaching the oral response. Barr acknowledges the limitations of generalizations from

the study, but suggests that if longer term research can illuminate further any differential effects of method on reading strategies, then the error patterns of a child can be used diagnostically to specify appropriate instruction. Weber (1970) reports another important influence on responses at the initial stages to be the style of sentences in the reading materials, the children demonstrating by their errors that they expected certain sentence types and turns of phrase.

These results from tests employing oral responding either to isolated words or to text may be compared to those reported in Chapter One in which matching techniques were used (e.g. Marchbanks & Levin 1965). Hislop & King (1973) state that all these findings suggest the potential value of giving up more time during instruction to asking the child to explain the phonic generalizations and other strategies he may be using, thus providing a rich source of additional information for the teacher in her analysis of his reading needs.

4.3. ERRORS IN WRITING.

Learning to write involves the development of rapid and accurate recall strategies for acoustic, visual, kinaesthetic and semantic information, plus recognition techniques for the checking of what has been written. Fluent, unhurried writing seems to involve at least the following distinguishable stages (1) sub-vocal auditory composition of sentence or phrase in advance of writing, (2) subvocal rehearsal of the word for the second time, in isolation from the rest of the phrase, immediately prior to its being written, (3) positioning of the pen in order to begin the word relative to the lines of the page or to the position of the last letter of the previous word, (4) writing the word, incorporating visual and possibly further subvocal repetition checks, and (5) the signal to stop, which seems to be largely visual. Day & Wedell (1972) believe memory likely to be involved in the initial planning of the graphic movement and then in the checking of what

has been written. However, it may be seen that the spontaneous writing situation and the dictated test situation differ considerably in the memory demands made, specifically, in the latter context the writer is presented with the correct auditory image of the word to be spelled. This may represent a considerable advantage to the beginner whose oral reproduction of some words may not be very accurate. On the other hand, this advantage may be counterbalanced by his greater prior understanding, in the spontaneous writing situation, of the meaning of the words he is about to write. Analysis of spelling errors made by beginners should therefore look both at the child's performance with materials provided by the experimenter or teacher, and at the mistakes he makes in his free writing.

So far, the need to obtain data on all types of 'stumbling blocks' in spelling has necessitated concentration on the use of tests designed to give opportunity to make every type of error, Livingston writes that before any profitable attempt can be made to discover how best to teach spelling, the various types of difficulties and their frequencies must be determined (Livingston 1961, p.160).

Cahen et al. have described S.K. Gibson's (1969) computer generation of errors technique for the construction of spelling tests. As for the oral taxonomies mentioned in 4.2., generated misspellings fell into the categories of additions, omissions, insertions and inversions. Administration of the tests showed high correlations between commission of the first three types, suggesting these errors to be 'similar' psychologically, whilst different processes seemed to be involved in making inversion errors (Cahen, Craun & Johnson 1971). An eight-point classification system has been proposed by Livingston (1961) which used the following major categories omissions, insertions, transpositions, doubling errors, confusions and substitutions, homonyms, perseverations and unclassified. Errors assigned to the last

category were ascribed to momentary lapses in attention and interest, and were only noted for younger children. Details of this system are given in Appendix A. Livingston found that erroneous responses frequently involved more than one type of mistake or more than one instance of the same type. Her results agreed with earlier studies in showing confusions or substitutions, and omissions to be the main types of error, accounting for just over one-third and one-quarter of the total errors respectively. Good and poor spellers in her sample were separated to see whether there were certain types of error particularly characteristic of either group, however, no significant differences were found, the weaker spellers merely tending to make more of those errors constituting the main error categories.

Both dictated and non-dictated spelling tests have been devised (Nisbet 1939) and have shown up certain other graphemic and phonemic characteristics of spelling problems. Words with ascenders and descenders, and also words having a natural break (with suffixes, for example) are relatively easier to spell (Cahen, Craun & Johnson 1971), and it is commonly found that a phonetically difficult element is more or less difficult according to its position in the word - Jensen (1962b) termed this the 'serial position effect'. This may be due to less attention being paid to the middle of words, or, as Peters (1967a) suggests, to the middle phonemes usually having the most number of reasonable alternatives. Whilst most studies have employed one or more of the many standardized tests, Richmond (1960) has also shown that analysis of the child's spontaneous writing is an effective means of determining his spelling needs, especially in the later school years (CA 11 - 12 years) when most mistakes are of an individual nature.

The influence of certain intrinsic and extrinsic factors on spelling ability has also been examined. Day & Wedell (1972) compared the performances of 8 - 10 year olds placed in one of three groups according to whether their

performance on a visual memory test was significantly better than, significantly worse than, or approximately equal to performance on a test of auditory memory. Although groups showed no overall differences in mean spelling scores, they differed considerably in the proportions of certain error types. The authors suggest that each group could have achieved its level of spelling by a different combination of functions, for example, the group showing no superiority in visual or auditory memory might have relied more on rule following, whilst the other groups capitalized on their high memory functions. Peters (1967b, 1970) has reported no quantitative but considerable qualitative differences in spelling error patterns for children learning to read under different methods. Results showed that i.t.a. children were superior only in categories of error arising from lack of economy and control of output (omissions, insertions and perseverations). The phonic method was superior in producing fewer transpositions or substitutions of vowels; also, when a major substitution was made by phonic children it was more often a reasonable phonic alternative. The 'look-say' method produced a better visual attack resulting in fewest doubling errors, consonant substitutions and non-conforming phonic alternatives, fewest errors of faulty auditory perception and fewest homophones. Thus the strength of look-say methods lay in superior attempts at overall structuring, whilst phonic methods produced the greatest number of 'good' errors (reasonable phonic alternatives). However, i.t.a. produced the most systematic and economical attack and seems to present the most receptive base for the teaching of spelling conventions. Overall, Peters concluded that the use of any reading system, when rigorously operated, did not seem to affect the level of spelling attainment, although differences in method or medium did seem to lead to differences in perceptual approach.

The task of copying verbal material is in many ways different from either spontaneous writing or writing to dictation. Most fundamentally, one

might suppose that, in the absence of particular perceptual-motor defect, an error-free performance on a copying task could theoretically be achieved by all individuals with a sufficiently mature level of motor control, whereas one could argue that veridicality of performance on the other tasks would not be possible for some children at the same stage even with limitless time allowed. Asso & Wyke (1971) have discussed this point in outlining the four basic methods for discriminating testing ability to discriminate letters (drawing/copying, matching, naming, and writing to dictation) they emphasize that whilst the first two only involve the ability to see the similarity and execute the manual movement that reproduces the similarity (visual-spatial abilities), the second pair depend upon ability to code a visual input into a verbal response or to transform auditory verbal input into the appropriate verbal symbol (verbal-visual spatial abilities).

Both Asso & Wyke (1971) and Chapman & Wedell (1972) have shown that children who make rotational errors on a letter dictation task show a great reduction in such mistakes when asked simply to copy. Asso & Wyke found copying performance uncorrelated with that on the other types of letter discrimination tasks administered, implying that such a test does not really examine ability to discriminate letters as purely verbal symbols. In their discussion of this performance discrepancy Chapman & Wedell suggest that although their "high reversers" were able to match the orientation of letters they were unable to include orientation as a component of their memory of a letter shape - on the basis of which they might spontaneously write a letter correctly, or even maintain checking procedures. This may relate to Bryant's more general hypothesis that the young child's problem is not what to perceive about a visual form but what to remember about it (Bryant 1971).

Studies involving the slightly different task of copying from memory (that is, reproducing a stimulus immediately following presentation) offer concurring results. Vellutino et al. reported that poor readers copied

words much better than they read them aloud. A similar pattern was found for the normal readers but the difference between their oral and written performance was much smaller. On the copying task, the number of errors increased with increased word length, with this decline in accuracy being greater for the poor reading group. This result was not in line with the experimental hypothesis predicting no difference in written performance for the two groups, but the authors suggest that the concommitant finding that poor readers' errors showed greater deviation from the correct spelling may indicate that the former group had to rely more heavily upon immediate visual recall than did the good readers, who had greater familiarity with the linguistic structure of the words presented. This interpretation is supported by results showing the absence of a good/poor difference with unpronounceable letter strings, when the good readers could not use such additional information. They conclude that the inferior performance of the poor readers on the words task was a reflection of their inability to 'chunk' verbal information for storage, rather than of deficiency in perception. (Vellutino, Steger & Kandel 1972). These authors also report no accuracy differences on a copying task involving non-verbal stimuli (geometric shapes and numbers), although Walters (1961) has reported that 7 year old children performing badly on a reading test had significantly inferior speed scores on a test of copying simple designs from memory, relative to good readers. Livingston (1961) found very little difference between error percentages on spelling and straightforward copying tests, although the overall number of errors on the latter was naturally much less. Omissions increased slightly, probably due to a careless attitude to the easier test, whilst confusions and transpositions slightly increased, however, the main classes retained their order (see Appendix B).

Errors in writing may therefore be considered to involve two essentially different types of mistake · spelling errors resulting from

lack of knowledge about the correct spelling of a word, and attentional errors due either to general carelessness or momentary inattention. Livingston (1961) has cited Randall's (1924) classification of spelling mistakes into errors of ignorance and carelessness, the former including errors resulting from defective auditory perception of words under dictated test conditions as well as insufficient spelling knowledge. Errors of carelessness could result from poor checking habits, fatigue, divided attention, poor pronunciation (self-produced auditory repetitions of the word) and by the intrusion of retrieved information concerning other words of similar sound or visual form. If information is stored in terms of letter-grouping as well as, or for all except the most frequently used words, instead of, whole word traces, then one might hypothesize that inattention will cause the intrusion of 'lower order' stored pattern in response to current visual, auditory or kinaesthetic feedback, as in the writing of 'car' for 'cart', 'bread' for 'bred' or 'chancing' for 'chance'. Straightforward copying tests may therefore be used to indicate more of the nature of errors of carelessness, and of the extent to which such problems may be aggravating any spelling knowledge inadequacy that may be handicapping the child's spontaneous writing.

4.4. ACCURACY AND THE SLIGHTLY BACKWARD READER

It seems necessary to consider certain aspects of the poor reader's performance as involving inappropriate behaviours that are not simply immature. Thus any remedial help for those falling behind will not merely revolve around the developmental problem of 'catching up'. Recent concern for the successful as well as the unsuccessful reader has also encouraged greater attention to the need to distinguish between the slightly backward and the severely retarded reader. This raises questions as to whether the pool of causal factors is the same for both groups, or whether greater differences exist between 'disabled' readers and the group Malmquist (1967) has termed the 'reluctant readers' - children who can read but don't.

Strang et al. have similarly referred to a group they call 'able retarded readers.' These children are not slow learners, rather, they are performing below their intellectual capacity, and although they may not admit to having a reading problem usually have a nagging feeling of failure and inferiority. To bolster their self-esteem they may employ various defences, such as disparaging the importance of reading, or gaining recognition or attention in other ways (Strang, McCullough & Traxler 1967, p.386).

The problems of this group may seem rather slight if one compares, for example, their chronological and reading ages. However, this apparently trivial deficiency at the early Junior stage may be deceptive. Firstly, because the children are still at the point where inadequate word recognition techniques, such as ideographic recognition, may work with some success, and they have yet to reach the time when their incorrect strategies really begin to retard progress. Secondly, CA-RA comparison does not reveal any concurrent maldevelopment of general interest and enthusiasm for reading in these children, who may already be only picking up a book when required to do so. Thirdly, it fails to highlight the fact that other children in the same class will be starting to race ahead, and thus the slightly below average child can be developing a sense of considerable relative failure.

Whilst an overwhelming amount of research is being undertaken with children exhibiting severe and often quite bizarre verbal problems, the slightly backward reader has received considerably less attention. It does not seem useful to consider all the problems of such children to be due simply to lower 'general intelligence', but rather it remains essential to look for difficulties of a specifically verbal nature. Nevertheless it seems probable that factors relating to personality and home background play a more important role in the progress of this group, if one takes the view that severe retardation is likely also to involve physiological or matur-

ational dysfunction of some kind. For these slightly backward children it may be useful to take Chapman & Wedell's (1972) point that the capacity to apply a perceptual skill to a specific educational task may often be a more relevant factor in the situation than the level of the skill itself.

Despite the likely influence of home factors, it nevertheless seems advisable to begin a search for the causes of this failure in the school. It is likely, for example, that the slightly backward reader will be required far more frequently than the severely retarded child to tackle tests which are too difficult for him. Any tendency to disruptive and hyperactive behaviour may be thus exacerbated by school experience, being socially reinforced in that it proves the most successful way for the child to gain the teacher's attention (Bell, Lewis & Anderson 1971b), or possibly the best 'escape route' from the educational situation that threatens loss of self-esteem. Awareness of failure may also reinforce careless and impulsive responding in the oral reading situation Levitt (1972) reported a tendency for mentally retarded subjects to 'prefer' to make verbal errors when faced with a word they did not know, whereas normal children tended rather to make no response. Levitt suggests that the retardate, in situations in which he cannot respond correctly, might prefer to make a random response as a means of 'satisfying' the teacher instead of remaining silent and being subjected to further prodding. Although this study involved children enrolled in a class for the mentally retarded, it seems feasible to suggest that a similar rationale might be employed by some poor readers when faced with this type of situation. Strang et al. emphasized that the 'able retarded' reader is often afraid of being considered different from his peers (Strang, McCullough & Traxler 1967). Thus it may be suggested that these children will deliberately adopt preferences for fast-inaccurate rather than slow-accurate performance if the former proves more socially rewarding, this may result if the teacher indicates she is more interested in the child 'finishing' his work than in

his doing it well, or if her lack of interest makes the child's desire to finish at the same time as his friends the most reinforcing element in the situation. At the same time, however, the child is likely to become hesitant in the positive and informative application of risk-taking behaviours, such as developing skills in using contextual cues in reading or experimenting with less common words in free writing.

Therefore, the poor reader's behaviour, when less than totally random, will tend to reflect one of two basic types of approach either the continued use of immature strategies, or the use of inadequate behaviours that a successful reader may never employ. Both militate against progress, and two main explanations have been proposed for their perseverance. Firstly, it is reported that the poor reader frequently demonstrates inferior ability to concentrate on a task, together with a general lack of attention to detail, and secondly that he often displays a tendency to respond on the basis of too little information. Both these points have been discussed more fully elsewhere in preceding chapters. On a more general level we may consider his behaviour to be under the influence of present or past teacher reward contingencies. It is possible that the child who has received little encouragement at home will be particularly influenced by such factors operating in the classroom. His attitudes to reading and writing in general and his concern with the level of accuracy of his own performance may be established very rapidly and very firmly by early reinforcement experiences in school. When the teacher has to cope with a large class, it is likely that some of the children in this state of heightened susceptibility to reward and punishment may have undesirable patterns of behaviour unintentionally reinforced, and greater concern with such classroom-centred factors to complement the considerable research into child- and home-oriented factors seems important. Investigation of the problems of the slightly backward reader must therefore look at the following questions . (1) to what extent

can his performance be said to resemble that of a younger, adequately progressing reader, or does it seem rather to involve the use of incorrect idiosyncratic behaviours or of correct techniques inappropriately applied? (2) are all aspects of his verbal performance - reading, copying and spelling - equally affected? and (3) what variables relating to classroom experience may be affecting his performance?

CHAPTER FIVE

THE PRESENT STUDY DESIGN AND HYPOTHESES

5 1 Introduction General Comments arising from the Literature Review

5 2 Series I Rationale and Method

5 3 Series II Rationale and Method

5 4 Proposed presentation of data, and experimental hypotheses

5 1 INTRODUCTION

General Comments arising from the Literature Review

There has been a quite staggering amount of research into the development of reading and writing skills, and from the literature may be drawn certain implications for further investigations.

The data outlined in Chapters Two and Three serve to indicate the tremendous range of factors that can affect educational progress. It has to be remembered both that social and other external environmental conditions will have a positive or negative influence on the development of the child's inherited potential, and the success of attempts to improve external elements in the learning situation will be limited by the extent to which constitutional differences are taken into account. It must be considered fundamentally inaccurate or inadequate to ascribe reading or writing problems solely to constitutional or to environmental handicap However, at an empirical level it is practical to suppose some difficulties to be predominantly attributable to adverse elements in one of these two areas, disregarding for the moment their obvious continual interaction

Within the normal classroom situation, whilst not wishing to overlook the presence and considerable influence of constitutional differences between children along several intellectual and behavioural dimensions, it is valuable to examine more closely the ways in which individual and collective classroom experiences can affect manifest performance on skilled tasks The present study is concerned particularly with the problem of children performing at 'below-competence' level. "Could do better" and "Must try harder" are all-too-common remarks on school reports it is necessary to ask why a high proportion of the output of so many children fails to reflect the standard of work of which they are capable Several intimately related areas of concern are involved in the investigation of this problem

It is necessary to examine the relative importance the student assigns to speed and accuracy of performance. Any shifts in this balance when a task is perceived as particularly easy or difficult must be noted As Kagan has observed, it is important to appreciate the difference between performance guided by a desire to avoid mistakes and performance haunted by expectancy or half-expectancy of failure. A desire to avoid 'failure' may not result in a striving for accuracy, rather, rapid escape from the task situation, regardless of output accuracy, may be judged the least unpleasant alternative (see 4.4) On the other hand, the overdevelopment of a fear of making errors can result in a level of response caution equally damaging to performance adequacy.

Thus the literature suggests that a tendency towards reflectivity or impulsivity, over and above typical chronological age changes, is a general characteristic of an individual and in part genetically determined However, several studies have indicated a task specificity of fast-inaccurate or slow-inaccurate behaviour. If the nature of the reading errors made, for example, can be partially dependent upon the difficulty of the material and the purpose for which it is being read, it may be suggested that general behavioural approach to verbal tasks might be similarly affected by these factors. However, performance will be determined not only by such objective factors but also by subjective estimates of task difficulty made by the individual, which can be linked to more arbitrary circumstantial factors and to his past history of success and failure in similar situations.

The purpose of the present study was therefore two-fold. Firstly it aimed to examine in detail some of the ways in which good and poor readers differ in the skills they bring to various verbal situations. This involved some overall measurement of reading, copying and spelling abilities, plus examination of component factors such as knowledge of grapheme-phoneme correspondences and ability to make use of visual word imagery. Secondly it tried to define certain ways in which performance in these situations could be affected by factors other

than skills competence This second area of concern was chiefly directed towards examining the relationship established by the individual between performance speed and accuracy Whilst those children who can perform accurately and speedily are obviously considered the best readers or writers, other behaviour was being viewed here from the standpoint that slow-accurate behaviour is more desirable (both in its own right and because it is more amenable to improvement) than fast-inaccurate behaviour The study did not attempt to take account of constitutional differences between subjects with regard to behavioural impulsivity but was concerned rather with the manipulation of test materials and performance conditions and the extent to which this manipulation could effect changes in an individual's general approach to certain types of verbal task Although not directly investigated, the study also attempted to make some inferences with regard to the influence of teacher practices and past school experiences on present behaviour in the test situations. Details of the various tests used and their administration are described in the following sections of this chapter, however, some general comments may be made concerning the choice of materials and methods of presentation involved

Choice of Tests

Comment has already been made on the wide spectrum of factors that may influence reading and writing progress. It is beyond the scope of this study to be concerned with the personal history of each subject in detail, rather, attention is centred in a more limited way upon certain aspects of the performance situation that may be affecting behaviour

It has been suggested above and in Chapter Four that attitudes developed towards reading and writing as the result of uncontrolled or unintentional reinforcement in the classroom of undesirable practices may contribute as much to poor manifest performance as fundamental inability or failure to master the necessary specifically-verbal skills Thus the child who has shown satisfactory progress initially may begin to fall behind, either because of the adoption of

inappropriate strategies or perhaps later because formerly deliberate policies have been absorbed into general behavioural attitudes and become highly resistant to change. As a result of either persistence with immature word-attack techniques or the development of a general approach to verbal tasks that lays minimal stress on accuracy, the child may well "miss out" mastery of a particular stage of skill development and thus be unable to succeed in any future attempts to "reform".

The development of tests for the present study was therefore guided by the following five considerations First of all, it was decided that the investigation would be limited to the use of tests of verbal performance, examining the expressive skills of speaking, reading aloud and writing (copying and spelling) Secondly it was intended that the tests employed would involve behaviours closely related to the types of activities carried on in the classroom, in contrast to a number of contemporary studies which have devised verbal tasks that distort conditions to such an extent as to make their inferred relevance to the normal reading and writing situation highly questionable.

Thirdly, some of the tests were designed to enable both the pupil's spontaneous oral and written performance and his ability to deal with material provided by the experimenter to be examined. Both inter- and intra-individual comparisons could be made, so that it was possible to see, for example, whether the difference in performance speed and accuracy between good and poor reading groups was noticeably different in these two types of situation. Fourthly, the experiments were designed to provide a series of situations in which subjects might have varying expectations of their ability to perform the task correctly. For example, (i) comparison was made between performance on spelling and straightforward copying tasks involving the same words, and (ii) certain test situations were used in which performances with real words and pseudo-words were compared It was hypothesized that differences might emerge between a subject's approach to the 'easier' and 'harder' tasks in such series, not only

because of objective differences in task difficulty, but also because of the child's subjective view of these changes. For example, few children would be expected to be worried about their ability to perform when asked simply to copy words, whilst a task asking them to read aloud pseudo-words - items they knew in advance they would not recognize - might make some subjects anxious in the test situation. This might enhance the subject's competitive aspect to the test in a favourable manner, or it might have a debilitating effect on performance in some way. Latly, series of written tests were constructed that gave subjects varying degrees of assistance with the basic task. This involved the provision of two types of visual cues (indication of the length of an item or the position of certain letters in it), and performance on these tests could be compared with that when no such assistance was given (it is appreciated, however, that performance may be adversely affected under the "assisted" conditions if normal behaviour patterns were disrupted)

Thus the experimental design reflects an attempt to utilize performance conditions which were, in general, familiar to the subjects and yet with the minimum of alteration were modifiable to accommodate novel stimulus materials or response situations. The use of (a) the same materials under different response conditions (e.g. reading and writing the same words) and (b) the same response condition and different stimulus materials (e.g the copying of isolated real words, isolated pseudo-words and prose) represents an attempt to provide information from the maximum number of performance situations without necessitating vast changes in response conditions for the handling of different types of verbal material. Thus it was hoped that the same tests could be used to provide information about skills development and behavioural impulsivity and intra-individual changes in performance strategy. Overall, the aim is to discover under what conditions the behaviour of good and poor readers is most similar and in what situations a concern with response accuracy may be most easily fostered.

Choice of Subjects

The study was chiefly concerned to look at the performance on these tests of children falling slightly behind in their verbal skills development (as indicated by standardized test score/chronological age comparison). There is today a greater appreciation of the need to help not only those whose backwardness requires clinical or other outside remedial help but also the considerable number of children leaving Primary schools with little or no interest or enthusiasm for using reading and writing as everyday communicative tools

The stage of reading and writing development corresponding to the average first year Junior level was chosen for study. However, within a typical class of 7-8 year olds there will be a considerable performance range, possibly including a few children in need of intensive remedial help but also those performing at well above average levels, as well as pupils showing signs of falling behind. Nevertheless, there is an increasing awareness of the need to study children who are succeeding in the formal learning situation so that a fuller picture of what the backward reader is and is not able to do may be obtained. By having a clearer notion of the behaviour of adequately progressing pupils, the poor reader's performance can be gauged more accurately in terms of its immature or idiosyncratic characteristics.

The use of subjects taken from a fairly narrow chronological age range was therefore intended to provide information about both general performance levels of children of this age and to look at the spectrum of individual differences within the group. As the study was not concerned with the performance of severely retarded readers, children could be chosen who had not for any reason been previously subjected to prolonged educational examination and who were generally naive in the test situation.

Nature of Data to be collected

The data collected in the present experimental series related to two main

areas of performance analysis discussion of the relationship between speed and accuracy of performance, and (2) examination of other qualitative differences between children designated as good and poor readers The major questions being asked by the study were as follows To what extent do subjects exhibit a similar general approach to the different verbal tasks with which they are confronted? Can we also differentiate along any other dimensions between those children who maintain their general approach (i.e. speed-accuracy relationship) from those who modify their approach according to task demands? Are there 'good' and 'bad' types of performance modification? Are there overall differences between tasks with regard to the extent to which they encourage, for example, slow-accurate or fast-inaccurate behaviour? What can be observed about the qualitative aspects of subjects' responses with regard to correct and incorrect components of output?

Major response measures were therefore concerned with response speed and whether the response was correct or incorrect. Further analysis involved examination of both accurate and inaccurate stimulus-free (S-F) and of incorrect performance on stimulus-controlled (S-C) tasks.

In addition, some form of detailed analysis of errors was undertaken to see whether there were any notable differences between the types of mistakes made in copying and free-writing. Ideally, such a comparison would be made for every child, but for the relatively small samples of work to be obtained from each subject in the present study only an assessment of group trends was feasible. Livingston's 1961 Error Classification system, prepared for this kind of analysis, was adopted, and used for a three-way comparison of free-writing, spelling to dictation and copying performance. In her own study, Livingston reported quantitative but not qualitative differences in error types under spelling to dictation and transcription conditions, however, in view of the tentative speed-accuracy proposals made above and in Section 4 4, it may be that differences between these two conditions will emerge when some experimental emphasis is placed upon response speed Use was also made of the

grammatical-graphical error analysis for prose material, as outlined in 4.2, although the limited amount of data available precluded a valid reading-group comparison of non-response behaviour.

It may be noted that the study excludes the investigation of oral or written comprehension skills Whilst knowledge of the meaning of the words used is obviously an advantage in many of the tasks, subjects' understanding of the material was not recorded. The only exception to this was some analysis of errors in tests employing prose material, as stated above.

5.2 SERIES I RATIONALE AND METHOD

The first experimental series has two major sections, one requiring subjects to spontaneously generate verbal material and the other requiring their oral and written responses to presented items.

Stimulus-Free (S-F) Tests

The first set of tasks involved the spontaneous production of verbal items by subjects (Ss), to look at the general ability of 7-8 year olds to cope with this type of task and to investigate any consistent differences between good and poor readers on both the quantitative and qualitative aspects of their performances. Three types of response were required. Firstly the speed at which Ss could generate alphabetic letter strings was measured to gauge the range of individual differences in rate of responding at a level at which there should be little difference in real ability to perform the test Secondly Ss were required to generate strings of isolated words. Althouh one may assume that all the children were reasonably fluent 'restricted code' conversationalists amongst themselves, characteristic differences in output might appear when asked to orally produce items in this experimental context, reflecting ability to deal with words as discrete meaningful units Differences in written performance rate might also involve an added component of handwriting facility, although it is suggested that this is not an important factor in determining rate. Thirdly, Ss' knowledge of

sequential probabilities and structural legality was examined by asking them to generate their own pseudo-words. It is hoped that, if test-retest reliability is high, both oral and written test performances will provide useful information about the specifically verbal and general behavioural capabilities of children who are succeeding or failing in reading

Method Ss were instructed to say aloud or to write down as many single letters of the alphabet or isolated words as they could in the time allowed (1 minute for Letters, 2 minutes for Words) In a third task they were asked to invent as many legal pseudo-words ('made-up' words) as they could in a two-minute period, only a written form of this test was presented, as it was decided that an oral form might not only prove too difficult for the children but also produce rather unintelligible or unscoreable responses. All response periods were timed by stop-watch Oral responses were tape-recorded, and written responses recorded on prepared results sheets, details of which, together with full instructions to Ss, are given in Appendix C.

Stimulus-Controlled (S-C) Tests

The second set of tests involved the oral reading or copying of verbal material provided by the experimenter (E). The aim was to provide data for a comparison of reading and copying errors made by the same children. Furthermore, this performance could be compared to that given under self-directed conditions, and in this way it was hoped that a fuller description might be developed of the all-round verbal behaviour patterns of above and below average readers - all of whom, it may be remembered, despite their considerable differences, would be receiving essentially identical instruction and be having basically the same types of verbal demands made upon them in the classroom.

Four types of material were used. First of all Ss were examined for their ability to name or copy letters. Whilst the previous chapters have highlighted the movement towards tackling letters only as constituents of words, it is essential to see whether any failure at the first year Junior level can be due, in part at least, to an inadequate knowledge of letter names, a tendency to confuse

letters with one another, or an inability to copy with accuracy Ability to read and copy words was tested in both the isolated words and prose contexts. Instructions to Ss laid emphasis on both speed and accuracy, the time imposition being made to encourage the adoption of slow-accurate or fast-inaccurate strategies in Ss who could not tackle the task accurately and at speed. For the creation of a more demanding task requiring Ss to deal with items new to them, pseudo-words of similar construction to isolated word items were used in preference to the use of longer and more difficult real words, so that disruption of the measurement of performance speed could be avoided

Method Ss were asked to read aloud or to make straightforward written copy of four types of verbal material: 1. Isolated letters of the alphabet
2 Isolated words
3 Isolated pseudo-words
4 Prose

Details of test stimuli are given in Appendix D Ss' oral responses were tape-recorded and written responses recorded on prepared results sheets Timings were made with a stop-watch Details of results sheets and instructions to Ss are given in Appendix E

Re-administration of Tests

All tests with the exception of the S-F Written Pseudo-words test and the S-C Prose tests were administered twice.

The S-C Letters, Words and Pseudo-words tests were presented once for Ss to deal with items horizontally and once vertically, to see whether such presentation differences consistently affected speed and/or accuracy of performance. Ss were randomly assigned to two groups, the first receiving stimuli in rows on Session 1 and in columns on Session 2, and the converse arrangement operating for the second group. The two test sessions were four weeks apart. The Prose test was only administered with words presented in the normal horizontal arrangement, firstly because of the rather unsatisfactory nature of columns as perceptual units when using words of such variable length (1 to 10 letters), and secondly because the tendency to read continuous prose from left to right would have been disproportionately strong compared to the situation in those tests involving isolated items. Due to the longer times taken for the Prose test it was decided to omit any straightforward repetition.

No such variation was employed in the S-F tests, a straightforward retest being made. Results sheets for Written Words and Pseudo-words were all designed for S to write his responses down rather than across the page. In anticipation of idiosyncratic spelling, and S writing rapidly under timed conditions, it was hoped that this would largely eliminate problems of separating the responses. Data from the Copying tests later showed this to have been a wise precaution, as several Ss copying horizontally left little or no gap between items. The Written Pseudo-words test was not repeated as it was felt that interim experience with the S-C pseudo-word items would have too great an effect on any subsequent S-F performance.

Additional response measures

Observations were also made during performance of certain aspects of Ss' general behaviour, for example (1) whether he made overt vocal responses during performances of any written test, (2) whether he used a finger guide on S-C tests, (3) whether he had any general difficulty keeping his place in the S-C tests, and (4) whether he tended to copy words as whole items or letter-by-letter.

Administration of a standardized reading test

Following administration of both experimental sessions, Reading Ages were obtained using the Schonell Graded Reading Vocabulary Test. This was chosen for quick administration and because its use was acceptable to the schools participating in the study. As the experiment itself was concerned with word recognition rather than comprehension skills it was also considered in keeping with the other tests being employed and could give an indication of the suitability of the S-C Oral Word tests devised for the two experimental series.

General Administrative Procedure

Forty children participated in this series, twenty from each of the two schools in Durham, covering the normal socio-economic range. The only selection criterion used was sex, such that ten boys and ten girls were taken from the first year Junior class in each school. The chronological ages of Ss in the sample ranged from 7.6 to 8.8 (mean 8.3) and their reading ages from 5.5 to 12.10 (mean 8.1). The series was conducted throughout February and March 1973, on school premises and during normal school hours. The schools were visited on alternate weeks and the four main testing sections run in the following order in each school

1. Stimulus-Free, Session 1
2. Stimulus-Controlled, Session 1
3. Stimulus-Free, Session 2
4. Stimulus-Controlled, Session 2

Within each of these sections every child was seen on several occasions so that no single test period was long enough to cause severe fatigue. It was especially necessary to take these precautions for the written tests with children of this age, and it is unfortunate that, if the effects of fatigue were ever not completely eliminated, the poorer Ss were probably affected most, as they took much longer to complete the tasks and their writing styles were often more uncomfortable.

Ss were tested individually, with E and S alone in the room. Although conditions were generally good there were a few occasions when the noise outside seemed to be slightly intrusive. However, Ss appeared undisturbed by this, and the use of short test periods precluded the possibility of the performance of one or a few Ss being disproportionately affected.

Analysis of data

The raw data were analyzed for the sample as a whole and with Ss divided into Good and Poor reading groups. Assignment to groups was as follows: Ss with RA (Schonell) higher than their CA were designated Good

readers, those with RA below CA were classed as Poor readers. Two Ss with identical RA and CA were assigned to the Poor reading group to equate the numbers, and there was no overlap of RA scores between the two groups. After completion of the S-F Session 1 tests one S was found to be unable to perform the S-C Oral tests; however, he completed the S-C written section and his scores were retained for those tests in which he participated. A second reading group classification had been proposed, to be made on the basis of scores on the S-C Oral Words test, but such a division proved identical to the Schonell-based grouping.

The raw data were analyzed in both quantitative and qualitative terms. The former was concerned with (1) the number of S-F responses produced in the time allowed, and the times for S-C test completion, and (2) whole-item error scores on Written S-F and S-C tests. The latter was undertaken with regard to all responses given in the S-F tests and to erroneous responses in the S-C tasks. Statistical analysis of the data took two main forms:

(1) An assessment of the correlation for individual Ss between their performances on the various tests:

- (i) between speed of performance on different tests
- (ii) between accuracy of performance on different tests
- (iii) between speed and accuracy of performance on the same test
- (iv) between the two administrations of the same test.

As all scores were not directly comparable the Spearman Rank Correl- Test was employed, comparing Ss in terms of their performance relative to others in the sample. Rankings were calculated for all Ss together (n=40) and for Good and Poor groups separately (n=20).

(2) A comparison of the performance of Good and Poor reading groups, one or both of the following methods being used as applicable:

- (i) comparisons of group totals using chi-square
- (ii) utilizing individual totals within each group by use of the Mann-Whitney U-test.

Results having a statistical probability of occurence due to chance $< .05$ were accepted as significant. Levels of significance given for the major

response measures (speed, accuracy and error correction) as they relate to reading ability rankings and groupings are one-tailed in the direction specified by the appropriate experimental hypotheses. Levels indicated for inter-test and test-retest calculations are also one-tailed. For confidence with less well specified reading group comparisons on other measures, including speed-accuracy calculations, and for all sex group and additional post-hoc comparisons between stimuli and conditions, two-tailed levels are quoted.

5.3. SERIES II · RATIONALE AND METHOD

In Series I the speed and accuracy of Ss' oral and written responding was investigated using a variety of verbal items. Certain qualitative features of their S-F and S-C performance were also examined. Series II was similarly concerned with these two types of performance, but additional experimental conditions were used which allowed a more detailed examination of certain qualitative aspects of the child's responding. To this end, only the Isolated Words conditions employed in the previous series were used in the present experiment.

Stimulus-Free (S-F) Tests

In the previous experiment the speed at which Ss could write or orally produce isolated words was tested. In the present series certain analytic word-attack skills were examined using this experimental situation. In addition to straightforward production, two other response conditions were introduced in which certain impositions were made upon S's freedom, although the task of supplying the response words remained his · (1) in which E designated the number of letters to be in the words (3,4 or 5), and (2) in which E designated either the first or the last letter of the word (no length restriction). The first of these conditions looked at Ss' knowledge of word construction with regard to its visual make-up and the second with regard to its sound. In some ways the latter condition supplements inform-

ation obtained from Consonant-Substitution methods requiring S to change the first or last letter of a given pseudo-word to make a real word he knows (Griffin 1972), or techniques asking S to say what word would be left if a particular letter sound were taken away from the test word (Bruce 1964). Bruce suggests that performance on such tests can highlight the stage of mastery achieved of the following abilities: to accept words and sounds as exclusive categories, to understand the criteria of what constitutes analysis, and to differentiate sounds positionally.

Method: In the Unrestricted condition Ss were required to say aloud or to write down 24 words as quickly as they could. Satisfaction of this criterion was not obvious to Ss under Oral conditions, but the Written task was completed when all 24 spaces on the prepared results sheet were filled. On the Length-Restricted task Ss were asked to produce a total of 24 items, 8 required to be 3-letters, 4-letters and 5-letters long respectively. Presentation order of items was randomized. On the Oral task Time scores were recorded for each item, on the Written task only the overall time for the task was measured. A limit of 2 minutes per item was imposed under Oral conditions; it was observed that Ss failing to respond within this time began to show signs of inattention, and it was felt that prolongation of the time allowance would produce greater distortion of overall results than the imposition of a time restriction. No such limit was introduced on the Written task, but Ss were encouraged to leave any item causing trouble and return to it at a later point. Similar regulations were in operation for the Letter-Restricted condition. Response times were measured by stop-watch, Oral responses were tape-recorded and written responses made on prepared results sheets. Details of the latter, and full instructions to Ss, are given in Appendix F.

Stimulus-Controlled (S-C) Tests

The remainder of the present experimental series examined, as previously, Ss' oral reading and copying abilities, and presented in addition a dictated (written response) spelling test. In order to make direct comparisons between performances the same set of 108 words was used for all three conditions, and to avoid as much as possible any interaction resulting from this arrangement the tests were always presented in the following order: Spelling, Reading, Copying. The word lists used, together with an example of the stimulus cards used in the Reading and Copying tests, are given in Appendix G. It had been intended to exclude from the experiment any word that had a homonym, however, it was later discovered that 8 items failed to satisfy this criterion (way, few, but, boy, are, build, aloud). The experiment required Ss to deal with items in the two written tests under four conditions:

(i) having unbroken lines on the results sheet on which the words were to be written (Series I condition)
(ii) having dashed lines indicating the correct number of letters in each word
(iii) having unbroken lines plus either the first, middle or last letter of each word given
(iv) having dashed lines plus the first middle or last letter.

The aim was to see whether the different types of additional information was of equal use to Ss, and whether some Ss were more able than others to take advantage of it. The function of the dashed line and added letters is presumably different under copying and spelling conditions : one might suppose them to act as 'markers' to help Ss avoid careless copying errors, whilst they can function as 'clues' in the spelling situation.

Method: Administration of the Reading and Copying tests followed the procedure outlined for Series I. In the Spelling test words were presented by E one at a time and not in context (Livingston (1961) reports there to be only a very small loss in accuracy using a vocabulary test rather than a test in context form). Each word was said twice. No measurement of speed

was made for this test as it was felt that performance might be disrupted by such a procedure and also that measurements might not have been of sufficient accuracy. Details of results sheets and instructions to Ss are given in Appendix H.

Administration of a standardized reading test

Following administration of all experimental tests, Reading Ages were obtained for Ss using the Schonell Graded Reading Vocabulary Test.

General Administrative Procedure

Forty first year Junior children from two schools in Durham participated on this experimental series. As for Series I, the only selection criterion employed was sex. CA range was from 7.3 to 8.5 (mean 7.11), and RA range from 6.5 to 12.4 (mean 8.1). The experiment was performed during November 1973, on school premises and during normal school hours. The schools were visited on alternate weeks with S-F tests being administered on the first, and S-C tests on the second, visit to the school. Within each week every child was seen on several occasions to avoid effects of fatigue. Ss were tested individually with E and S alone in the room. Conditions with regard to outside noise were excellent in both these schools.

Analysis of data

Data analysis followed the procedures outlined for Series I. Assignment of Ss to Good and Poor reading groups was made on the same basis as previously, with one S having identical CA and RA being put in the Poor group to equate the numbers (this almost equal supply of below and above average readers occured without any selection criteria regarding ability being imposed, in one school the entire first year class having been taken).

5.4. PROPOSED PRESENTATION OF DATA, AND EXPERIMENTAL HYPOTHESES

Certain aspects of this study were designed to examine features of performance in ways not necessarily amenable to statistical analysis, or to uncover differences between children that could not be clearly specified in advance. Nevertheless, this section aims to state the main hypotheses to be tested in the various experimental situations, which relate chiefly to the division of subjects into Good and Poor reading groups.

Due to the nature of the tests performed it was decided that data from the two experimental series should be presented together. Within this framework, however, the data are assigned to three main research areas and as such will be discussed separately in the three subsequent chapters of this report. These areas are defined as follows:

(1) Overall speed and accuracy of performance

(2) Discussion of further qualitative differences between subjects, materials and conditions

(3) Detailed analysis of word and pseudo-word errors.

Overall speed and accuracy of performance

The main hypotheses generated with regard to speed and accuracy of responding in the various experimental situations were as follows:

(1) That Good readers will produce Oral and Written S-F responses more rapidly than will Poor readers

(2) That Good readers will make fewer errors in Series I Written S-F and Series II Written and Oral Length- and Letter-Restricted S-F tasks than will Poor readers

(3) That Good readers will perform all S-C Reading and Copying tests more quickly than will Poor readers

(4) That Good readers will make fewer errors on all S-C tests than will Poor readers

(5) Because of the Good readers' greater ability to use contextual cues the Good-Poor group difference in speed will be greater on the Prose than on the Isolated Words S-C tests (Series I).

(6) As completely accurate performance might be considered possible for all Ss on the Copying but not on the Reading and Spelling S-C tasks, the Good-Poor group differences will be greatest under the latter conditions

(7) Although hypotheses 1-4 presume a positive relationship between speed and accuracy, it is proposed that this may apply more strongly to the performance of Good than of Poor readers. It is hypothesized that some members of the latter group may evidence fast-inaccurate tendencies that produce a negative relationship between speed and accuracy of performance

(8) That whilst performance is closely correlated with Reading Age, Chronological Age will not be a significant factor in intra-sample performance differences.

Further qualitative differences between subjects, materials and conditions

Hypotheses relating to various qualitative analyses are proposed as follows:

(1) That the Good readers' superiority on S-F Unrestricted tests will also be reflected in certain qualitative features such as the production of longer items, of items of more complex syllabic structure, and a greater tendency to use low frequency words.

