

APPROACHES TO READING DISABILITY:

HOLISTIC METHODS OF INSTRUCTION

by

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A B S T R A C T

This study is a theoretical and practical investigation of pupils who experience difficulty in learning to read. The method of repeated readings is selected as a representative holistic method for the purposes of the practical investigation.

Types of reading instruction are examined in the light of the holistic-analytic dichotomy. These different instructional approaches are related to the levels-of-processing paradigm of the nature of reading. The interactive synthesis of bottom-up and top-down views of the reading process is used to interpret the process of learning to read. Holistic methods of instruction are presented as a means of facilitating the development of higher and lower levels of processing, with particular reference to reading difficulties. Different holistic methods are compared in terms of their degree of reliance on certain instructional principles.

A single-subject research design is employed in order to investigate the method of repeated readings under conditions in which greater emphasis is given to top-down and/or bottom-up processing by the use of supplementary exercises.

Arguments are presented for graphical and qualitative analysis, rather than statistical analysis of the results. General features of the results of all eleven subjects are examined before individual subject's results are interpreted in the light of the specific hypotheses which each was intended to test. It is concluded that the attainment of fluency through repeated readings may be enhanced by supplementary comprehension or word analysis exercises, but that this depends on the characteristic processing strategies of each reader.

These findings are related to reading theory and practice and are critically evaluated before their implications for remedial instruction are outlined.

P R E F A C E

The work described in this dissertation was carried out under the supervision of Prof. I. Coetsee and Mr. R.H. Farman, of the Department of Educational Psychology, University of Natal, Durban.

This whole dissertation, unless specifically indicated to the contrary in the text, is the candidate's own original work, and has not been submitted to any other university for any degree.

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C H A P T E R 1I N T R O D U C T I O N

The concern of this study was the effects of holistic instructional methods, in particular the Method of Repeated Readings (MRR), on the reading performance of individuals exhibiting difficulty in reading. The term "holistic" is open to various interpretations. Therefore its different usages in the field of initial and remedial instruction are briefly explored, but its use in this study is restricted to the denotation of those methods which treat reading as a whole act of communication. This is in contrast to methods which treat reading instruction analytically, dealing with what are conceived as constituent sub-tasks of instruction.

It was, however, not intended to contrast the effects of holistic and analytic methods of instruction. Rather, the effects of holistic methods on reading difficulties were to be considered in general, and the application of the MRR in particular was to be investigated.

The practical issue of instructional methods and their effects on reading performance is not separable, in the literature or in logic, from a theoretical understanding of the nature of the reading process and of learning to read. Therefore effects of holistic methods had to be considered in the light of differing theoretical formulations.

In summary, this study was intended to draw together existing work on holistic methods of remedial reading, models of reading, and reading difficulties. Specifically, the purpose of the research was to investigate the relationship between these further, by research on the use and effects of the MRR. Different models of the reading process give rise to different interpretations of the nature and significance of reading difficulties and, furthermore, to different types

of instructional rationale.

In the discussion of the literature it is described how the MRR can be advocated on the basis of each of the major classes of models of the reading process. This provided the basis for an empirical investigation into the use of the MRR under circumstances in which different aspects of the method were given greater stress. These aspects were related directly to the issues on which the major models of the reading process differ.

C H A P T E R 2THE BACKGROUND TO THE RESEARCH

2.1 An historical perspective on reading instruction

Historical accounts of reading instruction in European civilisation, such as that provided by Morris (1973), reveal what seems to have been a single universally accepted approach, stretching back from the eighteenth century for more than two millenia. This approach, known as the alphabetic method, was used by the ancient Greeks and was passed on, through the Romans, to Western Europe. In Britain and the U.S.A. it lasted into the nineteenth century, until the impact of social and educational change, particularly the rise of popular schooling (Morris, 1973), led to the development of new methods of instruction.

It is interesting to note that this venerable method contained within itself the elements of most of the various methods which replaced it. Pupils were required to work their way through the instructional text, spelling out the names of the letters of each word as well as reading them aloud as wholes. In the way in which it directed attention to the component letters of words, the alphabetic method had much in common with phonic methods. It also achieved the same ends as the "look and say" approach, except that it was likely to have made pupils look a great deal more thoroughly at a word before saying it.