(2) That a greater proportion of S-C errors made by Good readers than by Poor readers will be made with the longest items.

(3) That words causing most errors in reading tests will also cause most copying and spelling errors (Series II)

(4) That Good readers will correct a significantly greater proportion of their errors than Poor readers

(5) That Good readers will show more sophisticated copying behaviour than Poor readers, tending to look away to the stimulus card between items rather than copying letter-by-letter

(6) That the two display conditions (horizontal and vertical) of S-C material will produce differences in speed and/or accuracy of performance. Since verbal material is normally tackled left-to-right across the page, it is suggested that horizontal presentation will lead to significantly faster performance, whilst the less familiar vertical display might encourage more attentive and thus more accurate performance (Series I).

(7) That girls will perform all tests faster and more accurately than boys.

Detailed analysis of word and pseudo-word errors

These hypotheses relate to the following qualitative analyses·

(i) Comparison of Copying errors on Isolated Words, Pseudo-words and Prose tests (Series I), classified according to Livingston's (1961) taxonomy.

(ii) Comparison of Written S-F, Copying and Spelling errors for Isolated Words (Series II), classified as (i).

(iii) Comparison of the grammatical fit and graphic similarity of real-word substitutions made by Good and Poor readers in the Series I Oral and Written Prose tests.

Statements in advance with regard to these analyses were difficult to make, particularly hypotheses concerning differences between Good and Poor readers. However, the main expectations may be stated as follows:

(1) That similar error proportions will be recorded for performance on the Isolated Words, Pseudo-words and Prose tests.

(2) That the proportion of errors in each category will tend to be similar for words written freely, written to dictation, or copied, with the relationship being greatest between the first two of these conditions

(3) That there will be differences between Good and Poor readers with regard to the grammatical fit and graphic similarity of real-word substitutions on the Prose tests; specifically, it is expected that a higher proportion of Good than of Poor readers' errors will be of the same part of speech as the stimulus word.

CHAPTER SIX

OVERALL MEASURES OF SPEED AND ACCURACY

6.1 INTRODUCTION

It is proposed that data relating to overall speed and accuracy of performance be first presented separately, in Sections 6.2 and 6.3 respectively, and the nature of their relationship subsequently discussed in Section 6.4. In most instances the Session 1 and Session 2 totals for Series I are presented separately to give an indication of performance similarity on the first and second administrations of the tests. Data are examined both with regard to the two samples of children as a whole and to divisions of each sample on the basis of standardized Reading Age scores. Correlations calculated for the reading groups separately tend to be less informative than those for the whole sample unless the relationship was particularly strong. The difference between the best and worst member of the group, in terms of performance time or number of errors, tended to be less for the Good than for the Poor readers and such ranking methods therefore often proved less satisfactory for the former group. Methods of analysis not involving such heavy reliance on individual scores were sometimes of more use in these comparisons.

6.2 SPEED OF PERFORMANCE

S-F data

Output totals for Series I are given in Table 1, these proving slightly higher on the second administration of each test, with one exception, although Table 2 figures show the overall test-retest correlations (using ranked positions of individuals) to be high. Both the lowering of the Oral Words output and the increases on other tests are presumed due to the various effects of increased familiarity with the task and/or with the experimenter. An impression of the speed at which Ss were

performing these tasks can be obtained from the average times given in Table 3. The greatest difference between the Good and Poor groups was obtained on the Written Words test, presumably reflecting the fact that this is the only one of the four Letters and Words tests in which some Ss might experience a real inability to respond correctly, over and above any differences in response speed or willingness to participate. That the Poor readers' problem here was not simply a motor one (due, for example, to more awkward writing styles) is endorsed by the Written Pseudo-word results which show very little group difference in terms of total output.

Tables 4 & 5 present the corresponding data for the second experimental Series, showing Ss to have been slightly slower, comparatively, in producing words in the Unrestricted condition - this may have been partly due to their not having had experience with this test situation in a prior Letters task. The Length-Restricted took longer to complete than the Letter-Restricted task, and the Good readers' superiority was greater for the former test. The only Ss to perform the Written Length-Restricted test more quickly than the Letter-Restricted test were all Good readers. Taking the whole-sample averages it can be seen that, whereas there was no difference in time taken for the Letter-Restricted task under Oral and Written response conditions, the Length-Restricted task was more quickly performed orally. However, these comparisons may be somewhat distorted by the time limit imposed under Oral conditions, and these differences will be shown to be quite closely related to the number of errors made.

Tables 6 & 7 show Unrestricted and Length-Restricted, but not Letter-Restricted, performance speed to be significantly correlated with RA, and all tests uncorrelated with CA for the age range employed in this study. Mann-Whitney scores for reading group differences are statistically significant for all Series I tests, although only for the Written Pseudo-words

task when acceptable items only are considered, and for all Series II tests with the exception of the Written Letter-Restricted test (Tables 8 & 9). It appears that speed of performance on the Restricted tests was not as firmly related to reading ability as was performance accuracy, but again the imposition of a time limit orally may have affected results.

Correlations between performance speed on each of the five Series I tests were statistically significant, any child doing well on one test also tending to do well on the others, whether responding orally or in writing (Table 10), although correlations between two Oral or two Written tests were generally higher than those between tests employing different response conditions. The only exception to this was found for the rather high correlation between Oral and Written Letters ranks, this presumably reflects the fact that, whilst responses given on the two Words tests differed qualitatively to a certain extent, responses made on both Letters tests were necessarily identical. These differences are more marked for the Good and Poor groups taken separately (Tables 11 & 12). Also, correlation between Oral and Written Letters output was higher for Good readers, but higher between Words tests for the Poor group. This may have been due to the greater range of word length used by Good readers; the higher Poor group correlations between the two Words tests also reflects the relatively smaller discrepancy between their Oral and Written total output. Intercorrelations for all Series II tests are given in Tables 13 - 15, and the S-F results show little correlation between Time score ranks for the three Oral tests, whilst correlations reached a low level of significance for Written tests. Ss performing either of the two types of Restricted task well orally also tended to perform that task more quickly under Written conditions. Findings for the reading groups separately tend to be less informative and no important group differences emerged for this section of the analysis.

A Time sub-period analysis was performed on Series I Oral data to see whether there were any consistent differences in response rate at different points throughout the allowed period. It was expected that all Ss would tend to show higher output rate initially, with a gradual falling off as time progressed, but that the Poor readers might display a more marked decline over time due to greater difficulty in maintaining concentration for the duration of the task. Taking the percentage of total output in each of four time sub-periods (15 seconds and 30 seconds long for the Letters and Words tests respectively), similar results were obtained for both tests (Table 16) and show the predicted pattern. On the Letters test the Good readers did give some indication of 'keeping going' better than the Poor readers, but this was not found for the Words test data, and the overall difference in output between the groups is attributed not to the Poor readers' greater deterioration but to the higher initial rate embarked upon by the Good readers.

S-C data

Overall S-C Time score totals for Series I, together with the error data to be discussed in the following section, are given in Table 17. For the sample as a whole test-retest correlations were again high, Oral tests showing greater ranking consistency in every case (Table 18), this being in part a function of the much shorter times involved. Taking the reading groups separately (Table 19), correlations were generally higher for the Good readers, reflecting the fact that several of these Ss performed at near maximum speed orally (for example, one S read 40 isolated words in 17 seconds in Session 2). The average times per subject (Table 20) show how much more quickly the Good readers completed each of these tests. Tables 21 & 22 for Series II tests show for the Reading and 'normal' Copying tests average times practically identical to those for Series I with the exception of the Poor group Reading times (Series I Ss slower). The three

'abnormal' Copying conditions disrupted fluency and increased performance times, the same pattern being shown by both reading groups. Related changes in performance accuracy are discussed in 6.3. Overall, correlations between RA and Time score ranks were high (Tables 23 & 24) and the difference between the experimental groups statistically significant in every case (Tables 25 & 26). Because the Good readers' superiority was so great the effects outlined in Hypothesis 5 could not be differentiated.

Comparing performances on the different Series I tests, correlations were all highly significant, those between Oral tests being generally highest (Table 27). Those between multi-letter item tests were also rather higher than those between the Letters tests and others, the highest, as might be expected, being between the Words and Prose tests. Results for the Good and Poor groups (Tables 28 & 29) show that in all but one instance the inter-test correlations were higher for the Poor group, and in some cases quite markedly so. This would seem to support the S-F findings in that the Good readers, whilst showing greater performance consistency over time on the same test, show more marked differences in the speed with which they deal with different types of verbal material. The RA range was greater within the Good than in the Poor reading group, and whilst a few of the best readers might be able to maintain fast performance on all tests, others demonstrated this adaptability of speed (being measured here by changes in the relative position of individuals within the group) in order to preserve accuracy. Within the Poor group Ss showed a greater tendency to respond generally either quickly or slowly with less adaptation to the particular task involved. Results for the Series II Copying task show Time ranks for the four conditions to be highly correlated with one another, with correlations for the reading groups separately (Tables 14 & 15) again showing the relationship between ranks to be higher for the poor readers.

Comparison of S-F and S-C Performance

Table 30 presents the correlations between Series I S-F output and S-C speed of performance ranks. For tasks involving isolated letters, all overall correlations were significant, identical for the two Sessions, and higher under Oral response conditions. Whilst the Good readers returned consistent and significant correlations across conditions and Sessions, all Poor group correlations failed to reach significance. Similar comparisons between figures for the Words tests are not so clear cut. For the sample as a whole correlations all reached significance, although higher this time between Written test performances. This reflects both the greater influence on the straightforward output measure under Oral S-F conditions of length and other qualitative features, and also the fact that the Reading tests present a fundamentally more difficult task. It is suggested that the first of these factors is largely responsible for the drop in Good group correlations to non-significant levels, and that the second played a considerable part in the decrease for Poor readers. In addition, the Oral S-F differs from the other three tests involved in being the only one in which Ss were, with the exception of 'wrong category' responses (see 6.3), unable to make a mistake. On this point at least the two types of Written test would seem, at a subjective level, to be relatively more similar in nature, and this may also account for the higher correlations observed for these tests. Results from Pseudo-word tests corroborate these findings. Correlation with Copying speed rose markedly when only acceptable items of S-F output were considered, showing that the S-F measure that more closely reflected S's ability to cope with the structural rules of English was more significantly related to his Copying performance. Correlations for the Good groups were again much higher.

A more complete intercorrelation analysis is offered of the Series II data (Tables 13-15). Taking first the results for the sample as a whole,

relative performance on the Unrestricted S-F tests was generally that most closely allied to position in the sample for the S-C tests. In particular, significant correlations were found between performance on the Written Unrestricted task and all Copying tests. Apart from this, however, inter-test correlations between S-F and S-C tests were mostly at a non-significant level. Nevertheless, a comparison of the tables for the two reading groups shows that many more of these correlations reached an acceptable level of significance for the Poor than for the Good group. This agrees with the Series I findings suggesting that S's speed of performance, relative to other individuals, is a more consistent feature of Poor than of Good readers, and supports the notion that the former show less adaptation of performance speed to secure performance accuracy.

Summary

It is relatively uninformative to look at performance times without reference to accuracy, and the latter is examined in the next section. However, the main findings of this initial analysis of the data may be summarized as follows. Hypotheses 1 and 3 received overall support from all sections of the experiment in showing Good readers to perform the tasks significantly more quickly, or with a higher response rate, than the Poor readers, and children performing the S-F tasks most quickly also tended to be the fastest performers of the corresponding S-C tasks. Whilst the Good readers showed greater intra-group consistency of speed rankings over time for the same test (Series I), ranking differences for different tests showed that some of this group were adapting their speed to maintain accuracy. The Poor readers, on the other hand, showed much greater intra-group stability of speed rankings for different tests, suggesting they were more attentive to the speed of their performance than to its accuracy. A time sub-period analysis of Series I S-F Oral data revealed no significant tendency for the Poor readers' performance to be more affected by an

inability to concentrate for the duration of a test, although it is possible that differences between Ss on this dimension did affect performance on the longest S-C tests.

6.3 ACCURACY OF PERFORMANCE

S-F data

For Series I S-F tests, response accuracy was only subjected to statistical analysis for the Written words and Pseudo-words tests. All Oral responses given were considered correct with the exception of a very few 'wrong category' responses, such as digits given on the Letters tests or single letters on the Words Test (Tables 31 & 32). Several writers have commented upon children's problems in keeping these categories distinct, and although the numbers involved were small the Poor readers did make the majority of these mistakes. In addition, incorrectly orientated letters were counted as errors, although only those letters whose reversed or inverted form is not identical to another letter could be included. Not many such errors were made : ten over both Sessions, made equally by Good and Poor readers. However the unmeasurable letter-confusion errors are generally a reflection of rather different problems and may have been far more numerous; group differences in difficulty with these letters are gauged in the S-C tests.

On the Written Words test two types of error were recorded: (1) misspellings and (2) unidentifiable responses. It is probable that many type (2) items were gross misspellings, however, they were classified under (2) if neither E nor S (shown his response again at a subsequent testing session) could identify the item as a real word (Table 33). The majority (38 of 44) of such errors were made by the Poor readers. Overall, 84.4% of all responses produced on this test were completely without error, percentages for the Good and Poor groups being 91.9% and 74.4% respectively. Several of the Poor readers' unidentifiable items can be said to result not

from sincere yet unsuccessful attempts to spell words correctly but from a definite and observable lack of concern with response accuracy.

Correlation between error ranks of the Written Words and Pseudo-words tests are given in Table 34. This reached a statistically significant level for all Ss taken together, but is not very high in absolute terms. Correlations for the two reading groups, however, show considerable disparity. Poor readers making fewest mistakes with real words also made fewest mistakes on the Pseudo-word task, whilst this relationship did not hold for the Good readers for whom the trend was towards a negative correlation. It may be suggested that more of the Word errors made by Good readers (misspellings rather than unidentifiable responses) were the result of carelessness under timed conditions rather than of a basic inability to spell the words correctly. On the other hand, the Good readers subordinated speed to accuracy on the Pseudo-word test and more of their errors reflected a real difficulty with the task. Such an explanation again implies that many of this group had developed an adaptability of approach that enabled them to alter their general behavioural strategy to suit the demands of the situation - this point will be further examined by looking at the relationship between response rate and accuracy in Section 6.4.

On the Series II S-F tasks, errors were recorded for the two Oral Restricted tests and all three Written tasks (Table 35). To some extent the types of error involved in the different tests varied : in the Oral tests two basic types were recorded, items incorrect in respect of test requirements and 'non-response' errors, these having different relationships with response speed. Written errors typically involved spelling mistakes rather than direct infringements of the response sheet restrictions, however, many of these mistakes did result from miscalculations with regard to the test requirements as well as from poor spelling ability per se. The number of errors made on these tests correlated highly with

RA but not CA (Table 36), the superiority of the Good group indicated by the Table 9 Mann-Whitney results. These suggest that where the group difference in speed was less the difference in accuracy increased, and also that length restriction proved the more difficult task, although there is great difference in difficulty between the two parts of the Letter-Restricted test (that is, whether the first or the last letter was designated). Inter-test comparisons (Table 37) show that, with one exception, all correlations between S-F tasks for error ranks reached a significant level. Correlations calculated for the reading groups separately (Tables 38 & 39) are difficult to interpret, although it appears that the Poor group generally achieved greater inter-test consistency of rankings than did the Good group, which goes against some of the conclusions drawn in the previous section. However, it seems necessary to assume that the low error totals recorded for the Good group has caused a certain distortion of their rankings , and that group differences in the types of error made may also have affected these calculations.

S-C data

On the Series I S-C tests, a total of 3943 items (10.0% of items presented) were recorded as errors (involving mispronounciation, misidentification, misspelling or omission). 2579 were Reading and 1364 Copying mistakes. Taking all Ss together, test-retest correlations were highly statistically significant, with the exception of the Written Letters task (Table 18), although Table 19 shows this latter result to be due entirely to the performance of the Poor reading group. Generally, the difference between correlations for Oral and Written versions of each test is greater for the Poor than for the Good group, the very high Oral correlations for the Poor readers suggesting their errors to reflect fundamental competence on the task whereas more of the Good readers' errors were again probably due to carelessness whilst responding at much faster speeds.

Correlations between accuracy rankings on the different tests support the previous conclusion that Good readers show greater adaptability to the task with regard to this performance parameter. Poor readers, by contrast, showed a much greater invariability of speed, which resulted in some Ss failing to maintain accuracy on certain tests (Tables 41& 42). Overall inter-test correlations were again lowest between the Letters tests and others, this being particularly true for Written performance (Table 40). This may have been because copying techniques were more consistent for each individual in the Words, Pseudo-words and Prose tests, whereas he may have experimented with several techniques to improve speed or accuracy during the course of the Letters test. Most of the copying he does in school will, after all, be of words rather than letters in isolation, and his behaviour is likely to be more stable in the former type of situation, even if his approach mainly involves the copying of words letter-by-letter. Factors relating to the number of items on the stimulus card and the greater tendency for Ss to lose their place on the Letters test were probably also reflected in these results.

Table 17 shows the whole-item error totals recorded for each test. For all Ss together highest error scores were made on the Oral Pseudo-words test and lowest scores on the Written Words test. The prose test was the only one to return more Written than Oral errors, whilst it could be suggested that this was due to the assistance of contextual cues in reading, the result came rather from a comparative increase in Written errors and may instead reflect a detrimental influence of contextual information under timed conditions in encouraging over-zealous anticipatory behaviours. However, a Good-Poor breakdown of scores (Table 43) shows that on both the Words and Prose tests the Good readers achieved higher Oral than Written accuracy, and on these tests showed their greatest superiority over the Poor readers. Table 44 shows the highly significant correlations between performance accuracy and RA on all tests, the super-

iority of the Good group being significant on all tests with the exception of the Session 2 Written Letters test (Table 25).

Taking finally the Series II S-C data, a comparison of the Error totals with Time scores for the different Copying conditions showed that, whilst 'abnormal' conditions decreased performance speed, the provision of a dashed line improved accuracy by approximately 20%. Provision of a letter produced no such improvement and cancelled the dashed-line effect when the two features were presented together. However, there are certain group differences here . both gave their most accurate performance under the Dashed-line condition, but whereas the provision of a letter hindered the Good group it helped the Poor readers. The most likely explanation for this is that most if not all the Good readers were copying whole words, whilst many of the Poor readers copied letter-by-letter. Thus provision of a letter interrupted writing fluency for the former group but helped the latter to attend more carefully to the words, keep their place and avoid letter omission errors. On the Spelling task all three 'abnormal' conditions reduced the number of mistakes made, both types of clues assisting all Ss so that the provision of both together produced the greatest reduction in errors (approximately 20%) for both reading groups (Table 45). These figures also show that the Good readers reaped the most benefit from the additional information, taking the Line-only condition as a baseline. Combining conditions, it was also found that provision of a dashed line seemed to help the Good readers more than provision of a letter, whilst the two types of information were of approximately equal value to the Poor readers, indicating the former group were able to take special advantage of the type of clue that offered information about the whole word. Further breakdown of these results is undertaken in Chapter 7. Overall error rates for the S-C tests were as follows : Reading 14.8% (Good 3.6%, Poor 25.9%); Copying 9.2% (Good 6.9%, Poor 11.5%), Spelling 42.6% (Good 27.3%, Poor 57.8%). Performance accuracy on the Spelling tests was highly

correlated with RA, but that on the Copying tasks less so (Table 46). These findings are mirrored by the Mann-Whitney comparison of reading groups (Table 26) where for both Copying and Spelling tests the largest group difference was found on the 'normal' (Line-only) condition.

Table 37 shows that Error ranks for the experimental Reading test and the Spelling tests are very highly correlated with one another. Reading test accuracy is only significantly correlated with the Line-only Copying performance, and rankings for Copying and Spelling accuracy are generally non-significantly related. Compared to the correlations between the different Spelling tests, those between the various Copying conditions are low, pointing again to the more arbitrary nature of the commitment of Copying errors. For Series II as a whole it can be seen that accuracy of performance on the various S-F tests was not related to Copying accuracy but very clearly related to Reading and Spelling performance. A notable exception is the Written Unrestricted S-F task, performance on which was significantly related to both Copying and Spelling accuracy. Division of the sample into the two reading groups obscures most of these relationships with the exception of the strongest correlations existing between Reading and Spelling performance (Tables 38 & 39).

Summary

In conclusion, therefore, the main points arising from this section may be summarized as follows. Hypotheses 2 and 4 received overall support from the data, and on the whole Reading and Spelling tests, together with the Written S-F tasks, were of most use in showing up the reading group differences in accuracy. Knowledge on the part of Ss that they could perform the Copying test accurately undoubtedly raised performance speed, and at the much higher copying rate achieved by the Good readers this led to a certain degree of carelessness which lowered the group difference in

error scores - although this was also a function of the much higher accuracy achieved by both groups. S-C data from both Series suggest speed and accuracy to be rather more varying features of copying than of reading performance. This tendency for the Good readers to respond more strongly to the timed aspect of the task when maintenance of accuracy was easiest should, however, be kept distinct from the tendency of some Poor readers to disregard accuracy for the sake of speed of test completion, and it never led to the development of a negative speed-accuracy relationship for the Good group. S-F results suggested in various ways that the Good readers were more aware of the visual forms of words, as evidenced by their greater ability to produce structurally legal pseudo-words in Series I and to comply with the Length-restrictions in Series II, and their greater superiority on the S-C Words test than on the Pseudo-words test (Series I). Their greater ability to deal analytically and synthetically with the sound patterns of words was likewise demonstrated by their very low 'unidentifiable response' total on the Series I S-F Written Words test, their greater ability to produce pronounceable pseudo-words (32/35 unpronounceable items were generated by the Poor group), and their much greater accuracy on the Series II Letter-Restricted task.

6.4 THE RELATIONSHIP BETWEEN SPEED AND ACCURACY

The most crucial aspect of this analysis pertains to the relationship between speed and accuracy of performance that a subject maintained on each test. To a large extent, the speed at which S can tackle the test will be determined by his basic ability to perform the test - thus a positive relationship between the two features is postulated. However, it was also suspected that this relationship may break down for some Ss, due to the operation of one of two influences on behaviour (1) a general tendency to respond impulsively, or (2) a tendency to deliberately sacrifice accuracy for speed of completion and 'escape' from the test

situation - this may happen when S believes the task too difficult for him to perform accurately. Under certain conditions these two factors may be related, in that the latter type of uncertainty may lead S to adopt typical 'impulsive' strategies, such as unsupported use of the first letter of words as a recognition technique, however, certain other behaviours which may be considered idiosyncratic rather than characteristic of the responding of younger children may also be evoked under difficult circumstances.

S-F data

For the Series I S-F tests this relationship could only be ascertained for Written Words and Pseudo-words performance (Table 47). Good group correlations were similar and non-significant for both tests, whilst Poor group results showed a marked difference in performance on the two tasks. On the Words test it was indeed those who produced the most responses who were also the most accurate, the Poor readers' lower overall rate of responding presumably not leading to the carelessness precipitated by the Good readers. However, there was a statistically significant tendency on the Pseudo-words test for those producing the most responses also to produce the most unacceptable items. It cannot be stated with certainty when these Ss were aware that their responses were unacceptable. However, if one assumes some awareness of this fact, and observation of the children supported this assumption, it indicates that, unlike the positive adaptability of the Good readers, some of the poorer readers inappropriately modified their behaviour when faced with a task too difficult for them, forsaking accuracy for the sake of producing something on the response sheet. Table 48 gives a more detailed breakdown of the output scores showing the poorest members of the Poor reading group to have been the worst offenders, they achieved lowest accuracy levels whilst sometimes producing more responses than the better members of the group.

This tendency of some of the Poor readers to prefer to respond inaccurately than to fail to respond may be contrasted with the Series II S-F performance of the Good readers on the Oral Restricted tests. Many errors on these tests were of the 'non-response' type rather than incorrect as such, and formed a greater proportion of the Good readers' than of the Poor readers' error totals (Table 49), the difference between the groups being statistically significant on the Length-Restricted test (χ^2 =6.69, p < .01). Thus the Good readers preferred not to respond rather than respond incorrectly, and this is reflected in the high positive speed-accuracy correlations found for this group on the two tests (Table 50). This relationship for the Written restricted tests, for which the 'non-response' category did not apply, all failed to reach significance, although a positive correlation was found for the Unrestricted condition contrary to the non-significant result obtained on the same test in Series I (Table 47). It is possible that certain differences in response conditions for the two Series, with Ss working towards completion of the response sheet in Series II but not in Series I, may have resulted in qualitative differences responsible for this discrepancy. A slightly higher percentage of Series II responses, for example, had only one or two letters (8.5% . 6.1%).

S-C data

The S-C data were then examined to see if children performing quickest on these tests were also the most accurate. Calculations for the Series I sample as a whole showed all but one of these correlations (Written Letters) to be positive at a statistically significant level (Table 51). Regular inter-test differences emerged, with the Words task returning the highest speed-accuracy correlations. These differences may be due to the interplay of several factors : firstly, the near optimal performances of some Ss on the Words and Prose tests and the fact that Ss generally had much more idea on these tests whether or not their responses were correct. On

the other hand, Pseudo-word items were new to all Ss, who did not know their correct pronunciation, correcting errors was thus more time-consuming and many may have felt it not worth the sacrifice in speed to make an attempt at checking. Secondly, lower correlations for the Letters tests were probably due rather to Ss moving more rapidly from item to item, making correction less likely. Thirdly, the greater number of responses involved on the Letters tests may also have affected results, and the high proportion of omission errors on this test would have acted to reduce the positive nature of this relationship.

Separate analyses for the two reading groups supports the notion that a positive correlation between speed and accuracy is rather more a characteristic of successful than of unsuccessful readers. This is obviously enhanced by the fact that several Good readers usually managed to give a totally correct performance, so that loss of speed due to error correction was also eliminated. On the other hand, their high error correction rates (see Chapter 7) suggest they may have been giving more time than the Poor readers to response checking, although the lower correction success of the latter group need not necessarily mean devotion of less time to this activity. Oral tests were of greatest interest on this measure since it is assumed that error-free copying performance was at least a possibility for all Ss. Results did indeed suggest that on the Reading tests some of the Poor readers put speed before accuracy, and by going too fast emphatically increased their error scores. This is particularly highlighted by the Session 2 Oral Pseudo-words results, where a significant negative correlation emerged. Taken with the S-F Pseudo-word findings, one may suggest that under conditions of maximum insecurity - when they felt least able to give a 'good' performance in terms of accuracy - some of the Poor readers preferred to complete the task as quickly as possible rather than make what they may have felt to be embarrassingly laboured attempts to give correct responses. That the high negative correlation occured on the

second administration of the test supports this explanation, with Ss adopting this strategy in anticipation of the task being too difficult. That it was not merely the result of general misinterpretation of experimental instructions is indicated by the significant positive correlations achieved by the Good readers on this test and by the Poor group themselves on other tests. This move towards a negative speed-accuracy relationship under Pseudo-word conditions would therefore seem to represent some kind of regression in the face of a more than usually difficult task. Series II S-C results offer little further information (Table 52), having involved in the Copying tests the type of task least likely to provoke the use of these maladaptive strategies.

Summary

Hypothesis 7 received general support, although some distortion of Good readers' error rankings occured due to the low error totals recorded and led to some obscuring of the speed-accuracy relationships for this group. The Pseudo-word tests employed in Series I, which may be considered to have constituted the most difficult tasks presented, or at least those causing greatest uncertainty in Ss regarding ability to perform correctly, evoked responding from some of the Poor readers that involved a sacrifice of any attempt at accuracy for the sake of speedy test completion or the production of some kind of response on the results sheet provided. Observation of Ss performing these tests suggested that such action could develop either during performance of a task or, when the test situation had already been experienced, be adopted in anticipation of a failure to cope. This 'regression' under particularly difficult conditions would seem to represent a return to idiosyncratic strategies rather than to normal immature patterns of responding.

6.5 SUMMARY

All the hypotheses outlined for this section of the results analysis received statistical support from the data, with the exception of Hypothesis 5, for reasons given in 6.2

The Reading Ages of children used in the present study give a clear indication of the range of reading ability with which the Junior teacher is normally required to cope, and the experimental data show that those children of first year Junior age having superior reading ability have already developed an all-round superiority extending to copying, spelling to dictation and free writing performance. However, the main point to be raised in this summary concerns the question of motivational differences between the children, over and above any differences in what may be termed their 'genuine' verbal competence. It is not immediately obvious why there should have been such highly significant differences between the two reading groups in, for example, S-F Unrestricted output, where the Good readers commenced at, and maintained, faster response rates. Lower output on the Words tests may be related to a difficulty in dealing separately with the meanings of individual words, however, it seems implausible to explain their Letters test superiority entirely in terms of greater ability to deal with items in this rather abstract manner. Observation of the children during the experimental tasks indicated that all appeared concerned about their performance, and obvious inattention in the test situation was almost unknown. However, it is suggested that the nature of the motivation behind the performance of Good and Poor groups differed in certain respects and had a dissimilar influence on behaviour. Whereas the Good readers appeared to be motivated to achieve success, the performance of the Poor readers may better be described as controlled by a desire to avoid failure. As a result, the Good readers' aims in each test tended to relate more closely to adult ideas of what constitutes 'good' performance in terms of the balance between speed and accuracy, in contrast, the Poor

readers' strategies frequently appeared governed by rather different principles. On the Series I S-F Letters test these motivational differences may have been responsible in part for the lower rate of response standards set by the latter group, whilst the more highly disruptive influence of these strategies on certain other tests has been reported in the previous section. However, it must be assumed that these were, at the time of performance, considered preferable by Ss to perseverance with attempts at producing accurate responses. The variable influence of these tendencies on performance speed supports the idea that attempts not to fail rather than general impulsive inclinations constituted the major controlling force behind the Poor readers' behaviour. The tendency to perform too quickly to secure success in terms of response accuracy appeared to be greatest on what seem, subjectively at least, to have been the most difficult tests. As was suggested in Chapter Four, the slightly retarded reader may be particularly likely to be subjected in the classroom to a situation in which, rather than being given easy tasks and encouraged to do well, he is given too-difficult tasks and expected to do badly. The fact that these behaviours, learned in the social context of the classroom, should also be displayed in the 1:1 test situation suggests that they have become rather firmly established elements of the child's approach to formal verbal tasks. Thus whilst general intellectual ability differences between children cannot be overlooked, results suggest that some of the problems of the below average children seem to have developed at some point from peripheral factors rather than, or as well as, from factors related directly to verbal competence. Past circumstances in which greater emphasis was laid by the teacher, perhaps unintentionally, on speed rather than accuracy, or the experience of greater reinforcement from behaviour that brought release from the performance of a verbal task, is now effectively blocking further development of reading and writing skills in these children.

In conclusion, certain comments may be made concerning experimental procedure. The wide range of performances obtained from the children on the tests indicated their value in highlighting ability differences between individuals on various aspects of oral and written verbal performance. However, although children were taken from a fairly small chronological age range (as small as was possible without imposing additional selection criteria), the better individuals within each sample were sometimes able to return error-free performances on certain tests, and statistical analysis of the results was made more difficult. More extensive experimentation would therefore have been desirable in order to accentuate individual differences on performance accuracy measures. It would also have been useful to have devised some method for timing spelling performance, as the findings from other tests suggested that knowledge of the child's approach to this task in terms of his relative concern with speed and accuracy could have shed further light on the reasons for the failure of some children in written verbal situations.

Test	All Ss		Good		Poor	
	Session 1	Session 2	Session 1	Session 2	Session 1	Session 2
Oral Letters	1106	1203	686	742	420	461
Written Letters	753	860	449	504	304	356
Oral Words	1546	1503	852	873	694	630
Written Words	714	755	398	431	316	324
Written Pseudo-words	399		210		189	

TABLE 1. SERIES I S-F TESTS : OUTPUT TOTALS ON EACH TEST

Test	All Ss		Good	Poor
Oral Letters	.740**		.737**	.563*
Written Letters	.687**		.721**	.263
Oral Words	.501**		.857**	.699**
Written Words	.780**		.774**	.596**

*p < .01
**p < .005

TABLE 2. SERIES I S-F TESTS : TEST-RETEST CORRELATIONS FOR OUTPUT SCORES.

(All correlations given in these tables are positive unless otherwise indicated).

Test	All Ss		Good	Poor
Oral Letters	2.08		1.68	2.72
Written Letters	2.98		2.52	3.64
Oral Words	3.50		2.78	3.63
Written Words	6.54		5.79	7.50
Written Pseudo-words i	12.03		11.43	12.70
ii	17.27		13.33	24.49

i) All items
ii) Acceptable items only

TABLE 3. SERIES I S-F TESTS : AVERAGE TIME/ITEM (SECS), SESSIONS 1 AND 2 COMBINED.

Test	All Ss		Good	Poor
Oral Unrestricted	2,714.1		1,097.8	1,616.3
Oral Length-Restricted	14,265.7		6,424.6	7,841.1
Oral Letter-Restricted	13.410.4		6,038.0	7,372.4
Written Unrestricted	7,930.7		3,305.1	4,625.6
Written Length-Restricted	17,261.2		7,494.5	9,766.7
Written Letter-Restricted	13,304.4		6,491.5	6,812.9

TABLE 4. SERIES II S-F TESTS : TIME SCORE TOTALS (SECS) FOR EACH TEST.

Test	All Ss		Good	Poor
Oral Unrestricted	2.83		2.29	3.37
Oral Length-Restricted	14.86		13.38	16.34
Oral Letter-Restricted	13.97		12.58	15.36
Written Unrestricted	8.26		6.89	9.64
Written Length-Restricted	17.98		15.61	20.35
Written Letter-Restricted	13.86		13.53	14.20

TABLE 5. SERIES II S-F TESTS : AVERAGE TIME/ITEM (SECS) FOR EACH TEST.

Test	Correlation with RA Session1	Session2	Correlation with CA Session1	Session2
Oral Letters	.609**	.521**	.050	.016
Written Letters	.641**	.544**	.109	.020
Oral Words	.322*	.324*	.246	.035
Written Words	.473**	.560**	.063	.089
Written Pseudo-words i	.083		.096	
ii	.466**		-.076	

*p <.05
**p <.005

TABLE 6. SERIES I S-F TESTS : CORRELATION BETWEEN OUTPUT RANKS AND RA/CA (ALL SS).

Test	Correlation with RA	Correlation with CA
Oral Unrestricted	.313*	-.050
Oral Length-Restricted	.347*	.095
Oral Letter-Restricted	.220	.023
Written Unrestricted	.453**	-.032
Written Length-Restricted	.424**	-.076
Written Letter-Restricted	.082	-.164

*p < .05
**p < 005

TABLE 7. SERIES II S-F TESTS : CORRELATION BETWEEN TIME SCORE RANKS AND RA/CA. (ALL SS).

Test	Session 1	Session 2
Oral Letters	72 ***	75.5***
Written Letters	84 ***	92.5**
Oral Words	113.5**	124.5*
Written Words i	105 **	95.5**
ii	76 ***	67 ***
Written Pseudo-words i	181	
ii	95.5**	

*p < .025
**p < .01
***p < .001

i) All items
ii) Acceptable items only

TABLE 8. SERIES I S-F TESTS : MANN-WHITNEY SCORES FOR DIFFERENCES BETWEEN GOOD AND POOR READING GROUPS (OUTPUT SCORES).

Test	Speed	Accuracy
Oral Unrestricted	138*	-
Oral Length-Restricted	127**	47***
Oral Letter-Restricted	136*	101**
Written Unrestricted	119**	101**
Written Length-Restricted	104**	80***
Written Letter-Restricted	197	73***

*p < .05
**p < .025
***p < .001

TABLE 9. SERIES II S-F TESTS : MANN-WHITNEY SCORES FOR DIFFERENCES BETWEEN GOOD AND POOR READING GROUPS (TIME AND ERROR SCORES).

	Wr.Letters	O.Words	Wr.Words	Wr.Pseudo-words
Oral Letters	.673 *** (.723)***	.437 ** (.656)***	.539 *** (.581)***	.457 ***
Written Letters		.358 * (.369)*	.625 *** (.761)***	.513 ***
Oral Words			.364 * (.471)***	.475 ***
Written Words				.717 ***

*p < .025
**p < .01
***p < .005
(Session 2 figures in parenthesis)

TABLE 10. SERIES I S-F TESTS : CORRELATIONS BETWEEN OUTPUT RANKS (ALL SS).

	Wr.Letters	O.Words	Wr.Words	Wr.Pseudo-words
Oral Letters	.570 ** (.632)***	.584 ** (.838)***	.261 (.340)	.276
Written Letters		.325 (.390)*	.660 *** (.713)***	.556 **
Oral Words			.167 (.134)	.443 *
Written Words				.670 ***

*p < .05
**p < .025
***p < .005

TABLE 11. SERIES I S-F TESTS : CORRELATIONS BETWEEN OUTPUT RANKS (GOOD READERS).

	Wr. Letters	O. Words	Wr. Words	Wr. Pseudo-words
Oral Letters	.347 (.468)**	.053 (.248)	.505 ** (.473)**	.222
Written Letters		-.093 (- 009)	.484 ** (.672)***	.098
Oral Words			.317 (.361)	.325
Written Words				.521 **

*p < .05
**p < .025
***p < .005

TABLE 12. SERIES I S-F TESTS : CORRELATIONS BETWEEN OUTPUT RANKS (POOR READERS).

Test	Time Scores	Error Scores
Oral Letters	.878	.879
Written Letters	.506	.281*
Oral Words	.947	.934
Written Words	.739	.720
Oral Pseudo-words	.918	.923
Written Pseudo-words	.836	.631

*ns (All others p < .0005)

TABLE 18. SERIES I S-C TESTS : TEST-RETEST CORRELATIONS (ALL SS).

	O. S-F Length-R.	O. S-F Letter-R.	Wr. S-F Unrestr.	Wr. S-F Length-R.	Wr. S-F Letter-R.	Reading S-C	Copying (L)	Copying (D)	Copying (L+L)	Copying (D+L)
Oral S-F Unrestr.	.196	.158	.289	.316*	.091	.398*	.343*	.248	.154	.233
Oral S-F Length-R.		.135	.130	.353*	.229	.443**	.283	.299	.283	.326*
Oral S-F Letter-R.			.142	.126	.540***	.138	.127	.239	.232	.300*
Written S-F Unrestr.				.374*	.301*	.460***	.450***	.561***	.559***	.526***
Written S-F Length-R.					.375*	.480***	.289	.388*	.325*	.387*
Written S-F Letter-R.						.074	.126	.342*	.192	.203
Reading S-C							.676***	.619***	.616***	.590***
Copying (L)								.834***	.755***	.735***
Copying (D)									.858***	.840***
Copying (L+L)										.880***

*p < .05, **p < .01, ***p < .005

TABLE 13. SERIES II S-F AND S-C TESTS : CORRELATIONS BETWEEN TIME SCORE RANKS (ALL SS).

	O. S-F Length-R.	O. S-F Letter-R.	Wr. S-F Unrestr.	Wr. S-F Length-R.	Wr. S-F Letter-R.	Reading S-C	Copying (L)	Copying (D)	Copying (L+L)	Copying (D+L)
Oral S-F Unrestr.	.152	-.245	.456*	.304	-.101	.203	.326	.069	-.132	-.046
Oral S-F Length-R.		.230	-.104	-.107	.239	.310	-.042	-.008	-.015	.057
Oral S-F Letter-R.			-.062	.093	.626***	-.227	.033	.245	-.027	.314
Written S-F Unrestr.				.026	.041	.056	.074	.370	.323	.111
Written S-F Length-R.					.227	.156	-.014	.050	-.051	.137
Written S-F Letter-R.						-.235	-.048	.331	-.047	.149
Reading S-C							.310	.092	.275	.065
Copying (L)								.580**	.433*	.459*
Copying (D)									.768***	.803***
Copying (L+L)										.806***

*p <.05, **p <.01, ***p <.005.

TABLE 14. SERIES II S-F AND S-C TESTS : CORRELATIONS BETWEEN TIME SCORE RANKS (GOOD READERS).

	O.S-F Length-R.	O.S-F Letter-R.	Wr.S-F Unrestr.	Wr.S-F Length-R.	Wr.S-F Letter-R.	Reading S-C	Copying (L)	Copying (D)	Copying (L+L)	Copying (D+L)
Oral S-F Unrestr.	.236	.400*	.221	.310	.241	.355	.340	.270	.246	.170
Oral S-F Length-R.		-.173	.229	.414*	.227	.358	.332	.171	.261	-.110
Oral S-F Letter-R.			.185	.146	.463*	.209	.048	.122	.169	.270
Written S-F Unrestr.				.516*	.508*	.615***	.635***	.546**	.677***	.443*
Written S-F Length-R.					.653***	.418*	.346	.392*	.348	.349
Written S-F Letter-R.						.392*	.314	.384*	.341	.212
Reading S-C							.726***	.652***	.600***	.269
Copying (L)								.894***	.892***	.362
Copying (D)									.812***	.319
Copying (L+L)										.497*

*p < .05, **p < .01, ***p < .005.

TABLE 15. SERIES II S-F AND S-C TESTS : CORRELATION BETWEEN TIME SCORE RANKS (POOR READERS).

Test	Time Periods							
	Good				Poor			
	1	2	3	4	1	2	3	4
Oral Letters	35.7	22.6	21.2	20.5	38.8	24.9	18.7	17.6
Oral Words	33.3	25.3	21.8	19.5	32.0	24.9	22.2	20.9

TABLE 16. SERIES I S-F TESTS : PERCENTAGE OF RESPONSES GIVEN IN EACH TIME SUB-PERIOD, GOOD AND POOR READING GROUPS COMPARED.

Test	Time Scores (secs)		Error Scores		Errors Corrected		Whole-item Omissions		Whole-item Insertions	
	Session1	Session2	Session1	Session2	Session1	Session2	Session1	Session2	Session1	Session2
O.Letters	5,509.8	4,659.8	350	322	54	64	35	39	9	8
Wr.Letters	15,950.5	14,937.7	181	106	43	42	106	87	79	102
O.Words	3,032.7	2,480.7	282	282	17	16	3	8	1	0
Wr.Words	11,576.0	11,310.4	134	157	56	81	28	17	3	1
O.Pseudo-words	4,485.2	3,699.2	516	543	21	18	0	1	0	0
Wr.Pseudo-words	12,326.7	12,347.6	169	164	78	100	40	5	3	0
O.Prose	4,734.3		284		30		42		20	
Wr.Prose	26,593.6		377		150		106		9	

TABLE 17. SERIES I S-C TESTS : SESSION 1 AND SESSION 2 TOTALS FOR SOME MAJOR RESPONSE MEASURES (ALL SS).

Test	Time Scores		Error Scores	
	Good	Poor	Good	Poor
Oral Letters	.791**	.837**	.668**	.831**
Written Letters	.493*	.494*	.455*	.156
Oral Words	.906**	.700**	.706**	.873**
Written Words	.556*	.675**	.726**	.629**
Oral Pseudo-words	.927**	.583*	.770**	.885**
Written Pseudo-words	.904**	.662**	.594**	.564*

*p < .025
**p < .005

TABLE 19. SERIES I S-C TESTS : TEST-RETEST CORRELATIONS (GOOD AND POOR READERS).

Test	Time (secs)	
	Good	Poor
Oral Letters	112.0	140.9
Written Letters	168.1	205.4
Oral Words	31.7	111.7
Written Words	225.4	346.8
Oral Pseudo-words	64.7	147.3
Written Pseudo-words	256.5	360.4
Oral Prose	42.4	204.6
Written Prose	552.4	818.2

TABLE 20. SERIES I S-C TESTS : AVERAGE PERFORMANCE TIMES (SECS) FOR GOOD AND POOR READERS.

Test	All Ss	Good	Poor
Reading	5,959.6	1,781.6	4,178.0
Copying: L*	8,406.3	3,655.7	4,750.6
D	9,100.1	3,966.0	5,134.1
L+L	9,375.6	4,144.5	5,231.1
D+L	8,574.2	3,731.1	4,843.1
Total	35,456.2	15,497.3	19,958.9

*L: Line only
D: Dashed line
L+L: Line + Letter
D+L: Dashed line + Letter

TABLE 21. SERIES II S-C TESTS : TIME SCORE TOTALS (SECS).

Test	Good	Poor
Reading	0.82	1.93
Copying: L	6.77	8 80
D	7.34	9.51
L+L	7.68	9.69
D+L	6.91	8.97
Total	7.17	9.24

TABLE 22. SERIES II S-C TESTS : AVERAGE TIMES/ITEM (SECS), GOOD AND POOR READERS COMPARED.

Test	Correlation with RA Session1	Session2	Correlation with CA Session1	Session2
Oral Letters	.709**	.653**	.049	.141
Written Letters	.302*	.402*	-.209	.007
Oral Words	.890**	.916**	-.060	-.091
Written Words	.594**	.714**	-.041	.001
Oral Pseudo-words	.815**	.814**	-.013	-.035
Written Pseudo-words	.674**	.686**	.101	.052
Oral Prose	.913**		-.033	
Written Prose	.731**		.057	

*p <.05
**p <.005

TABLE 23. SERIES I S-C TESTS : CORRELATION BETWEEN TIME SCORE RANKS AND RA/CA (ALL SS).

Test	Correlation with RA	Correlation with CA
Reading	.704*	- 039
Copying: L	.575*	.187
D	.634*	.162
L+L	.552*	.036
D+I	.651*	.089

*p <.0005

TABLE 24. SERIES II S-C TESTS : CORRELATIONS BETWEEN TIME SCORE RANKS AND RA/CA (ALL SS).

Test	Speed Session 1	Speed Session 2	Accuracy Session 1	Accuracy Session 2
Oral Letters	76 ***	85 ***	59 ***	68 ***
Written Letters	166.5	134 *	121.5*	164
Oral Words	6 ***	9 ***	9.5***	5.5***
Written Words	116 *	68 ***	109.5**	85.5***
Oral Pseudo-words	31 ***	29 ***	42 ***	54.5***
Written Pseudo-words	114 **	86 ***	111.5**	129.5*
Oral Prose	4 ***		13.5***	
Written Prose	106 **		57 ***	

*p < .05
**p < .01
***p < .001

TABLE 25. SERIES I S-C TESTS : MANN-WHITNEY DIFFERENCES BETWEEN GOOD AND POOR READING GROUPS (TIME AND ERROR SCORES).

Test	Speed	Accuracy
Reading	56 **	7 **
Copying: L	93 **	104 **
D	85 **	118 *
L+L	103 **	172
D+L	68 **	119 *
Spelling: L		13.5**
D		23.5**
L+L		26 **
D+L		21.5**

*p < .025
**p < .001

TABLE 26. SERIES II S-C TESTS : MANN-WHITNEY DIFFERENCES BETWEEN GOOD AND POOR READING GROUPS (TIME AND ERROR SCORES).

	Wr.Letters	O.Words	Wr.Words	O.P-words	Wr.P-words	O.Prose	Wr.Prose
O.Letters	.378 * (.396)*	.761 (.686)		.645 (.622)		.727	
Wr.Letters			.596 (.600)				.648
O.Words			.632 (.766)	.876 (.897)		.938	
Wr.Words					.748 (.867)		.761
O.P-words					.654 (.638)	.886	
Wr.P-words							.861
O.Prose							.713

All conditions $p < .0005$
except $^*p < .025$

(Session 2 figures in parenthesis)

TABLE 27. SERIES I S-C TESTS : CORRELATIONS BETWEEN TIME SCORE RANKS (ALL SS).

	Wr.Letters	O.Words	Wr.Words	O.P-words	Wr.P-words	O.Prose	Wr.Prose
O.Letters	.503 * (.491)*	.461 * (.617)***		.364 (.290)		.517 *	
Wr.Letters			.468 * (.356)		.746 *** (.632)***		.474 *
O.Words			.434 * (.629)***	.617 *** (.690)***		.700***	
Wr.Words					.669 *** (.704)***		.559 **
O.P-words					.233 (.328)	.637 ***	
Wr.P-words							.797 ***
O.Prose							.552 **

*p < .05, **p < .01, ***p < .005.

TABLE 28. SERIES I S-C TESTS : CORRELATIONS BETWEEN TIME RANKS (GOOD READERS).

	Wr.Letters	O.Words	Wr.Words	O.P-words	Wr.P-words	O.Prose	Wr.Prose
O.Letters	.183 (.086)	.944 *** (.651)***		.550 ** (.598)***		.780 ***	
Wr.Letters			.716 *** (.696)***		.796 *** (.653)***		.759 ***
O.Words			.388 (.705)***	.661 *** (.824)***		.826 ***	
Wr.Words					.618 *** (.874)***		.742 ***
O.P-words					.495 * (.642)***	.780 ***	
Wr.P-words							.800 ***
O.Prose							.545 **

*p < .025, **p < .01, ***p < .005.

TABLE 29. SERIES I S-C TESTS : CORRELATIONS BETWEEN TIME RANKS (POOR READERS).

Test	All Ss		Good		Poor	
	Session1	Session2	Session1	Session2	Session1	Session2
Oral Letters	.659***	.658***	.525*	.585**	.344	.343
Written Letters	.422**	.422**	.474*	.581**	.373	.168
Oral Words	.414**	.465***	.134	.261	.366	.268
Written Words	.583***	.789***	.420*	.715***	.572**	.577**
Written Pseudo-words i	.308*		.416*		.185	
ii	.607***		.488*		.316	

*p < .05
**p < .01
***p < .005

i) All S-F items
ii) Accepteble S-F items only

TABLE 30. SERIES I S-F AND S-C TESTS : COMPARISON OF TIME SCORE RANKS ON CORRESPONDING TESTS.

	No. items		Overall
	Session1	Session2	
Good	3	-	3
Poor	6	5	11

TABLE 31. SERIES I S-F TESTS : NUMBER OF NON-LETTER RESPONSES MADE ON ORAL LETTERS TEST, GOOD AND POOR READING GROUPS COMPARED.

	No.items Session1	Session2	Overall
Good	10	5	15
Poor	5	9	14

TABLE 32. SERIES I S-F TESTS : NUMBER OF NON-WORD RESPONSES MADE ON ORAL WORDS TEST, GOOD AND POOR READING GROUPS COMPARED.

	Good	Poor
Misspellings	61	124
Unidentifiable responses	6	38
Total errors	67	162
% errors corrected	28.4	14.8

TABLE 33. SERIES I S-F TESTS : TYPES OF ERROR ON WRITTEN WORDS TEST, (SESSIONS 1 AND 2 COMBINED).

	All Ss	Good	Poor
Using ranks of error scores	.316*	-.319	.485**
Using ranks of error scores as % total items produced	.403***	-.259	.222

*p < .05
**p < .025
***p < .01

TABLE 34. SERIES I S-F TESTS : CORRELATION BETWEEN ERROR RANKS ON WRITTEN WORDS AND PSEUDO-WORDS TESTS.

Test	All Ss	Good	Poor
Oral Unrestricted	-	-	-
Oral Length-Restricted	231	62	169
Oral Letter-Restricted	198	77	121
Written Unrestricted	113	34	79
Written Length-Restricted	205	65	140
Written Letter-Restricted	198	66	132

TABLE 35. SERIES II S-F TESTS : ERROR SCORE TOTALS.

Test	Correlation with RA	Correlation with CA
Oral Length-Restricted	.737***	.122
Oral Letter-Restricted	.410**	.230
Written Unrestricted	.395*	.147
Written Length-Restricted	.530***	.070
Written Letter-Restricted	.638***	.114

*p < .05
**p < .01
***p < .005

TABLE 36. SERIES II S-F TESTS : CORRELATION BETWEEN ERROR RANKS AND RA/CA (ALL SS).

	O.S-F Letter-R.	Wr.S-F Unrestr.	Wr.S-F Length-R.	Wr.S-F Letter-R.	Reading S-C	Copying (L)	Copying (D)	Copying (L+L)	Copying (D+L)	Spelling (L)	Spelling (D)	Spelling (L+L)	Spelling (D+L)
Oral S-F Length-R.	.456***	.356*	.587***	.595***	.692***	.211	.319*	.030	.249	.752***	.712***	.723***	.719***
Oral S-F Letter-R.		.146	.370*	.558***	.431**	.062	.162	-.214	-.049	.420**	.345*	.406**	.356*
Written S-F Unrestr.			.559***	.367*	.490***	.376*	.400**	.354*	.431**	.532***	.428**	.443**	.528***
Written S-F Length-R.				.450***	.565***	.167	.273	.097	.265	.569***	.564***	.613***	.667***
Written S-F Letter-R.					.618***	.214	.427**	.154	.171	.570***	.560***	.629***	.570***
Reading S-C						.369*	.216	.180	.257	.912***	.869***	.857***	.854***
Copying (L)							.294	.509***	.247	.254	.348*	.257	.297
Copying (D)								.286	.464***	.243	.248	.292	.366*
Copying (L+L)									.439**	.125	.243	.129	.074
Copying (D+L)										.246	.233	.230	.216
Spelling (L)											.884***	.907***	.861***
Spelling (D)												.897***	.835***
Spelling (L+L)													.889***

*p < .05, **p < .01, ***p < .005.

TABLE 37. SERIES II S-F AND S-C TESTS : CORRELATIONS BETWEEN ERROR SCORE RANKS (ALL SS).

	O.S-F Letter-R.	Wr.S-F Unrestr.	Wr.S-F Length-R.	Wr.S-F Letter-R.	Reading S-C	Copying (L)	Copying (D)	Copying (L+L)	Copying (D+L)	Spelling (L)	Spelling (D)	Spelling (L+L)	Spelling (D+L)
Oral S-F Length-R.	.067	.063	.328	.100	.364	-.021	-.029	.041	-.061	.538**	.394*	.456*	.585**
Oral S-F Letter-R.		.232	.261	.320	.132	.010	.262	-.215	-.089	.164	-.038	-.042	.117
Written S-F Unrestr.			.500*	.139	.402*	.277	.168	.001	-.081	.410*	.285	.348	.531*
Written S-F Length-R.				.064	.411*	.079	-.127	-.043	-.127	.618***	.416*	.486*	.655***
Written S-F Letter-R.					.365	.164	.337	.368	.013	.255	.271	.385*	.164
Reading S-C						-.076	-.090	.116	-.258	.781***	.573**	.736***	.643***
Copying (L)							.231	.569**	.135	-.286	-.064	-.040	.000
Copying (D)								.263	.559**	-.221	-.129	-.089	-.012
Copying (L+L)									.508*	-.135	.192	.218	-.067
Copying (D+L)										-.376	-.202	-.139	-.265
Spelling (L)											.709***	.816***	.745***
Spelling (D)												.822***	.520*
Spelling (L+L)													.690***

*p < .05, **p < .01, ***p < .005.

TABLE 38. SERIES II S-F AND S-C TESTS : CORRELATIONS BETWEEN ERROR SCORE RANKS (GOOD READERS).

	O.S-F Letter-R.	Wr.S-F Unrestr.	Wr.S-F Length-R.	Wr.S-F Letter-R.	Reading S-C	Copying (L)	Copying (D)	Copying (L+L)	Copying (D+L)	Spelling (L)	Spelling (D)	Spelling (L+L)	Spelling (D+L)
Oral S-F Length-R.	.576**	.183	.523*	.699***	.359	-.169	.184	-.164	.187	.320	.337	.350	.307
Oral S-F Letter-R.		-.209	.115	.430*	.091	-.356	-.226	-.391*	-.345	.048	.141	.171	-.160
Written S-F Unrestr.			.459*	.227	.137	.265	.234	.582**	.706***	.347	.075	.140	.178
Written S-F Length-R.				.487*	.208	-.024	.288	.135	.368	.127	.191	.368	.434*
Written S-F Letter-R.					.443*	-.140	.056	-.004	.074	.297	.241	.392*	.315
Reading S-C						.092	-.456*	.074	.097	.716***	.728***	.610***	.506*
Copying (L)							.158	.461*	.209	-.036	.245	-.083	-.037
Copying (D)								.241	.151	-.199	-.239	-.171	.154
Copying (L+L)									.316	.112	.248	-.080	-.053
Copying (D+L)										.275	.003	.100	.121
Spelling (L)											.626***	.709***	.508*
Spelling (D)												.644***	.544**
Spelling (L+L)													.649***

*p <.05, **p <.01, ***p <.005.

TABLE 39. SERIES II S-F AND S-C TESTS : CORRELATIONS BETWEEN ERROR SCORE RANKS (POOR READERS).

	Wr.Letters	O.Words	Wr.Words	O.P-words	Wr.P-words	O.Prose	Wr.Prose
O.Letters	.272 (.275)	.798 *** (.753)***		.805 *** (.754)***		.739 ***	
Wr.Letters			.446 ** (.321)*		.261 (.250)		.440 **
O.Words			.569 *** (.670)***	.814 *** (.816)***		.879 ***	
Wr.Words					.662 *** (.571)***		.580 ***
O.P-words					.511 *** (.308)*	.765 ***	
Wr.P-words							.598 ***
O.Prose							.486 ***

*p < .05
**p < .01
***p < .005

(Session 2 figures in parenthesis)

TABLE 40. SERIES I S-C TESTS : CORRELATIONS BETWEEN ERROR SCORE RANKS (ALL SS).

	Wr.Letter	O.Words	Wr.Words	O.P-words	Wr.P-words	O.Prose	Wr.Prose
O.Letters	-.071 (.294)	.795 *** (.597)***		.739 *** (.602)***		.431 *	
Wr.Letters			.358 (.385)*		.622 *** (.369)		.602 ***
O.Words			.492 * (.462)*	.590 ** (.830)***		.315	
Wr.Words					.702 *** (.686)***		.623 ***
O.P-words					.363 (.409)*	.315	
Wr.P-words							.670 ***
O.Prose							.109

*p <.05, **p <.01, ***p <.005

TABLE 41. SERIES I S-C TESTS : CORRELATIONS BETWEEN ERROR RANKS (GOOD READERS).

	Wr.Letters	O.Words	Wr.Words	O.P-words	Wr.P-words	O.Prose	Wr.Prose
O.Letters	.136 (.268)	.557 ** (.695)***		.643 *** (.616)***		.578 **	
Wr.Letters			.335 (.178)		-.202 (.084)		.171
O.Words			.436 * (.665)***	.492 * (.574)**		.818 ***	
Wr.Words					.492 * (.316)		.409 *
O.P-words					.253 (-.049)	.442 *	
Wr.P-words							.452 *
O.Prose							.397 *

*p <.05, **p <.01, ***p<.005

TABLE 42. SERIES I S-C TESTS : CORRELATIONS BETWEEN ERROR RANKS (POOR READERS).

Test	No.errors Good	Poor
Oral Letters	208(56)	464(62)
Written Letters	129(44)	234(41)
Oral Words	64(12)	500(21)
Written Words	83(59)	208(78)
Oral Pseudo-words	302(23)	757(16)
Written Pseudo-words	121(71)	212(107)
Oral Prose	43(7)	241(23)
Written Prose	117(66)	260(84)

(Figures in parenthesis give no. errors corrected)

TABLE 43. SERIES I S-C TESTS : WHOLE-ITEM ERRORS.

Test	Correlation with RA Session1	Session2	Correlation with CA Session1	Session2
Oral Letters	.769**	.733**	-.121	.012
Written Letters	.451	.286	.014	-.135
Oral Words	.919**	.938**	-.177	-.173
Written Words	.546**	.660**	-.099	-.104
Oral Pseudo-words	.812**	.797**	-.263	-.261
Written Pseudo-words	.548**	325*	.064	-.253
Oral Prose	.911**		-.071	
Written Prose	.482**		.037	

*p < .05
**p < .005

TABLE 44. SERIES I S-C TESTS : CORRELATION BETWEEN ERROR RANKS AND RA/CA (ALL SS).

Test	No.errors Good	Poor
Reading	78(25)	562(48)
Copying: L	34(23)	71(44)
D	30(21)	54(43)
L+L	45(27)	60(34)
D+L	39(34)	63(42)
Spelling: L	172(28)	334(13)
D	138(20)	311(17)
L+L	154(15)	315(14)
D+L	126(23)	289(13)

(Figures in parenthesis give no. errors corrected)

TABLE 45. SERIES II S-C TESTS : WHOLE-ITEM ERRORS.

Test	Correlation with RA	Correlation with CA
Reading	.901***	.185
Copying: L	.387**	.256
D	.303*	.006
L+L	.128	-.056
D+L	.329*	.145
Spelling: L	.851***	.193
D	.828***	.280
L+L	.882***	.163
D+L	.850***	.196

*p < .05
**p < .025
***p < .0005

TABLE 46. SERIES II S-C TESTS : CORRELATION BETWEEN ERROR RANKS AND RA/CA (ALL Ss).

Test	All Ss	Good	Poor
Written Words	.045	-.239	.871**
Written Pseudo-words	-.287	-.284	-.477*

*p < .05
**p < .001

TABLE 47. SERIES I S-F TESTS : CORRELATION BETWEEN SPEED AND ACCURACY RANKS.*

*Raw scores are given in Appendix I

Test	31-40	21-30	11-20	1-10
Oral Letters	395	486	640	785
Written Letters	308	352	401	552
Oral Words	681	643	848	877
Written Words i	290	350	360	469
ii	204	274	324	438
% correct	70.3	78.3	90.0	93.4
Written Pseudo-words i	98	91	96	114
ii	41	57	82	98
% correct	41.8	62.6	85.4	86.0

i) All items
ii) Correct items only

TABLE 48. SERIES I S-F TESTS : COMPARISON OF OUTPUT OF FOUR READING SUB-GROUPS (SESSIONS 1 AND 2 COMBINED).

Test	Good	Poor
Length-Restricted:		
3-letter	25.0	29.0
4-letter	17.7	12.8
5-letter	52.6	26.7
Total*	39.7	23.2
Letter-Restricted:		
1st letter given	7.7	0.0
Last letter given	64.1	56.6
Total	54.6	49.6

* Difference between the groups: Length-Restricted $\chi^2 = 6.69$, $p < .01$
Letter-Restricted $\chi^2 = 1.06$, NS.

TABLE 49. SERIES II S-F TESTS : PERCENTAGE OF ORAL TEST ERRORS THAT WERE NON-RESPONSES.

Test	All Ss	Good	Poor
Oral Length-Restricted	.432*	.680**	-.093
Oral Letter-Restricted	.653**	.742**	.567*
Written Unrestricted	.418*	.239	.321
Written Length-Restricted	.089	-.064	-.176
Written Letter-Restricted	.183	.138	.258

*p < .02
**p < .001

TABLE 50. SERIES II S-F TESTS : CORRELATION BETWEEN TIME AND ERROR RANKS.

Test	All Ss		Good		Poor	
	Session1	Session2	Session1	Session2	Session1	Session2
Oral Letters	.560***	.460***	.500*	.398	.185	.196
Written Letters	.236	.332	.419	.233	.019	.429
Oral Words	.875***	.869***	.624***	.730***	.573**	.315
Written Words	.549***	.652***	.194	.330	.693***	.603***
Oral Pseudo-words	.623***	.525***	.539*	.453*	.080	-.454*
Written Pseudo-words	.401**	.392*	.456*	.511*	.091	.242
Oral Prose	.864***		.445		.586**	
Written Prose	.474***		.329		.382	

*p < .05
**p < .02
***p < .01

TABLE 51. SERIES I S-C TESTS : CORRELATION BETWEEN TIME AND ERROR RANKS.

Test	All Ss	Good	Poor
Reading	.702**	.432	.458*
Copying: L	.205	.186	-.136
D	.266	-.007	-.084
L+L	.089	.138	-.031
D+L	.188	.210	-.042

*p < .05
**p < .001

TABLE 52. SERIES II S-C TESTS : CORRELATION BETWEEN TIME AND ERROR RANKS.

CHAPTER SEVEN

QUALITATIVE DIFFERENCES BETWEEN SUBJECTS, MATERIALS AND CONDITIONS

7.1 INTRODUCTION

The second section of the results analysis is concerned with further examination of certain aspects of S-F and S-C performance, as they relate to differences in the children and the materials used. Sections 7.2 and 7.3 examine qualitative features of the S-F output of different children and, where appropriate, the types of error made. Section 7.4 is concerned with the difficulties still experienced by Ss with certain individual letters and the effect on these identification problems of the provision of contextual information. Sections 7.5 and 7.6 respectively look at error and error-correction rates, with regard to the nature of the verbal items involved, their length, and their presentation conditions. Observations of Ss made during performance of the tests are reported in Section 7.7. Finally, Section 7.8 examines any apparent sex differences in test performance. The chapter concludes with a summary of these various findings, relating them to the hypotheses stated in Chapter Five and to each other, in an attempt to provide a more global picture of the child's behaviour in the test situations.

7.2 ANALYSIS OF UNRESTRICTED S-F PERFORMANCE (SERIES I)

Output totals on Series I S-F tests given in Chapter Six showed that, on all but the Written Pseudo-words test, the Good reading group produced significantly more responses than the Poor reading group. The present section looks at three additional aspects of Ss' responses on these tests : item length, syllabic structure and frequency, to investigate qualitative performance differences between the reading groups.

Item Length

Table 53 shows the number of Words and Pseudo-words produced at each item length by the two groups, and Table 54 the percentage of total output at each length These figures show that the Good readers tended to produce a higher proportion of long words than did the Poor readers, on the Written Words test it can be seen that a word 3-letters in length was the most common response of the Poor readers, whereas the greatest number of Good readers' responses fell in the 4-letter category. However, there is a slight reversal of this trend for Pseudo-word output. Table 55 presents the collapsed results for statistical analysis, with items placed in one of two length groups 1-5 letters in length, or 6 or more letters in length (for Pseudo-words, categories of 1-4 and 5-8 were used). Mann-Whitney U-scores show that whilst the difference in Words test output between the groups was less under Written than under Oral response conditions, the difference in terms of length of item produced was greater for the former, although just failing to reach an acceptable level of significance Both groups tended to give longer words under Oral conditions, and because relative difficulty of production does not increase with length under these conditions, there was less difference between the groups Group differences were also non-significant for the Written Pseudo-words test.

Syllabic structure

Comparing the proportions of mono- and poly-syllabic words produced by the two groups (a feature obviously closely connected to item length), parallel differences were found (Table 56). However, none of the group comparisons yielded statistically significant results On the Written Words test the Good readers produced a significantly higher proportion of polysyllabic words than Poor readers. Under Oral response conditions, however, Poor readers produced a marginally higher proportion of such words, although the Good group did produce the majority of words having four or more syllables On the Written Pseudo-words test no response with more than two syllables was produced, and although the Good Ss produced a significantly

greater proportion of these when all responses were included, there was no group difference when only acceptable items were considered

Frequency of S-F Word responses

It was hypothesized that words with low frequency of occurrence in the language might be more common in the spontaneous output of Good than of Poor readers Table 57 gives the group totals for words with a Thorndike-Lorge General count of less than 25 per million. The hypothesis received statistical support under Written conditions, the slightly greater group differences on these tests concurring with results from the other analyses reported above.

T-L frequencies had also been used for assessment of acceptable Pseudo-word items Real words given on the test which had a General count of less than 15 per million were considered acceptable. Most words accepted were in fact much rarer than this, and were all judged to be unknown to Ss as real words (examples are dib, shag, sot, teg). Overall, a slightly higher percentage of the Poor readers' responses on this test were real words (25.9% 18.1%) whilst a much higher proportion of words given by the Good readers fell into the acceptable category (χ^2 = 20 61, $p < .001$)

Summary

The reasons for these findings might be several firstly the Good readers' knowledge of words of greater structural complexity and lower frequency of occurrence, secondly their greater ability to bring such words to mind in the test situation, and thirdly their greater willingness to utter such words or commit them to paper. The fact that group differences were more prominent under Written conditions suggests that the Poor readers may often have thought of much the same words and the Good readers but decided against writing them down. Time wasted on such decisions may also be partly responsible for their lower output. However, one may expect this hypothesis to apply to a greater extent to the better members of the

Poor reading group, and this is supported by the Table 48 figures discussed in Chapter 6. For these children the results seem to support the view quoted in the literature review that children who are falling behind begin to try and cover up their inadequacies by being less adventurous in their written work.

7.3 ANALYSIS OF RESTRICTED S-F PERFORMANCE (SERIES II)

Results discussed so far have indicated quantitative and qualitative differences between children in spontaneous test output. The present section considers in more detail the responses given on the Restricted S-F tests, indicating some of the ways in which Good readers achieve their overall superiority.

Distribution of errors

Taking first the Length-Restricted tests, Table 59 shows the number of incorrect responses recorded at each length by the two reading groups. As would be expected, longer items resulted in a higher number of incorrect responses, the overall percentage of Oral responses that were errors being 12.2%, 20.0% and 40.0% for 3-letter, 4-letter and 5-letter items respectively. Corresponding figures for the Written test were 9.1%, 18.4% and 36.6%. Thus whilst the types of error made were different under Oral and Written conditions, the tests show an almost identical progression of difficulty with increasing length, although the Written error rates were slightly lower. Of those responses that were incorrect rather than non-response errors on the Oral test, only 1 of 37 mistakes made by the Good readers (2.7%) was more than one letter in length away from the correct length, whilst 26 of the 128 such errors made by Poor readers (20.3%) were inaccurate by two or more letters. 20 of 24 (83.3%) unidentifiable responses produced on the Written task were given by the Poor readers, the group difference being statistically significant ($\chi^2 = 10.93$, $p < .001$).

Table 60 gives the error figures for the Oral Letter-Restricted task. Ss generally had little difficulty in giving words to comply with E's designation of the first letter : only 5.6% of responses were incorrect, and only on one occasion did an S fail to produce a response. No S committed more than three errors on this part of the task, and 21 Ss made no mistakes. However, responding to designation of the last letter proved more difficult, only 2 Ss giving an error-free performance. 12 Ss committed only non-response errors, 8 of these being from the Good group. On the First-letter task, 18 of the 27 incorrect responses were due to a confusion between letter names (e.g. 'sand' given to the command "Begin 'c'"; 'kneel' for "Begin 'n'"), rather than to any difficulty with the task as such. Of the remaining errors, 3 involved the use of an alternative but not like-sounding initial letter, 5 involved the incorrect use of the designated letter (e.g. 'elf' for "Begin 'l'"; 'looking' for "Begin 'g'"), and one response was not a real word. A breakdown of error types on the Last-letter task is given in Table 62. It can be seen that in most cases of error Ss did use the designated letter, but used it incorrectly. This is not merely due to confusion arising from the intermingling of the two types of command, or a similar number of mistakes should have occured under the First-letter condition. Also common were mistakes where the final sound corresponded to that of the letter designated but this did not form the final letter of the word (e.g. 'telephone' for "End 'n'"; 'lolly' for "End 'e'"). One particular type of response produced was that in which the word began and ended with the designated letter (e.g. 'going', 'peep'), or in which the letter was used in some other way more than once (e.g. 'people') These responses were particularly common under the Last-letter instructions, and were given in equal numbers by Good and Poor readers (Table 63).

Due to the results sheet design, few Ss on either of the Written Restricted tests actually produced items of the wrong length or with the incorrect first or last letter. Rather, these restrictions led to

spelling errors which could be considered the direct result of inaccurate appraisal of a word's length, or to spelling modifications which would not have been made in the absence of the need to accommodate the designated letter. Although several errors seemed due to a combination of factors, three main types of mistake could be distinguished : (1) in which a spelling error occured which had no effect upon the 'correctness' of the response in terms of the task requirements (e.g. 'hosué for 'house' in 5-letter Length-Restricted item; 'peple' for 'people' in "Begin 'p'" Letter-Restricted item), (2) in which a spelling error was probably directly caused by task restrictions (e.g. 'yellw' for 'yellow' in 5-letter Length-Restricted item; 'broanw' for 'brown' in "End 'w'" Letter-Restricted item), and (3) in which Ss deliberately ommitted or added letters to words to make them comply with task restrictions (e.g. 'verys' for 'very' in 5-letter Length-Restricted item; 'cate' for 'cat' in "End 'e'" Letter-Restricted item). The Last-letter restricted task also provoked some rather odd doubling and reversal mistakes (e.g. 'olw' for 'low', 'lal' for 'all' and 4 Ss wrote 'eeg' for 'egg' on the "End 'g'" item). Differences between children in the correction of these errors is discussed later in this chapter. The group difference in number of unidentifiable Written responses on the Letter-Restricted task was also statistically significant ($\chi^2 = 5.75$, $p < .02$).

An analysis of group differences in terms of length and syllabic structure of items produced was carried out for Restricted-test as for Unrestricted test data, as appropriate. As reported in the previous section, group differences in item length were statistically significant under Written but not under Oral response conditions (Table 64). Examination of syllabic structure was undertaken for both Length- and Letter-restricted tasks. Table 65 shows there to be no large or consistent difference between the Good and Poor readers. Two general trends are for there to be fewer polysyllabic words used in Written tests, and for the percentage of poly-

syllabic words to be much lower on the Length-Restricted test. It was probably considerably easier to be correct on this test if one dealt with monosyllabic items, and figures show that, under both Oral and Written conditions, a greater number of Good readers employed such a strategy. This idea appears to be confirmed by figures showing the percentage of polysyllabic items that were incorrect, compared with the overall error rates. On the Length-Restricted test the error rate goes up for polysyllabic items, whilst on the Letter-restricted test such responses achieve improved accuracy (this may have been particularly due to Ss 'working backwards' to find a word on items in which E designated the last letter).

Summary

On these tests, which presented Ss with something other than a normal speaking, reading, writing or copying task, certain differences emerged between the Good and Poor readers with regard both to their approach to the tasks and to the accuracy of their execution. Results from both Length-Restricted tests offer a further indication that the Good readers could appreciate the benefit of certain strategies that were more likely to lead to a correct response - in this case concentration on monosyllabic words. When errors were made, particularly on the Oral tests, the Good readers' mistakes tended to be 'less inaccurate' than those of the Poor readers : Length-Restricted errors were nearer to the correct length, and on no Last-letter restricted item did any of the Good group fail to use the designated letter altogether. Furthermore, as shown in Chapter 6, Good readers seemed better able to check an incorrect response before it was made, and showed a greater tendency to give no answer if unable to provide a response they believed to be correct. On the other hand, observations of test performance indicated that some children responded on these tests with relatively little, or only intermittent concern for accuracy. Thus some Oral Length-Restricted responses were recorded for the Poor reading group that were inaccurate to the extent of being 4 or 5

letters away from the correct length (e.g. 'furniture' given as 4-letter item, 'cardigan' given as 5-letter item). Such responses are not indicative of a failure to understand the task requirements, but rather of the preference to make some sort of response in the face of a task perceived as too difficult.

7.4 SERIES I S-F & S-C TESTS : LETTER ERRORS

The Letters tests were devised to provide an opportunity to look at Ss' behaviour under conditions in which all Ss should perceive the task as easy to perform. Nevertheless, certain findings relating specifically to ability to deal with letters in the isolated manner demanded by the test can also be discussed. These relate to the relative 'popularity' of different letters on the S-F tests, and the nature of confusions made between letters on the S-C tasks. It was also noted that there were differences between Ss in use of the commonly accepted ('ay-bee-see') letter names on Oral tasks. No S failed to use these entirely, but on the Oral S-F test far more 'incorrect' responses were recorded for the Poor than for the Good readers (115:15, Sessions 1 and 2 combined).

S-F production of letters in relation to S-C errors

In the spontaneous generation of oral and written letter strings it was obvious that the 26 letters did not enjoy equal popularity (Table 66). Combining Sessions, the most frequently produced letter under both conditions was 'a' (Oral: 144, Written: 92) and the least used were 'j' (35) and 'v'(29) in Oral and Written tests respectively. With letters ranked for the number of times used, there was high correlation between Oral and Written rankings (rho= +.795, $p < .001$). Test-retest correlations for relative use in the two Sessions were also highly significant (Oral: rho= +.823, $p < .001$; Written: rho= +.452, $p < .05$). The lower test-retest correlation under Written conditions was presumably due mainly to the greater opportunity to check for previous use of a letter, although this did not completely destroy the very considerable preferences that emerged orally.

S-C Error totals in Table 66 show that no letter completely escaped error, although 'e' was only mistakenly called on one occasion (each letter having been presented a total of 790 times). The error rates in terms of misidentification may of course have been slightly distorted by Ss' omissions, but there was no way of rectifying this, and a considerable range nevertheless emerged. With letters ranked for number of mis-naming or copying errors, test-retest correlations were very highly significant under oral response conditions but non-significant for Written performance (Oral: rho= +.912, $p < .001$; Written rho= +.326, ns). These findings suggest that Reading mistakes were very consistent errors in the child's verbal behaviour, whereas Copying errors are again shown to be more arbitrary. However, naming competence does seem to play some part in copying accuracy, and for the two Sessions combined there was a positive though non-significant correlation between Oral and Written error rankings (rho= +.333, ns).

Error ranks for letters on the S-C tests were then compared to S-F output ranks, and the results are given in Table 67. This gives some indication that, particularly with regard to the writing of letters, Ss tended not to spontaneously produce those letters that caused them most trouble in naming and copying situations. The fact that 'reversible' letter mistakes could not be measured on the S-F tests may have precluded this relationship from appearing more definite, and the degree of negative correlation observed would seem to be largely related to factors of frequency of occurence.

Analysis of S-C Errors

This analysis begins with consideration only of errors made on the Letters tests. Table 68 presents confusion matrices for Reading and Copying errors. As indicated in the previous paragraph, errors appeared to arise from two major sources · (1) from confusion between those letters differing only in orientation, and (2) from confusion between letters occuring least often in words. The most common error-pairs were as follows, with Oral

error totals given in parenthesis p for q 115 (103), i for l 74 (63), d for b 53(43), g for j 49 (48), x for z 47 (43), u for y 36 (36), and y for w 35 (34). Particularly confused, then, were the names of letters at the end of the alphabet Errors between 'g' and 'j' are perhaps somewhat excusable in that the former is sometimes pronounced identically to the latter in the word context Positional differences and visual reference to other letters in words will probably normally eliminate most 'i' for 'l' confusion However, the overall distribution of errors shows that these mistakes were not made consistently by Ss (that is, a letter was seldom miscalled or miscopied by an S on all five of its presentations in a test) but illustrates rather a persisting uncertainty about the names of certain letters.

Whilst providing an equal occurrence of all letters, the Letters tests did produce a rather false setting for letter identification, and errors with 'reversible' letters were therefore also recorded from the Words, Pseudo-words and Prose tests. These are given in Table 69 for the Good and Poor reading groups separately A higher percentage of the Good readers' written mistakes (29.3% 20.0%) were due to a reversal of the stimulus that could be judged clearly not to involve confusion with another letter. The totals given in Table 70 indicate the extent of group differences in difficulty with these letters Although the difference is understandably much greater for the Oral tests, it is also considerable for Written Word and Pseudo-word tests. Comparing the Oral Words, Pseudo-words and Prose tests for b-d-g-þ confusions quite marked differences were found, error totals being 37,118 and 32 respectively Although the Pseudo-word lists contained slightly more instances of these letters, a corrected error total still indicated that such errors were approximately twice as likely to be made under Pseudo-word than under real word conditions Two reasons are suggested for this firstly that a sight vocabulary may help eliminate

this error on the real word tests, despite the structural similarity between Word and Pseudo-word items. Secondly, Ss may have been paying less attention to this problem on the Pseudo-word test while trying how to pronounce each item as a whole. The greater number of transpositions reported on this test (see Chapter 8) was probably another manifestation of this. It is not inconsistent with an assumption that Ss pay more attention to individual constituent letters of Pseudo-word items, the suggestion is rather that Ss who are inclined to confuse certain letters, or to tackle the letters in an incorrect order, will be taking less care over these particular performance hazards. These results support the notion that tendency to reverse is a habit that is suppressed rather than eliminated, and under the more difficult or unfamiliar circumstances of the Isolated Letters and Pseudo-words tasks will temporarily reassert itself. Thus whilst most letter confusions on these tests occured orally, a greater proportion of such errors on real word tests were produced under copying conditions, the Prose test returning more Written than Oral reversals. This suggests that knowledge of the words greatly reduces the problem of actual confusion between these letters, leaving it chiefly as one of motor carelessness. The variable incidence of these letters in the different tests is largely responsible for the alteration of the relative proportions of different confusions from those found on the Letters tests. However, there is a persistent tendency for more errors to be made with the letter 'b' than with 'd', even though the latter occured more frequently in the stimulus lists. More specifically, Table 71 shows 'b' to have been spoken or written as 'd' almost twice as often as 'd' was given as 'b'. One possible reason for this is that whilst both letters occur regularly as the initial letter of English words, the letter 'b' only rarely occupies the final position. This may help establish the identity (name-form association) of the letter 'd' as the one that appears and is heard at the end of words.

The result also fits Zaslow's 'body midline' hypothesis (2.7), although the decreased difference between the letters on the Written tests does not support this notion.

Summary

Analysis of single letter confusion errors suggests that part of the reading difficulty experienced by some of these children may be due to poor knowledge of letter names - or rather, they knew the names but applied them inconsistently to the written forms. Differences between 'reversible' letter errors on the Letters and other tests reinforce the idea that word identification does not merely involve identification of the constituent letters. On the Oral Pseudo-words test, however, where Ss had to use phonic knowledge to arrive at the correct pronounciation rather than being able to recognize items 'on sight', there was an increased difference in single letter errors between Ss who tackled the task using such rules and those who tended rather to 'sound out' items more or less letter-by-letter. Although the total error pool was small, analysis of b-d-g-p errors suggest that visual, acoustic and kinaesthetic (motor feedback) factors are differentially involved in oral and written reversal errors.

7.5 ANALYSIS OF S-C ERRORS (SERIES I & II)

Results presented in Chapter 6 showed that the Good readers, as expected, made fewer errors on the experimental tasks than Poor readers. The distribution of these errors with regard to certain stimulus parameters is now examined in more detail.

Error distribution according to item length (Series I & II)

Table 72 presents the distribution of errors according to item length for Series I Words and Pseudo-words tests, and to correct for the different number of items presented at different lengths gives the average number of errors per item at each length, for the Good and Poor groups. Overall there was a slightly steeper rise in errors between 3- and 4-letter

items than between 4- and 5-letter items for Pseudo-words, and a greater increase between 4- and 5-letter items for real words. On the Words test the rise in errors with increased word length is more marked for the Poor than for the Good readers. This is also true for Oral but not for Written Pseudo-word responses, there being the greatest performance similarity between the groups on the latter test. Comparison of the errors on the Words and Pseudo-words tests further suggests that the Poor readers tackled the Oral recognition task similarly for the two types of verbal item, whilst the Good readers show different error distributions for the two tests. This may indicate the greater use of 'sight vocabulary' knowledge on the real words task by this group.

The greater range of item length employed in the Series II Words tests offers an extended picture of the length-accuracy relationship. For the Oral Reading test, Table 73 shows that about half the mistakes made involved 7-letter items, one-third 5-letter and one-sixth 3-letter items. There is a difference between the reading groups with respect to the proportion of errors assigned to the 3- and 5-letter items; this is in part due to the inclusion in the 3-letter category for Good readers of a number of omission errors that were due to carelessness rather than to an inability to pronounce the word. Similar error proportions were found on the Copying task, although there is a slight relative decrease in 3-letter errors. However, there are considerable reading group differences in these proportions · whilst over 60% of the Good readers' errors were restricted to the longest items, there was very little difference between 5- and 7-letter item totals for the Poor group. This may result from an interaction of several factors whilst the Poor readers have difficulty in dealing with shorter items than cause trouble to Good readers, the difficulty of the 7-letter items caused many Poor readers to adhere to a letter-by-letter copying technique which, although slower, held back an increase in error rate. This second factor also seemed to affect error correction rate, as discussed in the following section.