In addition, though, pupils were encouraged to focus their attention on syllabic segments within words, and this was achieved by practising reading lists of syllables, such as ab, eb, ib, ub, as wholes (Schreiner & Tanner, 1976). This is somewhat similar in principle to the "linguistic" methods advocated by Bloomfield, Barnhart and others (Lamb, 1977).

In the sense that it included major elements of several later

methods within a single approach, the alphabetic method could legitimately be described as holistic. However, this term is open to different interpretations. For example, Samuels (1980) uses the word holistic to refer to instruction which is concerned with teaching words as wholes, as opposed to that which directs pupils' learning to the sound-equivalents of letters and letter patterns within words. This issue brings us into the arena of "The Great Debate" documented by Chall (1967), in which the protagonists championed the cause of these two major successors to the alphabetic method - the phonics and whole word approaches.

Beginning in the late nineteen-sixties and early nineteen-seventies, a "New Debate" (Otto, 1982) has arisen, though, which places the "Great Debate" of the fifties and sixties in a context within which it is viewed as a comparatively minor disagreement between those who in fact stand together on the same side on a larger issue. Goodman, Goodman & Burke (1978) argue, on this point, that phonics and whole word instructional models share in a single, broad theoretical orientation. What is common to them, according to Goodman et al, is a conceptualisation of reading as a process which is based on word recognition. Word recognition skills are a prerequisite for obtaining meaning. The different models of the reading process which are implicated in this statement will be dealt with more fully in a subsequent section of this chapter. For the present it is sufficient to note that the word recognition view leads to instruction which treats reading as a series of discrete skills.

Phonic methods begin with the skills of letter recognition and letter-sound association, assuming that they are prerequisites for normal word recognition. Whole word methods begin directly with word recognition. "Linguistic" methods, although aiming at a knowledge of letter-sound associations, also begin with whole word recognition. In all cases, instruction is focused primarily on skills and not on reading as a total act of communication of meaning. It is assumed, though, that mastery of letter and word recognition skills will enable the learner to engage in reading for meaning. In

the process of instruction, therefore, reading is fractionated into subordinate skills which are trained separately (Roberts, 1980).

Over against this fractionated or analytic approach to instruction, Goodman & Goodman (1979) advocate an approach to learning to read in which the essential nature, as they see it, of reading as meaningful language is recognised. For to break reading down into separate skills for the purposes of instruction is, in their view, to destroy reading and to hinder learners from understanding its true purpose - communication. Thus, in a sense which differs considerably from Samuels' use of the term, Goodman & Goodman (1979) are arguing for an holistic approach to learning to read.

Goodman & Goodman (1979), and Smith (1978), envisage the learner developing reading ability "naturally" in a way which exactly parallels the development of oral language ability. Strong arguments are raised by Mattingly (1972) against a view of reading as a language process parallel to and independent of oral language, but other holistic approaches to reading instruction, for example the language experience approach (Stauffer, 1980) and the story method (Slaughter, 1983), have been developed. These treat reading, from the beginning of instruction, as a whole language process, without necessarily relying on the hypothesis of the total independence of reading as a language process parallel to listening.

In the field of reading instruction it seems that there is nothing new under the sun, however. From the late nineteenth century, and into the early twentieth century, a story method was in use (Morris, 1973; Ollila & Nurss 1981). Children were introduced to reading by means of a story which was first told, and possibly dramatised also. Once the story was known orally, it was read to them repeatedly while they followed as best they could in their own books. Gradually they would begin to read with the teacher, as the more common words and phrases were recognised. With skillful management on the part of the teacher they would eventually be able to read the book independently.

Ollila & Nurss (1981) report that in the U.S.A. one period per day would be devoted to this activity while another period would be used for memorising phonetic word families such as at, cat, bat. Nevertheless, from its beginning, and throughout the process of instruction, the method presented reading to the learners as an holistic experience of meaningful language. This holistic character is shared by modern versions of the story method, as is the emphasis on repeated readings of the story (Park 1982).