On examination of the interaction on the Copying task between item length and response condition, it was found that the percentage of errors committed at each item length varied more widely under the different conditions for the Good than for the Poor group, who returned more or less similar proportions under all four conditions. This again underlines the fact that the conditions had varying detrimental effects on the fluency of the Good readers' copying techniques, but generally less effect on the letter-by-letter methods of many of the Poor readers. The main feature of the Good group results was that the 'abnormal' conditions tended to increase the proportion of errors made with the shorter words. Overall, figures for the sample show that provision of a dashed line improved copying accuracy of longer words. Provision of one letter of the word had no such effect but did tend to increase errors with shorter words.

Examination of Spelling errors shows once again that over 60% of the Good group errors were with the 7-letter items, whilst the Poor readers made a relatively larger proportion of their mistakes on shorter items. Comparison of the three S-C tests shows that, for the whole sample, the proportion of errors at each item length is quite similar for all tests, with there being a slight shift towards a higher percentage of errors to be with longer items from Reading through Copying to Spelling. Differences between the groups are summarized in Table 74 (figures for 'normal' Copying and Spelling conditions only). It can be seen that whilst the error proportions at each item length are more or less identical on each test for the Poor readers, the Good readers show written work close to being error-free when dealing with short words.

Written errors and position of a given letter (Series II)

A further detail of Copying and Spelling test performance to be considered is the influence of the position of the added letter in the 'Line+Letter' and 'Dashed-Line+Letter' conditions, the given letter being either the first, middle or last letter of the word. To summarize results

discussed previously, the provision of a letter as the only additional marker or clue improved spelling but not Copying accuracy, relative to the 'Line-only' baseline. Incorporation of letter with length information produced the greatest improvement in Spelling accuracy but again had very little effect on Copying performance. The two letter-added conditions may then be examined to see whether there was any variation from these general effects dependent upon the position of the letter. Data given in Table 75, and summarized in Table 76, show that letter position had no discernible effect upon error rate under these conditions when Ss simply had to copy words. However, provision of the middle letter caused most errors on the Spelling task, whilst provision of the last letter seemed of most use. These relative scores were the same for both reading groups, although the differences are only statistically significant for the Good readers ($\chi^2 = 10.16, p < .01$ and $6.97, p < .05$ for 'Line+Letter' and 'Dashed-Line+Letter' respectively, df=2). The reason for the lower value of the central letter could have been that under the 'Line+Letter' conditions Ss were uncertain as to the position of the given letter in the word, although they were told tnat it was exactly in the middle; however, the difference remains when the additional provision of a dashed line makes this clear. Examination of Spelling test errors in general suggests that, as well as avoiding substitution errors, the chief value of end-letter provision was to overcome the tendency to omit the last letter, especially when this was 'silent'.

Word difficulty under different response conditions (Series II)

Finally, a direct examination of the words comprising the test lists was made. Error scores of items from the four lists were brought together to see whether those words with which Ss had most difficulty on one test tended to be those causing most problems on other tests. Table 77 shows that words causing most trouble on the Reading test did indeed tend to account also for most difficulties on the Spelling test. At the longer

word lengths there was a tendency for those words most difficult to spell leading to most errors in straightforward copying. However, correlation between Reading and Copying error ranks remained non-significant at all lengths.

For items 5- and 7-letters in length each list contained both mono- and poly-syllabic words. This aspect of word structure did not seem to be particularly important in response accuracy, although there was a slight but consistent tendency for the monosyllabic words to have higher Reading and Spelling error rates and lower Copying error rates (Table 78). The most important factors affecting accuracy seemed therefore to be word 'regularity' (Schonell 1932), although this may be more important in the present isolated-word situation than when dealing with prose (Lee 1972), and Ss' familiarity with the written form of the word. These factors tend to be positively related to word length, but where a short word was less familiar (e.g. 'few') and a long word well-known (e.g. 'seaside') the relationship between item length and accuracy was overridden.

Horizontal and Vertical Display and Response effects (Series I)

The first experimental Series also involved a comparison of speed and accuracy of Reading and Copying performance when items were presented in rows and columns. Table 79 presents results for all Ss. Results from Session 1 indicated that Oral performance was fastest when stimuli were to be dealt with horizontally, whilst Copying was assisted by vertical presentation. However, these findings were not replicated in Session 2, and it appeared that subject differences were generally more influential than differences in presentation, and the participation of one S in the Written but not the Oral Tests (see 5.2) may have been partially responsible for this. Any possible significant effect may also have been reduced by some Ss' use of a finger guide, which was not discouraged but which almost completely removed the risk of that S losing his place. In an attempt to eliminate the distorting influence of one S, Good and Poor groups were

considered separately (Tables 80 & 81). However, no significant consistent trends were again observable. Nevertheless, there was some slight overall indication that the group dealing with stimuli horizontally performed more quickly; combining total Oral and Written time scores, Good Ss did better performing across the page on both Sessions, and Poor Ss performed better horizontally on one Session and vertically on the other. This suggests that the advantage of horizontal presentation, in being that normally encountered in reading and copying situations, was of greater benefit to the Good readers.

Effects of horizontal and vertical presentation in terms of response accuracy were equally indeterminate. Overall, it appeared that to a very slight degree vertical presentation encouraged fewer errors, although this may be better described as the outcome of horizontal presentation inducing more rapid, and consequently more careless, responding. To a certain extent there was a tendency for the insertion of new items or the repetition of presented stimuli to occur more often with vertical presentation of material, suggesting that correct transfer from the bottom of one column to the top of the next was more difficult (less practised) than transfer from the right end of a row to the left end of the row beneath it. However, examination of the results from the two Sessions again suggests that differences between subjects have the greater influence upon performance.

Summary

Analysis of error data with regard to item length indicated, as would be expected, that errors made by the Good readers were confined to a greater extent than those of the Poor readers to the longer test items, this being particularly true for Written (Copying and Spelling) performance. Results from the Series II tests clearly indicate the discrepancy between Reading and Spelling ability at this age level, and some of the responses produced by the Poor readers on the latter test suggest that whilst Ss

were familiar orally with the words employed on these tests, the written forms of some of the 7-letter words were not well-known On the Copying test, provision of dashed-line and letter markers assisted the Good readers only on 7-letter items, otherwise they had a slightly detrimental effect upon accuracy through disrupting copying fluency In contrast the Poor readers' accuracy was improved under these conditions at all item lengths. On the other hand, provision of clues on the Spelling task was only of help to the Poor readers for 5-letter items, 7-letter words could not generally be spelt correctly by members of this group under any of the response conditions (87.5% of all their 7-letter responses contained errors, compared to 49.9% of Good group responses). Overall, manipulation of display and response conditions indicated that the Good readers' superiority was greatest when Ss were performing in situations most closely resembling the normal reading or copying situation

7 6 ERROR CORRECTION (SERIES I & II)

It was hypothesized that the Good readers in the sample would not only make fewer errors on performance of these tests than Poor readers, but also that they would correct a larger proportion of those mistakes they did make Results from the various tests will be discussed in the following order firstly, the S-F Restricted data from Series II, and secondly the S-C data from both Series. Finally, the Written Unrestricted data is compared with copying and Spelling performance.

Series II S-F Tests

Table 82 gives the percentage of errors corrected by the Good and Poor reading groups on the S-F Restricted tests It can be seen that lowest error correction rates were achieved on the Oral Length-Restricted test, which in other areas of the results analysis also appeared to be the most difficult task The lack of difference between the two reading groups

on this test is chiefly due to the large proportion of errors on this test that were non-responses On the corresponding Written task, in which Ss were more able to recognize any errors, the correction rates are much higher It is interesting to note that whilst the Good readers' correction rate improved for the longer items, the Poor readers' rate sharply declined with increased item length However, whilst the latter fact may genuinely reflect the Poor readers' greater difficulty with longer items, the former may be to some extent due only to the low error total of the Good readers for 3-letter items. Results for the two Letter-Restricted tests show a greater degree of similarity, with the correction rate for items with the first-letter designated being much higher The Poor readers failed to correct any of the errors they made on the Last-letter Oral task On both tests the reading group difference in rate was statistically significant, being greater for the Oral task Comparisons between the tasks show that the Good readers achieved a higher Oral correction rate on the Letter- than on the Length-Restricted task, whilst the reverse is true for the Poor readers However, the latter result is due to their poorer performance on items when the last letter was designated. There is less difference between rates obtained on the two Written tests, and overall the test may be placed in the order First-letter restricted, Length-Restricted, and Last-letter restricted with regard to successful error correction

Series I S-C Tests

The number of errors corrected on each of the Series I S-C tests was included in Table 43, presented in Chapter 6, and the percentage figures for Good and Poor reading groups are given in Table 83 Overall, 220 (8 5%) of Oral and 550 (40 3%) of Written mistakes were corrected Taking each test separately, the highest correction rate was achieved for Written Pseudo-words (53 5%) and the lowest for Oral Pseudo-words (3 7%) There was a slightly better rate for Written Pseudo-words than

for real words, suggesting that there was more attention paid to individual letters of items on the former test and also that checking was predominantly visual - the high error rate for Oral Pseudo-words would tend to preclude the possibility of successful checking being chiefly auditory. These conclusions are confirmed by the data to be reported in Section 7.7. The high correction rate for Written Pseudo-words on Session 2 may well be the reason for this test being the only one not to show an improvement in speed on re-administration (see Table 17). Although the Poor readers corrected a larger number of errors than Good readers, this represented a much lower percentage of total errors committed (15.0% : 31.7% overall).

Clear differences on this measure emerge between the real word and pseudo-word tests. Although correction rates on the Oral Pseudo-word task were generally low, there was a statistically significant difference between the reading groups in ability to use grapheme-phoneme knowledge not only to make fewer errors but also to put into practice better checking procedures. On the Written test a visually-controlled copying technique seems to have been most likely to bring accuracy, and the greater familiarity of the Poor readers with such a letter-by-letter approach reduced the group difference to a non-significant level. However, on the two tests involving real words the Good readers' superiority was greatest under Written conditions. Some discrepancy on this measure between Series 1 and Series II findings for the Reading and Copying of isolated words nevertheless emphasize the need to appreciate performance changes with items of different length, and to avoid over-generalization of results from a small sample of children. However, taking only the Series I results and thus comparing the same children on different tests, the Words and Prose data indicate that for both Reading and Copying the superiority of the Good readers in terms of error correction was less on the latter task, dropping to a non-significant level on the Prose reading test. These findings are in line with the view that the better readers will make greater use of contextual cues, relatively

more of their errors are therefore likely to be grammatically correct within the sentence and as a result less likely to be noticed (this point is discussed further in Chapter 8).

Series II S-C Tests

The error correction data for Series II Copying and Spelling tests are now examined Overall, on the Copying task the Good readers corrected 71.6% of their mistakes and the Poor readers 65.9%. Comparison of the different conditions (Table 45) shows that the provision of a dashed-line enabled Ss to notice a greater number of their mistakes (χ^2 difference between correction rate for Dashed-line and other conditions = 9 21 $p < .01$) There was only a significant difference between the reading groups under the Dashed-line condition (Table 84) The different conditions did not have a significant effect on the correction of Spelling mistakes, although, as noted previously, they did have an initial influence on error commitment Good readers corrected significantly more of their errors under all but the Dashed-line condition.

Breakdown of error correction rate according to item length shows a decrease in correction with increased length, although the decline is much sharper for the Good reading group, due mainly to the higher rates achieved with shorter words (Table 85) However, on the Copying task the overall rate for 7-letter words achieved by the Poor readers was in fact very marginally higher than that recorded by the Good readers This may be traced back to their greater indulgence in a letter-by-letter copying technique, and is more prominent under those conditions offering a dashed-line guide Overall, the results seem to suggest that provision of length and letter guides on a Copying task influenced the error correction behaviour of the Poor readers to a greater extent than that of the Good readers. No trends can be observed here for the influence of letter-position in the two Copying and Spelling letter-given conditions (Tables 86 & 87)

As for the error-score data, error correction results suggest that, for children of this age and for words of the lengths employed, increase

in item length increases spelling more than reading difficulty. The reduction of this effect within the Poor reading group would seem to indicate that for these children Reading was not yet so much of a straightforward recognition task, but still involved a good deal of on-the-spot analysis. Their error and error-correction percentages for Reading and Spelling thus showed much greater similarity than did those of the Good readers, for whom reading was relatively the much easier task. Error correction rates achieved by Good and Poor readers on the S-F Unrestricted task (29.4% and 25.3% respectively) indicate that Ss were more familiar with, and more able to correct mistakes made with words of their own than of the experimenter's choosing.

Summary

Errors can be the result of either ignorance, uncertainty or carelessness, and it is errors of the latter kind that Ss have the most opportunity to correct. Consequently it may be expected that a greater proportion of the Good readers' errors will be amenable to correction. This is supported by the finding of less difference between their Spelling and Written S-F correction rates than between those of the Poor readers (assuming the majority of words written in the latter task to be chosen by Ss because they believe themselves capable of writing them correctly, although there are likely to be individual differences in adoption of such a policy). However, correction rate is also a function of the extent to which Ss are concerned about the accuracy of their performance, and on the Copying tests, where all errors may be considered the result of carelessness of some kind, there remains a tendency (not always statistically significant) for the better readers to achieve a higher correction rate. Copying would therefore seem to offer an opportunity not only to consolidate knowledge of letter orientation, sequential probabilities and other structural patterns of words, but also to help develop an attitude of attention to accuracy in a situation where complete accuracy can be achieved.

7.7 SERIES I S-C TESTS OTHER ASPECTS OF BEHAVIOUR

During performance of the Series I Copying tasks observations were made of certain general aspects of Ss' behaviour. These concerned copying strategy with regard to looking away to the stimulus card, and additional methods employed by Ss to improve performance speed and accuracy.

Looking at the Stimulus Card

Only a few Ss (all from the Good reading group) were observed looking away to the stimulus card and writing simultaneously; the majority kept these two activities separate. For each of the multi-letter item tests Ss were assigned to one of three categories with regard to this behaviour (1) looking away more than once during the copying of a single item, (2) copying items as wholes but looking away after each item, and (3) copying several items between each look away to the card. Ss were allocated to (1) or (3) if they exhibited these behaviours at any point during performance of a test; however, Ss typically maintained the same strategy throughout any one task. The results (Table 88) reflect differences in both the tasks and the children. Whilst more than half the Ss were able to deal with several words together on the Prose test, fewer worked in this manner when copying isolated words and only two managed it on the Pseudo-word task (the same two Ss performed this way on both Sessions). Predictably, the latter task induced the most Ss to adopt a letter-by-letter copying technique. Taking all Ss together these task differences proved statistically significant ($\chi^2 = 44.85$, $p < .01$. $df=4$). Significant differences were also found between the two reading groups, a greater number of the Good readers showing the more sophisticated behaviour patterns on each test and the difference being greatest on the Isolated Words test.

Overt vocal behaviour

Table 89 gives the number of Ss who exhibited overt vocal behaviour during the performance of copying tasks. All but seven of the children used such a technique on at least one test. Although there were no

overall differences between the Good and Poor readers on this measure, a group difference was found on the Pseudo-words test, on which many of the Good readers, although vocal on other tests, remained silent. This supports the view that these children reinforce their more fundamental verbal superiority by utilizing more appropriate peripheral strategies - it was probably far better on this test to place greater reliance on visual study of the stimuli than to be guided by attempts at pronunciation of items, which the Oral test data have shown to be highly prone to inaccuracy.

Finger guide

The use of a finger guide to help S keep his place was not observed so frequently (Table 90). 17 Ss used this technique on at least one occasion, 11 of these coming from the Poor reading group and suggesting this to be a technique the better readers do not need to employ. Most of the recorded instances were observed on the Letters test, which was undoubtedly the task posing the most problems in keeping one's place, as is indicated by the number of whole-item omissions and insertions (Table 91). Making comparisons within the Poor reading group on this test, it did not appear that use of a finger guide resulted in either faster or more accurate performance, although it may be that these Ss would otherwise have returned markedly inferior scores.

Summary

The results presented in this Section suggest that the Poor readers were more likely to lose their place while reading or copying. However, whilst the behaviour of the Good readers on the Copying tests has been described as more sophisticated or mature, it may be that some of the techniques used by the Poor readers are ones that the Good readers bypassed altogether. Perseverance with letter-by-letter copying may actively inhibit the development of strategies involving consideration of the whole word as a visual or auditory unit. This may be another aspect of the problem which

involves weaning the Poor reader (and writer) from behaviours that are speed-oriented rather than accuracy-oriented, or that are centred primarily around the easing of short-term personal discomfort with little regard to performance at all.

7.8 SEX DIFFERENCES IN PERFORMANCE

A brief analysis of the data was made to see whether there were any general differences between the sexes in performance of the various experimental tests, and in line with previous research it was hypothesized that girls would perform these verbal tasks better than boys. However, although a higher proportion of girls in both samples were classified as Good readers, ranked RA scores for boys and girls were not different to a statistically significant extent in either Series.

Nevertheless, Mann-Whitney analysis of the Series I S-F results (Table 92) shows that the girls produced significantly more items on all tests than the boys, although the difference only reached an acceptably significant level on one session for the oral generation of letters and words. The Series I S-C tests (Table 93) indicate more clearly that the girls' superiority was limited almost entirely to Written test performance. Series II results support these findings, showing a significant difference between the groups on the Written but not the Oral Unrestricted S-F task (Table 94), although differences on the Restricted tasks were generally non-significant. There is a sex difference in performance accuracy for the two Written S-C tests (Table 95), although only for the 'normal' (Line only) condition, and the girls seemed better able to deal with the other Copying conditions in terms of speed. Generally, the girls' superiority tends to be greater for speed than for accuracy, suggesting that a better handwriting style may be one of their main advantages. However, any situation in the classroom which may lead to development of such an advantage could also be responsible for other motivational or attentional differences between girls and boys.

Observation of the children suggested, subjectively, that the girls as a group had a general approach to the tasks more conducive to success. The boys presented a greater diversity of approach the better boys appeared overtly to be the most highly motivated to do well on the tests, and typically were particularly responsive to the timed aspect of the situation, although their tendency to be noisier and more 'keyed up' had a detrimental effect upon performance speed. Children with the very lowest RA's in both samples were boys, and they also tended to exhibit this paradox of being concerned with performance times whilst acting in ways antagonistic to speedy test completion - such as talking to themselves (and sometimes the experimenter) whilst working, or looking away from both response sheet and stimulus card whilst copying and tending to lose their place. Breakdown of the results given in Section 7.7 supports these comments. Table 96 shows that overt vocal behaviour whilst copying was much more frequently a feature of the boys' than of the girls' performance, percentage figures offering a correction for the unequal distribution of Good and Poor readers in the sex groups (12 girls and 8 boys were Good readers). Good readers of both sexes show the decline in vocal behaviour on the Pseudo-word test. However, whilst the boys talked a lot more during the tests, figures for the Good readers seem to indicate that the girls were more discriminating in their use of such behaviour. The difference between the Poor groups would suggest much of the boys' vocal practices to have been irrelevant to the improvement of performance accuracy. Figures for the use of a finger guide show this to have been much more common amongst the girls than the boys, and within this group particularly characteristic of the Poor readers. Both observational and statistical data therefore support the contention that much of the manifest superiority of girls on verbal tasks at this age level can be due to performance organization differences rather than to differences in basic competency with verbal symbols.

The contribution of constitutional sex differences to severe reading disability is becoming more fully documented, and it is presumably necessary to attribute some degree of the behavioural differences normally observed between boys and girls to physiological dissimilarity. Socialization processes will both develop inherited predispositions and encourage additional behavioural divergence. The extent to which those aspects of sex differences affecting ease of acquisition and operation of verbal skills within the normal range can be influenced by teachers and parents is further discussed in Chapter 9.

7.9 SUMMARY

The experimental findings reported in this chapter emphasize that the Poor readers' inferior performance was a function not only of specific inadequacies in certain analytic and synthetic verbal skills but also of attitudes and other aspects of their behavioural approach to tasks that hindered, or possibly actively discouraged, the development of certain of these skills.

Hypothesis (1) received statistically significant support from the Written but not the Oral tests (Series I). This emphasized the fact that, within the normal range at least, the main problem for the child falling behind is lack of familiarity with words as they are written, which led to a restriction on items he was willing to commit to paper. As with several aspects of the Poor reader's behaviour, this leads to a 'vicious circle' effect in that such inhibition further limits experience with the written forms of words Ss understand and use orally. Hypotheses (2) and (3) also received support. These findings are in agreement with those obtained by Vellutino et al. (1972) using a more limited test programme and employing immediate memory copying tasks with severely retarded and older readers. These authors had hypothesized no difference between their reading groups for copying performance, and although this was upheld for the reproduction of shapes, digits, unpronounceable letter groups and 3-

and 4-letter words, there was a group difference in copying of 5-letter words. They suggest this to be due to the normal readers' greater familiarity with the linguistic structure of the words presented and their consequently lessened need to rely upon immediate visual recall for reproduction accuracy. These conclusions would be supported by the Word and (pronounceable) Pseudo-word results of the present study, although the latter suggest that in addition to greater linguistic knowledge the Good readers also have greater familiarity with visual aspects of word forms. This enabled them to perform more accurately on the Restricted S-F tasks, and increased their superiority on the Series I S-C Words task relative to Pseudo-word performance. Data further indicated that the Good readers experienced less confusion with those letters of the alphabet which for reasons of visual similarity or infrequency of occurence cause particular individual problems, and Series I display comparisons suggested that they had established more firmly than the Poor readers the left-to-right, down-the-page scanning habit, and/or a greater eye-voice span. However, Hypothesis (6) failed to receive statistical support from the data; overall, it appeared that, for the sample size employed, individual differences between Ss dominated any presentation effects.

Although the Poor readers should not be presumed a particularly homogeneous group in terms of the problems they bring to the reading and writing situation, certain aspects of their behaviour did appear fairly characteristic of the group as a whole. They tended, for example, to indulge in particular behaviours to a greater extent, or less discriminatingly, than the Good readers. Also, a greater proportion of the Poor group copied letter-by-letter (Hypothesis 5), and whilst this was obviously to some extent due to their inability to use other whole-word methods, it may be that persistence with this technique is actively preventing the development of more mature procedures which the child would be quite capable of adopting. Although these different techniques did not differ

enormously in resultant performance accuracy, the main disadvantage of the letter-by-letter method may be that it encourages the tendency to persist in tackling the more difficult tasks of reading and free writing in a similar manner. Practice in coping with larger units of material in the easier copying situation might help the child transfer these abilities and strategies to those situations in which memory and the use of anticipatory skills play a greater part. The problem seems to be, therefore, that these children adopt maladaptive techniques because they are falling behind, but then become further adrift due to persistence with these methods. In the performance situations employed in the present study these behavioural differences seemed more important than factors of inattention or inability to concentrate, although it is appreciated that the latter may assume a more central role under normal classroom circumstances.

Furthermore, certain aspects of the difference between Good and Poor readers' performance appeared to be related more directly to their attitudes to task performance. In addition to the speed-accuracy relationships discussed in Chapter 6, this was reflected in the difference in error correction rates between the groups which is assumed to be related to the interacting factors of lack of ability and lack of concern to correct. Hypothesis (4) was generally upheld by the data, however, the Good readers' superiority was lower, and not always statistically significant, on the straightforward copying tasks, on which all Ss achieved fairly high correction rates, and was not observed on the Series I Oral Prose test.

Consideration of aspects of performance other than straightforward speed or accuracy measures also revealed differences between the sexes. In both samples of children a greater number of the Good readers were girls, and Hypothesis (7) received general support. However, more detailed breakdown of the Series II results indicated that the boys were at both ends of the continuum, contributing the best and the worst test performances. Taken together with data on Ss' general behaviour during

performance, these results are consistent with the view that the social environment of the home and school tends to develop typical differences between boys and girls that will be reflected in their approach to work. Even by this age the boys seemed inspired to a greater degree by a competitive spirit - they were keener to know how they had done in relation to other children - and generally appeared more strongly motivated by the timed aspects of the tasks. On the other hand, they were characteristically noisier and more 'fidgety' than the girls, and this hampered their performance, particularly that of the Poor readers. Present results would suggest that, with particular reference to the acquisition of verbal skills, any sex differentiation must not arise from the unthinking reinforcement of social norms, but rather needs to be based on an informed awareness of likely differences between boys and girls, as a result of socialization influences already operational, in (1) their development, more or less autonomously, of certain performance tactics, and (2) their general susceptibility to various (and sometimes antagonistic) social reinforcement contingencies in the classroom.

Test		1	2	3	4	5	6	7	8	9	10	11	12
O.Words i)	Good	2	41	300	458	425	240	100	86	32	32	8	1
	Poor	13	44	256	321	304	171	97	66	30	18	2	2
O.Words ii)	Good	2	41	314	486	409	240	81	84	31	28	8	1
	Poor	13	44	274	335	288	182	83	58	25	19	1	2
Wr.Words a)	Good	2	31	253	274	164	56	30	13	4	2	1	
	Poor	6	51	266	177	98	29	6	3	2	2	1	
Wr.Words b)	Good	2	31	245	276	163	57	25	17	5	2	1	
	Poor	6	50	246	162	92	26	11	6	1	2	1	
Wr.Pseudo-words 1)	Good		2	80	74	35	11	7	1				
	Poor		4	90	64	21	6	4	-				
Wr.Pseudo-words 2)	Good		1	70	60	33	9	6	1				
	Poor		1	36	40	15	4	2	-				

i) As spoken
ii) Plurals reduced

a) As written
b) As corrected and plurals reduced (excluding non-words)

1) All items
2) Acceptable items only

TABLE 53. SERIES I S-F TESTS : LENGTH OF ITEMS PRODUCED.

Test		1	2	3	4	5	6	7	8	9	10	11	12
O.Words i)	Good	0.1	2.4	17.4	26.6	24.6	13.9	5.8	5.0	1.9	1.9	0.5	0.1
	Poor	1.0	3.3	19.3	24.2	23.0	12.9	7.3	5.0	2.3	1.4	0.2	0.2
O.Words ii)	Good	0.1	2.4	18.2	28.2	23.7	13.9	4.7	4.9	1.8	1.6	0.5	0.1
	Poor	1.0	3.3	20.7	25.3	21.8	13.8	6.3	4.4	1.9	1.4	0.1	0.2
Wr.Words a)	Good	0.2	3.7	30.5	33.0	19.8	6.8	3.6	1.6	0.5	0.2	0.1	
	Poor	0.9	8.0	41.5	27.6	15.3	4.5	0.9	0.5	0.3	0.3	0.2	
Wr.Words b)	Good	0.2	3.8	29.7	33.5	19.8	6.9	3.0	2.1	0.6	0.2	0.1	
	Poor	1.0	8.3	40.8	26.9	15.3	4.3	1.8	1.0	0.2	0.3	0.2	
Wr.Pseudo-words 1)	Good	0.0	1.0	38.1	35.2	16.7	5.2	3.3	0.5				
	Poor	0.0	2.1	47.6	33.9	11.1	3.2	2.1	0.0				
Wr.Pseudo-words 2)	Good	0.0	0.6	38.9	33.3	18.3	5.0	3.3	0.6				
	Poor	0.0	1.0	36.7	40.8	15.3	4.1	2.0	0.0				

i) As spoken
ii) Plurals reduced

a) As written
b) As corrected and plurals reduced (excluding non-words)

1) All items
2) Acceptable items only

TABLE 54. SERIES I S-F TESTS : PERCENTAGE ITEMS AT EACH LENGTH

(i) WORDS

Test	Item length				Group Difference U
	Good		Poor		
	1-5	6+	1-5	6+	
Oral Words i)	1226	499	938	386	
ii)	1252	473	954	370	198 5 ns
Written Words a)	724	106	598	43	
b)	717	107	556	47	129 0 ns

i) As spoken
ii) Plurals reduced
a) As written (includes non-words)
b) Corrected and plurals reduced

(ii) PSEUDO-WORDS

Test	Item length				Group Difference U
	Good		Poor		
	1-4	5-8	1-4	5-8	
All items	156	54	158	31	182 5 ns
Acceptable only	131	49	77	21	202.5 ns

TABLE 55. SERIES I S-F TESTS GROUP DIFFERENCE IN LENGTH OF ITEMS PRODUCED

Test		Good	Poor	Group Difference U
O. Words	No. polysyllabic words	548	461	
	% polysyllabic words	31.8	34.8	215 ns
	Items > 4 syllables	15	4	
Wr. Words	No. polysyllabic words	158	90	
	% polysyllabic words	19.2	15.0	137 ns
	Items > 3 syllables	18	10	
Wr. Pseudo-words	No. polysyllabic words i)	34	22	
	% polysyllabic words i)	16.2	11.6	208 ns
	No. polysyllabic words ii)	29	17	
	% polysyllabic words ii)	16.1	17 4	185.5 ns

i) All items, excluding 35 unpronounceable items
ii) Acceptable items only

TABLE 56. SERIES I S-F TESTS SYLLABIC STRUCTURE OF OUTPUT

Test	No. responses Good	Poor	Group Difference U[1]
Oral Words	264	163	172.5
Written Words	55	22	121*

*$p < .05$

([1]Calculated using individual scores % responses < 25 per million)

TABLE 57. SERIES I S-F TESTS NUMBER OF WORDS PRODUCED WITH FREQUENCY OF OCCURRENCE LESS THAN 25 PER MILLION (THORNDIKE-LORGE GENERAL COUNT)

	Good	Poor
Acceptable Pseudo-words	147	79
Unacceptable Pseudo-words	25	61
Total	172	140
Acceptable Real words	33	19
Unacceptable Real words	5	30
Total	38	49
Total Acceptable items	180	98
Total Responses	210	189

TABLE 58 SERIES I S-F TESTS CLASSIFICATION OF WRITTEN PSEUDO-WORD RESPONSES

Test		All Ss	Good	Poor
Oral	3-letter	39	7	32
	4-letter	64	17	47
	5-letter	128	38	90
Written	3-letter	29	12	17
	4-letter	59	13	46
	5-letter	117	40	77

TABLE 59 SERIES II S-F TESTS NUMBER OF ERRORS AT EACH LENGTH ON LENGTH-RESTRICTED TESTS

	First letter given				Last letter given			
	No response	Letter incorrect	Non-word	Total	No response	Letter incorrect	Non-word	Total
Good	1	11	1	13	41	20	3	64
Poor	-	15	-	15	60	43	3	106
All Ss	1	26	1	28	101	63	6	170

TABLE 60. SERIES II S-F TESTS : ORAL LETTER-RESTRICTED ERRORS.

	First letter given			Last letter given		
	Error	Non-word	Total	Error	Non-word	Total
Good	25	1	26	28	12	40
Poor	40	4	44	64	24	88
All Ss	65	5	70	92	36	128

TABLE 61. SERIES II S-F TESTS : WRITTEN LETTER-RESTRICTED ERRORS.

	Type of error committed				
	(a)	(b)	(c)	(d)	(e)
Good	43.5	13.0	30.4	-	13.0
Poor	34.8	15.2	28.3	15.2	6.5
All Ss	37.7	14.5	29.0	10.1	8.7

(a) Letter used at beginning of word
(b) Letter used in middle of word
(c) Final sound correct but wrong last letter
(d) Letter not used
(e) Non-word response

TABLE 62 SERIES II S-F TESTS . ORAL LETTER-RESTRICTED TEST, LAST-LETTER GIVEN: INCORRECT USE OF THE DESIGNATED LETTER (% DIFFERENT ERROR TYPES).

Test	All Ss	Good	Poor
First-letter given	41	22	19
Last-letter given	88	42	46
Total	129	64	65

TABLE 63 SERIES II S-F TESTS DOUBLE USE OF DESIGNATED LETTER ON ORAL LETTER-RESTRICTED TEST

Test	Item length Good 1-5	Good 6+	Poor 1-5	Poor 6+		Group Difference U
Oral First-letter	182	56	180	60		205
Last-letter	171	26	149	28		175
All items	353	82	329	88		204 5
Written First-letter	201	38	218	18		120 5*
Last-letter	198	33	198	18		117 *
All items	399	71	416	36		101 **

*p < 05 (Plurals reduced under both conditions,
**p < 02 Spelling corrected for Written responses)

TABLE 64 SERIES II S-F TESTS LENGTH OF LETTER-RESTRICTED ITEMS, GOOD AND POOR READING GROUPS COMPARED

Test	% polysyllabic items Good	Poor	% polysyllabic items incorrect Good	Poor
Oral Length-Restricted	11.2	17.3	15 7(12 9)*	61.8(35 1)
Letter-Restricted	26 5	30.9	7 0(16.0)	16.3(25 0)
Written Length-Restricted	14 9	17 4	29.6(13 5)	46 3(29 2)
Letter-Restricted	21 3	15 5	2 0(13 8)	4 3(27.5)

*Comparison figures in parenthesis show % of all responses that were errors

TABLE 65 SERIES II S-F TESTS PERCENTAGE OF POLYSYLLABIC ITEMS ON RESTRICTED TESTS

Letter	S-F OUTPUT						S-C ERRORS					
	Oral		Written		Total output		Oral		Written		Total errors	
	Session1	Session2	Session1	Session2	Oral	Written	Session1	Session2	Session1	Session2	Oral	Written
a	79	65	39	53	144	92	2	3	3	-	5	3
b	70	56	38	34	126	72	26	22	4	5	48	9
c	55	54	37	36	109	73	23	19	-	1	42	1
d	40	40	31	28	80	59	7	7	-	3	14	3
e	42	57	34	42	99	76	1	-	-	-	1	-
f	49	47	28	38	96	66	2	3	-	4	5	4
g	33	37	25	29	70	54	7	17	1	2	24	3
h	29	28	27	32	57	59	5	1	1	4	6	5
ɪ	31	32	30	40	63	70	2	2	-	1	4	1
j	15	20	17	20	35	37	17	24	1	6	41	7
k	28	44	22	34	72	56	6	6	2	5	12	7
l	32	49	21	42	81	63	39	24	7	4	63	11
m	39	32	20	34	71	54	-	1	1	4	1	5
n	47	52	29	37	99	66	1	1	8	5	2	13
o	49	54	28	51	103	79	2	-	4	1	2	5
p	42	45	21	33	87	54	2	2	1	7	4	8
q	35	33	26	19	68	45	63	59	14	9	122	23
r	42	47	34	26	89	60	-	1	2	1	1	3
s	53	66	40	45	119	85	8	3	-	2	11	2
t	49	60	40	37	109	77	1	-	1	-	1	1
u	31	34	19	20	65	39	4	4	5	4	8	9
v	32	31	13	16	63	29	15	8	5	2	23	7
w	44	53	27	24	97	51	18	21	2	2	39	4
x	39	55	38	25	94	63	5	12	3	2	17	5
y	49	57	37	32	106	69	25	21	-	3	46	3
z	52	55	32	33	107	65	29	22	1	3	51	4

TABLE 66. SERIES I S-F AND S-C TESTS : OUTPUT AND ERROR TOTALS FOR EACH LETTER.

	S-C Oral Letters	S-C Written Letters
S-F Oral Letters	-.034	- 345
S-F Written Letters	-.266	-.532*

* $p < .01$

TABLE 67 SERIES I S-F TESTS CORRELATION BETWEEN LETTER RANKINGS FOR S-F OUTPUT AND S-C ERRORS

Test	No. items Good	Poor		Group Difference U
Oral Letters	29	159		92*
Written Letters	31	36		161.5
Oral Words	2	19		
Written Words	4	13		
Oral Pseudo-words	10	79		
Written Pseudo-words	11	20		
Oral Prose	-	12		
Written Prose	12	10		

* $p < 02$

TABLE 70. SERIES I S-C TESTS NUMBER OF SINGLE LETTER REVERSALS, GOOD AND POOR READING GROUPS COMPARED

Letter confused	Confusion errors b	d	g	p	q
b		82 (20)	1	7 (3)	-
d	42 (17)		3 (1)	9 (3)	-
g	3	6 (2)		-(2)	2 (2)
p	15 (4)	12 (3)	2 (9)		2 (6)
q	3	4	-(10)	103 (12)	

(Written totals in parenthesis)

TABLE 71 SERIES I S-C TESTS CONFUSIONS WITH THE LETTERS b,d,g,p,q (ALL TESTS)

Letter intended	Letter produced																								
	a	b	c	d	e	f	g	h	ı	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
a					3										2											
b				43												1									1	
c	1				1						29					1			10		1			1		
d		12					1									1										
e								1																		
f															1	1		1	1					1		
g			1							12	2						2							1	1	1
h					3										1						2					
ı	1				1			1																	1	
J							48		1		1									1	1					
k							3	1	1	1														2		1
l									63																1	
m														1												
n					1																1					
o	1		1																							
p		2															2									
q	1	3	1	4							2					103						1		7		
r													1													
s			9																							2
t						1																				
u	1			1											4										1	
v						12																	1	2	1	7
w								2							2			1				1			34	
x											2										1	1				13
y					2		1		1												36	2	4			
z																			9					43		

TABLE 68 (ı). SERIES I S-C TESTS : ORAL LETTERS CONFUSION MATRIX.

Letter intended	Letter produced																								
	a	b	c	d	e	f	g	h	ı	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
a					1		1								1											
b				10																						
c					1																					
d		2																		1						
e																										
f																		2	1	1						
g																	2			1						
h														5												
ı										2																
J							1		1											1					1	
k		1	3					1						1	1											
l									11																	
m														4	1											
n								4					8								1					
o	3																		1		2					
p		1					2				1						3	1								
q							10									12										
r														2	1											
s																										1
t											1															
u														1											8	
v					1							1								1			3			
w															1						1	1			1	
x			1				2				1											1				
y	1		1				1																			
z																			1					4		

TABLE 68(ıı). SERIES I S-C TESTS . WRITTEN LETTERS CONFUSION MATRIX.

Test	Good													Poor											
	b	d	g	p	q	n	u	s	z	t	f	ɪ	j	b	d	g	p	q	n	u	s	z	t	f	ɪ	j
Oral Letters			1	1	23			1	2				1	44	14	1	3	87	1		1	7	1			
Words	2													10	8		1									
Pseudo-words	5		1	4										24	29	8	18									
Prose														5	3		4									
Written Letters	2	1	2	1	9		1		(13)		1	1		8	1	(1)	5	13	1		1	1			1	1(4)
Words	1	1	1(1)											2	3	1(6)				1						
Pseudo-words	1	3	1(1)	5										1	6	1(1)	6(3)		1				(1)			
Prose	5	2		2(1)		1							(1)	3	3		3(1)									

(Figures in parenthesis indicate written reversals not involving another letter)

TABLE 69. SERIES I S-C TESTS : SINGLE LETTER REVERSALS.

Test	Error totals						Average errors/item					
	Good			Poor			Good			Poor		
	3	4	5	3	4	5	3	4	5	3	4	5
Oral Words	7	24	32	69	171	261	0.4	0.8	1.1	3.5	5.7	8.7
Written Words	17	28	38	32	77	99	0.9	0.9	1.3	1.6	2.6	3.3
Oral Pseudo-words	44	130	128	145	272	340	2.2	4.3	4.3	7.3	9.1	11.3
Written Pseudo-words	17	47	57	41	80	91	0.9	1.6	1.9	2.1	2.7	3.0

TABLE 72. SERIES I S-C TESTS : DISTRIBUTION OF ERRORS ACCORDING TO ITEM LENGTH (SESSIONS 1 AND 2 COMBINED).

	S-C Oral Letters	S-C Written Letters
S-F Oral Letters	-.034	-.345
S-F Written Letters	-.266	-.532*

*p < .01

TABLE 67. SERIES I S-F AND S-C TESTS : CORRELATION BETWEEN LETTER RANKINGS FOR S-F OUTPUT AND S-C ERRORS.

Test	No. items Good	Poor		Group Difference χ^2
Oral Letters	29	159		89.9**
Written Letters	31	36		0.4
Oral Words	2	19		13.8**
Written Words	4	13		4.8
Oral Pseudo-words	10	79		53.5**
Written Pseudo-words	11	20		2.6
Oral Prose	-	12		12.0**
Written Prose	12	10		0.2

*p < .05
**p < .001

TABLE 70. SERIES I S-C TESTS : NUMBER OF SINGLE LETTER REVERSALS, GOOD AND POOR READING GROUPS COMPARED.

Letter confused	Confusion errors b	d	g	p	q
b		82(20)	1	7(3)	-
d	42(17)		3(1)	9(3)	-
g	3	6(2)		-(2)	2(2)
p	15(4)	12(3)	2(9)		2(6)
q	3	4	-(10)	103(12)	

(Written totals in parenthesis)

TABLE 71. SERIES I S-C TESTS : CONFUSIONS WITH THE LETTERS b,d,g,p,q (ALL TESTS).

Test	All Ss			Good			Poor		
	3-letter	5-letter	7-letter	3-letter	5-letter	7-letter	3-letter	5-letter	7-letter
Reading	105	217	318	18	19	41	87	198	277
Copying : L	13	32	60	3	6	25	10	26	35
D	10	27	47	3	7	20	7	20	27
L+L	14	31	60	5	12	28	9	19	32
D+L	14	47	41	6	13	20	8	34	21
Total	51	137	208	17	38	93	34	99	115
Spelling : L	53	186	267	12	50	110	41	136	157
D	47	161	241	8	51	79	39	110	162
L+L	51	162	256	13	45	96	38	117	160
D+L	46	144	225	8	44	74	38	100	151
Total	197	653	989	41	190	359	156	463	630

TABLE 73. SERIES II S-C TESTS : ERRORS COMMITTED AT EACH LENGTH UNDER EACH CONDITION.

Test	Good 3-letter	Good 5-letter	Good 7-letter	Poor 3-letter	Poor 5-letter	Poor 7-letter
Reading	23.1	24.4	52.6	15.5	35.2	49.3
Copying*	8.8	17.7	73.6	14.1	36.6	50.0
Spelling*	7.0	29.1	64.0	12.3	40.7	47.0

(*Line-only condition only)

TABLE 74. SERIES II S-C TESTS : PROPORTION OF ERRORS AT EACH ITEM LENGTH.