There is at present, then, some interest in and use of holistic methods of instruction in initial reading instruction, and, as will be discussed, this trend is also apparent in remedial reading instruction. The holistic approach to instruction is not new, at least in initial reading instruction. Indeed it may be regarded as going back beyond the old story method to the original alphabetic method. In that method the pupils were engaged in working through a piece of connected discourse. With subsequent readings of their text they would have experienced reading as an holistic, meaningful, language process.

The applicability of holistic instructional approaches to cases of reading difficulty is a live issue, and this leads us to a consideration of the area of concern of the present study.

2.2 The holistic-versus-analytic issue in remedial instruction

Otto, McMenemy & Smith (1973) draw attention to the fact that much remedial reading instruction consists largely or completely of work on phonic or structural analysis of words. This takes place with pupils whose problems have been with this very task of word analysis. They have never experienced reading as a communication process which serves informational and affective needs. Indeed, their affective associations with reading are likely to have been mainly negative.

Otto et al go on to emphasise the importance of providing experience of reading itself, as a whole process, in addition to working with separate subskills. Their comments were made before the current debate had gathered momentum, yet they direct us to the heart of the problem. Smith (1978) and Goodman & Goodman (1979) would see subskill-oriented instruction as being the major cause of reading difficulty. Smith's views are summed up in his phrase "learning to read by reading," which points to the necessity of treating reading as an holistic process.

Goodman & Goodman (1979) similarly stress the importance of children experiencing reading as a whole communication process, which is learned as an extension of natural language learning. They state,

"Instruction consistent with this process will facilitate learning. Instruction that does not build on the process of natural language learning will, in some respects, be at cross-purposes with learners' natural tendencies, will neutralise or blunt the force of their language learning strengths, and may become counterproductive. To become literate, learner's may then have to overcome barriers placed in their way" (p.138).

A little later in their paper they identify these barriers with frac-

tionated instruction which deals in "letters, phonics, words and word attacks" instead of treating reading as language.

In a paper in the same volume as that of Goodman & Goodman, Bateman (1979) states emphatically that systematic instruction in subskills is essential if "learning disabled" children are to overcome their difficulties in learning to read. What is more, she characterises as disastrous the use of a meaning-oriented approach in trying to help these children. What Bateman (1979) claims on the basis of empirical evidence, arising out of practical experience in the application of systematic subskill instruction, Samuels (1980) re-inforces on theoretical grounds by referring to models of the reading process.

Thus there exist diametrically opposed views on the type of method which is appropriate for the instruction of those experiencing reading difficulties. There are those, on the one hand, who insist on the need to employ an holistic approach which maintains the integrity of reading as a language process. On their view, subskill oriented instruction, whether it begins at the level of letters or of words, is not only ineffective in overcoming the difficulty but is likely to have been its cause. On the other hand, there are authorities who are equally emphatic on the need to provide instruction in subskills as the only effective way of teaching these children to read.

The importance of an understanding of the various models of the reading process, in any attempt to investigate this problem, is apparent. The argument of Samuels (1980) for subskill instruction, based on theoretical considerations, has already been mentioned. Similarly, Goodman & Goodman (1979) base their recommendations for practice squarely on a specific theoretical position regarding the nature of reading. It is, therefore, necessary to consider the opposed models which underlie the thinking of those authors who address themselves to the problem of remediating reading difficulties.

Of especial interest are recent models which seek to achieve a synthesis between these divergent models.

In the following section the different models of reading and their implications for instructional practice, particularly remedial instruction, will be dealt with. Apart from this, however, it will be necessary to give attention to theories on the nature of reading difficulties. The various sources of difficulty in learning to read, which are suggested, differ in importance and in relevance depending on the model of the reading process which is employed. This in turn has consequences for the evaluation of methods of instruction.

2.3 MODELS OF THE READING PROCESS

2.3.1 Types of models

In a rather facile generalisation Otto (1982, p.14) states that until recently "researchers assumed they knew what reading is but questioned the best way to acquire it." This statement overlooks much theory-oriented research which was being carried out even while the "Great Debate" on reading instruction was in progress. Nevertheless it is true that the issues debated in the field of reading were more often instructional than theoretical, and also that this arose out of a widespread assumption of the validity of one particular class of models of the reading process.

This class of models is referred to by Gibson & Levin (1975) as information-processing models. In their simplest form they posit a stage-by-stage processing of information, beginning with the detection of the features of the printed page and ending with comprehension of the encoded communication. Examples of this class are the models of Gough (1972) and LaBerge & Samuels (1974). Although a straight-forward linear processing sequence would be recognised as inadequate by most if not all of this category of theorists, all envisage an overall direction of flow which proceeds from print to comprehension.

A second, opposed class of models is referred to by Gibson & Levin (1975) as analysis-by-synthesis models. The central idea, borrowed from the field of speech perception, is constructivist in nature, in that the interpretation given by the reader, to the communication as a whole, influences his perception of component words or sounds, or letters (Neisser, 1967; Cooper, 1972.)

A recent tendency has been to describe both classes in terms of a levels-of-processing paradigm. Thus Weaver & Resnick (1979), in the introduction to a major collection of papers on the theory and practice of early reading, identify the top-down versus bottom-up issue as one amongst a few closely related issues

which are the focus of attention in theory-based reading research at present. In bottom-up models, the information-processing models of Gibson & Levin (1975), lower level processes, such as letter and word recognition, are regarded as a prerequisite for higher level processes, such as comprehension. Top-down models (analysis-by-synthesis models) ascribe a controlling influence to higher level processes, such that they would only invoke lower level processes when these were required to maintain the flow of meaning during reading.

While Gibson & Levin (1975) characterise these two classes of models in such a way that they appear as opposed and mutually exclusive alternatives, the top-down versus bottom-up antithesis has in fact led to a synthesis. This has occurred despite the apparently greater opposition implied by the very names, bottom-up and top-down. The basis for the reconciliation has been provided by the common levels-of-processing paradigm within which both classes have been able to be accommodated.

The traditionally proposed levels, as enumerated by Spiro, Bruce & Brewer (1980), are the orthographic, phonological, lexical, syntactic and semantic. Spiro et al go on to comment that higher level knowledge sources, such as inference rules and expectations about the story structure, are also crucial, although not included in the five traditional levels. Goodman (1976a), however, includes inference rules and story expectations under the term semantic in his three-component (semantic, syntactic and graphophonetic) model. Frederiksen (1979) lists the processing levels as feature analysis, graphic decoding, syntactic analysis, semantic interpretation, and inference.

Despite variety in the number and nature of processing levels these differences are not aligned with the dichotomy between top-down and bottom-up views. As has already been stated, both types of model can be accommodated within the general framework of levels of processing. The crucial difference between the two types of models lies not so much in the nature of the different processing levels as in the

direction in which processing takes place through the whole system.

Bottom-up models have the information passing from an initial visual-perceptual stage up through the successive levels of the processing hierarchy until finally comprehension of the communication occurs. They are, therefore, invariably sequential stage models even though they may involve branching, confluent and even feedback pathways (Singer, 1973). In top-down models, such as that of Goodman (1976a), there is not a strictly sequential progression through progressively lower levels, but the flow of meaning which constitutes the act of reading is directed and maintained by selectively drawing on cues from the semantic, syntactic and graphophonic levels as they are required. This type of model tends, therefore, more towards an interactive character, but the motive force proceeds from the "top" and the direction of control is downwards.

Frederiksen (1979) proposes a bi-directional model which goes part of the way to achieving the synthesis referred to above. Instead of treating them as mutually exclusive conceptualisations of the nature of the reading process, he views top-down and bottom-up processing as alternative modes of processing which are available to the reader and which may be utilised under different circumstances. Material whose content and linguistic structure is familiar, such as well-known fairy tales, may lead the reader to adopt a top-down mode of processing, while material on an unfamiliar topic, phrased in complex syntax and using many unfamiliar words, would cause the reader to rely on bottom-up processing.

A different synthesis of the top-down and bottom-up positions is to be found in interactive models of reading (Rumelhart, 1977; Stanovich, 1980). Spiro, Bruce & Brewer (1980, p.7) identify the characteristic nature of interactive models as follows:

"..... although the knowledge sources or levels seem to form a 'natural' hierarchy running from orthographic knowledge to expectations about

discourse structure, communication between these levels is not limited to adjacent members of the hierarchy. Thus, the knowledge sources interact in a heterarchical fashion."

In interactive models, then, processing is not limited to one direction only; and the controlling influence is not limited to either "top" or "bottom" or even both, as in a bi-directional model.