Test	Good First letter given	Good Middle letter given	Good Last letter given	Poor First letter given	Poor Middle letter given	Poor Last letter given
Copying: L+L	17	14	15	20	17	23
D+L	12	17	10	23	19	21
Spelling: L+L	49	66	39	104	116	95
D+L	41	53	32	95	107	87

TABLE 76. SERIES II S-C TESTS : ERRORS WHEN LETTER PROVIDED: COMPARISON OF READING GROUPS AND LETTER POSITIONS.

Tests compared	3-letter	5-letter	7-letter
Reading - Copying	.076	.276	.170
Reading - Spelling	.449**	.306*	.435**
Copying - Spelling	.107	.363*	.466**

*$p < .05$
**$p < .01$

TABLE 77. SERIES II S-C TESTS : CORRELATION BETWEEN NUMBER OF ERRORS MADE WITH WORDS UNDER DIFFERENT CONDITIONS.

(i) Good readers

Test	First letter given			Middle letter given			Last letter given		
	3-letter	5-letter	7-letter	3-letter	5-letter	7-letter	3-letter	5-letter	7-letter
Copying L+L	3	2	11	1	5	8	1	5	9
D+L	-	6	6	5	3	9	1	4	5
Spelling L+L	2	13	34	8	23	35	3	9	27
D+L	3	14	24	3	18	32	2	12	18

(ii) Poor readers

Test	First letter given			Middle letter given			Last letter given		
	3-letter	5-letter	7-letter	3-letter	5-letter	7-letter	3-letter	5-letter	7-letter
Copying L+L	4	7	9	3	5	9	2	7	14
D+L	2	13	8	3	10	6	3	11	7
Spelling L+L	16	33	55	12	46	58	10	38	47
D+L	12	31	52	17	37	53	9	32	46

TABLE 75. SERIES II S-C TESTS : POSITIONAL EFFECTS OF SUPPLYING LETTERS (ERROR SCORES).

Test	Average time per S				Average errors per S			
	Session1		Session2		Session1		Session2	
	Horiz.	Vert.	Horiz	Vert	Horiz.	Vert.	Horiz.	Vert.
Oral Letters	125.3	139.5	126.2	112.4	8.2	9.7	9.2	7.3
Written Letters	394.1	403.8	325.6	421.3	7.0	2.4	3.1	6.0
Oral Words	68.3	86.7	65.2	62.0	6.9	7.6	8.0	6.5
Written Words	305.6	273.2	257.1	308.5	4.3	2.7	3.6	4.3
Oral Pseudo-words	107.6	122.0	93.4	96.4	13.4	13.1	14.2	13.6
Written Pseudo-words	317.8	298.5	292.1	325.3	5.1	3.4	4.2	4.1

TABLE 79. SERIES I S-C TESTS : EFFECTS OF HORIZONTAL/VERTICAL PRESENTATION (ALL SS).

		Reading	Copying	Spelling
5-letter items	monosyllabic	6 3	3 4	18 7
	2 syllables	5 5	4 7	17 0
7-letter items	monosyllabic	10 0	5 7	29 3
	2 syllables	7 3	6 2	25 2
	3 syllables	9 1	5 4	27 9

TABLE 78 SERIES II S-C TESTS AVERAGE NUMBER OF ERRORS/WORD FOR MONO- AND POLY- SYLLABIC 5- AND 7- LETTER WORDS (ALL Ss)

Test		% errors corrected Good	Poor
Oral Length-Restricted	3-letter	0 0	3 1
	4-letter	5 9	4 3
	5-letter	2 6	1 1
	Total	3 2	2 4
Oral Letter-Restricted	First given	23 1	6 7
	Last given	4 7	0 0
	Total	7.8	0 8
Written Length-Restricted	3-letter	16 7	29 4
	4-letter	23 1	13 0
	5-letter	32 5	6 5
	Total	27.7	11 4
Written Letter-Restricted	First given	30 8	20 5
	Last given	17 5	8 0
	Total	22 7	12 1

TABLE 82 SERIES II S-F TESTS ERROR CORRECTION RATES ON RESTRICTED TESTS, GOOD AND POOR READING GROUPS COMPARED

Test	Average time per S				Average errors per S			
	Session1		Session2		Session1		Session2	
	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.
Oral Letters	107.8	124.4	112.1	103.5	6.2	4.2	4.5	5.9
Written Letters	352.5	372.2	318.8	353.6	2.8	1.6	2.7	6.2
Oral Words	30.1	35.9	31.9	29.0	2.0	1.0	1.8	1.6
Written Words	263.2	238.8	212.9	212.7	2.2	1.7	2.3	2.1
Oral Pseudo-words	66.0	73.4	58.4	61.0	8.4	6.4	6.2	9.2
Written Pseudo-words	263.1	257.6	247.1	258.2	3.5	2.4	2.7	3.5

TABLE 80. SERIES I S-C TESTS : EFFECTS OF HORIZONTAL/VERTICAL PRESENTATION (GOOD READERS).

Test	Average time per S				Average errors per S			
	Session1		Session2		Session1		Session2	
	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.
Oral Letters	144.8	154.5	140.3	122.3	10.4	15.2	13.8	8.9
Written Letters	435.6	434.8	332.3	489.1	11.1	3.1	3.5	5.7
Oral Words	110.8	137.6	98.5	98.6	12.3	14.1	14.1	11.9
Written Words	374.3	307.6	301.2	404.2	5.9	3.6	4.9	6.4
Oral Pseudo-words	153.8	170.7	128.3	135.8	19.0	19.7	22.2	18.6
Written Pseudo-words	372.6	339.4	337.1	392.4	6.7	4.3	5.6	4.6

TABLE 81. SERIES I S-C TESTS : EFFECTS OF HORIZONTAL/VERTICAL PRESENTATION (POOR READERS).

Test	% Errors corrected Good	Poor	Group difference U
Oral Letters	26 9 (20)	13 4 (19)	117 5*
Written Letters	34 1 (17)	17 5 (20)	124
Oral Words	18 8 (15)	4.2 (19)	174***
Written Words	71.1 (18)	37.5 (20)	101.5**
Oral Pseudo-words	7 6 (20)	2.1 (19)	120 5*
Written Pseudo-words	58.7 (18)	50.5 (20)	168
Oral Prose	16 3 (13)	9.5 (19)	130 5
Written Prose	56.4 (20)	32.3 (20)	143 5

*p < 05
**p < 025
***p < .01

TABLE 83. SERIES I S-C TESTS PERCENTAGE ERRORS CORRECTED, GOOD AND POOR READING GROUPS COMPARED

Test		% Errors corrected Good	Poor	Group difference U
Reading		32 1 (18)	8.5 (20)	127
Copying	L	67.7 (16)	62 0 (19)	105
	D	70 0 (16)	79.6 (19)	96.5*
	L+L	60.0 (16)	56.7 (18)	180 5
	D+L	87.2 (16)	66 7 (20)	146.5
Spelling	L	16 3 (20)	3.9 (20)	132.5*
	D	14.5 (20)	5.5 (20)	150**
	L+L	9 7 (20)	4.4 (20)	98
	D+L	18 3 (20)	4 5 (20)	74 5***

*p < 05
**p < 01
***p < 001

TABLE 84 SERIES II S-C TESTS PERCENTAGE ERRORS CORRECTED, GOOD AND POOR READING GROUPS COMPARED

Test	All Ss			Good			Poor		
	3-letter	5-letter	7-letter	3-letter	5-letter	7-letter	3-letter	5-letter	7-letter
Reading	15.2	10.6	10.7	33.3	31.6	31.7	11.5	8.6	7.6
Copying: L	69.2	62.5	63.3	100.0	50.0	68.0	60.0	65.4	60.0
D	100.0	70.4	74.5	100.0	85.7	60.0	100.0	65.0	85.2
L+L	71.4	67.7	50.0	80.0	75.0	50.0	66.7	63.2	50.0
D+L	78.6	72.3	75.6	100.0	92.3	80.0	62.5	64.7	71.4
Total	78.4	68.6	64.4	94.1	74.0	63.4	70.6	64.7	65.2
Spelling: L	20.8	8.6	5.2	41.7	20.0	11.8	14.6	4.4	0.6
D	27.7	9.3	3.7	50.0	17.7	8.9	23.1	5.5	1.2
L+L	23.5	6.2	2.9	53.9	8.9	4.2	13.2	5.1	1.9
D+L	23.9	7.6	6.2	37.5	20.5	14.9	21.1	2.0	2.0
Total	23.9	7.9	4.5	46.3	16.8	9.8	18.0	4.3	1.4

TABLE 85. SERIES II S-C TESTS : PERCENTAGE ERRORS CORRECTED AT EACH LENGTH UNDER EACH CONDITION.

Test		First letter given 3-letter	5-letter	7-letter	Middle letter given 3-letter	5-letter	7-letter	Last letter given 3-letter	5-letter	7-letter
Good Readers	Copying: L+L	100.0	50.0	36.4	0.0	60.0	50.0	100.0	100.0	66.7
	D+L	-	100.0	66.7	100.0	100.0	88.9	100.0	75.0	80.0
	Spelling: L+L	0.0	7.7	8.8	62.5	13.0	2.9	66.7	0.0	0.0
	D+L	66.7	21.4	0.0	0.0	22.2	12.5	50.0	16.7	38.9
Poor Readers	Copying: L+L	75.0	71.4	66.7	66.7	60.0	55.6	50.0	57.1	35.7
	D+L	50.0	76.9	87.5	66.7	60.0	83.3	66.7	54.6	42.9
	Spelling: L+L	12.5	6.1	0.0	16.7	0.0	0.0	10.0	10.5	6.4
	D+L	25.0	0.0	1.9	23.5	5.4	1.9	11.1	0.0	2.2

TABLE 86. SERIES II S-C TESTS : PERCENTAGE ERRORS CORRECTED UNDER CONDITIONS WITH ONE LETTER GIVEN, GOOD AND POOR READING GROUPS COMPARED.

Test	Good Readers Letter-by-letter	Whole items	Several items together	Poor Readers Letter-by-letter	Whole items	Several items together	Group Difference χ^2
Words	3	20	17	27	13	-	47.68*
Pseudo-words	6	30	4	30	10	-	30.00*
Prose	-	1	19	12	4	4	23.58*

*$p < .001$

TABLE 88. SERIES I S-C WRITTEN TESTS : SS' WRITING AND LOOKING BEHAVIOUR, GOOD AND POOR READING GROUPS COMPARED.

Test	Good: First letter given	Good: Middle letter given	Good: Last letter given	Poor: First letter given	Poor: Middle letter given	Poor: Last letter given
Copying: L+L	47.1	50.0	80.0	20.0	58.8	43.5
D+L	83.3	94.1	80.0	78.3	68.4	52.4
Spelling: L+L	8.2	13.6	5.1	3.9	1.7	8.4
D+L	12.2	15.1	31.3	4.2	6 5	2.3

TABLE 87. SERIES II S-C TESTS : PERCENTAGE ERRORS CORRECTED: GROUPS AND GIVEN-LETTER POSITIONS COMPARED

Test	No.Ss Good	No.Ss Poor	Group Difference χ^2
Letters	18	25	2.46
Words	18	21	0.45
Pseudo-words	12	21	4.18*
Prose	11	11	0.0

*$p < .05$

TABLE 89. SERIES I S-C TESTS : SS USING OVERT VOCAL BEHAVIOUR WHILST COPYING.

Test	No. Ss Good	No. Ss Poor
Letters	8	15
Words	3	5
Pseudo-words	2	5
Prose	2	4

TABLE 90. SERIES I S-C TESTS : SS USING A FINGER GUIDE WHILST COPYING.

Test	Omissions Good	Omissions Poor	Insertions Good	Insertions Poor
Oral Letters	27	47	6	10
Written Letters	60	133	66	115
Oral Words	1	10	1	-
Written Words	1	44	1	3
Oral Pseudo-words	-	1	-	-
Written Pseudo-words	7	38	1	2
Oral Prose	12	30	9	11
Written Prose	9	97	6	3

TABLE 91 SERIES I S-C TESTS NUMBER OF WHOLE-ITEM OMISSIONS AND INSERTIONS, GOOD AND POOR READING GROUPS COMPARED

Test		Session 1	Session 2
Oral Letters		103 5*	127 5**
Written Letters		119	95
Oral Words		157 5**	124 5*
Written Words	i	49 5***	97 5***
	ii	42 5***	99
Written Pseudo-words	i	135 5**	
	ii	111 5	

* p < 05
** p < 02
*** p < 002

i) All items
ii) Acceptable items only

TABLE 92 SERIES I S-F TESTS SEX DIFFERENCES IN OUTPUT (MANN-WHITNEY)

Test	Speed Session1	Speed Session2	Accuracy Session1	Accuracy Session2
Oral Letters	127.5	127.5	149	162.5
Written Letters	96 **	115 *	184	111.5**
Oral Words	136	137	124 *	146
Written Words	116 *	90 **	83 ***	104 **
Oral Pseudo-words	154.5	160	158.5	177
Written Pseudo-words	96 **	79 ***	123 *	120 *
Oral Prose	138		130	
Written Prose	79 ***		104 **	

*p < .05
**p < .02
***p < .002

TABLE 93. SERIES I S-C TESTS : SEX DIFFERENCES IN PERFORMANCE SPEED AND ACCURACY (MANN-WHITNEY).

Test	Speed	Accuracy
Oral Unrestricted	188	-
Length-Restricted	203	166
Letter-Restricted	155	154
Written Unrestricted	57**	123.5*
Length-Restricted	122*	175.5
Letter-Restricted	187	141

*p < .05
**p < .002

TABLE 94. SERIES II S-F TESTS : SEX DIFFERENCES IN SPEED AND ACCURACY (MANN-WHITNEY).

Test	Speed	Accuracy
Reading	161	108.5**
Copying: L	140	126.5*
D	122.5*	194.5
L+L	125 *	148
D+L	122 *	180.5
Spelling: L		102.5*
D		128.5
L+L		145.5
D+L		149

*p < .05
**p < .02

TABLE 95. SERIES II S-C TESTS : SEX DIFFERENCES IN PERFORMANCE SPEED AND ACCURACY (MANN-WHITNEY).

Test	Ss using finger guide. Good Girls	Poor Girls	Good Boys	Poor Boys	Ss using overt vocal behaviour Good Girls	Poor Girls	Good Boys	Poor Boys	Sex Difference χ^2
Letters	6	8	2	7	9 (37.5)*	6 (37.5)	9 (56.3)	19 (79.2)	8.50*
Words	3	4	-	1	7 (29.2)	3 (18.8)	11 (68.8)	18 (75.0)	18.06**
Pseudo-words	2	4	-	1	4 (16.7)	6 (37.5)	8 (50.0)	15 (62.5)	8.72*
Prose	2	2	-	2	5 (41.7)	3 (37.5)	6 (75.0)	8 (66.7)	3.64
All tests	13	18	2	11	27	18	34	60	

(* % group using overt vocal behaviour on each test)

*p < .01
**p < .001

TABLE 96. SERIES I S-C TESTS : SEX DIFFERENCES IN USE OF FINGER GUIDE AND OVERT VOCAL BEHAVIOUR ON COPYING TESTS.

CHAPTER EIGHT

DETAILED ANALYSIS OF ERRORS

8.1 INTRODUCTION

This chapter discusses a graphical and grammatical analysis, as appropriate, of the error data recorded on certain Series I and II tests. The analysis consists of three main sections, as outlined in Section 5.4. The data to be presented in Sections 8.2 and 8.3 is to be compared with the findings reported by Livingston (1961) given in Appendix B. That in 8.4 involves a grammatical analysis of errors made in dealing with continuous prose. Whilst omissions have been included in the whole-item error totals throughout this study, due to the fact that oral omissions may be due to a preference for not responding rather than to carelessness, the omission data were nevertheless insufficient to permit analysis in terms of non-response tendencies according to the stages outlined by Biemiller (1970) and others (some attempt at gauging non-response preferences has been made with regard to S-F Restricted test performance as reported in 6.4).

8.2 COPYING ERRORS WITH ISOLATED WORDS, PSEUDO-WORDS AND PROSE (SERIES I)

In her 1961 study, Livingston included a transcription test for comparison with the Spelling error data. She comments that "Here the characteristic errors of the individual child will probably be discerned " (p.164). Thus far, analysis of data from the present study has suggested that the overall number of mistakes made whilst copying is to some extent an arbitrary feature of performance, that is to say, a much less accurate guide to verbal 'competence' than the number of mistakes a child makes in reading or spelling (although it is appreciated that a child who copies inaccurately as a result of a careless attitude to the task may be

hindering his progress in other areas). However, the somewhat random quantitative aspect of copying errors may not be reflected in a detailed qualitative analysis of the types of mistakes made. Although Livingston argues that consistent differences between children will be revealed by the latter, she only presents the data for her sample as a whole. In the results to be presented here the stability of error proportions for three types of material is examined (real words in isolation and in context, and pseudo-words), and some estimation of the 'characteristic' nature of these errors made by division of the sample into Good and Poor reading groups.

Comparison of data for All Ss

Tables 97 and 98 present the error totals and error proportions respectively for all Ss on the Series I Written S-C tests. The results show that, with regard to the two main error categories (Confusions/ Substitutions and Omissions), there is a clear difference between the types of intra-word error made with isolated items and items in context. Thus the percentages for the Words and Pseudo-words tests bear much greater similarity than for the two real words tests (this may be gauged in a rather crude fashion by summing the differences between the percentages recorded for each error category). The relative numbers of single-letter substitutions on the three tests gives more general support to the selective single-letter reversal data reported previously. On the other hand, there is greater similarity between the real words tests with regard to Insertion errors. The small number of errors recorded in the remaining categories precludes useful test comparisons.

Of the three present study distributions, that for the Prose test bears most similarity to that reported by Livingston (also using text). Considerable differences do remain, although the order of the categories is the same with the exception of the greater contribution of Transposition

errors to the present study total - this may be due to the participation of younger children (Livingston's Ss were aged 9-10 years). This fact also accounted for the need of the 'Unclassified' category in the present study. Other reasons for differences in the results may relate to differences in E's scoring, although every attempt was made to equate the studies with regard to this, the relative differences in the difficulty of the test material, and the fact that performance was timed in the present study.

Comparison of Good and Poor readers

Tables 99 and 100 present the data for the Good and Poor reading groups separately. It can be seen that a larger number of type (b) errors (that is, errors involving an entire syllable rather than a single letter) were made by the Poor readers. The tendency for the Prose test to be the 'odd one out' seems slightly greater for the Poor than for the Good readers, and the greatest difference between the groups appears to be on the Words test, as was previously indicated by the whole-item analysis. On this test the skills of the Good readers are most beneficial to performance accuracy; on the Pseudo-words test their knowledge of word form - whether the response 'looks correct' - was of less use, and on the Prose test their anticipations often led to error - this being particularly reflected in an increase of type (b) mistakes.

8.3 ERRORS IN FREE-WRITING, COPYING AND SPELLING TO DICTATION (SERIES II)

Involving the use of isolated words only, the Series II results enable comparison to be made between error distributions under three conditions : free-writing, copying and spelling to dictation. The major comparison will involve the Unrestricted S-F and 'Line-only' Copying and Spelling conditions, but results from other experimental conditions are also considered. It may be noted that the Homonym category is inapplicable to the S-F analysis, and the attempted elimination of words with homonyms from the S-C tests resulted in the redundancy of this category for the Copying

and Spelling tests also. All results are presented for the sample as a whole, and also for the Good and Poor readers separately to see whether certain errors were disproportionately characteristic of one of the groups. Although Livingston's error classification system was again used, and comparisons made with her data, certain points should be noted. Firstly, the Copying errors registered by Livingston, as indicated in the previous section, were from administration of a Prose test rather than the vocabulary test used in this part of the present study. Secondly, her assignment of Ss to Good and Poor groups for the Spelling test analysis was made on the basis of Spelling (Orthographic) Age scores rather than the Reading Age grouping used in the present experiment. Furthermore, her Good-Poor comparison only utilized data from children with high or low Orthographic Ages (10.0 - 13.6 years and 6.10 - 8.3 years), that of children between these sections (about 50% of the sample) being omitted. This contrasts with the procedure used here in which all Ss were included in any Good-Poor comparison. Thirdly, it was decided in the present study not to reject any papers from the poorest Ss, although it is acknowledged that some of the words employed might not have been familiar to some Ss in their written form. However, none of the Ss were unable to attempt the tests and all data was retained, although this meant the assignment of a larger proportion of errors to the Unclassifiable category.

Written S-F errors

Tables 101 and 102 give, respectively, the absolute numbers and proportions of errors made on the three S-F tasks. As noted for the whole-item analysis, imposition of length or letter restrictions increased the number of spelling errors made, although not all error categories are involved. The most important general increase under restricted conditions is in the type (b) Confusion/Substitution errors; the two main test-specific effects are an increase in Omission errors on the Length-Restricted task and of Unclassifiable errors under Letter-Restricted conditions. There was,

however, a reduction of Doubling errors under Length restrictions.

Data for the Good and Poor reading groups separately (Tables 103 and 104) may suffer some distortion of error category percentages due to the relatively low error totals, particularly for the Good group. However, it is apparent that the error proportions for the two groups show greater similarity under the Restricted than under the 'normal'(Unrestricted) writing condition. The difference between the groups on the latter test is chiefly confined to the greater number of Confusion errors made by the Poor readers. Bearing in mind the caution given above, a surprisingly high proportion of the Good readers' errors were due to doubling mistakes, although in terms of absolute numbers the Poor group made more of these errors. Overall, there was a tendency for the Poor readers' error proportions to show more inter-test similarity than those of the Good readers, which may be a reflection either of their lesser adaptation to the demands of the restricted tasks or of the more fundamental nature of the errors they commit.

S-C Copying errors

Tables 105 and 106 reflect the whole-item error findings that only the Dashed-line condition reduced copying mistakes, affecting the number of single-letter Confusions and Omissions. The rise in Double-for-Single errors under the two letter-given conditions was almost entirely the result of Ss repeating the letter provided, particularly when the latter was in the middle of the word. There is a slight consistent tendency for the 'abnormal' conditions to reduce Insertion and Transposition errors, but the very small number of errors involved precludes the attachment of significance to these observations. There was no significant tendency for the different conditions to have consistent and equal effects, relative to one another, on all error categories (Friedman, $\chi r^2 = 4.55$, ns.df = 3).

Comparison of the Line-only proportions with those obtained for the Series I Isolated Words test (Table 98) shows some quite considerable dis-

tribution differences. These chiefly involve the relative proportions of single-letter Confusions and Omissions, and to a lesser extent single-letter Transpositions. The increase in Omission and Transposition errors for the Series II task may be in part a reflection of the use of some longer words. However, it cannot be ascertained from these results whether the bulk of the discrepancy arises from the involvement of different children in the two Series who nevertheless have individually consistent tendencies to make errors of a particular type, or from a general randomness with regard to Copying errors such that a tendency to be meticulous or careless may be a consistent characteristic of children but not any proneness to certain types of mistake.

Tables 107 and 108 present Good and Poor group results. The absolute error totals confirm the whole-item findings that the group difference is greatest under the Line-only condition and that provision of length and letter 'markers' hinders the fluency and accuracy of the Good readers but improves the accuracy of Poor readers. The most obvious group difference to emerge is that Omission errors were more common than Confusions for the Good group under two conditions. The Series I and II differences noted above are magnified in the separate reading group figures (Tables 100 and 108), and it seems more judicious to accept that the errors a child makes when copying may have only limited value as a source of qualitative information about the problems he has generally in dealing with verbal material.

S-C Spelling errors

Finally, the detailed error analysis is presented for the Spelling test data (Tables 109 and 110). Provision of a Dashed-line, whilst reducing whole-item errors (Table 45), increased the average number of intra-item mistakes made in those responses that were incorrect. However, both dashed-line conditions reduced single-letter and syllable omissions, whilst the number of Confusion errors was reduced under the 'Line+Letter' conditions (this improvement was lost when the letter clue was combined

with a dashed line). There was a tendency for the dashed-line conditions to increase Transposition and Perseveration errors, and for the letter-given conditions to affect Doubling mistakes. Overall, a comparison of the different response conditions showed that they did not have a consistent effect, relative to one another, on all types of error (Friedman χ_r^2 = 2.16, n.s. df=3), but rather affected the various categories differentially.

Separation of results for Good and Poor readers (Tables 111 and 112) shows that under normal condition a higher proportion of the Good readers' errors involved omission or insertion rather than the confusion of single letters, whilst the position is reversed for Poor readers. The least difference between the groups occurs for Doubling errors, and the greatest for syllable Confusions and Unclassifiable responses. The differences in group totals is greatest under the Dashed-Line + Letter condition, which registered the largest error decrease for both groups but particularly by the Good readers, although comparison of the error proportions within each error category show the least group differences in percentages under the Dashed-Line condition.

Comparison of 'normal' conditions

Table 113 compares the error proportions recorded for the three 'normal' conditions (Written S-F Unrestricted, and Copying and Spelling 'Line-only' tests). The main difference between the tests lies in the much greater difference between Confusion and Omission error proportions on the S-F and Spelling tests compared to that on the Copying test. Otherwise, the only notable difference is the increased proportion of Transposition errors on the Copying task : this may be due to this being the only test on which S does not necessarily hear the words 'spoken' - either covertly by himself or overtly by E. It seems correct to attribute the higher proportion of Doubling errors on the S-F task to the fact that only two of the words in the S-C lists contained a double letter, and thus the experimental design acted to eliminate this type of mistake. Taking the summed differences

between percentages for each category, the S-F error distribution was, as hypothesized in Chapter Five, closer to that of the Spelling test than that of the Copying test. However, there was even less difference between the Copying and Spelling distributions, presumably this relates to the same words being used in these two tests, and may be connected with factors concerning S's familiarity with the written form of the items involved. Comparing Copying and Spelling performance there is general agreement between Livingston's results and those of the present study with regard to which of the two tests provides the higher proportion of errors in each category; the only discrepancy concerns Doubling errors, Livingston reporting a higher percentage for Spelling and the present study for Copying, although the difference between the tests in respect of this category is only slight. Differences in Doubling error proportions may be explained as above. Overall, the present study found Confusion errors more common and Insertion errors less common, with respect to Livingston's distributions, and these differences may possibly be attributable to the CA difference between the two samples of children involved.

The picture presented by the whole sample figures is not, however, duplicated in those for the Good and Poor groups taken separately, as shown by Tables 114 and 115. The most obvious finding is that there was much greater variability in the Confusion and Omission error proportions of Good readers than of Poor readers on the different tests. General differences between the groups centre around the higher proportion of Confusion errors recorded by the Poor readers and of Insertion errors by the Good readers. The higher S-F proportion of Doubling errors noted above is a feature of the performance of both groups, whilst the increased percentage of Transposition errors on the Copying test is entirely attributable to the Poor readers. Of the three tests, the group difference in error distribution is far greater under Copying than under either of the other two performance situations.

The conclusions tentatively drawn from these results are as follows. The findings question Livingston's conclusion that the difference in Confusion and Omission error proportions under Copying and Spelling conditions are "probably not very important" (p.181). Rather, a Good-Poor group breakdown suggests that variation of the relative frequency of different errors with the nature of the task is more a feature of the Good readers than of the Poor readers' performance. Consequently, the conclusions drawn in 8.2 that Copying errors should not be taken as an accurate indication of the child's basic problems may now be slightly modified : it would seem that, whilst the Copying error distribution of Good readers is to some extent rather arbitrary, that produced by the Poor readers may be a reasonably accurate reflection of the problems these children have in their free writing.

8.4 GRAMMATICAL AND GRAPHIC SIMILARITY OF REAL-WORD SUBSTITUTION ERRORS ON PROSE TESTS (SERIES I)

Although the majority of tests employed in the present study did not involve the use of contextual information in task completion, the Series I Prose tests permit an analysis of errors in terms of grammatical and graphic similarity to the miscalled stimulus word. Thus all errors on these tests that were other real words were first categorized as to whether they were of the same or different part of speech as the stimulus (only those Written errors where an entire incorrect word was produced could be included, although it is realized that many more errors of this type were noticed before the whole word had been written). Within the former group a further distinction was made between words of 'good' and 'poor' fit, the former referring to substitutions both syntactically and semantically acceptable in the context of the phrase or sentence (for example: 'exciting' for 'easy' in Passage 2 was classed as a good fit; 'win' for 'wait' in Passage 2 was classed as a poor fit). Secondly, errors were examined for their graphic similarity to the stimulus. Decisions were made according to the somewhat crude criterion of whether or not the stimulus and error shared the same initial letter;

however, this method has been used by others, who have found first-letter correspondence to be highly associated with other correspondences between the error and stimulus (Biemiller 1970, Weber 1970). Thirdly, the number of errors corrected was recorded.

65.0% of Oral and 11.4% of Written Prose errors were included in this analysis, there being no difference between the reading groups in these percentages. Table 116 gives the figures for grammatical and graphic similarity, and certain differences may be observed between the Good and Poor reading groups. Firstly, a significantly greater proportion of the Good than of the Poor readers' errors were of the same part of speech as the stimulus (85.2% : 52.5%, $\chi^2 = 10.06$ $p < 0.1$). This difference was non-significant for Copying performance. Secondly, there was no difference between the groups in the proportion of same-part errors falling in the good and poor fit categories, but there were differences in the graphic similarity of errors according to grammatical fit, as shown in Table 117. The Good readers made no different-part errors that were not graphically constrained by the stimulus, whereas a few of the Poor readers' Oral responses were neither grammatically nor graphically similar to the stimulus. A very much lower proportion of the Good than of the Poor readers' 'good fit' responses were also graphically similar (Oral: $\chi^2 = 8.32, p < .01$; Written. $p = .036$ using Fisher Exact Probability test), although there was no significant group difference on this measure for 'poor fit' errors. Within the reading groups there was a significant difference between the number of 'good fit' and 'poor fit' errors that were graphically similar to the stimulus for the Good readers (Oral. $\chi^2 = 5.09, p < .05$; Written: $p = .048$) but not for the Poor readers. Overall, only a few of these errors were corrected by Ss, and this precluded the emergence of any significant differences between the groups on this measure, although it was shown in 7.6 that, taking all errors made, the Oral Prose test was the only one on which the Good readers' correction rate was not significantly higher than that of the Poor readers.

8.5 SUMMARY

The results presented in Chapter Eight give some indication of specific performance differences between Good and Poor readers at the early Junior level. Series I Written S-C data indicated certain differences in error distribution for the copying of isolated items and items in context, and whilst this may have been due in part to the use of words having a greater range of item length in the latter case, the fact that the percentage differences were caused both by an increase in Omissions and a drop in Confusions supports an explanation of the data in terms of the presence or absence of contextual information. Whilst this pattern is more or less replicated for both reading groups, the group difference in error totals, as for the whole-item error analysis, was greatest on the Isolated Words test. These results suggest that it is in the use of graphemic and phonemic skills rather than of contextual information that the Poor readers' deficiency is greatest. The fact that differences were less when dealing with isolated pseudo-words than with real words suggests further, however, that the Good readers' main advantage may be in their more highly developed knowledge of the visual forms of words. This is also manifest in the Written S-F Restricted data (Series II) in which the Omissions category becomes the largest for the Poor group, indicating their difficulty in making correct projected matches of word length or letter structure.

Livingston concluded that Good and Poor spellers made different amounts, but basically similar proportions, of the different types of error, and the present study reports a similar finding for a comparison of Good and Poor readers' S-F Unrestricted and Spelling performances, with the qualification that Poor readers made many more type (b) errors, particularly within the Confusion/Substitution category. Generally, the error distributions produced by Good readers varied more under the different performance conditions (free writing, copying and spelling to dictation). The similarity of error proportions produced by Poor readers on these tests supports the

idea expressed elsewhere that the development of copying skills may be a useful intermediate step in the development of the free writing skills of the Poorer Ss, as this may prove much the easier situation in which to eliminate mistakes.

Although the results reported in 8.2 showed the reading groups closer together when contextual cues were available, the grammatical analysis of both Oral and Written Prose data made in 8.4 indicated group differences in the use of this type of information. The Good readers apparently made more successful use of contextual cues in reading, as indicated by the fact that a higher proportion of their errors were of the same part of speech as the miscalled word, although their relative use of contextual/syntactic cues as compared to graphical cues may not have been higher. The fact that a lower percentage of their same-part errors were graphically similar to the stimulus, and that every one of their different-part errors was graphically constrained, suggests that the Good readers were able to make better collaborative use of these two sources of information. The amount of appropriate data obtained was not sufficient to permit a valid analysis of non-response or error-correction tendencies.

Overall, therefore, the results relating to the reading and writing of different types of verbal material, and to the ability to conform to structural constraints or utilize structural cues, indicate that the Poor readers needed greatest assistance in drawing their attention to the visual forms of words. It is suggested that visual and motor knowledge of sequential probabilities may be established better through the encouragement of accurate copying of material than of unavoidably inaccurate 'creative writing' which may not only fail to establish correct habits but also be responsible for the overlearning of incorrect behaviours.

	(a) Words	(a) Pseudo-words	(a) Prose	(b) Words	(b) Pseudo-words	(b) Prose	Total Words	Total Pseudo-words	Total Prose
Confusions	156	175	122	13	4	11	169	179	133
Omissions	42	50	81	7	4	15	49	54	96
Insertions	19	36	19	-	1	-	19	37	19
Single for Double	3	3	2						
Double for Single				11	7	10	14	10	12
Transpositions	6	7	18	2	-	3	8	7	21
Homonyms							-	1	-
Perseverations							4	4	3
Unclassified							5	5	2
						Totals:	268	297	286

TABLE 97. SERIES I S-C TESTS : CLASSIFICATION OF WRITTEN ERRORS (ALL SS): ERROR TOTALS.

	(a) Words	(a) Pseudo-words	(a) Prose	(b) Words	(b) Pseudo-words	(b) Prose	Total Words	Total Pseudo-words	Total Prose
Confusions	58.2	58.9	42.7	4.9	1.4	3.9	63.1	60.3	46.6
Omissions	15.7	16.8	28.3	2.6	1.4	5.2	18.3	18.2	33.5
Insertions	7.1	12.1	6.6	-	0.3	-	7.1	12.4	6.6
Single for Double	1.1	1.0	0.7						
Double for Single				4.1	2.4	3.5	5.2	3.4	4.2
Transpositions	2.2	2.4	6.3	0.8	-	1.1	3.0	2.4	7.4
Homonyms							-	0.3	-
Perseverations							1.5	1.4	1.1
Unclassified							1.9	1.7	0.7

TABLE 98. SERIES I S-C TESTS : CLASSIFICATION OF WRITTEN ERRORS (ALL SS): PERCENTAGES.

		Words		Pseudo-words		Prose	
		Good	Poor	Good	Poor	Good	Poor
Confusions	a)	60	96	63	112	49	73
	b)	2	11	2	2	5	6
Omissions	a)	13	29	24	26	35	46
	b)	-	7	-	4	6	9
Insertions	a)	7	12	17	19	9	10
	b)	-	-	-	1	-	-
Doubling	a)	-	3	1	2	-	2
	b)	4	7	2	5	4	6
Transpositions	a)	3	3	4	3	4	14
	b)	-	2	-	-	1	2
Homonyms		-	-	-	1	-	-
Perseverations		1	3	1	3	-	3
Unclassified		-	5	1	4	2	-
Totals:		90	178	115	182	115	171

TABLE 99. SERIES I S-C TESTS : CLASSIFICATION OF WRITTEN ERRORS: ERROR TOTALS, GOOD AND POOR READING GROUPS COMPARED.

		Words		Pseudo-words		Prose	
		Good	Poor	Good	Poor	Good	Poor
Confusions	a)	66.7	53.9	54.8	61.5	42.6	42.7
	b)	2.2	6.2	1.7	1.1	4.4	3.5
Omissions	a)	14.4	16.3	20.9	14.3	30.4	26.9
	b)	-	3.9	-	2.2	5.2	5.3
Insertions	a)	7.8	6.7	14.8	10.4	7.8	5.9
	b)	-	-	-	0.6	-	-
Doubling	a)	-	1.7	0.9	1.1	-	1.2
	b)	4.4	3.9	1.7	2.8	3.5	3.5
Transpositions	a)	3.3	1.7	3.5	1.7	3.5	8.2
	b)	-	1.1	-	-	0.9	1.2
Homonyms		-	-	-	0.6	-	-
Perseverations		1.1	1.7	0.9	1.7	-	1.8
Unclassified		-	2.8	0.9	2.2	1.7	-

TABLE 100. SERIES I S-C TESTS : CLASSIFICATION OF WRITTEN ERRORS: PERCENTAGES, GOOD AND POOR READING GROUPS COMPARED.

	(a)			(b)			Total		
	Unrestr.	Length Restr.	Letter Restr.	Unrestr.	Length Restr.	Letter Restr.	Unrestr.	Length Restr.	Letter Restr.
Confusions	36	44	37	13	36	38	49	80	75
Omissions	28	65	45	-	1	3	28	66	48
Insertions	7	5	6	-	-	-	7	5	6
Single for Double	10	12	18						
Double for Single				12	4	10	22	16	28
Transpositions	7	15	13	1	3	-	8	18	13
Homonyms							-	-	-
Perseverations							1	-	-
Unclassified							5	16	43
						Totals:	120	201	213

TABLE 101. SERIES II S-F TESTS : CLASSIFICATION OF WRITTEN ERRORS : ERROR TOTALS (ALL SS).

	(a)			(b)			Total		
	Unrestr.	Length Restr.	Letter Restr.	Unrestr.	Length Restr.	Letter Restr.	Unrestr.	Length Restr.	Letter Restr.
Confusions	30.0	21.9	17.4	10.8	17.9	17.8	40.8	39.8	35.2
Omissions	23.3	32.3	21.1	-	0.5	1.4	23.3	32.8	22.5
Insertions	5.8	2.5	2.8	-	-	-	5.8	2.5	2.8
Single for Double	8.3	6.0	8.5						
Double for Single				10.0	2.0	4.7	18.3	8.0	13.2
Transpositions	5.8	7.5	6.1	0.8	1.5	-	6.6	9.0	6.1
Homonyms							-	-	-
Perseverations							0.8	-	-
Unclassified							4.2	8.0	20.2

TABLE 102. SERIES II S-F TESTS : CLASSIFICATION OF WRITTEN ERRORS: PERCENTAGES (ALL SS).

		Unrestr. Good	Unrestr. Poor	Length Restr. Good	Length Restr. Poor	Letter Restr. Good	Letter Restr. Poor	Overall Good	Overall Poor
Confusions	a)	13	23	15	29	17	20	45	72
	b)	-	13	9	27	6	32	15	72
Omissions	a)	8	20	20	45	12	33	40	98
	b)	-	-	-	1	1	2	1	3
Insertions	a)	3	4	1	4	2	4	6	12
	b)	-	-	-	-	-	-	-	-
Doubling	a)	3	7	5	7	8	10	16	24
	b)	6	6	2	2	5	5	13	13
Transpositions	a)	1	6	6	9	3	10	10	25
	b)	1	-	-	3	-	-	1	3
Homonyms		-	-	-	-	-	-	-	-
Perseverations		-	1	-	-	-	-	-	1
Unclassified		3	2	2	14	15	28	20	44
Totals:		38	82	60	141	69	144	167	367

TABLE 103. SERIES II S-F TESTS : CLASSIFICATION OF WRITTEN ERRORS: ERROR TOTALS, GOOD AND POOR READING GROUPS COMPARED.

		Unrestr. Good	Unrestr. Poor	Length Restr. Good	Length Restr. Poor	Letter Restr. Good	Letter Restr. Poor	Overall Good	Overall Poor
Confusions	a)	34.2	28.1	25.0	20.6	24.6	13.9	27.0	19.6
	b)	-	15.9	15.0	19.2	8.7	22.2	9.0	19.6
Omissions	a)	21.4	24.4	33.3	31.9	17.4	22.9	24.0	26.7
	b)	-	-	-	0.7	1.5	1.4	0.6	0.8
Insertions	a)	7.9	4.9	1.7	2.8	2.9	2.8	3.6	3.3
	b)	-	-	-	-	-	-	-	-
Doubling	a)	7.9	8.5	8.5	5.0	11.6	6.9	9.6	6.5
	b)	15.8	7.3	3.3	1.4	7.3	3.5	7.8	3.5
Transpositions	a)	2.6	7.3	10.0	6.4	4.4	6.9	6.0	6.8
	b)	2.6	-	-	2.1	-	-	0.6	0.8
Homonyms		-	-	-	-	-	-	-	-
Perseverations		-	1.2	-	-	-	-	-	0.3
Unclassified		7.9	6.1	3.3	9.9	21.7	19.4	12.0	12.0

TABLE 104. SERIES II S-F TESTS : CLASSIFICATION OF WRITTEN ERRORS: PERCENTAGES, GOOD AND POOR READING GROUPS COMPARED.

	(a)				(b)				Total			
	L	D	L+L	D+L	L	D	L+L	D+L	L	D	L+L	D+L
Confusions	41	34	45	49	3	5	2	1	44	39	47	50
Omissions	34	31	33	32	3	1	1	-	37	32	34	32
Insertions	5	2	2	1	-	-	-	-	5	2	2	1
Single for Double	1	1	4	1								
Double for Single					6	6	11	10	7	7	15	11
Transpositions	9	7	6	9	4	1	-	1	13	8	6	10
Homonyms									-	-	-	-
Perseverations									1	-	3	1
Unclassified									-	-	-	-
								Totals:	107	88	107	105

TABLE 105. SERIES II S-C TESTS : CLASSIFICATION OF COPYING ERRORS: ERROR TOTALS (ALL SS).