2.3.2. The relation of instruction to models of reading

Returning to Otto's (1982) observations on reading theory and the methodology of reading instruction, there is a need for research into reading instruction to acknowledge and critically appraise the theoretical foundation on which the instructional method under investigation rests. This explicit recognition of the practice-theory relationship is found, for example, in Vacca's (1980) empirical study of holistic and subskill instruction. In his report he makes the link, already alluded to in the previous section of this chapter, between holistic methods of instruction and top-down models of the reading process. Samuels (1976) does the same with regard to the relationship of subskill-oriented instruction and his own bottom-up view of the reading process.

In a study concerned with holistic instructional approaches, it is necessary, therefore, to scrutinise the theoretical implications of this type of approach. The nature of the theoretical positions which are used to lend support to instructional approaches of an holistic nature also require examination.

Prior to the advent of interactive models it might have seemed possible to make a direct link between holistic instruction and a top-down view of the reading process. This is what Vacca (1980) does, although he does not use the term top-down. It is equally possible, though, from an interactive perspective, to advocate holistic instruction, since interactive models such as that of Rumelhart (1977) incorporate much of what is central to the top-down view. But even from a bottom-up viewpoint it is possible to advocate holistic instruction, although not, it is true, as sufficient in itself. Samuels (1976) does exactly this when he emphasises the need for ample practice in reading meaningful and interesting material in addition to work on letters and words in isolation. Furthermore, in another paper, Samuels (1979) recommends the use of an holistic method, the method of repeated readings, for the purpose of increasing

efficiency at the lower levels of processing.

Despite the fact of the inability to link holistic instruction in a straightforward manner to any one of the types of models which have been described, the practice-theory relationship deserves close consideration. For although a case can be made for employing holistic methods from a top-down, a bottom-up or an interactive position, the reasoning in each of these cases begins from different premises, and proceeds along different paths to justify holistic methods on different grounds. This point will be taken up again later when holistic methods are discussed in detail.

2.3.3. Further aspects of the models and their empirical validity

The different major types of models have, up to this point, merely been described. No attempt has been made to advance empirical evidence for or against any of them. Stanovich (1980), in presenting his own interactive-compensatory model, reviews bottom-up and top-down models briefly. He points out the inadequacy of bottom-up models in failing to account for many important experimental findings, such as syntactic and semantic context effects on letter and word processing.

Top-down models have most often been criticised for a vagueness in their formulation which renders them difficult to test and which has resulted in their engendering little research (Gibson & Levin, 1975). Stanovich (1980) cites an even more serious criticism. All the major top-down models, for example those of Smith (1971), Goodman (1976a) and Hochberg (1970), embody a concept of hypothesis-testing on the part of the reader as he proceeds through text. This hypothesis-testing, under the control of high level processes, is thought of as depending on the lower information levels only as a source for sampling in order to form and test the hypotheses. Several authors such as McConkie & Rayner (1976), are quoted, who have questioned the implausible assumptions about the speeds of the processes that are required.

"Specifically, the generation of hypotheses about a subsequent word or words, must take less time than is necessary to recognise the words on the basis of purely visual information, otherwise the hypothesis generation is unnecessary. However, it seems unlikely that a hypothesis based on complex syntactic and semantic analyses can be formed in less than the few hundred milliseconds that is required for a fluent reader to recognise most words."

(Stanovich, 1980, p.34).

Stanovich (1980) goes on to advocate interactive models. He points out that in these models each level of processing is not merely a data source for higher levels. Rather, each level seeks to synthesise a pattern based on its own analysis of the stimulus and the constraints imposed by both higher and lower levels. The products of each level are compared and integrated. His detailed and incisive review marshals arguments based on study after study in order to demonstrate the falsity of the major elements in top-down models and the manner in which the interactive position can account for the effects concerned. Many of the points which are raised relate directly to difference between good and poor readers and will therefore be referred to in a subsequent section of this chapter which deals with sources of reading difficulty.

A major distinction, which Stanovich (1980) emphasises in relation to higher level processes in reading, requires mention at this stage. This concerns the difference between the general comprehension of text and the use of the cumulative comprehension of a text to facilitate on-going word recognition. Stanovich characterises both of these as contextual processes, but emphasises that the former involves constructing a knowledge structure from the text, while the latter is the entirely different use of context for hypothesis-testing, central to the top-down view.