	(a)				(b)				Total			
	L	D	L+L	D+L	L	D	L+L	D+L	L	D	L+L	D+L
Confusions	38.3	37.4	42.1	46.7	2.8	5.5	1.9	1.0	41.1	42.9	44.0	47.7
Omissions	31.8	37.4	30.8	30.5	2.8	1.1	0.9	-	34.6	38.5	31.7	30.5
Insertions	4.7	2.2	1.9	1.0	-	-	-	-	4.7	2.2	1.9	1.0
Single for Double	0.9	1.1	3.7	1.0								
Double for Single					5.6	6.6	10.3	9.5	6.5	7.7	14.0	10.5
Transpositions	8.4	7.7	5.6	8.6	3.7	1.1	-	1.0	12.1	8.8	5.6	9.6
Homonyms									-	-	-	-
Perseverations									0.9	-	2.8	1.0
Unclassified									-	-	-	-

TABLE 106. SERIES II S-C TESTS : CLASSIFICATION OF COPYING ERRORS: PERCENTAGES (ALL SS).

		L		D		L+L		D+L		Overall	
		Good	Poor	Good	Poor	Good	Poor	Good	Poor	Good	Poor
Confusions	a)	7	34	8	26	17	28	17	32	49	120
	b)	2	1	3	2	-	2	-	1	5	6
Omissions	a)	15	19	14	20	15	18	14	18	58	75
	b)	1	2	1	-	1	-	-	-	3	2
Insertions	a)	3	2	-	2	-	2	-	1	3	7
	b)	-	-	-	-	-	-	-	-	-	-
Doubling	a)	1	-	1	-	1	3	-	1	3	4
	b)	2	4	5	1	5	6	4	6	16	17
Transpositions	a)	-	9	4	3	4	2	2	7	10	21
	b)	1	3	-	1	-	-	-	1	1	5
Homonyms		-	-	-	-	-	-	-	-	-	-
Perseveration		1	-	-	-	2	1	-	1	3	2
Unclassified		-	-	-	-	-	-	-	-	-	-
Totals:		33	74	36	55	45	62	37	68	151	259

TABLE 107. SERIES II S-C TESTS : CLASSIFICATION OF COPYING ERRORS: ERROR TOTALS, GOOD AND POOR READING GROUPS COMPARED.

		L		D		L+L		D+L		Overall	
		Good	Poor	Good	Poor	Good	Poor	Good	Poor	Good	Poor
Confusions	a)	21.2	46.0	22.2	47.3	37.8	45.2	46.0	47.1	32.5	46.3
	b)	6.1	1.4	8.3	3.6	-	3.2	-	1.5	3.3	2.3
Omissions	a)	45.5	25.7	38.9	36.4	33.3	29.0	37.8	26.5	38.4	29.0
	b)	3.0	2.7	2.8	-	2.2	-	-	-	2.0	0.8
Insertions	a)	9.1	2.7	-	3.6	-	3.2	-	1.5	2.0	2.7
	b)	-	-	-	-	-	-	-	-	-	-
Doubling	a)	3.0	-	2.8	-	2.2	4.8	-	1.5	2.0	1.5
	b)	6.1	5.4	13.9	1.8	11.1	9.7	10.8	8.8	10.6	6.6
Transpositions	a)	-	12.2	11.1	5.5	8.9	3.2	5.4	10.3	6.6	8.1
	b)	3.0	4.1	-	1.8	-	-	-	1.5	0.7	1.9
Homonyms		-	-	-	-	-	-	-	-	-	-
Perseverations		3.0	-	-	-	4.4	1.6	-	1.5	2.0	0.8
Unclassified		-	-	-	-	-	-	-	-	-	-

TABLE 108. SERIES II S-C TESTS : CLASSIFICATION OF COPYING ERRORS: PERCENTAGES. GOOD AND POOR READING GROUPS COMPARED.

	(a)				(b)				Total			
	L	D	L+L	D+L	L	D	L+L	D+L	L	D	L+L	D+L
Confusions	140	146	115	162	176	215	145	161	316	361	260	323
Omissions	160	96	165	71	22	15	25	14	182	111	190	85
Insertions	42	33	38	21	1	5	2	12	43	38	40	33
Single for Double	18	16	14	12								
Double for Single					20	19	29	36	38	35	43	48
Transpositions	29	41	31	32	12	21	11	20	41	62	42	52
Homonyms									-	-	-	-
Perseverations									10	20	14	17
Unclassified									11	17	12	18
								Totals:	641	644	601	576

TABLE 109. SERIES II S-C TESTS : CLASSIFICATION OF SPELLING ERRORS: ERROR TOTALS (ALL SS).

	(a)				(b)				Total			
	L	D	L+L	D+L	L	D	L+L	D+L	L	D	L+L	D+L
Confusions	21.8	22.7	19.1	28.1	27.5	33.4	24.1	28.0	49.3	56.1	43.2	56.1
Omissions	25.0	14.9	27.5	12.3	3.4	2.3	4.2	2.4	28.4	17.2	31.7	14.7
Insertions	6.6	5.1	6.3	3.7	0.2	0.8	0.3	2.1	6.8	5.9	6.6	5.8
Single for Double	2.8	2.5	2.3	2.1								
Double for Single					3.1	3.0	4.8	6.3	5.9	5.5	7.1	8.4
Transpositions	4.5	6.4	5.2	5.6	1.9	3.3	1.8	3.5	6.4	9.7	7.0	9.1
Homonyms									-	-	-	-
Perseverations									1.6	4.7	2.3	3.0
Unclassified									1.7	4.3	2.0	3.1

TABLE 110. SERIES II S-C TESTS : CLASSIFICATION OF SPELLING ERRORS: PERCENTAGES (ALL SS).

		L		D		L+L		D+L		Overall	
		Good	Poor	Good	Poor	Good	Poor	Good	Poor	Good	Poor
Confusions	a)	51	89	42	104	37	78	43	119	173	390
	b)	38	138	61	154	32	113	43	118	174	523
Omissions	a)	65	95	29	67	54	111	22	49	170	322
	b)	2	20	3	12	3	22	5	9	13	63
Insertions	a)	18	24	9	24	12	26	6	15	45	89
	b)	-	1	1	4	-	2	1	11	2	18
Doubling	a)	8	10	6	10	9	5	5	7	28	32
	b)	8	12	5	14	13	16	9	27	35	69
Transpositions	a)	8	21	23	18	15	16	13	19	59	74
	b)	5	7	7	14	3	8	9	11	24	40
Homonyms		-	-	-	-	-	-	-	-	-	-
Perseverations		5	5	1	19	5	9	4	13	15	46
Unclassified		1	10	1	16	-	12	1	17	3	55
Totals:		209	432	188	456	183	418	161	415	741	1721

TABLE 111. SERIES II S-C TESTS : CLASSIFICATION OF SPELLING ERRORS: ERROR TOTALS, GOOD AND POOR READING GROUPS COMPARED.

		L		D		L+L		D+L		Overall	
		Good	Poor	Good	Poor	Good	Poor	Good	Poor	Good	Poor
Confusions	a)	24.4	20.6	22.3	22.8	20.2	18.7	26.7	28.7	23.4	22.7
	b)	18.2	31.9	32.5	33.7	17.5	27.0	26.7	28.4	23.5	30.4
Omissions	a)	31.1	22.0	15.4	14.7	29.5	26.6	13.7	11.8	22.9	18.7
	b)	1.0	4.6	1.6	2.6	1.6	5.3	3.1	2.2	1.8	3.7
Insertions	a)	8.6	5.6	4.8	5.3	6.6	6.2	3.7	3.6	6.1	5.2
	b)	-	0.2	0.5	0.9	-	0.5	0.6	2.7	0.3	1.1
Doubling	a)	3.8	2.3	3.2	2.2	4.9	1.2	3.1	1.7	3.8	1.9
	b)	3.8	2.8	2.7	3.1	7.1	3.8	5.6	6.5	4.7	4.0
Transpositions	a)	3.8	4.9	12.2	4.0	8.2	3.8	8.1	4.6	8.0	4.3
	b)	2.4	1.6	3.7	3.1	1.6	1.9	5.6	2.7	3.2	2.3
Homonyms		-	-	-	-	-	-	-	-	-	-
Perseverations		2.4	1.2	0.5	4.2	2.7	2.2	2.5	3.1	2.0	2.7
Unclassified		0.5	2.3	0.5	3.5	-	2.9	0.6	4.1	0.4	3.2

TABLE 112. SERIES II S-C TESTS . CLASSIFICATION OF SPELLING ERRORS: PERCENTAGES, GOOD AND POOR READING GROUPS COMPARED.

	(a)			(b)			Total		
	S-F	Copying	Spelling	S-F	Copying	Spelling	S-F	Copying	Spelling
Confusions	30.0	38.3	21.8	10.8	2.8	27.5	40.8	41.1	49.3
Omissions	23.3	31.8	25.0	-	2.8	3.4	23.3	34.6	28.4
Insertions	5.8	4.7	6.6	-	-	0.2	5.8	4.7	6.8
Single for Double	8.3	0.9	2.8						
Double for Single				10.0	5.6	3.1	18.3	6.5	5.9
Transpositions	5.8	8.4	4.5	0.8	3.7	1.9	6.6	12.1	6.4
Homonyms							-	-	-
Perseverations							0.8	0.9	1.6
Unclassified							4.2	-	1.7

TABLE 113. SERIES II S-F AND S-C TESTS : ERROR PROPORTIONS UNDER 'NORMAL' WRITTEN CONDITIONS (ALL SS).

	(a)			(b)			Total		
	S-F	Copying	Spelling	S-F	Copying	Spelling	S-F	Copying	Spelling
Confusions	34.2	21.2	24.4	-	6.1	18.2	34.2	27.3	42.6
Omissions	21.1	45.5	31.1	-	3.0	1.0	21.1	48.5	32.1
Insertions	7.9	9.1	8.6	-	-	-	7.9	9.1	8.6
Single for Double	7.9	3.0	3.8						
Double for Single				15.8	6.1	3.8	23.7	9.1	7.6
Transpositions	2.6	-	3.8	2.6	3.0	2.4	5.2	3.0	6.2
Homonyms							-	-	-
Perseverations							-	3.0	2.4
Unclassified							7.9	-	0.5

TABLE 114. SERIES II S-F AND S-C TESTS : ERROR PROPORTIONS UNDER 'NORMAL' WRITTEN CONDITIONS (GOOD READERS).

	(a)			(b)			Total		
	S-F	Copying	Spelling	S-F	Copying	Spelling	S-F	Copying	Spelling
Confusions	28.1	46.0	20.6	15.9	1.4	31.9	44.0	47.4	52.5
Omissions	24.4	25.7	22.0	-	2.7	4.6	24.4	28.4	26.6
Insertions	4.9	2.7	5.6	-	-	0.2	4.9	2.7	5.8
Single for Double	8.5	-	2.3						
Double for Single				7.3	5.4	2.8	15.8	5.4	5.1
Transpositions	7.3	12.2	4.9	-	4.1	1.6	7.3	16.3	6.5
Homonyms							-	-	-
Perseverations							1.2	-	1.2
Unclassified							6.1	-	2.3

TABLE 115. SERIES II S-F AND S-C TESTS : ERROR PROPORTIONS UNDER 'NORMAL' WRITTEN CONDITIONS (POOR READERS).

	Same part of speech						Different part of speech		
	Good fit			Poor fit					
	No. errors	No. graphically similar	No. corrected	No. errors	No. graphically similar	No. corrected	No. errors	No. graphically similar	No. corrected
Oral : Good	12	3	3	11	8	1	4	4	1
Poor	42	30	4	42	36	3	76	69	9
Written : Good	2	-	-	5	5	-	8	8	5
Poor	6	6	2	10	10	2	12	12	7

TABLE 116. SERIES I S-C TESTS : GRAMMATICAL AND GRAPHIC SIMILARITY OF PROSE ERRORS, GOOD AND POOR READING GROUPS COMPARED.

	Oral			Written		
	Good fit	Poor fit	Different	Good fit	Poor fit	Different
Good	25.0	72.7	100.0	0.0	100.0	100.0
Poor	71.4	85.7	90.8	100.0	100.0	100.0

TABLE 117. SERIES I S-C TESTS : PERCENTAGE PROSE ERRORS HAVING GRAPHIC SIMILARITY TO THE STIMULUS, GOOD AND POOR READING GROUPS COMPARED.

CHAPTER NINE

CONCLUSIONS AND IMPLICATIONS

9.1 INTRODUCTION

The aim of the present study was to examine the behaviour of first year Junior children in a range of oral and written verbal situations, and to see whether the superiority of children classed by a standardized test as above average readers extended to all areas and aspects of performance.

The results obtained indicated the generally ubiquitous nature of the Good readers' superiority, although the reasons for their excellence were not always easy to determine Interpretation of the findings is attempted in terms of specific factors relating to the level of competence demonstrated by the children in performing the various verbal tasks, and in terms of subjective observations relating to less easily defined attitudinal and motivational factors. Whist many of the latter comments are admittedly rather speculative, they may serve to draw attention to particular influences on performance that may have considerable relevance to the situation of the slightly backward reader

9 2 MAIN EXPERIMENTAL FINDINGS INDIVIDUAL PERFORMANCE DIFFERENCES

Overall, the experimental results showed clearly that, at the 7-8 year old level, children above-average in reading were also better at copying and spelling than below-average readers This superiority concerned both the speed and the accuracy of their performance The best readers were capable of performing both quickly and correctly, but the major difference between the remaining above-average readers and the Poor group was that the former modified their performance speed under difficult test conditions in an attempt to maintain accuracy whilst the latter tended to exhibit high intra-group stability with regard to speed. Some of this group may have been unaware of this characteristic, but such a lack of awareness of the need for performance adaptability can be considered in itself a sign of inadequate skill development However, on certain tests it was possible to discern members of the Poor reading group who deliberately adopted fast-inaccurate performance strategies Negative speed-

accuracy correlations may, of course, also emerge as a result of slow-accurate responding, but this can be considered the subordinate feature of performance in the present case Similar findings were reported for tasks involving the spontaneous production of verbal items, the only exception to this being the Series I Written Pseudo-word task in which the group difference was significant with regard to quality but not quantity of output. The Good readers also succeeded in correcting a higher proportion of the errors they made, the only exception here involving Series I Oral Prose test performance in which reduced error correction rate may be linked with greater use of contextual information Qualitative measures showed the Good readers' superiority to be greatest on the 'harder' tasks, as indicated by comparisons between Oral and Written S-F performance (Series I) and Copying and Spelling performance (Series II).

Although more girls than boys in both experimental Series were classed as Good readers, there was no significant difference in RA ranks between the sexes in either case, and the anticipated superiority of the girls was almost exclusively confined to tests involving a written response, in contrast to the usual finding (Dwyer 1973) that the magnitude of sex differences is greater on measures of reading than of other verbal activities. Although the behavioural measures taken were limited, present findings tend to support those of Garner, Percy & Lawson (1971), concerning WISC performance, that passive boys and active girls do best Further differences were recorded with regard to certain behavioural observations made during administration of the tests, and whilst physiological considerations are noted, the view taken here is that sex differences in performance within the range sampled in the present study may best be explained in terms of socialization and teacher-pupil interaction factors

Qualitative analysis of errors made on the various tests indicated several differences between the two reading groups The Poor readers made the majority of 'wrong category' responses on S-F tasks, and throughout the study produced significantly greater numbers of unidentifiable and/or unpronounceable written

word responses, more unclassifiable copying and spelling errors, and on the Series I S-F Pseudo-words test a higher proportion of 'illegal' responses. These results all point to some unsufficiency of knowledge of sequential letter probabilities and other rules and constraints concerning the structure of English words.

The analysis of single-letter errors made in Series I supported the findings of Chapman, Lewis & Wedell (1970) that some children at this age still have identification problems with certain alphabetic letters, difficulties relating particularly to the 'reversible' letters. As most of these letters are similar in both form and sound, it is difficult to ascertain whether the problem is primarily visual, for example, the result of inability or disinclination to include orientation as a salient component of memory (Chapman & Wedell 1972, Merritt 1969a), or one of auditory mediation (Vellutino et al. 1972). The results agree with Chapman & Wedell in finding that most reversals still represent correctly-shaped letters, and the Series I S-C findings showing an increase in errors on the Pseudo-word test relative to performance with real words, would seem to lend support to the second hypothesis, or at least suggest the two not to be mutually exclusive

Errors on the Series II S-F Length-Restricted tests suggested that the Poor readers were less able to make use of visual word imagery in order to make the judgements demanded by these tasks. Difficulties in visual skills seemed more pronounced than in the phonemic skills additionally required in the Letter-Restricted tests. The greater use of the provided length and letter information able to be made by Good readers on the Series II Spelling task supports these findings To what extent the data reflect a lack of knowledge of word form, and to what extent problems with image retrieval or reconstruction, cannot be estimated However, they are similar to results obtained by Mackworth & Mackworth (1974) for much older children. The authors concluded that, although the most difficult part of learning to read is probably learning the relationship

between the written and spoken forms of words, a necessary preliminary step involves the construction of mental images of words so that the visual recognition process can succeed. Spelling progress is equally dependent upon such imagery The findings of Mackworth & Mackworth suggest that initial inadequacy in this regard, which interferes with later processes of coding and comprehension, is unlikely to disappear simply through maturation, but rather that development of imaging skills requires specific instructional assistance The greater number of transposition errors made by the Poor readers, as indicated in the Chapter 8 analysis of data, and their greater problems with the Orak S-F last-letter Restricted task, would further suggest problems of sequential processing, although the latter results may have been in part another manifestation of impulsive tendencies, with Ss deciding that use of the designated letter in some way (usually as the first letter) was preferable to making no response.

Whilst the whole-item analysis of errors suggested that commitment of errors on Copying tests were less precise indications of verbal 'competence' than were Reading or Spelling error scores, the detailed classification of error types suggested that for the Poor readers Copying performance was a reasonably accurate reflection of basic difficulties This view is endorsed by the Series II comparison of whole-item Copying and Spelling data the effects of provision of length or letter 'guides' show much greater inter-test similarity for the Poor group, improving accuracy on all occasions, whilst for the Good readers tending to improve Spelling but worsen Copying accuracy The more random nature of Good readers' Copying mistakes is further expressed in the Series I finding that this group made more Copying than Reading mistakes on the S-C Words and Prose tests, whilst the Poor readers had far higher error totals on the Oral tasks

From a research point of view, demonstration of these deliberately inaccurate, speed-oriented performance tactics raises the question of whether the assumption can be universally upheld that analysis of errors offers an accurate insight into

the strategies the child can and does employ when responding is correct. Rather, they suggest that a further dimension of performance needs to be considered, namely the child's perception of the difficulty of the task and of the outcome if he fails It would appear that the errors made by some slightly backward readers may vary considerably according to the degree of stress under which they are operating Whilst this may relate particularly to oral responding, the point may well be relevant also to the free-writing situation.

Claims for and against teaching schemes which either encourage 'learning through one's mistakes' or attempt to eliminate error behaviour have been outlined in Chapter 3, together with suggestions for ways in which the teacher might use the errors made by her pupils for more accurate assessment of their particular instructional needs, and the findings of the present study have already been discussed with reference to the need to qualify the use of such diagnostic procedures With regard to the fundamental role of error behaviour in learning, it has been suggested that considerably more attention should be paid to the commitment of written errors. It would appear that there has been much less concern with the dangers of overlearning inaccurate writing habits than with comparable reading problems Present findings showed that children with spelling problems also tended to copy material less accurately than did good spellers, indicating problems of ingrained unconcern with accuracy, and perhaps over and above this the establishment of certain incorrect orthographic conventions and performance routines It seems essential that the risk of this detrimental learning should be reduced, and the Series II results suggest that direction of the poor reader and speller's attention to the visual construction of words can bring some improvement in performance accuracy The possible development of faulty motor habits must also not be overlooked. This endorses the point made by Hanna et al. (1966) that the child first needs help in making conscious use of sensory information in the development of behaviours that are eventually to become largely automatic. Nevertheless, to the extent that lack of attention was the direct outcome of the operation of impulsive strategies,

it is suggested that the reform of well-established attentional inefficiency may require the use of techniques that do more than enforce response delay (Siegelman 1969).

The results suggested that certain important aspects of oral and written verbal performance techniques were more firmly established or more highly developed in the Good readers For example they benefited more from having the material displayed fro left-to-right handling, and were able to use more sophisticated whole-item copying techniques. It was suggested in Chapter 7 that this persistence of Poor readers with a letter-by-letter copying procedure might be unnecessary in that they were capable of using more mature techniques. This may be in line with Kagan's (1965) proposition that 'looking up' when copying could be due not to necessity but to impulsivity, however, whatever the reason for perseverance with this behaviour, the implications for its discouragement of better free-writing, and perhaps reading, techniques remain. The grammatical and graphical analysis of Prose errors reported in 8.4 showed that the Good and Poor readers were making somewhat dissimilar attempts at the integrated use of different types of cues, particularly in the reading situation. However, the fact that their whole-item error scores showed lower inter-test correlation whilst time score correlations were generally higher than those for the Good group suggests that some of the Poor readers' difficulties were caused not so much by a basic inability to use certain word analysis skills but by inferior task-adaption that precluded maximum use of these skills.

Certain tests appeared to highlight somewhat intangible abilities displayed by many of the better readers which enabled them to 'latch on to' more efficacious strategies in novel test situations Thus, they adopted faster output rates on Oral S-F Unrestricted tasks, reduced overt vocal behaviour on the Series I S-C Written Pseudo-words task, and tended to concentrate upon monosyllabic words for responses in the Series II S-F Length-Restricted tasks The comprehensive yet detailed nature of this tactical adroitness supports the contention of Fries

(1963), Samuels (1973) and others that there are a very great number of subskills involved in attaining reading and writing proficiency, many of which are not immediately apparent. Moreover, results from the Series II tests which employed 'normal' and 'abnormal' conditions showed that the greatest differences in performance between the Good and Poor reading groups were found on tests most similar to usual classroom situations (that is, the Unrestricted S-F tests and the 'Line-only' Copying and Spelling tasks). On the Series I S-C tests group differences were greatest when dealing with real words rather than with pseudo-words or isolated letters. These results reflect the Good readers' special cognizance of, and accommodation to, normal conditions and the consequently greater disruption of fluency they suffer in irregular experimental circumstances Development of these particular skills may be due in part to the Good readers' generally greater cognitive ability enabling them to devise better performance techniques autonomously, and in part to their greater attention to the teacher and consequent 'picking up' of more of the information she makes available

Summary

Schonell (1942) and others have reported that poor spellers characteristically rely on the auditory rather than on the visual recall of words and that ability to reproduce visual patterns from memory is an important factor in spelling. The later theoretically-oriented studies of Birch (1962 et seq.) stressed the importance of the mergence of vision as the dominant sense for the successful development of reading and writing skills. Whilst some writers have emphasized that individuals will differ in the mature states of their imaging and inter-sensory functions (e.g. Wepman 1962), the present results suggest that below-average readers are particularly deficient in their ability to attend to and manipulate visual verbal information This was demonstrated specifically by their less advantageous use of length and letter guides on the Series II Spelling tests, and their considerable difficulty with the Series II S-F Length-Restricted task. However, that they benefit from having their attention drawn to aspects of word structure was indicated by the fact that all three 'abnormal' Copying

conditions (Series II), whilst reducing speed, improved performance accuracy and error correction rate This suggests that these children may normally be making poor use of what knowledge and skills they do possess, or perhaps that they fail to realize what can be done with the capabilities they have This in turn points to the need for greater explanation during the course of reading and spelling instruction of the general rationale and specific purposes behind the skills being taught. Coins (1958) and Vernon (1971) suggest that children need to be aware at one and the same time that words consist of individually identifiable parts - letters - and that these form integrated wholes. Vernon proposes that training in the construction of words from isolated letters in correct sequential order might be of value, and whilst a letter-by-letter approach to word analysis in reading and spelling is generally found to be abortive, the present results would also support the view that methods drawing the child's attention to the need for detailed observation of word structure are of considerable use.

Work has been described (e g. Goodman, K. S. 1967, Smith 1973) which argues that the major reading skill to be acquired is the efficient use of redundancy in the language, whilst other writers (e g. Biemiller 1970, Weber 1970) have shown that the development of an ability to use contextual and graphic cues must necessarily include a stage of primary attention to visual information. The findings of the present study, reported above, together with the Series I S-C data showing the Good readers' superiority to be greater when dealing with words in isolation than when dealing with prose, support the view that the below-average reader primarily needs help to attend to the visual properties of words and to reach this intermediate, graphically-oriented ("non-response") stage.

Overall, the results suggest that the slightly backward reader is characterized by minor problems or immaturity in a number of areas rather than by a preponderant disability in any one area of functioning. With the exception of one child in the Series I sample, none of the Ss classed as 'poor readers' in the present study were below average by more than 1 year 4 months, as indicated

by Schonell norms, and with regard to certain other suggested performance norms, such as those proposed by Bruce (1964) for the development of phonemic analysis skills, many of these children would not seem very 'backward' There is, furthermore, the need to appreciate that some of these normative scores may require revision, and also that the performance of other children in the class were generally much superior The poorer reader's position relative to the performance of others rather than his absolute position on a standardized scale may therefore be the more salient measure, not only for the teacher but also for the child himself when evaluating his own performance However, the results also indicated that much of the inferiority of these children's performance was due to insufficient application of what skills they possessed, and one implication of such a finding is that their problems are likely to increase rather than decrease as time progresses The results accentuate the complexity of the cause and effect relationship between reading and spelling backwardness and the specific deficiencies demonstrated when performance is analyzed

9.3 COMMENTS ON SUBJECTS' GENERAL APPROACH TO THE TASKS

Performance on verbal tasks is dependent not only upon level of skills development, but also upon motivational and attitudinal factors. Certain suggestions were put forward in Chapter Six concerning the possible role of such factors in an explanation of those Series I results that indicated a tendency on the part of some of the Poor readers deliberately to forsake accuracy for the sake of speedy test completion Differences between the Good and Poor groups did not appear to relate to positions on a straightforward 'high-low' motivational dimension but rather to their being governed by dissimilar (as objectively defined) sources of incentive, that is, respectively, the desire to be successful and the desire to avoid failure. Though no definite evidence is available, it is suggested that the adoption of these strategies may be the result of past learning experience in school, rather than or in addition to constitutional predisposition or preschool socialization practices Nevertheless, differences in cognitive style are reported as observable even at the preschool level (Ward 1968). Ward,

on the basis of this kindergarten data, rejects Kagan's hypothesis that reflective children are anxious about making mistakes whilst impulsive children are not, the latter being anxious instead about appearing incompetent by responding slowly (Kagan & Kogan 1970). Tentatively, however, the present results are offered as supporting this view The selective employment of fast-inaccurate strategies noted in the present experiments has also been recently described by Egeland (1974)

Whilst the type of fast-inaccurate behaviour observed may be generally described as in some way regressive, it represented reversion to behaviour not typical of the successfully progressing younger reader In the normal classroom situation these children may often be able to get away with doing very little work at all, but when these tactics are thwarted they are likely to employ fundamentally unproductive strategies if not identical at least similar to those used in the test situation from which 'escape' was also impossible. Merritt (1972) has derived the concept of 'Reading Neurosis' from animal data on the experimental neurosis phenomenon to explain why children, when faced with perceptual discrimination problems too difficult for them, go through meaningless rituals without the slightest hope of solving the tasks presented. Whilst the perceptual emphasis seems inappropriate to the discussion of Junior age children, the concept may have some value in helping to explain why some children initially adopt, and later persist with, strategies having no hope of success in terms of accurate task completion The analogy holds with regard to the implication that such 'neurotic' attempts will be only temporarily successful in reducing anxiety and will in the long run prove counterproductive. The finding that the Poor group returned lower test-retest correlations in Series I than did the Good readers suggests that miscellaneous 'emotional' influences - how the child 'feels', what 'mood' the teacher is in - and other elements of the school situation on a particular occasion may possibly exercise the more potent influence on the performance of the former group

One could assume that the strategic decision taken by some children to abandon performance accuracy was made because such a course seemed to them the most desirable, and this raises the question of why this should be so To some extent Levitt's (1972) point can be accepted, that the children are motivated to please the teacher, and have developed the notion that her preference is for 'anything rather than nothing' Conversely, over-cautious behaviour could also be attributed to teacher-encouraged procedures, whether or not they were intentionally advocated However, it seems necessary to refer additionally to notions of 'self-preservation' in order to develop a potential explanation of these sresults, although, of course, these ideas may have been initially moulded by teacher-pupil interaction. In either case, the explanation must be sought in the child's past history of reinforcement in the verbal learning situation, and there is considerable evidence that a negative self-image is highly resistant to change (Gillham 1967). Braun suggests that part of this resistance results from the fact that the child needs to be faithful to the picture he has of himself "Making the decision to fail, in fact, becomes a convenient defence - criticism for poor performance can no longer hurt the learner's image." (Braun 1973, p.711) This attitude may be considered part of what Kagan (1965) has termed the "state of being a retarded reader", and it seems that this concept can be of use not only in the contemplation of the problems of the severely retarded performer but also of the slightly backward reader functioning in the regular classroom From the suggestions made by Bond & Tinker (1967), it may be postulated that this type of problem is most likely to be the outcome of too rapid progress through the instructional schedule, engendering in the child the feeling that he cannot keep up, together with inappropriate emphasis on some technique or skill. More specifically, as suggested in Chapter Four, the latter may take the form of emphasis on the quantity rather than the quality of work desired, although one may suggest in addition that the factors encouraging and consolidating the behaviour described above may be more closely connected to the child's perception of his relative status in the class than to any absolute

measure of his verbal competence The child of Junior school age is typically quite well aware of the standard of his performance - if it is good or bad, or if it represents his 'best effort', whether or not its excellence is estimated relative to the performance of others - and the effect of disenchanting self-appraisal, over and above any negative responses from the teacher or his peers, must be expected to encourage a defeatist attitude and the setting up of protective barriers Evaluation of the child's general approach to various tasks, such as the gradation of spelling performance proposed by Peters, would seem to offer a particularly useful initial source of feedback with regard to an individual's progress and future needs in terms of both his skill development and his 'security' in the educational situation

With regard to the development of a reflective strategic approach to verbal tasks, and particularly the remedial training of children who have established habits of impulsive responding, Egeland (1974) emphasizes that the child needs to be able to use a reflective approach without having to concentrate on the mechanics of the strategy. He suggests that a training sequence that aims to be as near errorless as possible is the best method for developing an automatically reflective approach, since the success such a scheme brings helps convince the child of the worth of the techniques involved. In general terms, therefore, one may propose that 'learning by one's mistakes' can be, for many children at least, the optimal method of progression only after certain levels of competence and confidence have been achieved With reference to this, the present results seem to hold some implications for the development of written verbal skills it is suggested that instructional situations incorporating the regular and constructive use of copying, presented within an interesting and challenging study framework, could possibly be of continuing assistance to some children in the early Junior stages It has been proposed that copying requires the use of more features of the model than is necessary in visual discrimination and recognition (Maccoby and Bee 1965), and although visual-motor activity may introduce reproduction errors unrelated to mistakes made in visual perception (Cutter et al. 1973)

the copying situation may be presumed less likely to establish incorrect spelling habits than the free-writing situation. Furthermore, it can be used to encourage accuracy in circumstances where accuracy can be achieved, offering increased opportunity for the child to produce neat work and develop habits of error corrections, and to generally experience feelings of success and self-satisfaction in the verbal learning situation Such suggestions are seen as relating not to methods of class copying from book or blackboard, but to more personalized schemes that can relate to the child's interests and what he wishes to say, whilst at the same time forcing him to pay closer attention to verbal stimuli (words) when they may be seen in their correct form. The problem of affording adequate individual attention to children within the large class is appreciated, howver, methods which allow the child to see himself succeeding may be expected to bring later reward in encouraging him to take a more enthusiastic and responsible attitude to spelling accuracy in the free-writing context Without such help, many children will probably learn little in a 'creative writing' session except how to waste time successfully and write words wrongly, and a slow yet steady start may be considered preferable to one through which the child becomes accustomed to not knowing what to do.

Further discussion of the results in these terms remains at the level of conjecture, but it nevertheless seems useful to pass some comment on the need for a greater appreciation of possible discrepancy between a child's perceptual and intellectual capabilities and his ability to use these skills appropriately and efficiently, particularly when faced with circumstances that generate some insecurity concerning what is expected of him Interpretation of the results from the present study remains impoverished by the lack of data relating to differences between subjects on the reflectivity-impulsivity dimension which may be constitutional or have resulted from socialization training and this may have led to an apparent over-emphasis on the role of past learning experiences in the development of verbal behaviour patterns. Approaching backwardness as a learning problem should not preclude a search for more fundamental differences

between individuals that may exist in the form of predispositions towards certain modes of behaviour. The aim of these comments, however, is not to discount the importance of a consideration of such variability, but to encourage the closer examination of elements in the classroom situation (typically overlooked) that may affect this aspect of behaviour. In particular, attention must be focused on those elements that may exacerbate matters for a 'naturally impulsive' individual

Whilst a considerable percentage of the teacher's interaction with her class may be assumed to be more or less identical for all pupils, it also seems very necessary to suppose that the individual attention students receive will vary enormously in content from one pupil to another As childrens' past learning histories gradually grow and diverge, the effect of a certain action by the teacher may be interpreted in widely differing ways by her various students. It would thus be quite incorrect to assume that all pupils in a class can be said to receive the same instruction and reinforcement from the teacher. If one further supposes that any individual 'treatment' is likely to be more potent than that aimed at the class as a single, undifferentiated group, the need to look at this aspect of the classroom situation becomes more crucial.

When children in the same class fail to make the same progress, factors in the classroom situation itself, over and above constitutional and home-background variability need to be taken into account. That children in the class respond in different ways to the teaching and guidance they receive does not imply only that there are ingrained differences between them in their ability to attend to and use the information and reinforcement to which they are exposed Rather, it should make us aware of differences in the way the teacher responds to her pupils. It must not be assumed that the teaching experiences of the good and poor students have been the same, and it may be supposed that, in the course of treating her pupils as individuals, the teacher may sometimes be initiating and reinforcing behaviours that are detrimental to satisfactory progress in the long run. Thus a child may be 'naturally' impulsive or reflective, but will then have imposed

upon this knowledge of whether his teacher places most emphasis on doing work quickly or doing it slowly and more carefully. The influence of such experiences is supported by findings of some task specificity in the predominance of concern with speed or with accuracy Results would further tend to suggest, if one excepts slow-accurate as more desirable than fast-accurate behaviour, that the ultimate goal of fast-accurate performing can only be attained via a period during which the pupil is encouraged to work attentively and carefully Many above-average students may be able to pace themselves through this stage, but the teacher must play a more active role with the less able ones. Possibly those children in the 'could try harder' group will be less likely to get this necessary 'take your time' encouragement than will the very weak students, whom the teacher will tend to reward for work done at any speed

These points may be allied finally to an emphasis of the omnipresent element of chance that attends the learning situation (see Merrill 1969 for a discussion of this in relation to the development of word recognition skills). If one assumes there to be no deliberate desire on the teacher's part to establish in the child patterns of behaviour that lead to responding that is either too fast or too slow to permit accurate and meaningful activity then the present results would suggest that similar hypotheses to those proposed for word recognition skills development might be adopted with regard to the development of attitudes and related non-specific elements of the formal learning situation In circumstances where the effects of teacher reinforcement may be to some extent unavoidably arbitrary, the advantages of some use of programmes or other controlled techniques to teach beginning skills may therefore relate both to their preclusion of error overlearning and to the stability and congruity of their reinforcement schedules. And the teacher even then can never afford to underestimate the ability of the pupil to pick up cues from her that he perceives as indicating how she wants or expects him to behave

9.4 FINAL COMMENTS ON EXPERIMENTAL DESIGN AND FURTHER EXPERIMENTATION

The aim of the present study was to compare and contrast the performances of an unselected sample of children at the first year Junior level on a variety of verbal tasks. Although comparisons throughout have been discussed in terms of 'Good' and 'Poor' readers, this dichotomy has been to some extent a misleading or awkward one. The RA range within the Good group for both experimental samples was much greater than that within the Poor reading groups, with the RA-CA relationship being taken as the assignment criterion rather than one relating to the mean or median RA for the sample or some other measure of partition. However, it was felt that the former did allow more justifiable comparisons in 'Good-Poor' or 'above- and below-average' terms. Further clarification of the differences between children at the extremes of the performance continuum would be desirable, but the present samples were insufficient to permit this.

Within the experimental design the objective was to compare both specific qualitative aspects of performance and general behavioural approach to the tasks. However, as a number of tests would be described as 'too easy' for the best readers and others 'too difficult' for the Poor Ss, it may be seen that the two groups were sometimes performing under rather different circumstances. Although the study included a range of tests wide enough to examine the performance of both groups under easy and difficult conditions, it would be useful to extend the 'mapping' of performance strategies to examine more thoroughly the Good readers under challenging conditions and the Poor readers on tests they regarded as easy.

The present study was concerned only peripherally with comprehension skills, in that Ss' performance of many tests was obviously affected by this factor, but their understanding of the test material was not investigated. However, it may be supposed that the ability of beginning readers

to use contextual cues is likely to lose its advantage and its motivating power if word recognition skills are not advanced at the late Infant and early Junior stage, and further longitudinal study is obviously required.

Perhaps the most enduring problem of much research into human performance. and one with particular and crucial relevance to the study of educational issues, is that of determining whether S's behaviour under test conditions is an accurate reflection of his approach to the 'real-life' tasks to which the experiment is related. In the present study comparison was made between Ss' performance of 'novel' verbal tasks, such as the invention of pseudo-words, and their performance of tasks aiming to reproduce more nearly those faced in the regular classroom situation. Whilst attempts were made to minimize physical distractions in the performance situation, it is appreciated that conditions may have been somewhat abnormal with regard to subject motivation. It may be hypothesized that Ss were in general likely to be more highly motivated to do well in the test situation, and there were probably individual differences in the extent of such an effect. Furthermore, the 1:1 test situation fails to resemble classroom conditions in the sense that Ss were unable to 'opt out' of any of the oral or written work demanded of them. Whilst the present results therefore offer a useful assessment of the general performance capabilities and types of performance strategies employed by the children, it would be valuable to explore the utilization of these behaviours in the child's day-to-day school activity.

Various other comments on the experimental design have been made throughout the previous chapters. However, some further proposals for future study may be briefly outlined. First of all, it would be useful to make more direct comparisons between errors the child commits when writing freely and those made when copying or spelling to dictation the same words. Furthermore, it would be interesting to explore in more detail

differences in the types of error recorded on a task when the 'motivational' circumstances of the test situation are manipulated. Secondly, there would seem to be a place for further investigation of the relationship between performance in 'normal' and 'abnormal' or novel test situations, since there is evidence that some children can 'disguise' problems of word analysis to some extent at this age by the use of reasonably successful but basically unsound or counter-productive techniques.

Finally, it is of important that our knowledge is increased of the complex process of behaviour control that operates in the classroom. Primarily, this necessitates more complete documentation of the types of social and material reward systems that are involved and the consistency of their application. It also requires further study of the quantitative and qualitative differences in the interaction between the teacher and various members of her class, following and expanding upon certain sex-oriented studies (McNeil 1964 and Davis & Slobodian 1967, cited in Dwyer 1973, p.461), and as a corollary to this a better understanding of the role played by child-child interactions and general peer-group pressures. As Staats (1970) has commented, getting the child into the classroom is the first big step in orienting his attention towards academic pursuits and away from competing activity preferences; however, whilst much has been written about the skills that the child has to acquire to become a proficient 'intellectual' performer, much less is known about remaining influences in the classroom that can solicit the child's interest and enthusiasm for learning or distract and discourage him.

The complexity of these various communication systems is not underestimated, and quantification of all the variables involved is not a feasible proposition. However, much valuable information could derive from further study of some of the major interaction parameters, particularly

with regard to comparison of different instructional methods in the teaching of reading and writing, and different systems of general class discipline. The interaction between various school situations and the pre-school parent-child environment also requires fuller exploration; whilst a considerable amount is known about parental influence on achievement motivation, rather less is understood about the ways in which parent-child relationships affect the child's ability to respond to different teaching techniques. In the rapidly changing atmosphere of contemporary society these are matters which need constant re-examination. In education no less than medicine must 'prevention rather than cure' be the long term objective of research into learning difficulties. The ideas outlined above do not derive from a desire for return to rigorous 'formal' classroom routines. Rather, it is believed that teacher awareness of the factors affecting the success of basic instructional methods represents an element in the situation particularly amenable to amelioration in the short term, and as such can prove one of the most important avenues of improvement in the development of reading and writing skills in the Primary school.

REFERENCES

ABERCROMBIE, M. L. J. 1964 London Heinemann Perceptual and Visuo-motor Disorders in Cerebral Palsy

ABRAVANEL, E. 1968. Monogr. of Soc. for Research in Child Development, 33 (118) The Development of Intersensory Patterning with regard to selected spatial dimensions.

ADAMS, W V. 1972 Child Development, 43, 1076-1080. Strategy Differences between Reflective and Impulsive Children.

ADERMAN, D. & SMITH, E. E. 1971. Cognitive Psychol , 2, 117-129. Expectancy as a determinant of functional units in perceptual recognition.

ALEXANDER, D & MONEY, J. 1967 The Reading Teacher, 20, 404-409 Reading Disability and the problem of Direction Sense.

ALLISON, R B 1966. Diss Abstr , 27(5-A), 1256. The Relationship between handedness in Elementary school children and reading skills, school achievement and perceptual-motor development.

AMSTER, H. 1964. Psychol. Bull. 62, 273-286 Semantic Satiation and Generation Learning? Adaptation?

ANDERSON, J. R. & BOWER, G. H. 1972. Psychol. Rev., 79, 97-123. Recognition and Retrieval Processes in Free Recall.

ANISFELD, M. & KNAPP, M E. 1968 J. Exper. Psychol., 77, 171-179. Association, synonymity and directionality in false recognition.

ASSO, D & WYKE, M. 1970. Brit. J. Psychol., 61, 99-107. Visual Discrimination and Verbal Comprehension of spatial relations by young children.

ASSO, D. & WYKE, M. 1971. J Exper. Child Psychol., 11, 11-20. Discrimination of spatially confusable letters by young children.

ATHEY, I J 1971. Reading Res Quart., 7, 16-110 Language models and Reading.

AULT, R. 1973. Child Development, 44, 259-266. Problem-solving strategies of Reflective, Impulsive, Fast-accurate, and Slow-inaccurate children.

BACH, M. J. & UNDERWOOD, B. J 1970 J Educ. Psychol., 61, 292-296. Developmental Changes in Memory Attributes

BAHRICK, H. P. & BAHRICK, P. 1971. J Exper. Psychol., 91, 344-346. Independence of Verbal and Visual codes of the same stimuli.

BALL, T. S & DEICH, R. F. 1972. Percep. Motor skills, 34, 383-386 Reading Disability and Hypothesis Formation An application of the Postman and Bruner theory.

BANNATYNE, A D. 1971. Springfield, Illinois Thomas. Language, Reading and Learning Disabilities Psychology, neuropsychology, diagnosis and remediation.

BARON, J. 1973. Quart. J. Exper Psychol., 25, 241-246. Phonemic stage not necessary for reading.

BARR, R. C. 1972. Reading Res Quart , 7, 509-529. The influence of instructional conditions on word recognition errors.

BARRETT, T. C. 1965(a). Reading Res. Quart., 1, 51-76. The relationship between measures of prereading visual discrimination and first grade reading achievement a review of the literature.

BARRETT, T. C. 1965(b). The Reading Teacher, 18, 276-282. Visual Discrimination tasks as predictors of first grade reading achievement.

BARTLETT, F S. 1932. Cambridge. Cambridge University Press. Remembering A study in experimental and social psychology.

BELL, D. B., LEWIS, F. D. & ANDERSON, R. P. Personality and reading retardation in Junior High School students. In Arena, J. I (Ed) 1971. San Rafael, California Academic Therapy Publications. The child with learning disabilities· his right to learn (a)

BELL, D. B., LEWIS, F. D. & ANDERSON, R. P. 1971(b). J. Educ. Res., 65, 229-234. Some Personality and Motivational factors in reading retardation

BELMONT, L. & BIRCH, H. G. 1963 Child Development, 34, 257-270. Lateral Dominance and Right-Left awareness in normal children.

BELMONT, L & BIRCH, H G. 1966 Percep. Motor skills, 22, 787-816. The Intellectual profile of retarded readers.

BENDER, L. 1957. Bull.Orton Soc., 7, 9-18. Specific reading disability as a maturational lag.

BENNETT, A. 1942. J. Educ. Psychol., 33, 25-38. An analysis of errors in word recognition made by retarded readers.

BENTON, A. L. Dyslexia in relation to form perception and directional sense. In Money, J (ed) 1962 Baltimore Johns Hopkins press. Reading disability Progress and research needs in dyslexia.

BERNSTEIN, B. 1958 Brit. J. Sociol.,9, 159-174. Some sociological determinants of perception.

BERNSTEIN, B. 1961(a) Educ. Res., 3, 163-176. Social structure, language and learning.

BERNSTEIN, B. Social class and linguistic development. In Halsey, A. H., Floud, J. & Anderson, C. A. (Eds) 1961. New York Glencoe Free Press. Education, Economy and Society (b)

BIEMILLER, A. 1970. Reading Res Quart , 6, 75-96. The development of the use of graphic and contextual information as children learn to read.

BIRCH, H. G Dyslexia and the maturation of visual function. In Money, J. (ed) 1962 Baltimore Johns Hopkins Press. Reading Disability Progress and research needs in dyslexia.

BIRCH, H G. & BELMONT, L. 1964. Amer J Orthopsychiat., 34, 852-861. Auditory-visual integration in normal and retarded readers

BIRCH, H G. & LEFFORD, A. 1963 Monogr. of Soc. for Res in Child Development, 28(89). Intersensory development in children.

BIRCH, H. G. & LEFFORD, A. 1967. Monogr of Soc. for Res. in Child Development, 32(110) Visual differentiation, intersensory integration, and voluntary motor control.

BISHOP, C. H. 1964. J. Verb. Learning Verb. Behav., 3, 215-221. Transfer effects of word and letter training in reading.

BLACK, F. W. 1973. J. Learning Dis , 6, 313-316. Neurological dysfunction and reading disorders.

BLANK, M. 1968. Child Development, 39, 1091-1101. Cognitive processes in auditory discrimination in normal and retarded readers.

BLANK, M. & BRIDGER, W. H. 1966. Amer. J. Orthopsychiat., 36, 840-847. Deficiencies in verbal labelling in retarded readers.

BLANK, M., HIGGINS, T. J. & BRIDGER, W. H. 1971. J. Educ. Psychol., 62, 117-122. Stimulus complexity and intramodal reaction time in retarded readers.

BLANK, M. & KLIG, S. 1970. J. Exper Child Psychol., 9, 166-173 Dimensional learning across sensory modalities in Nursery school children.

BLOOM, R. D 1973. Reading Res Quart., 8, 147-166. Learning to read An Operant perspective

BOND, G L & TINKER, M. A 1967. New York Appleton-Century-Crofts Inc. (2nd ed). Reading difficulties their diagnosis and correction.

BOWER, G. H , CLARK, M., LESGOLD, A M. & WINZENZ, D 1969. J. Verb. Learning Verb. Behav., 8, 323-343 Hierarchical retrieval schemes in recall of categorized word lists

BOWERS, H. 1932, Amer. J. Psychol., 44, 775-779. Factors influencing visual imagery for letter groups.

BRAUN, C. 1973. The Reading Teacher, 26, 704-712. Johnny reads the cues teacher expectation.

BROWN, G W. 1972. Rehabilitation Literature, 33, 358-361. How correctable is reading failure?

BROWN, H. D. 1970. J. Verb. Learning Verb. Behav., 9, 232-236. Categories of spelling difficulty in speakers of English as a first and second language.

BRUCE, D. J. 1964. Brit. J. Educ Psychol., 34, 158-170 The analysis of word sounds by young children.

BRYANT, P. E 1968. Cortex, 4, 127-137. Comments on the design of developmental studies of cross-modal matching and cross-modal transfer.

BRYANT, P E. 1971. Brit Med. Bull., 27, 200-205. Cognitive Development.

BRYDEN, M P. 1972. Child Development, 43, 824-832. Auditory-visual and sequential-spatial matching in relation to reading ability.

BURKE, C L & GOODMAN, K. S. 1970 Elem. English 47, 121-129. When a child reads A psycholinguistic analysis.

BUSCHKE, H. & LENON, R. 1969. Psychon. Sci., 14, 269-270. Encoding homophones and synonyms for verbal discrimination and recognition.

BUSCHKE, H. & RONSCH, J. 1972. Psychon. Sci., 29, 241-243. Word feature encoding Synonym and antonym discrimination after generating synonyms or antonyms.

CAHEN, L. S., CRAUN, M S. & JOHNSON, S. K. 1971. Rev. Educ. Res., 41, 281-301. Spelling difficulty A survey of the literature.

CALDWELL, E. C. & HALL, V. C 1969. Child Development. 40. 63-71. The influence of concept training on letter discrimination.

CALFEE, R. C & VENEZKY, R. L Component skills in beginning reading. In Goodman, K.S. and Fleming, J. T (eds) 1969. Newark, Delaware I.R.A. Psycholinguistics and the teaching of reading.

CARVER, R. P. 1971. Reading Res. Quart. 6, 449-471. A computer model of reading and its implications for measurement and research.

CHAKRABARTI, J. & BARKER, D. G. 1966 Percep. Motor skills, 22, 881-882. Lateral Dominance and reading ability.

CHALL, J. S. 1967. New York McGraw Hill. Learning to read The Great Debate.

CHAPMAN, L J., LEWIS, A. & WEDELL, K 1970. Remedial Educ , 5, 91-94. A note on reversals in the writing of eight-year-old children.

CHAPMAN, L. J. & WEDELL, K. 1972. J. Learning Dis., 5, 321-325. Perceptual-motor abilities and reversal errors in children's handwriting.

CHOMSKY, C 1970. Harvard Educ Rev , 40, 287-309. Reading, writing and phonology.

CHOMSKY, N. & HALLE, M. 1968 New York Harper & Row. The Sound pattern of English.

CLARK, M M. 1970. Harmondsworth Penguin Books. Reading Difficulties in Schools.

CLARK, M. P. & KARP, J. Elem. Sch J., 61, 137-142. 1960 A summer remedial program.

CLAY, M. M. 1968. J. Verb. Learning Verb. Behav., 7, 434-438. A syntactic analysis of reading errors.

CLAY, M. M 1970. J. Exper. Child Psychol., 9, 297-306. An increasing effect of disorientation on the discrimination of print a developmental study.

COHN, R. 1961. Arch. Neurol., 4, 153-164. Delayed acquisition of reading and writing abilities in children.

COLLINS, A. M. & QUILLIAN, M. R. 1969. J. Verb. Learning Verb. Behav., 8, 240-247. Retrieval time from semantic memory.

COLTHEART, M. Visual information processing. In Dodwell, P. C. (ed) 1972. Harmondsworth Penguin Books. New Horizons in Psychology, Volume 2.

CONRAD, C. 1972. J. Exper. Psychol., 92, 149-154. Cognitive economy in semantic memory.

COOK, H. & SMOTHERGILL, D. 1971. Child Development, 42, 1805-1812. Verbal mediation and satiation in young children.

COTTERELL, G. C. Methods of teaching 2. Multisensory approaches. Paper given at the British Psychological Society Annual Conference, Nottingham, April 1972.

CRINELLA, F. M., BECK, F. W. & ROBINSON, J. W. 1971. Child Development, 42, 2033-2054 Unilateral dominance is not related to neuropsychological integrity.

CRITCHLEY, M. 1970. London Heinemann. The dyslexic child.

CROMER, W. & WIENER, M 1966. J Consult. Psychol., 30, 1-10 Idiosyncratic response patterns among good and poor readers.

CROSBY, R. M. N. & LISTON, R. A. 1968. London Souvenir Press. Reading and the dyslexic child

CUSZAK, F. J. 1972. New York Harper & Row. Diagnostic reading instruction in the Elementary school.

CUTLER, C. M , CIGIRELLI, V. G & HIRSHOREN, A 1973. Percep. Motor skills, 37, 163-166. Comparison of discrimination and reproduction tests of children's perception.

DAY, J B. & WEDELL, K. 1972. Brit. J. Educ. Psychol., 42, 33-39. Visual and auditory memory in spelling An exploratory study.

DE HIRSCH, K., JANSKY, J. J. & LANGFORD, W. S. 1966. New York Harper & Row. Predicting reading failure A preliminary study.

DEICH, R F 1971. Percep. Motor skills, 32, 695-700. Children's perception of differently oriented shapes word recognition

DEUTSCH, M 1965. Amer. J. Orthopsychiat , 35, 78-88. The role of social class in language development and cognition.

DIACK, H. 1960 Nottingham Skinner Reading and the psychology of perception.

DIXON, N F. 1971. London McGraw Hill. Subliminal perception The nature of a controversy.

DOEHRING, D G. 1968 Bloomington, Indiana Indiana University Press. Patterns of impairment in specific reading disability.

DOUGLAS, V. I. 1972. Canad J. Behav. Sci., 4, 259-282. Stop, look and listen the problem of sustained attention and impulse control in hyperactive and normal children.

DOWNING, J. 1967. London Cassell. Evaluating the initial teaching alphabet.

DOWNING, J. & THACKRAY, D. V. 1971. London University of London Press. U.K.R.A. Teaching of reading monograph Reading Readiness

DUNN-RANKIN, P. 1968. J. Verb. Learning Verb. Behav., 7, 990-995. The similarity of lower case letters of the English alphabet.

DUNN-RANKIN, P., LETON, D. A. & SHELTON, V. F. 1968. Percep. Motor skills, 26, 659-666. Congruency factors related to visual confusion of English letters.

DWYER, C. A. 1973. Rev. Educ. Res., 43, 455-468. Sex differences in Reading An evaluation and a critique of current theories.

DYKMAN, R. A., WALLS, R. C., SUZUKI, B. S., ACKERMAN, M. A. & PETERS, J. E. 1970. Amer. J. Orthopsychiat. 40, 766-782. Children with learning disabilities Conditioning, differentiation, and the effect of distraction.

EDELSTEIN, R. R. G. 1971. Percep. Motor skills, 33, 899-905. Time perception as related to reading achievement.

EGELAND, B. 1974. Child Development, 45, 165-171. Training impulsive children in the use of more efficient scanning techniques.

EISENBERG, L. The epidemiology of reading retardation and a program for preventive intervention. In Money, J. (ed) 1966. Baltimore John Hopkins Press. The disabled reader Education of the dyslexic child.

ENTWISLE, D R 1971. Reading Res Quart , 7, 111-167 Implications of language socialization for reading models and for learning to read

FABIAN, A A. 1945 J Educ Psychol., 36, 129-154. Vertical rotation in visual-motor performance its relationship to reading reversals

FAIRBANK, A. 1970. London Faber & Faber. The story of handwriting Origins and development

FEITELSON, D. The relationship between systems of writing and the teaching of reading In Jenkinson, M. D. (ed) 1967 Newark, Delaware I R.A. Reading instruction an International forum

FELZEN, E. & ANISFELD, M. 1970. Developmental Psychol , 3, 163-168. Semantic and phonetic relations in the false recognition of words by third- and sixth-grade children

FERNALD, G. M 1943 New York McGraw Hill. Remedial techniques in basic school subjects.

FLEMING, J T Introduction to Goodman, K. S & Fleming, J T (eds) 1969 Newark, Delaware I.R.A. Psycholinguistics and the teaching of reading.

FOOTE, W E. & HAVENS, L. L 1967 J Exper. Psychol., 73, 340-346. Differential effects of stimulus frequency and graphic configuration in Free- and Forced-choice experiments

FRENCH, E. L 1953 Educ Psychol Measmt , 13, 636-654 Kinesthetic recognition in retarded readers

FREUND, J S & JOHNSON, J W. 1972 J Educ. Psychol., 63, 386-389 Changes in memory attribute dominance as a function of age.

FREUND, R. D., BRELSFORD, J. W & ATKINSON, R. C 1969 Quart J. Exper. Psychol., 21, 214-224. Recognition vs recall Storage or retrieval differences?

FRIES, C C 1963 New York Holt, Rinehart & Winston Inc Linguistics and Reading

FRITH, U. 1971. Brit J Psychol , 62, 459-468. Why do children reverse letters?

FULLER, G. 1973. Psychology in the schools, 10, 19-23 Three categories of visual-motor performance of children with a reading disability and their theoretical implications

GAGNE, R. M. 1970. New York Holt, Rinehart & Winston Inc. The Conditions of Learning (2nd ed).

GARNER, J , PERCY, L. M. & LAWSON, T. 1971. J. Child Psychol. Psychiat., 12, 261-271. Sex differences in behavioural impulsivity, intellectual impulsivity, and attainment in young children

GATES, A. I. 1941. J. Genet. Psychol., 59, 77-83 The role of personality adjustment in reading disability.

GATES, A I. What we know and can do about poor readers (1957) Reprinted in Harris, A. J (ed) 1963 New York Mackay. Readings on Reading Instruction.

GEYER, J. J. 1972 Reading Res Quart , 7, 541-587. Comprehensive and Partial models related to the reading process

GEYER, J J. & KOLERS, P. A Reading as information processing. In Voight, M. J. (ed) 1972 New York Academic Press. Advances in Librarianship.

GIBSON, E J. 1965. Science, 148, 1066-1072 Learning to Read.

GIBSON, E J Experimental psychology of learning to read In Money, J. (ed) 1966. Baltimore Johns Hopkins Press. The Disabled reader Education of the dyslexic child.

GIBSON, E J. 1970. Amer. Psychologist, 25, 136-143. The Ontogeny of Reading

GIBSON, E. J., BISHOP, C H., SCHIFF, W. & SMITH, J 1964 J. Exper Psychol. 67, 173-182 Comparison of meaningfulness and pronounciation as grouping principles in the perception and retention of verbal material.

GIBSON, E J., GIBSON, J. J , PICK, A & OSSER, H 1962 J Comp. Physiol. Psychol., 55, 897-906. A developmental study of the discrimination of letter-like forms

GIBSON, E J , OSSER, H. & PICK, A 1963 J. Verb. Learning Verb.Behav., 2, 142-146. A study of the development of grapheme-phoneme correspondences.

GIBSON, E J., PICK, A., OSSER, H. & HAMMOND, M. 1962 Amer. J. Psychol., 75, 554-570. The role of grapheme-phoneme correspondence in the perception of words.

GIBSON, E J., SCHAPIRO, F & YONAS, A Confusion matrices for graphic patterns obtained with a latency measure. In Levin, H , Gibson, E. J., & Gibson, J. J (eds) 1968. Ithaca, New York Cornell University, The analysis of reading skill A program of basic and applied research.

GIBSON, E J., SHURCLIFF, A. & YONAS, A. Utilization of spelling patterns by deaf and hearing subjects. In Levin, H. & Williams, J. P. (eds) 1970. New York Basic Books Inc. Basic studies on reading.

GIBSON, J J. 1968. London George Allen & Unwin. The senses considered as perceptual systems.

GILLOOLY, W B 1971. J Reading Behav., 4, 50-58 A theoretical analysis of writing system characteristics on learning to read

GILLOOLY, W. B. 1973. Reading Res Quart., 8, 167-199 Theinfluence of writing-system characteristics on learning to read.

GOINS, J T 1958. Chicago University Chicago Press, Suppl. Educ. Monogr. 87, Visual perceptual abilities and early reading progress.

GOLDBERG, H K & SCHIFFMAN, 1972. New York Grune & Stratton Dyslexia Problems of reading disabilities

GOLDIAMOND, I & DYRUD, J. E Reading as operant behaviour. In Money, J. (ed) 1966. Baltimore Johns Hopkins Press. The Disabled reader Education of the Dyslexic Child.

GOODACRE, E J. 1968. Slough N F.E.R. Teachers and their pupils' home background.

GOODACRE, E. J Learning how to teach reading a research note on the findings of a postal survey (1969). Reprinted in Melnik, A. & Merritt, J. E. (eds) 1972 London London University Press Reading Today and Tomorrow.

GOODMAN, K S Reading A Psycholinguistic guessing game (1967) Reprinted in Harris, L A. & Smith, C. B (eds) 1972. New York Holt, Rinehart & Winston Inc. Individualizing reading instruction A Reader.

GOODMAN, K. S 1969(a). Reading Res. Quart., 5, 9-30 Analysis of oral reading miscues Applied psycholinguistics

GOODMAN, K. S. Words and morphemes in reading In Goodman, K S & Fleming, J T (eds) 1969. Newark, Delaware I R A Psycholinguistics and the teaching of reading. (b)

GOODMAN, K S 1970 J Typographic Res 4, 103-110 Psycholinguistic universals in the reading process.

GOODMAN, Y. M 1970. The Reading Teacher, 23, 455-459. Using children's reading miscues for new teaching strategies.

GORDON, N. 1972 Developmental Med & Child Neurol., 14, 520-523. Reading Retardation.

GORFEIN, D S. 1967. Psychon. Sci., 7, 47-48 Semantic satiation and word association.

GOYEN, J D & LYLE, J. G. 1971(a) J Exper. Child Psychol., 11, 266-273. Effect of incentives and age on the visual recognition of retarded readers.

GOYEN, J. D. & LYLE, J G. 1971(b) J Exper. Child Psychol., 11, 274-280. Effects of incentives, upon retarded and normal readers on a visual-associate learning task.

GOYEN, J. D. & LYLE, J. G. 1973. Percep. Motor skills, 36, 403-408. Short-term memory and visual discrimination in retarded readers

GRIFFITHS, A. N. 1970. Quart J. of the Florida Acad. Sci., 33, 1-16. Dyslexia Symptoms and remediation results.

GUMMERMAN, K & GRAY, C R 1972. J. Exper. Child Psychol., 13, 165-170. Age, Iconic storage, and visual information processing

GUTHRIE, J T. & GOLDBERG, H. K. 1972. J. Learning Dis., 5, 41-46. Visual sequential memory in reading disability.

HALL, J. W & HALPERIN, M. S. 1972 Developmental Psychol , 6, 181. The development of memory encoding processes in young children

HALLE, M Some thoughts on spelling In Goodman, K S & Fleming, J T. (eds) 1969 Newark, Delaware I R A Psycholinguistics and the teaching of reading

HALLGREN, B 1950. Acta Psychiat et Neurol. Suppl 65, 1-287 Specific dyslexia A clinical and genetic study

HANNA, P R , HANNA, J. S , HODGES, R E & RUDORF, E H 1966 Washington D C U S Dept Health, Education & Welfare, Office of Education Phoneme-grapheme correspondences as cues to spelling improvement

HANSEN, D N & RODGERS, T S Exploration of psycholinguistic units in initial reading In Goodman, K S (ed) 1968 Detroit Wayne State University Press The psycholinguistic nature of the reading process

HARRIS, A. J 1956 New York Mackay How to increase reading ability (3rd ed)

HARRIS, A J 1962 New York Mackay Effective teaching of reading

HARRIS, T L & RARICK, G L Physiological and motor correlates of handwriting legibility In Herrick, V E (ed) 1963. Madison University of Wisconsin Press New horizons for research in handwriting.

HARTLAGE, L C & LUCAS, D G 1973(a) J. Learning Dis , 6, 317-322 Group screening for reading disability in first grade children

HARTLAGE, L C & LUCAS, D G Early predictors of optimum educational approaches to preventing reading failure in first grade children Paper presented at the American Psychological Association Annual meeting, Montreal, Canada, August 1973. (b)

HARTMANN, G W 1931 J Educ Psychol , 22, 691-699 The relative influence of visual and auditory factors in spelling abilities

HAVINGHURST, R J. 1964 Chicago University of Chicago Press, Suppl Educ Monogr 94 Characteristics and needs of students that affect learning

HEBB, D O 1968 Psychol Rev , 75, 466-477 Concerning Imagery

HERRICK, V E Children's experiences in handwriting In Herrick, V E & Jacobs, L B (eds) 1955 New Jersey Prentice-Hall Inc Children and the language arts

HERSHENSON, M 1969 J. Exper Psychol , 79, 327-335 Stimulus structure, cognitive structure and the perception of letter arrays

HILDRETH, G Some principles of learning applied to reading (1954) Reprinted in Harris, A J (ed) 1963 New York Mackay. Readings on reading instruction

HILLMAN, H H 1956. Durham Res Rev , 7, 86-96 The effect of laterality on reading

HISLOP, M J & KING, E M. 1973 J Educ. Res., 66, 405-412. Application of phonic generalizations by beginning readers

HOCHBERG, J & BROOKS, V Reading as an intentional behaviour In Harris, L A & Smith, C B (eds) 1972 New York Holt, Rinehart & Winston Inc Individualizing reading instruction A Reader

HOLDEN, M H & MacGINITIE, W H 1972 J Educ Psychol , 63, 551-557 Children's conceptions of word boundaries in speech and print

HOWARD, I, P & TEMPLETON, W B 1966 London John Wiley & Sons Human Spatial Orientation

HUNTER, E J 1971 Psychology in the schools, 8, 362-367 Autonomic responses to aircraft noise in dyslexic children

HUNTER, E J & JOHNSON, L C 1971 J Learning Dis , 4, 572-577 Developmental and psychological differences between readers and nonreaders

HUNTER, E J , JOHNSON, L C & KEEFE, F B 1972 J Learning Dis , 5, 187-197 Electrodermal and cardiovascular responses in nonreaders

HURLEY, O L 1968 Excep. Children, 35, 207-215 Perceptual integration and reading problems

HUTTENLOCHER, J 1964 Science, 143, 264-265 Children's language Word-phrase relationship

INGLIS, A & CONNELL, E 1964 London Nelson The teaching of handwriting Infant Teacher's manual

INGLIS, A & GIBSON, E H 1962 London Nelson The teaching of handwriting Primary Teacher's manual

JENSEN, A R 1962(a) Amer J Psychol , 75, 390-400 Temporal and spatial effects of serial position

JENSEN, A R 1962(b) J Educ Psychol , 53, 105-109 Spelling errors and the serial position effect

JOHNSON, D J & MYKLEBUST, H R 1967 New York Grune & Stratton Learning Disabilities, Educational principles and practice

KAGAN, J 1965 Child Development, 36, 609-628 Reflection-impulsivity and reading ability in primary grade children

KAGAN, J Reflection-Impulsivity The generality and dynamics of conceptual tempo (1966) Reprinted in Sperry, L (ed) 1972 Glenview, Illinois Scott, Foresman & Co Learning Performance and Individual Differences Essays and Readings

KAGAN, J & KOGAN, N Individual variation in cognitive processes In Mussen, P H (ed) 1970 New York Wiley, Carmichael's manual of child psychology, Volume 1

KAGAN, J , ROSMAN, B L , DAY, D , ALBERT, J & PHILIPS, W 1964 Psychol.Monogr 78 Information processing in the child Significance of analytic and reflective attitudes

KALLAN, C A Perceptual-motor therapy An intersensory approach to learning disability Paper delivered to the 7th International Conference of the Association for children with learning disabilities, Philadelphia, Pennsylvania, February 1970

KALLAN, C A 1972 J Learning Dis , 5, 68-74 Rhythm and sequencing in an intersensory approach to learning disability

KANUNGO, R & LAMBERT, W E 1963 Amer J Psychol , 76, 421-428 Semantic satiation and meaningfulness

KAPLAN, G A , YONAS, A & SHURCLIFF, A 1966 Psychon Sci , 1, 172-174 Visual and acoustic confusability in a visual search task

KASS, C E Some psychological correlates of severe reading disability (dyslexia) In Sievers, D J et al (eds) 1963 University of Illinois Institute for Res on Excep Children Selected studies on the Illinois test of Psycholinguistic Abilities

KATZ, L & WICKLUND, D A 1972 J Educ Psychol , 63, 363-367 Letter scanning rate for good and poor readers in Grades two and six

KATZ, P A & DEUTSCH, M 1963 Percep Motor skills, 17, 327-332 Relation of auditory-visual shifting to reading achievement

KAWI, A A & PASAMANICK, B 1959 Monogr of the Soc for Res in Child Development, 24(73) Prenatal and paranatal factors in the development of childhood reading disorders

KEOGH, B K & DONLON, G McG Field Dependence, Impulsivity and Learning Disabilities. Paper presented, in part, at the Western Psychological Association Meeting, San Francisco, April 1971

KEOGH, J F & SMITH, C E 1967 Percep. Motor skills, 25, 101-110 Visuomotor ability for school prediction a seven year study

KILBURG, R R & SIEGEL, A W 1973 Memory & Cognition, 1, 413-419. Differential feature analysis in the recognition memory of reflective and impulsive children

KINSBOURNE, M The analysis of learning deficit with special reference to selective attention In Bakker, D. J. & Satz, P (eds) 1970 Rotterdam Rotterdam University Press Specific reading disability Advances in Theory and Method

KINSBOURNE, M & WARRINGTON, E Disorders of spelling In Money, J (ed) 1966 Baltimore Johns Hopkins Press The Disabled reader Education of the dyslexic child

KINTSCH, W Models for free recall and recognition In Norman, D A (ed) 1970 New York Academic Press Models of Human Memory

KOLERS, P A 1966(a) Amer J Psychol , 79, 357-376 Reading and talking bilingually

KOLERS, P A 1966(b) J. Verb Learning Verb Behav , 5, 314-319 Interlingual facilitation of short-term memory

KOLERS, P A Reading temporally and spatially transformed text In Goodman, K S (ed) 1968 Detroit Wayne State University Press The psycholinguistic nature of the reading process

KOLERS, P A Reading is only incidentally visual In Goodman, K S & Fleming, J T (eds) 1969 Newark, Delaware I R A Psycholinguistics and the teaching of reading

KOLERS, P A Three stages of reading (1970) Reprinted in Smith, F 1973. New York Holt, Rinehart & Winston Inc Psycholinguistics and Reading.

KOLERS, P A & PERKINS, D N 1969(a) Percep Psychophys 5, 265-269 Orientation of letters and their speed of recognition

KOLERS, P A & PERKINS, D N 1969(b) Percep. Psychophys, 5, 275-280 Orientation of letters and their speed of recognition

KOOS, E M 1964 J Genet Psychol , 104, 155-166 Manifestations of cerebral dominance and reading retardation in primary-grade children

KRISE, M 1952 J Educ Psychol , 43, 408-422 An experimental investigation of theories of reversal in reading

KUENNE, J B & WILLIAMS, J P 1973 J Educ Psychol , 64, 241-246 Auditory recognition cues in the primary grades

LACHMANN, F M 1960 J. Consult Psychol , 24, 427-431 Perceptual-motor development in children retarded in reading ability

LAMBERT, W E & JAKOBOVITS, L A 1960 J. Exper Psychol , 60, 376-383 Verbal satiation and changes in the intensity of meaning

LANDAUER, T K & STREETER, L A 1973 J. Verb Learning Verb Behav , 12, 119-131 Structural differences between common and rare words failure of equivalence assumptions for theories of word recognition

LARSEN, C A Approaches to beginning reading in Denmark In Jenkinson, M. D (ed) 1967 Newark, Delaware I R A Reading instruction An International forum

LEE, W R 1972 Slough N F E R Spelling irregularity and reading difficulty in English (2nd ed)

LESSLER, K & BRIDGES, J S 1973 J Learning Dis , 6, 95-101 The prediction of learning problems in a rural setting Can we improve on readiness tests?

LEVIN, H , WATSON, J S & FELDMAN, M 1964. J Educ Psychol , 55, 181-184 Writing as pretraining for association learning

LEVITT, E 1972 Amer J Ment Defic , 77, 13-20 Higher-order and lower-order reading responses of mentally retarded and nonretarded children at the first grade level

LEWIS, H R & LEWIS, H P 1964 Elem English, 41, 855-858 Which manuscript letters are hard for first-graders?

LIVINGSTON, A A A study of spelling errors In Publications of the Scottish Council for Research in Education, 1961 London University of London Press Studies in Spelling

LOCKE, J L & LOCKE, V L 1971 Psychon Sci , 24, 189-190 Recall of phonetically and semantically similar words by 3-year old children

LOTT, D & SMITH, F 1970 Psychon Sci , 19, 343-344 Knowledge of intraword redundancy by beginning readers

LOWELL, R, E 1971 J. Learning Dis , 4, 563-567 Reading readiness factors as predictors of success in First grade reading

LYLE, J G 1969. Child Development, 40, 832-843 Reading retardation and reversal tendency A factorial study

LYLE, J G 1970 Child Development, 41, 481-491 Certain antenatal, perinatal and developmental variables and reading retardation in middle-class boys

LYLE, J G & GOYEN, J P 1968 J Abnorm Psychol , 73, 25-29 Visual recognition, developmental lag and strephosymbolia in reading

LYLE, J G & GOYEN, J. P 1969 J Abnorm Psychol , 74, 105-112 Performance of retarded readers on the WISC and educational tests

MACCOBY, E E & BEE, H L 1965 Child Development, 36, 367-377 Some speculations concerning the lag between perceiving and performing

MACKINNON, A R 1959 Vancouver Copp Clark Publishing Co How DO children learn to read?

MACKINNON, G E & McCARTHY, N A 1973 Canad J Behav Sci , 5, 124-132 Verbal labelling, auditory-visual integration, and reading ability

MACKWORTH, J F 1972 Reading Res Quart , 7, 701-733 Some models of the reading process learners and skilled readers

MACKWORTH, J F & MACKWORTH, N H 1974 Bull. Psychon Soc , 3, 59-60 Spelling recognition and coding by poor readers

MACKWORTH, N H 1972 Reading Res Quart , 7, 679-700 Seven cognitive skills in reading

MALMQUIST, E Provisions made for children with reading disabilities in Sweden In Jenkinson, M D (ed) 1967 Newark, Delaware I R A Reading instruction An International forum

MARCHBANKS, G & LEVIN, H. 1965 J Educ Psychol , 56, 57-61 Cues by which children recognize words

MARTIN, H P 1971 J Sch Health, 41, 468-472 Vision and its role in reading disability and dyslexia

MASON, G E Preschoolers' concepts of reading (1967) Reprinted in Melnik, A & Merritt, J E (eds) 1972 London· University of London Press Reading Today and Tomorrow

MASON, G E 1971 J. Reading Behav , 3, 41-46 A second report on word confusion Sequence and duration of instruction in the mislearning of words.

MASSARI, D J & MASSARI, J A 1973 J Genet. Psychol , 122, 175-181 Sex differences in the relationship of cognitive style and intellectual functioning in disadvantaged preschool children

MAZURKIEWICZ, A J 1960 J Developmental Reading, 3, 254-263 Socio-cultural influences and reading.

McCORMACK, P D 1972 Canad J Psychol , 26, 19-41 Recognition memory How complex a retrieval system?

McNINCH, G 1971 Reading Res Quart 6, 472-492 Auditory perceptual factors and measured first grade reading achievement.

McNINCH, G. & RICHMOND, R 1972 Percep Motor skills, 35, 7-13 Auditory perceptual tasks as predictors of first grade reading success

MELTZER, N S & HERSE, R 1969 J Reading Behav , 1, 3-14 The boundaries of written words as seen by first graders

MERRITT, J E 1969(a) Special Educ , 58, 18-22. Reading skills re-examined

MERRITT, J E The Intermediate skills In Gardner, K (ed) 1969 London Ward Lock International Reading skills Theory and practice

MERRITT, J E Reading failure: A Re-examination In Southgate, V (ed) 1972 London Ward Lock International Literacy at all levels

MEYER, D E 1970 Cog Psychol , 1, 242-300 On the representation and retrieval of stored semantic material

MILLER, G A 1965 Amer Psychologist, 20, 15-20. Some preliminaries to psycholinguistics

MILLER, G A , BRUNER, J S , & POSTMAN, L. 1954. J Gen Psychol , 50, 129-139. Familiarity of letter sequences and tachistoscopic identification

MONEY, J Dyslexia A Postconference review In Money, J (ed) 1962 Baltimore Johns Hopkins Press Reading disability Progress and research needs in dyslexia

MONEY, J On learning and not learning to read In Money, J (ed) 1966 Baltimore Johns Hopkins Press The disabled reader Education of the dyslexic child

MONEY, J 1969 J Learning Dis , 2, 144-145 Editorial Physical, mental and critical period

MONROE, M 1932 Chicago University of Chicago Press Children who cannot read

MORRIS, J M 1959 London Newnes Reading in the Primary School

MORRIS, J M 1966 Slough N F E R Standards and Progress in Reading

MORRIS, J M. The first 'R': Yesterday, today and tomorrow (1972) Reprinted in Melnik, A & Merritt, J E (eds) 1972 London: University of London Press Reading Today and Tomorrow

MOYLE, D Reading for the 'seventies (1971) Reprinted in Melnik, A & Merritt, J E (eds) 1972 London London University Press Reading Today and Tomorrow

MUEHL, S 1963 J Educ Psychol , 54, 316-321. Relation between word recognition errors and hand-eye preference in pre-school children

MYKLEBUST, H R & JOHNSON, D 1962 Excep Children, 29, 14-25 Dyslexia in children

NAIDOO, S 1971 Brit J Educ Psychol , 41, 19 22 Specific developmental dyslexia

NAIDOO, S 1972 London Pitmans Specific dyslexia

NEISSER, U 1967 New York Appleton-Century-Crofts Cognitive Psychology

NELSON, D. L. 1973 Bull. Psychon. Soc. 1, 241-243. Word coding the role of intrinsic and extrinsic features

NELSON, D. L., BROOKS, D. H. & FOSSELMAN, J. R. 1972. J. Exper. Psychol., 92, 305-312. Words as sets of features Processing phonological cues.

NELSON, D. L. & DAVIS, M. J. 1972. J. Exper Psychol., 92, 347-353. Transfer and false recognition based on phonetic identities of words.

NEWLAND, T. E. What are the most common cursive errors? (1932) Abridged and reprinted in Hunnicutt, C. W. & Iverson, W J. (eds) 1958. New York Harper. Research in the Three R's

NIELSEN, H. H & RINGE, K. 1969. Scand. J. Psychol., 10, 225-231. Visuo-perceptive and visuo-motor performance of children with reading disabilities.

NISBET, S. D. 1939. Brit. J Educ. Psychol., 9, 29-42. Non-dictated spelling tests.

NOELKER, R. W. & SCHUMSKY, D. A 1973. J. Educ Psychol., 64, 22-25. Memory for sequence, form, and position as related to the identification of reading retardates.

NORMAN, R. D. & DARLEY, M. F 1959. J. Educ. Psychol., 50, 31-36. The comparative personality adjustment of superior and inferior readers.

NUESSLE, W. 1972. J. Exper. Child Psychol., 14, 265-276 Reflectivity as an influence on focusing behaviour of children.

OLIVER, P. R., NELSON, J. M. & DOWNING, J. 1972. J. Educ. Psychol., 63, 487-492. Differentiation of grapheme-phoneme units as a function of orthography.

ORTON, S. T. 1937. New York· W. W. Norton. Reading, Writing and Speech problems in children.

PAIVIO, A. & CSAPO, K. 1969. J. Exper Psychol., 80, 279-285. Concrete image and verbal memory codes.

PAYNE, M. A. 1971. Speed of recognition of geometrically transformed words by Junior children. Unpublished P.G C.E. Thesis, University of Durham.

PETERS, M. L. 1967(a) London Routledge & Kegan Paul. Spelling Caught or taught?,

PETERS, M. L. 1967(b). Brit. J. Educ. Psychol., 37, 47-53. The influence of reading methods on spelling.

PETERS, M. L. 1970. Cambridge Cambridge Institute of Education Monographs on Education, 4. Success in spelling.

PETERS, M. L. Further thoughts on spelling caught or taught. In Clark, M. M. & Milne, A. (eds) 1973. London· Ward Lock International. Reading and related skills.

POLLIS, N. P. & DOYLE, D. C. 1972. Percep. Motor skills. 34, 235-238. Sex role, status, and perceived competence among first-graders.

POSNER, M. I., BOIES, S. J , EICHELMAN, W. H. & TAYLOR, B. L. 1969. J. Exper. Psychol., 79, 1-16, Retention of visual and name codes of single letters.

POSTMAN, L. & CONGER, B. 1954 Science, 119, 671-673. Verbal habits and the visual recognition of words

RADAKAR, L. D. 1963. J. Educ. Res., 56, 370-372. The effect of visual imagery upon spelling performance

RAND, C. W. 1973. Child Development, 44, 47-53. Copying in Drawing the importance of adequate visual analysis versus the ability to utilize drawing rules.

REED, D W. A Theory of language, speech, and writing (1965) Reprinted in Singer,H & Ruddell R. B. (eds) 1970 Newark, Delaware I R.A. Theoretical models and processes of reading

REED, J. C. 1969 The Reading Teacher, 23, 132-136. Children's figure drawing - a clue to reading progress

REID, J F. 1966 Educ. Res , 9, 56-92 Learning to think about reading.

REILLY, D. H. 1972. Percep. Motor skills, 35 995-1001. Auditory-visual integration, school demographic features and reading achievement.

REINHOLD, M. 1963. Proc. R. Soc Med , 56, 203-206. The effect of laterality on reading and writing.

REINVANG, I. R 1972. Scand. J. Psychol., 13, 285-291 Perception and generation of mirror-inverted letters

RICHMOND, A. E. 1960. J. Exper. Educ., 29, 3-22. Children's spelling needs and the implications of research.

ROBERTS, G. R 1969. London: Routledge & Kegan Paul. Reading in Primary schools.

ROBERTS, G. R & LUNZER, E A. Reading and learning to read. In Lunzer, E. A. & Morris, G. F. (eds) 1968. London: Staples Press Development in Human Learning.

ROBERTS, R. W. & COLEMAN, J. C 1958 J Educ Res., 51, 445-451. Investigation of the role of visual and kinesthetic factors in reading failure.

ROBINSON, H. M 1946. Chicago: University of Chicago Press. Why pupils fail in reading

ROBINSON, H M. The major aspects of reading. In Robinson, H. M. (ed) 1966. Chicago University of Chicago Press, Suppl. Educ. Monogr. 96. Reading Seventy five years of progress.

ROSE, S. A., BLANK, M. & BRIDGER, W H. 1972. Developmental Psychol., 6, 482-486. Intermodal and intramodal retention of visual and tactual information in young children.

ROSINSKI, R. R. & WHEELER, K. E. 1972. Psychon. Sci., 26, 97-98. Children's use of orthographic structure in word discrimination.

ROURKE, B. P. & TELEGDY, G. 1971. Percep. Motor skills, 33, 875-883. Lateralizing significance of WISC Verbal-Performance discrepancies for older children with learning disabilities

RUDDELL, R. B. Psycholinguistic implications for a systems of communication model. In Goodman, K S. & Fleming, J. T. (eds) 1969. Newark Delaware I.R.A. Psycholinguistics and the teaching of reading.

RUDISILL, M. 1956. J. Psychol. 42, 317-328. Flashed digit and phrase recognition of oral and concrete responses a study of advanced and retarded readers in the third grade.

RUTTER, M., TIZARD, J. & WHITMORE, K (eds) 1970. London Longmans Education, health and behaviour.

RYAN, T. J. & WATSON, P. 1968. Psychol. Bull., 69, 111-125 Frustrative nonreward theory applied to children's behaviour

SABATINO, D. A. & BECKER, J T 1971 Child Development, 42, 2055-2060. Relationship between lateral preference and selected behavioral variables for children failing academically

SAMPSON, G. P. 1972. Reading Improvement, 9, 48-50 The problem of spelling irregularity.