It is important to bear in mind, though, that the interactive concept is not the property of a single model. Stanovich (1980) terms his model an interactive-compensatory model, and views the compensatory aspect as a logical extension of what is implied in Rumelhart's (1977) model. But this compensatory element (which will be discussed later) is not the major point of difference between these two authors. In the introductory chapter of a volume on reading comprehension, the editors, Spiro, Bruce & Brewer (1980), describe three essential characteristics of any adequate model of reading comprehension. These are that it should be multilevel, interactive and hypothesis-based. In a further chapter of their volume Rumelhart (1980)

refers to predictions which may be confirmed or disconfirmed. Indeed Spiro, Bruce & Brewer (1980) refer explicitly to the similarity of the top-down models of Smith (1971) and Goodman (1973a) to the interactive view found in the papers of their volume. This perception of an affinity between the interactive and top-down positions contrasts with Stanovich's (1980) presentation in which they stand in a contradictory relationship to one another.

2.3.4. Schema theory

The relationship between the top-down position and different interactive models can be understood in terms of recent developments in schema theory (Rumelhart, 1980). Spiro, Bruce & Brewer (1980) contrast the vagueness of Goodman's (1973a) formulation with the explicit definition given in their collection of papers especially with regard to the "semantic" knowledge source of Goodman. They list word semantics, logical inference rules, social action patterns, story schemata and strategic knowledge about how to use the various knowledge sources, as examples of the components which can be distinguished in the broad "semantic" area.

Regarding schemata in particular, Rumelhart (1980) outlines the nature of schemata and the role which they play in reading. In describing the nature and function of schemata, Rumelhart (1980) makes use of a number of analogies which are briefly summarised below:

- (i) Schemata are like theories. A schema is an informal personal theory about the nature of events, objects or situations which we face. The set of schemata brought into play (instantiated) at a given time constitutes our model of the situation we are facing, or, in the case of reading, our model of the situation depicted in the text.
- (ii) Schemata are like scripts for a play. In the same way that a script can be performed by different actors under different circumstances without changing the basic plot, so a schema may be instantiated in order to interpret a variety of similar situations.
- (iii) Schemata are like procedures. They are active processes, resembling computer programmes and capable of evaluating the quality of their own fit to the available data. Where a promising schema fails to account for some aspect of a situation, it is liable to be rejected in favour of one which

provides a more adequate fit. Like procedures, schemata also consist of a network of subschemata, each representing a subconcept of the total concept being represented.

- (iv) Schemata are like parsers. Just as a parser can determine whether a sequence of symbols constitutes a grammatically meaningful sentence and, if so, what that constituent structure is, so a schema finds constituents and subconstituents among the impinging data.

In applying schema theory to reading Rumelhart (1980) is affirming the fundamental similarity and unity of reading not only with language but with cognition as a whole. Furthermore he throws a rather different light on hypothesis-testing in reading than that which is usual in the top-down position. Hypothesis-formation and testing are not conceived as moment-by-moment activities which are applied to each successive upcoming word or set of words, as understood by Stanovich, (1980). Instead they are firmly located within Stanovich's first type of contextual process, constructing a knowledge structure from the text. . Whether or not this rescues the hypothesis-testing concept from Stanovich's refutation is a matter worthy of further consideration.

Rumelhart (1980) postulates two ways of activating schemata in perception and comprehension in general and reading in particular: top-down and bottom-up activation. This brings us back to familiar ground, but what is distinctively different in a schema-based model is that the hypotheses for the incoming data do not necessarily have to be formed in the act of perception or comprehension. Instead previously formed schemata merely need to be activated. The hypotheses of a schema-based model of reading are not to be identified with the type of hypothesis formation criticised by Stanovich (1980).

There is a further difference, though. The criticism of Stanovich (1980) is directed at the idea of prediction and confirmation/disconfirmation of each new word or set of words encountered. Rumelhart

(1980) appears to envisage a use of schemata which is less momentary and more persistent over time. According to this view, in the act of reading there is an initial text-based bottom-up activation of one, or probably, a few likely high level schemata. As reading proceeds, one of these would receive sufficient positive evidence about its goodness of fit and would activate a still higher level schema. This would then, in a top-down fashion, activate constituent sub-schemata at progressively lower levels. If at any point any of these schemata fails to achieve a satisfactory fit with the data, a fresh bout of bottom-up and top-down activation will ensue. But this does not constitute a forming and testing of a linear series of hypotheses for successive words of the text.

Within a schema-based interactive model it would be quite possible to accommodate the notion of ongoing text-based word recognition occurring parallel to schema-based comprehension processes. These latter, comprehension processes would rely on the simultaneous parallel, lower level processes for their initial activation and they would continue to draw on the lower level processes to determine their suitability. The higher level processes would be able to exert an influence over word recognition in the manner familiar to all who have listened to learner readers - where a word "recognised" by the reader obviously does not fit with the higher level schemata, the reader will go back and try again. This notion of the relation of higher and lower level processes in reading appears to be compatible with the positions of both Rumelhart (1980) and Stanovich (1980).

The preceding discussion on the nature of schema theory has been descriptive rather than evaluative. A critical evaluation of schema theory is beyond the scope of this study, but the concepts of schema theory provide an important means for understanding and comparing the various top-down and interactive views of reading. The application of schema theory extends further though, as evidenced by the appearance in the literature of papers dealing with the use of schemata in readers' approaches to different types of reading

tasks (Richgels, 1982 ; Anderson, Pichert and Shirey, 1983), with the implications of schema theory for understanding the differences between beginning, fluent and poor readers (Whaley, 1981; Seidenberg, 1982), and with the application of schema theory to instruction (Strange, 1980; Jones, 1982; Moldofsky, 1983; Carr, 1983). The issues with which these papers are concerned will be returned to in subsequent sections of this chapter.

2.3.5 The compensatory aspect of the interactive position

Stanovich (1980) sees his interactive-compensatory view as a logical extension of the interactive position which he believes is best exemplified in the work of Rumelhart (1977). He typifies interactive models as assuming that a pattern is synthesised based on information provided simultaneously by several knowledge sources. A further, related assumption underlies the compensatory view: "a deficit in any knowledge sources results in a heavier reliance on other knowledge sources, regardless of their level in the processing hierarchy" (Stanovich, 1980, p.63). As an example several studies are cited demonstrating that readers with deficient word analysis skills show a greater reliance on context.

This proposed compensatory aspect of the functioning of levels of processing in reading is of the greatest significance for instruction, especially holistic instruction, which is aimed at alleviating reading difficulties. However, at least one recent study (Freebody & Anderson, 1983) failed to confirm the compensatory assumption and, on the basis of the logical connection between the compensatory and interactive assumptions, radically questioned the validity of the interactive position. Two experiments were performed to determine the effects of text cohesion and schema availability on comprehension of passages of different vocabulary difficulty. While significant main effects of schema availability and vocabulary were found, these two factors did not interact. Interaction was defined in terms of compensation.

Further studies in this area will be needed to clarify the issue. Some provisos stated by the authors deserve particular notice, though: firstly their study was concerned with factors at higher levels of processing and it could be that the compensation hypothesis is viable only between certain levels, such as grapho-phonemic analysis and sentence context; secondly, it is possible that an interactive model could be formulated which would explicitly

exclude the compensation assumption. This latter point would, however, imply a serious weakening of the utility of the interactive position for the understanding of reading difficulties and their remediation.

2.3.6 Further implications of models of reading

Apart from the relationship between reading theory and instructional practice, referred to in the introduction to this section, models based on the levels-of-processing paradigm have implications for other areas of reading theory which in their turn also have implications for instruction, including remedial instruction. Specifically, the relation of these models to different types of reading and especially to beginning, fluent and "disabled" or "poor" reading, must be considered.

2.4. BEGINNING READING : THE LEVELS-OF-PROCESSING PERSPECTIVE

2.4.1 Various types of reading

In concluding their chapter on models of the reading process in the mature reader, Gibson & Levin (1975) express their doubt that any one model will suffice to typify the reading process. The most obvious ground for this view is that reading is not a single uniform process. Gleitman & Rozin (1977) provide an historical and cross-cultural perspective on varieties of writing systems and of the reading process, from semasiographic stone-age systems (a style which is being increasingly revived in modern multi-lingual international society) through ideographic and syllabic systems to the alphabetic-phonetic system used in European civilisation and its heirs. Each of these major systems for graphically encoding language poses different tasks for the reader attempting to respond to the written communication and so, to a greater or lesser extent, each requires a rather different type of reading process.