SAMUELS, S. J. 1973. Reading Res. Quart., 8, 200-239. Success and failure in learning to read A critique of the research.

SATZ, P., RARDIN, D. & ROSS, J. 1971. Child Development, 42, 2009-2021. An Evaluation of a theory of specific developmental dyslexia.

SATZ, P. & SPARROW, S. Specific developmental dyslexia A Theoretical Formulation. In Bakker, D. J & Satz, P. (eds) 1970. Rotterdam Rotterdam University Press. Specific reading disability Advances in theory and method.

SAUNDERS, R. E. Dyslexia its phenomenology. In Money, J. (ed) 1962. Baltimore Johns Hopkins Press. Reading disability Progress and research needs in dyslexia.

SAWITZ, L. A. 1964 Diss. Abstr. 25(6), 3678. Ocular-manual laterality and perception of axially rotated reading materials.

SCAGNELLI, P. 1970. Diss Abstr. Int. 30(8-B), 3875. Relationships among visual imagery, language and haptics in spatial perception.

SCHIFFMAN, H. R. 1972. Reading Res Quart , 7, 588-612. Some components of sensation and perception for the reading process.

SCHILDER, P 1944. J. Genet. Psychol., 65, 67-88. Congenital alexia and its relation to optic perception.

SCHONELL, F. J. 1934. Brit. J. Educ. Psychol., 4, 123-139 The relation between defective speech and disability in spelling.

SCHONELL, F J. 1942. Edinburgh Oliver & Boyd. Backwardness in the basic subjects.

SCHONELL, F J. 1952. London Oliver & Boyd. The psychology and teaching of reading.

SEALEY, L. G. W. & GIBBON, V. 1962. Oxford Basil Blackwell. Communication and learning in the Primary school.

SEIGLER, H. G. & GYNTHER, M. D. 1960. J. Developmental Reading, 4, 17-24. Reading ability of children and family harmony.

SENF, G. M. 1969. Diss. Abstr. 29(9-B), 3117. The development of immediate memory for bisensory stimuli in normal children and children with learning disorders.

SHANKWEILER, D. Some critical issues concerning developmental dyslexia. In Franklin, A W. (ed) 1962 London· Pitmans. Word blindness or specific developmental dyslexia

SHANKWEILER, D. 1964(b). Neuropsychol., 1, 267-286. A study of developmental dyslexia.

SHEPHERD, E. M. 1956. Amer J. Ophthal., 41, 1029-1039. Reading efficiency of 809 average school children.

SHORES, J. H. & YEE, A. H. 1973. J. Special Educ., 7, 301-309. Spelling achievement tests what is available and needed?

SHORT, P. L. 1953. Brit. J Psychol , 44, 38-51. The objective study of mental imagery.

SIMON, D. P. & SIMON, H. A. 1973. Rev Educ Res., 43, 115-137. Alternative uses of phonemic information in spelling

SKINNER, B. F. 1953. New York· Macmillan. Science and Human Behaviour.

SMITH, D. D. & LOVITT, T. C. 1973. J. Learning Dis., 6, 356-363. The Educational diagnosis and remediation of written b and d reversal problems A case study.

SMITH, F. 1971. New York Holt, Rinehart & Winston Inc. Understanding reading A psycholinguistic analysis of reading and learning to read.

SMITH, F. 1973. New York· Holt, Rinehart & Winston Inc. Psycholinguistics and reading.

SMITH, F. & GOODMAN, K. S On the psycholinguistic method of teaching reading. (1971) Reprinted in Smith, F 1973. New York Holt, Rinehart & Winston Inc. Psycholinguistics and reading.

SMITH, F. & HOLMES, D. L. The independence of letter, word, and meaning identification in reading (1971) Reprinted in Smith, F. 1973. New York Holt, Rinehart & Winston Inc. Psycholinguistics and reading.

SMITH, H. K. 1967. Reading Res. Quart., 3, 53-83. The responses of good and poor readers when asked to read for different purposes.

SMITH, I L & RINGLER, L. H. 1971. Percep. Motor skills, 32, 764-766. Preferred sensory modality, reading readiness, and reading achievement in first-grade children.

SOUTHGATE, V. Approaches to beginning reading in Great Britain. In Jenkinson, M.D. (ed) 1967. Newark, Delaware I.R.A. Reading instruction An International forum.

SOUTHGATE, V. 1972. London· University of London Press. Beginning Reading.

SPACHE, G. D. 1957 J Educ. Res., 50, 461-469. Personality patterns of retarded readers.

SPACHE, G. D. Reactions to 'Models of perceptual processes in reading ' In Singer, H. & Ruddell, R. B. (eds) 1970. Newark, Delaware I.R.A. Theoretical models and processes of reading.

STAATS, A. W 1970. London· Holt, Rinehart & Winston Inc. Learning, Language and cognition.

STAATS, A. W. & STAATS, C. K. 1962. Child Development, 33, 831-846 A comparison of the development of speech and reading behaviour with implications for research.

STEGER, J. A., VELLUTINO, F. R. & MESHOULAM, U. 1972. Percep. Motor skills, 35, 263-266. Visual-tactile and tactile-tactile paired associate learning in normal and poor readers.

STEIN, A. & SMITHELLS, J. 1969. Developmental Psychol., 1, 252-259. Age and sex differences in children's sex role standards about achievement.

STEINER, R., WIENER, M & CROMER, W 1971. J Educ. Psychol., 62, 506-513. Comprehension training and identification for good and poor readers.

STENNETT, R. G , SMYTHE, P C , HARDY, M & WILSON, H. R. 1972. Percep. Motor skills, 34, 183-186. Developmental trends in letter-printing skill

STRANG, R 1964. New York McGraw Hill, Diagnostic teaching of reading.

STRANG, R., McCULLOUGH, C. M. & TRAXLER, A. E. 1967. New York McGraw Hill. The improvement of reading (4th ed).

TANSLEY, A. E. 1967 London Routledge & Kegan Paul. Reading and Remedial reading.

THORNDIKE, E. L. & LORGE, I. 1944 Bureau of Publications, Teacher's College, Columbia University The Teacher's word book of 30,000 words.

TINKER, M A 1963. Ames, Iowa Iowa State University Press. Legibility of Print.

TINKER, M. A. & McCULLOUGH, C. M. 1962 New York Appleton-Century-Crofts Teaching elementary reading (2nd ed).

TULVING, E. & GOLD, C 1963. J. Exper. Psychol., 66, 319-327. Stimulus information and contextual information as determinants of tachistoscopic recognition of words.

TULVING, E. & THOMSON, D. M 1971. J Exper Psychol., 87, 116-124. Retrieval processes in recognition memory Effects of associative context.

UNDERWOOD, B J. 1969 Psychol. Rev., 76, 559-573. Attributes of memory.

VELLUTINO, F. R., STEGER, J. A. & KANDEL, G. 1972 Cortex, 8, 106-118. Reading disability An inves igation of the perceptual deficit hypothesis.

VELLUTINO, F R., STEGER, J. A. & PRUZEK, R M 1973. Canad J.Behav. Sci., 5, 111-123. Inter- vs intra-sensory deficit in paired associate learning in poor and normal readers.

VENEZKY, R L. 1967. Reading Res. Quart., 2, 75-105. English orthography Its graphical structure and its relation to sound.

VENEZKY, R. L. & CALFEE, R. C. The Reading Competency model. In Singer, H. & Ruddell, R. B. (eds) 1970 Newark, Delaware I.R.A Theoretical models and processes of reading.

VENEZKY, R. L , CALFEE, R C & CHAPMAN, R S. Skills required for learning to read In Harris, L. A. & Smith, C B. (eds) 1972. New York Holt, Rinehart & Winston Inc. Individualizing reading instruction A Reader.

VERNON, M. D 1957. London Cambridge University Press. Backwardness in Reading.

VERNON, M. D 1968 London' The College of Special Education, Guide Lines for Teachers, No. 4. Backward Readers

VIGOTSKY, L S. 1962. Cambridge' M I.T. Press Thought and Language.

WALLACH, M. A 1963. J. Educ. Psychol., 54, 57-62. Perceptual recognition of approximations to English in relation to spelling achievement

WALTERS, C E. 1961 Percep. Motor skills, 13, 370. Reading ability and visual-motor function in second grade children

WARDHAUGH, R 1971. Reading Res. Quart , 7, 168-194. Theories of language acquisition in relation to beginning reading instruction.

WEAVER, W. W. & KINGSTON, A. J 1972. Reading Res. Quart., 7, 613-627. Modeling the effects of oral language upon reading language.

WEBER, R. J. & BACH, M 1969. Brit. J. Psychol., 60, 199-202 Visual and speech imagery.

WEBER, R-M. 1968. Reading Res. Quart., 4, 96-119 The study of oral reading errors a survey of the literature

WEBER, R-M 1970 Reading Res. Quart , 5, 427-451. A linguistic analysis of First-grade reading errors.

WECHSLER, D. & HAGIN, R A 1964. Percep. Motor skills, 19, 319-326. The problem of axial rotation in reading disability

WECHSLER, D. & PIGNATELLI, M L 1937 J Educ Psychol., 28, 215-221. Reversal errors in reading' Phenomena of axial rotation.

WEDELL, K 1973. London John Wiley & Sons Learning and Perceptuo-motor disabilities in children

WEINER, A. S. & ADAMS, W. V 1974 J Exper. Child Psychol., 17, 353-359. The effect of failure and frustration on reflective and impulsive children.

WEINSTEIN, R. & RABINOVITCH, S. 1971. J. Educ. Psychol., 62, 25-30. Sentence structure and retention in good and poor readers

WEIST, R M & CRAWFORD, C. 1972. Psychon. Sci., 28, 106-108. Phonological and semantic representations of words, compartments of memory, and rehearsal.

WEPMAN, J. M. Dyslexia Its relationship to language acquisition and concept formation. In Money, J. (ed) 1962 Baltimore Johns Hopkins Press. Reading disability Progress and research needs in dyslexia.

WICKENS, D D. 1970. Psychol. Rev , 77, 1-15. Encoding categories of words An empirical approach to meaning.

WARD W 1968 Child Development, 39, 867-874 Reflection-impulsivity in Kindergarten children

WICKENS, D. D. Characteristics of word encoding. In Melton, A. W. & Martin, E. (eds) 1972 Washington, D C' Winston & Sons. Coding processes in human memory

WICKENS, D. D. 1973. Memory & Cognition, 1, 485-490. Some characteristics of word encoding.

WILLIAMS, J. P Reactions to 'Modes of word recognition' In Singer, H. & Ruddell, R. B. (eds) 1970. Newark, Delaware I.R.A. Theoretical models and processes of reading

WILLIAMS. J P 1973 Reading Res Quart., 8, 121-146. Learning to read A review of theories and models

WILLIAMS, J P., BLUMBERG, E. L. & WILLIAMS, D. V. 1970 J. Educ. Psychol., 61, 310-315. Cues used in visual word recognition.

WOHLWILL, J. F. & WEINER, M 1964 Child Development, 35, 1113-1125. Discrimination of form orientation in young children.

WOLPERT, E. M. 1971 The Reading Teacher, 24, 640-643. Modality and reading A perspective.

WOLPERT, E. M. 1972. The Reading Teacher, 26, 180-186. Length, imagery values and word recognition.

WOODS, P A. Schedule effects in the operant behaviour of ESN(S) children. Paper presented at the British Psychological Society Annual Conference, Bangor, North Wales, April 1974.

WUSSLER, M & BARCLAY, A. 1970. Percep. Motor skills, 31, 419-425. Cerebral dominance, psycholinguistic skills and reading disability.

ZASLOW, R. W. 1966. J. Educ. Psychol., 57, 133-139. Reversals in children as a function of midline body orientation.

ZECHMEISTER, E. B. 1969. J. Verb. Learning Verb. Behav., 8, 754-761. Orthographic Distinctiveness

ZELNIKER, T., JEFFREY, W. E., AULT, R. L. & PARSONS, J. 1972. Child Development, 43, 321-335. Analysis and modification of search strategies of impulsive and reflective children on the Matching Familiar Figures test.

APPENDIX (A)

CLASSIFICATION OF WRITTEN ERRORS (LIVINGSTON, 1961)

(1) Omission of letters, other than failure to double
(a) single letter (b) syllable

(2) Insertion of letters, other than erroneous doubling
(a) single letter (b) syllable

(3) Transpositions
(a) inversions (namely adjacent letters) (b) transposition proper

(4) Doubling
(a) single for double (b) double for single

(5) Confusions and Substitutions
(a) single letter (b) syllable

(6) Homonyms

(7) Perseveration

(8) Unclassified Group

Type of Error	Section (a)		Section (b)		Total	
	Good	Poor	Good	Poor	Good	Poor
Confusions	18.7	23.5	13.5	17.0	32.2	40.5
Omissions	23.9	28.9	2.2	2.7	26.1	31.6
Insertions	17.8	11.7	0.6	0.8	18.4	12.5
Single for Double	7.4	5.9				
Double for Single			2.1	2.4	9.5	8.3
Transpositions	11.7	4.0	0.6	0.5	12.3	4.5
Homonyms					0.9	1.3
Perseveration					0.6	0.4
Unclassified					0	0.9

APPENDIX (B) LIVINGSTON (1961) PERCENTAGE OF EACH TYPE OF SPELLING ERROR: GOOD & POOR SPELLERS COMPARED.

Type of Error	Section (a)		Section (b)		Total	
	Dict.	Trans.	Dict.	Trans.	Dict.	Trans.
Confusions	24.1	31.9	15.7	3.7	39.8	35.6
Omissions	25.8	29.6	2.2	1.9	28.0	31.5
Insertions	13.5	12.5	0.9	0.3	14.4	12.8
Single for Double	6.7	4.0				
Double for Single			2.9	3.1	9.6	7.1
Transpositions	5.4	11.1	0.6	0.2	6.0	11.3
Homonyms					1.4	1.5
Perseveration					0.3	0.2
Unclassified					0.5	0

LIVINGSTON (1961): PERCENTAGE OF EACH TYPE OF ERROR: VOCABULARY DICTATION TESTS & TRANSCRIPTION TESTS COMPARED.

SERIES I S-F TESTS INSTRUCTIONS TO SUBJECTS

INTRODUCTION: Today I want you to do some tests which involve saying and writing letters and words. All the tests are very short, and I will explain everything you have to do. If there is anything you don't understand, always ask me.

ORAL LETTERS Here I have a tape recorder and microphone to record what you say. When I say 'GO' I want you to say as many separate letters of the alphabet as you can in the time I give you, like this. Say the letters as they come into your head, but try not to just recite the alphabet. It doesn't matter if you use the same letter more than once. Say as many letters as you can, as quickly as possible, before I say 'STOP'. Do speak clearly into the microphone. Do you understand ?
READY ? GO. (1 minute allowed)

WRITTEN LETTERS: On this sheet I want you to write separate letters of the alphabet. Write the letters as they come into your head, but try not to just write out the alphabet. Write them in rows across the page, like this. As soon as you finish one row, start the next one. Begin when I say 'GO', and write as many letters as you can before I say 'STOP'. Do you understand ?
READY ? GO. (1 minute allowed)

ORAL WORDS: This time, when I say 'GO', I want you to say any words that come into your head, like this. Say as many separate words as you can before I say 'STOP'. Go as quickly as you can, but remember to speak clearly. Do you understand ?
READY ? GO. (2 minutes allowed)

WRITTEN WORDS. On this sheet I want you to write separate words. Write one word on each line down the page, like this. Write any word that comes into your head, even if you're not absolutely sure that you can spell it correctly. Begin when I say 'GO', and write down as many words as you can before I say 'STOP'. Keep your writing neat enough for me to read. Do you understand ?
READY ? GO. (2 minutes allowed)

WRITTEN PSEUDO-WORDS Now something rather different. This time I want you to try and make up some words. I have made up some myself, like this. You see - they are like real words, but they don't actually exist. When I say 'GO' I want you to make up some words yourself. Write one on each line down the page, like this. Keep your writing neat, and make up as many words as you can before I say 'STOP'. Do you understand ?
READY ? GO. (2 minutes allowed)

Response sheets

Overleaf are presented copies of response sheets (reduced from A4) for Written S-F Letters and Words tasks. The latter was also employed in the Pseudo-word test.

APPENDIX (D)

SERIES I S-C TESTS : DETAILS OF STIMULUS MATERIAL

Stimulus material was prepared using Black 18 pt. Century Schoolbook Letraset on white card, as specified below

LETTERS TEST: Cards 28cm x 17cm contained 130 items arranged in 5 rows or columns. 2 lists were constructed, in which letter order was randomized with the restraint that no two letters adjacent in the normal alphabetic order should be adjacent on the card.

ISOLATED WORDS TEST: 4 matched lists were constructed, each containing ten 3-letter, fifteen 4-letter and fifteen 5-letter words.
Cards 24cm x 13 cm and 19cm x 19cm had the 40 items arranged in 4 rows and columns of 10 respectively.
All 4 lists were prepared for both horizontal and vertical presentation.
Ss received each list once during the four administrations of the test (i.e. Oral and Written tests, Sessions 1 & 2). Allocation of Ss to administration sub-groups ensured an alternation of presentation order among the 4 lists.

ISOLATED PSEUDO-WORDS TEST: Arrangements similar to those for the Isolated Words test were employed.

PROSE TEST: 2 passages of 80 words, matched as closely as possible for item length and overall composition were constructed, and presented on cards 26cm x 14cm.
Half the sample received Passage 1 for Reading and Passage 2 for Copying and the other half the reverse arrangement.

Examples of test material

Word and Pseudo-word lists and the two Prose passages are presented overleaf, followed by four examples of the test material as presented (size reduced).

1. Letters, List 2 (Vertical Presentation)
2. Words, List 2 (Vertical Presentation)
3. Pseudo-words, List 3 (Horizontal Presentation)
4. Prose Passage 1.

SERIES I S-C WORD LISTS

LIST 1	LIST 2	LIST 3	LIST 4
men	set	get	net
had	bad	bed	big
air	eat	out	our
top	mop	how	now
egg	off	see	too
but	bus	cut	hut
can	ran	pin	win
day	may	way	say
who	why	fry	try
she	the	and	end
then	them	that	than
same	came	some	come
call	ball	will	hill
mine	fine	line	nine
best	nest	test	desk
face	race	gave	save
long	song	ring	wing
cart	hard	dark	bark
seen	week	been	keep
boat	coal	coat	soap
town	down	snow	grow
dear	year	four	your
hold	told	gold	cold
fish	such	much	dish
mean	real	hair	fair
spell	still	shall	small
grass	cross	class	dress
sorry	lorry	carry	merry
again	ahead	along	about
right	fight	night	light
point	paint	brain	train
cream	dream	teach	beach
would	build	field	could
these	those	think	thank
house	mouse	sound	round
under	after	until	often
music	never	magic	water
place	grace	plate	brave
tries	chair	cries	stair
since	pence	horse	large

SERIES I : S-C PSEUDO-WORD LISTS

LIST 1	LIST 2	LIST 3	LIST 4
vɪd	tɪd	fɪp	bɪp
nop	gop	mot	sog
gar	lur	dar	tur
aɪf	aɪn	oap	ead
bly	bry	gly	gry
doy	poy	tay	foy
sut	sud	oun	mun
wam	nam	gam	vam
heg	feg	pog	deg
lan	lɪn	han	hɪn
feak	deak	neak	heak
yent	hond	fent	jond
nelp	melp	besk	lesk
pɪme	pɪte	dɪte	fɪme
tarp	barp	varm	sarm
dape	nade	hape	tade
foad	foat	soat	hoad
mang	wang	lang	dang
ohɪm	thɪm	chɪd	shɪd
bɪnk	hɪnk	tɪnk	dɪnk
nuch	ruch	sich	mɪch
prɪd	drap	brap	brod
beep	geet	deet	feep
clet	cled	blet	plet
gowm	sowt	dowm	cown
lɪsty	hɪsty	garty	darty
dreak	dreal	treal	treak
shrud	strud	shrɪd	shrod
trand	sland	brend	clend
baɪnt	gaɪnt	haɪnt	maɪnt
frash	tresh	crɪsh	bresh
glane	blane	flane	glape
brɪke	shɪke	grɪne	stɪde
shoom	choop	shoop	choom
snoat	loast	doast	troap
gofty	ɪften	onger	ampty
natch	datch	satch	fatch
blɪck	fluck	glɪck	bluck
abong	adaɪn	alout	aleng
chope	chone	chode	chote

SERIES I : S-C PROSE PASSAGES

PASSAGE 1

One morning John came down for breakfast to find everywhere white with snow. As soon as possible he rushed outside. He wanted to build the biggest snowman in the world.

All morning John piled up snow to make the body. But the sun was shining, and when he came back after dinner his big snowman had almost completely melted !

John looked at the tiny lump of snow. "Never mind," he said, "I'll make the smallest snowman in the world instead."

PASSAGE 2

Peter's father was a fisherman. Every day Peter watched the boats sailing far out to sea. If only he could go with them.

One night he dreamt he was alone in a small boat, and caught the largest fish anybody had ever seen. But it was so heavy that the boat started sinking ! Just when he was absolutely certain he would drown, Peter suddenly woke up.

"Perhaps I'll wait until I'm older," he said, "Fishing isn't so easy after all."

j	l	x	r	q
n	s	w	q	j
x	i	d	w	a
i	k	h	i	x
z	t	u	m	b
g	l	z	s	z
b	w	f	x	h
a	v	k	z	p
k	e	y	l	i
y	z	m	f	v
b	g	o	w	c
m	x	q	u	u
p	p	t	q	h
h	a	p	g	m
a	m	b	s	f
g	r	l	d	e
r	n	n	r	t
e	y	k	u	o
n	c	d	t	r
a	f	c	b	q
d	o	h	j	s
c	k	w	c	n
j	t	e	l	v
s	e	g	p	j
o	d	v	i	o
y	y	f	v	u

fine	bad	bus	told
ball	week	eat	real
mop	such	still	song
dream	fight	paint	may
set	came	ahead	off
cross	those	coal	nest
hard	build	the	grace
ran	race	never	year
pence	after	mouse	them
lorry	down	why	chair

tink	mot	brend	satch	deet	fip	varm	lang	pog	blet
shoop	grine	soat	cun	tay	crish	alout	han	besk	flane
chid	gam	dar	neak	chode	gly	onger	fent	hape	doast
garty	sich	brap	haint	oap	shrid	treal	dowm	glick	dite

One morning John came down for breakfast to find everywhere white with snow. As soon as possible he rushed outside. He wanted to build the biggest snowman in the world.

All morning John piled up snow to make the body. But the sun was shining, and when he came back after dinner his big snowman had almost completely melted!

John looked at the tiny lump of snow. "Never mind," he said, "I'll make the smallest snowman in the world instead."

APPENDIX (E)

SERIES I S-C TESTS : INSTRUCTIONS TO SUBJECTS

INTRODUCTION In the last set of tests I asked you to make up lists of letters, words and made-up words. Today I have some more short tests for you, but this time you will be using some lists I have made up. I want to see how quickly and how accurately you can say or copy these lists. Again, I will explain everything you have to do, but always ask if you don't understand.

ORAL LETTERS Here we use the tape recorder again. This card has a lot of separate letters on it, like this card here. When I say 'GO' I want you to start reading the letters out loud. Read them in rows across the page, like this.* As soon as you finish one row, go on to the next. Read always from left to right. Go as fast as you can, but do speak clearly. Carry on until you reach the end of the bottom row. Do you understand ?
READY ? GO.

WRITTEN LETTERS Here is another card with rows of letters on it. When I say 'GO' I want you to start copying the letters on to this sheet as fast as you can. Work across the page from left to right. When you fill one row, go straight on to the next. Don't worry about having your letters in the same positions as they are on the card. Carry on until you reach the last letter in the bottom row. Do you understand ?
READY ? GO.

ORAL WORDS Here I have a card with rows of words on it. I want you to read the words as quickly and as accurately as you can. When I say 'GO' start reading across the page, from left to right, like this. When you finish one row go straight on to the next, and carry on to the end of the bottom row. Do you understand ?
READY ? GO.

WRITTEN WORDS: This time, when I say 'GO' I want to see how quickly you can copy the words on this card. Copy the words across the page, working from left to right, like this. Don't worry about having you words in the same positions as they are on the card. Write as fast and as accurately as you can, and keep your writing neat enough to read. If you begin to make a mistake and you notice it, just cross it neatly through and carry on. Don't write the correct letter on top of your mistake, but next to it. Do you understand ?
READY ? GO.

ORAL PSEUDO-WORDS: This card had rows of made-up words on it. They are like real words, but don't actually exist. You've never heard them before, but I want you to read them out loud as you think they ought to sound. Work as quickly and as accurately as you can. When I say 'GO' start reading them across the page, from left to right, like this. When you finish one row, go straight on to the next, and carry on to the end of the bottom row. Do you understand ?
READY ? GO.

* On the reverse side of the card, E traces the direction in which S is to work.

WRITTEN PSEUDO-WORDS: When I say 'GO' I want to see how quickly you can copy the made-up words on this card. Copy them across the page, from left to right, like this. Don't worry about having your words in the same positions as they are on the card. Write as fast and as accurately as you can. If you make a mistake and you notice it, just cross it neatly through and carry on. Don't write the correct letter on top of your mistake, but next to it. Do you understand ?
READY ? GO.

ORAL PROSE: On this card is a short story. Begin when I say 'GO', and read it to me as quickly and as accurately as you can. Do you understand ?
READY ? GO.

WRITTEN PROSE: On this card is another short story. When I say 'GO' begin copying it on to this sheet as quickly and as accurately as you can. If you make a mistake, just cross it through neatly and carry on. Don't write the correct letter on top of your mistake, but next to it. Do you understand ?
READY ? GO.

Instructions for Letters, Words and Pseudo-words tests are modified appropriately for vertical presentation.

Response sheets

Response sheets for S-C tests were the same as those used for S-F tasks, the only addition being the Letters (Vertical Presentation) sheet, which is reproduced overleaf (reduced size).

APPENDIX (F)

SERIES II S-F TESTS : INSTRUCTIONS TO SUBJECTS

INTRODUCTION: Today I want you to do some tests in which you have to read and write words. All the tests are very short, and I will explain everything you have to do. If there is anything you don't understand, always ask me.

ORAL UNRESTRICTED: Here I have a tape recorder to record what you say. When I say 'GO' you must say as many words as you can, like this. Say any words that come into your head, and say as many as you can before I say 'STOP' Remember to speak clearly. Do you understand ?
READY ? GO.

ORAL LENGTH-RESTRICTED: This test is a bit different. Again you must say words but I will say how long the word must be. For example, I will ask for a word with four letters in it, and you could say _____.
After each instruction I want you to say one word : the first word you think of with the right number of letters in it. Say it as quickly as you can.
Do you understand ? READY ?

ORAL LETTER-RESTRICTED: This time, instead of telling you how long your word must be I will tell you which letter the word must begin or end with. For example, if I ask for a word beginning with 'j', you could say _____. Or a word ending with 'o' and you could say _____. After each instruction say one word: the first word you think of with the right first letter or the right last letter. Answer as quickly as you can. Do you understand ? READY ?

WRITTEN UNRESTRICTED: This time I want to see how quickly you can write words. Write one word on each line down the page, like this. Write any word that comes into your head, even if you're not absolutely sure you can spell it correctly. Begin when I say 'GO', and fill the sheet as quickly as you can. Do you understand ?
READY ? GO.

WRITTEN LENGTH-RESTRICTED. This time I have decided how long your words must be. Each of these dashes is the space for one letter, so that your first word must be __ letters long, and so on. Write the letters of your words over the dashes, like this. If you make a mistake, begin again above the letters of the wrong word, like this. Work down the page, but if you get stuck on one, go on to the next and come back to it at the end. Begin when I say 'GO' and fill up the sheet as quickly as you can. Do you understand ?
READY ? GO.

WRITTEN LETTER-RESTRICTED. This time I have marked what letter your word is to begin or end with. Write any word you think of : the length of your words doesn't matter this time, but they must begin or end with the letters given. Work down the page, but if you get stuck on one, go on to the next and come back to it at the end. Don't bother to write the letters that are given, just write in the rest of the word. If you make a mistake, write your correction above the wrong word, like this. Begin when I say 'GO', and fill the sheet as quickly as you can.
Do you understand ?
READY ? GO.

Instructions and response sheets

Details of the instructions given by E. on the Restricted tests are given overleaf, together with reproductions of the response sheets (21cm x 15cm) used on Written Restricted tests (reduced size).

SERIES II S-F TESTS RESTRICTED TEST INSTRUCTIONS

Ss were randomly assigned to one of two instruction groups, which allowed two presentation orders for test items. The assignments given below for Oral tests were reversed for the Written task.

GROUP I : LENGTH RESTRICTED

1.	three	13.	five
2.	five	14.	five
3.	three	15.	three
4.	three	16.	four
5.	four	17.	five
6.	five	18.	four
7.	four	19.	three
8.	three	20.	five
9.	five	21.	four
10.	four	22.	three
11.	three	23.	five
12.	four	24.	four

GROUP I : LETTER RESTRICTED

1.	begin p	13.	end d
2.	begin s	14.	begin g
3.	end n	15.	begin m
4.	end m	16.	end l
5.	begin t	17.	begin o
6.	end p	18.	end h
7.	begin h	19.	end r
8.	end e	20.	begin f
9.	end t	21.	begin b
10.	begin c	22.	end k
11.	begin r	23.	end w
12.	begin n	24.	end g

GROUP II : LENGTH RESTRICTED

1.	four	13.	five
2.	five	14.	three
3.	four	15.	four
4.	three	16.	five
5.	five	17.	three
6.	four	18.	five
7.	three	19.	three
8.	four	20.	four
9.	three	21.	five
10.	four	22.	four
11.	five	23.	five
12.	three	24.	three

GROUP II : LETTER RESTRICTED

1.	end t	13.	begin t
2.	begin c	14.	end e
3.	begin p	15.	begin a
4.	end y	16.	end d
5.	end m	17.	end r
6.	begin b	18.	begin w
7.	begin r	19.	end n
8.	begin s	20.	begin d
9.	end h	21.	end k
10.	end w	22.	begin f
11.	end g	23.	end p
12.	begin l	24.	begin g

_ _ _	_ _ _ _ _	_ _ _ _ _
_ _ _ _ _	_ _ _ _	_ _ _ _
_ _ _	_ _ _	_ _ _
_ _ _	_ _ _ _	_ _ _ _ _
_ _ _ _	_ _ _ _ _	_ _ _ _
_ _ _ _ _	_ _ _ _ _	_ _ _
_ _ _ _	_ _ _	_ _ _ _ _
_ _ _	_ _ _ _	_ _ _ _ _

_____t	_____h	_____r
c_____	_____w	w_____
p_____	_____g	_____n
_____y	l_____	d_____
_____m	t_____	_____k
b_____	_____e	f_____
r_____	a_____	_____p
s_____	_____d	g_____

APPENDIX (G)

SERIES II S-C TESTS : WORD LISTS

LIST 1	LIST 2	LIST 3	LIST 4
bus	hat	but	bat
big	bed	dig	had
set	ten	get	men
pay	lay	sky	say
may	boy	toy	way
try	dry	cry	how
and	she	end	the
old	eat	out	you
age	few	are	own
grape	broke	blame	grace
those	these	brave	slide
fight	stone	chair	plate
sound	round	young	found
field	paint	speak	brain
could	mouth	laugh	build
above	along	alone	again
about	angry	ahead	aloud
until	magic	under	music
watched	clothes	learned	scratch
pleased	breathe	brought	thought
stopped	reached	dripped	changed
because	promise	measles	forgive
trouble	seaside	someone	outside
careful	picture	science	believe
history	factory	holiday	bravery
several	evening	another	seventy
general	anybody	bicycle	already

Selection of words

Words for both Series I and II S-C tests were selected from Spelling lists provided by Arvidson (1963), Freyburg (1960) and Schonell (1932).

Example of test material

Word lists were presented on cards 26cm x 21cm. An example (reduced size) is presented overleaf.

2

along	picture	lay
hat	bed	evening
stone	mouth	dry
anybody	seaside	round
paint	angry	breathe
she	eat	ten
magic	promise	reached
factory	few	boy
these	broke	clothes

APPENDIX (H)

SERIES II S-C TESTS : INSTRUCTIONS TO SUBJECTS

SPELLING TESTS

INTRODUCTION: Today I want to see how well you can spell words that I read out to you. Some will be easy and others more difficult. Do your best each time even if you're not sure you can spell the word correctly.

LINE ONLY: In the first test, write one word on each line, and work down the page, like this. I will say each word twice, and then you must write it down. If you want to correct your answer, cross the wrong letters through neatly, and write your new answer next to it. Do not use more than one line for any one word that I give you. Do you understand ?
READY ?

DASHED LINE: In this next test I have given you the number of letters in each of the words I will ask you to spell. Each dash is the space for one letter in the word, and each line shows the number of letters in the word if it is correctly spelt.
The dashes are there to guide you, but if you're not sure of the spelling of a word and your guess doesn't fit the dashes, don't leave off letters you know should be there,or add extra letters that shouldn't be there, just to make it the right length. Do you understand ?
I will read the words one at a time, and say each word twice. Then you must write it down. Work down the page and be careful to keep on the right line for each word. Correct any mistakes neatly. Do you understand ?
READY ?

LINE + LETTER: On the next test I am giving you the first, middle or last letter of the word I want you to spell, but the sheet doesn't show you how many letters should be in the word.
I will say each word twice and then you must write it down. Don't bother to write the letters that are already given on the sheet. Make any corrections neatly. Work down the page and be careful to keep on the right line for each word. Do you understand ?
READY ?

DASHED LINE + LETTER: This is the last spelling test. This time the sheet shows you both the number of letters that should be in each word, and gives the first, middle or last letter. You have to spell the word by filling in the spaces shown by the dashes.
I will say each word twice, and then you must write it down. Make any corrections neatly. Work down the page, and be careful to keep on the right line. Do you understand ?
READY ?

READING TEST

On each of these four cards there are three columns of words. I want to see how quickly and how accurately you can read these words. When I say 'GO' start reading the words down the page, like this.* When you finish one column, go straight on to the next, and carry on to the last word in the third column.
READY ? GO.

* Direction indicated by E on the reverse side of the card.

COPYING TESTS

INTRODUCTION Today I want you to write again, but this time I want to see how quickly and how accurately you can copy words.

LINE ONLY: In the first test I want you to copy words from this card. Write one word on each line, and your words should be in the same place as the words on the card. Work down the page, like this.
If you make a mistake, cross it through neatly, and write your correction next to it. When I turn the card over and say 'GO', start copying the words as quickly and as accurately as you can. Do you understand ?
READY ? GO.

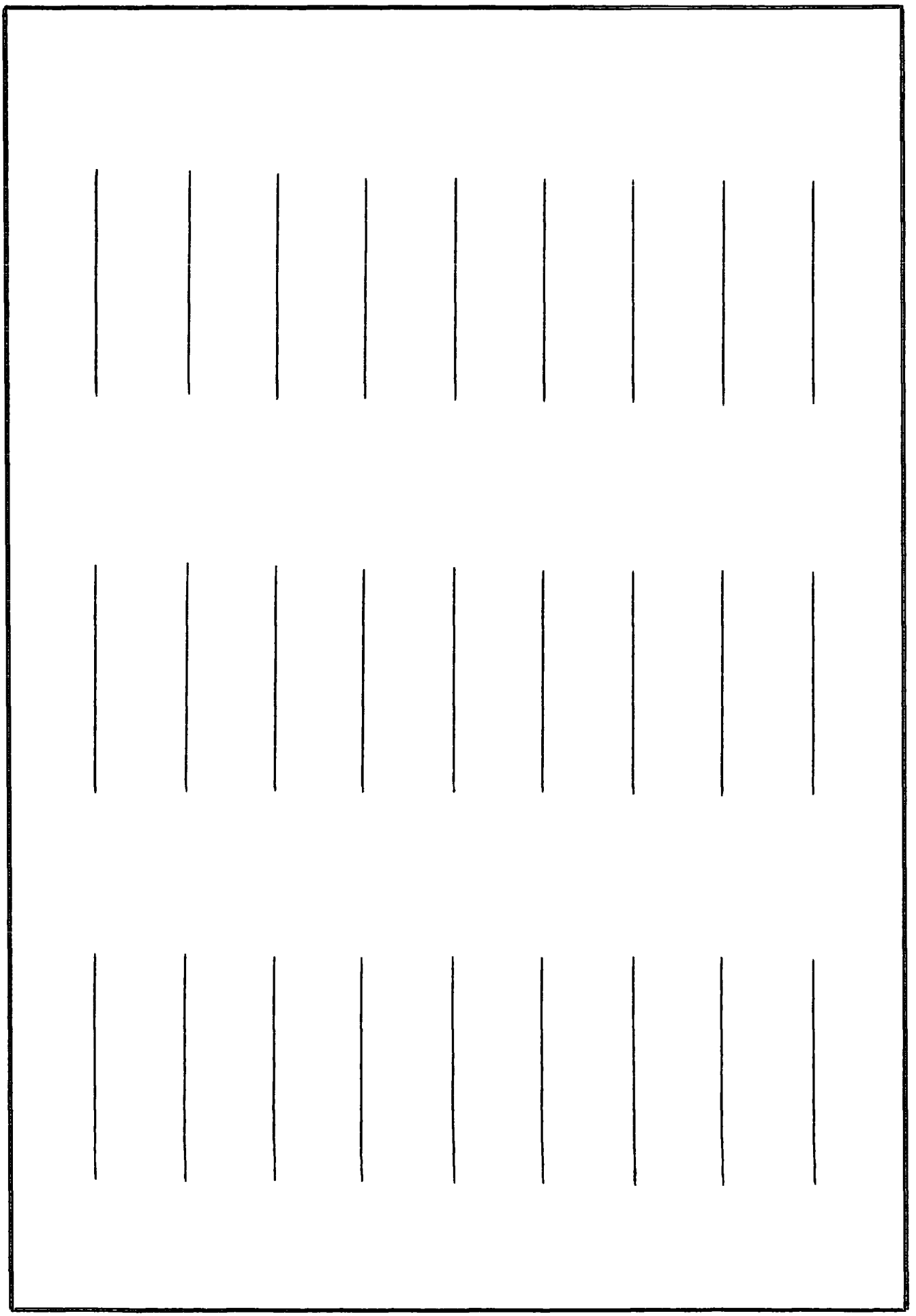
DASHED LINE: On this card are some more words for you to copy. This time your sheet has dashes on it to show how many letters are in each word. Copy the letters of each word on top of the dashes. Your words should be in the same place as the words on the card. Work down the page, like this.
If you make a mistake, cross it through neatly, and write your correction above the mistake, like this. Begin when I say 'GO', and work as quickly and as accurately as you can. Do you understand ?
READY ? GO.

LINE + LETTER: This time the sheet gives you either the first, middle or last letter of each word you have to copy. Do not write the letters that are already given, but copy the other letters of the word after, around or before the letters I have given. Do you understand ?
Your words should be in the same place as the words on the card. Work down the page, like this. If you make a mistake, cross it through neatly, and write your correction above the mistake, like this. Begin when I say 'GO' and work as quickly and as accurately as you can. Do you understand ?
READY ? GO.

DASHED LINE + LETTER: This is the last test. This time your sheet gives you one letter of the word and the number of letters in the word. You have to copy in the rest of the letters, on the dashes, as quickly and as accurately as you can.
Your words should be in the same place as the words on the card. Work down the page, like this. If you make a mistake, cross it through neatly, and write your correction above the mistake, like this. Begin when I say 'GO'.
Do you understand ?
READY ? GO.

Response sheets

Overleaf are presented copies of response sheets (reduced from A4) for the four Spelling and Copying conditions.



f_____	t_____	_____a_____
_____h	_____d	f_____
m_____	_____o_____	_____a_____
_____l_____	a_____	_____d
_____n	_____y	a_____
_____e_____	_____o_____	_____i_____
p_____	_____y	_____c
_____e	t_____	w_____
_____o_____	_____e	_____n_____

a_ _ _ _	_ _ _ t _ _ _	_ _y
_ a _	_ _d	_ _ _ n _ _ _
_ _ _ _e	m_ _ _ _	d_ _
_ _ _ _ _ _y	_ _ _ _ _ _e	_ _ _ _d
_ _ i _ _	_ _ g _ _	b_ _ _ _ _ _ _
s_ _	_ _t	t_ _
_ _ _ _c	p_ _ _ _ _ _	_ _ _ c _ _ _
f_ _ _ _ _ _	_ e _	_ o _
_ _ e _ _	b_ _ _ _	_ _ _ _ _ _s

APPENDIX (I)

SERIES I S-F WRITTEN PSEUDOWORDS OUTPUT & ACCURACY SCORES

GOOD			POOR	
Output	No. items correct		Output	No. items correct
20	16		2	2
12	12		5	2
7	7		7	5
6	4		14	13
4	4		10	10
12	8		13	5
17	11		9	9
17	17		8	1
15	15		16	5
4	4		7	5
9	8		10	4
8	8		16	4
8	2		8	5
8	6		8	5
19	16		7	3
8	8		13	5
13	12		9	2
11	11		9	7
3	3		12	4
9	8		6	2

SERIES I S-C ORAL PSEUDOWORDS SPEED AND ERROR SCORES

GOOD			POOR (n=19)	
Time(secs)	No. errors		Time(secs)	No. errors
42.1	1		97.3	12
57.3	1		118.6	11
31.8	-		118.0	6
35.9	3		36.3	32
58.9	2		198.4	11
41.2	3		169.2	18
107.2	-		104.2	23
40.8	1		77.6	40
57.6	2		91.9	28
53.7	3		143.9	16
68.0	3		159.3	28
44.8	9		110.5	18
52.1	7		147.7	14
69.1	6		89.0	33
51.1	7		130.5	24
75.7	16		123.8	21
111.7	28		166.9	18
59 1	17		192.1	15
63.3	27		230.1	21
72.5	18			