Even within the limits of the alphabetic-phonetic system different types of reading are required for different purposes and it is more to this that Gibson & Levin (1975) allude. Ordinary reading for meaning may be contrasted with "skimming" or speed-reading on the one hand, and with proof-reading on the other. It would appear, for example, that whatever the nature of ordinary reading, proof-reading is a process based on lower levels of processing, and, to the extent that higher level processes intrude upon this process its accuracy will suffer and its purpose will not be achieved. Conversely, "skimming" would appear to be a clear instance of top-down processing.

The interactive position is able to provide an overall framework within which the different use of "top" and "bottom" levels of processing in these different types of reading may be accommodated. The view of Gibson & Levin (1975) is therefore over-pessimistic, but

nevertheless points us to the need to take account of the varieties of reading processes. With regard to our present purpose proof- and speed-reading may be of minimal relevance, but the same is not true of the difference, if such exists, between beginning reading and fluent reading.

2.4.2 Differences in beginning and fluent reading processes

Chall (1979), mainly on the basis of an oft-quoted study of Biemiller (1970), maintains the existence of definite stages in learning to read. The nature of the reading process in these different stages varies considerably. In a type of reading which Chall (1979) designates as pseudomature, the child who has been given little instruction often produces word substitutes which bear no graphic relationship to the original words of the text. They are, however, semantically and syntactically compatible with the text. Thus the pseudomature reader operates by utilising the information he or she brings to the text, along the lines envisaged by those espousing a top-down view of learning to read (such as Smith, 1978, and Goodman & Goodman, 1979). But while these top-down theorists view this type of early reading as a foundation on which to build, Chall (1979) regards it as an aberration to be overcome.

Chall's (1979) contention finds support in Stanovich (1980) who takes issue with Smith's (1971, 1973, 1978) "oft-repeated statement" that the good reader relies less on graphic cues. Stanovich (1980, p.47) states,

"Instead, the research shows that even the very youngest readers use context to facilitate word recognition. In addition, many studies have failed to show the expected increase in contextual facilitation as reading fluency develops. Just as many, if not more, studies have shown contextual facilitation to decrease as reading fluency develops."

A decrease in the use of contextual information also forms part of Chall's (1979) conception of progress in early reading development.

Apart from the phenomenon of "pseudomature" reading, which is contextually but not graphically constrained, Chall (1979) describes the major stage of beginner reading as involving an almost overriding concern with the graphic code. In those children who have engaged in

pseudomature reading, attention to the meaning of text would now be sacrificed in the interests of developing a knowledge of the graphic code. In some ways the type of reading process thought to be occurring at this stage is similar to proof-reading. Processing would certainly be of a bottom-up nature, just as processing in pseudomature reading would clearly be top-down.

Chall (1979) then describes a transitional phase of becoming "unglued" from the print. She is prepared to allow that in the stage of true maturity, which the reader now enters, use of context will occur as postulated in top-down models. Gibson & Levin (1975) differ in their view of mature reading but are in general agreement with the move away from excessive concern with print proposed by Chall (1979). In addition to finding support in Biemiller (1970), these authors draw heavily on the classic study of Weber (1970). But it is with regard to the effect of instruction on the course of reading development that Gibson & Levin (1975) make a highly significant contribution to the understanding of possible differences between beginning and fluent reading processes.

2.4.3 The effect of instruction on the reading process

Referring to the phases that can be discerned in the results of Biemiller (1970), Gibson & Levin (1975) state that these are undoubtedly influenced by the type of instruction received by the subjects. They contrast the results of Biemiller (1970), in which the instruction given emphasised the meaning as well as the decoding aspects of reading, with another study by Elder (in Gibson & Levin 1975) in which children were given instruction which was more analytically oriented. In this latter case it was found that there was still less exploitation of contextual information.

Although their conclusions differ widely from those of Gibson & Levin (1975), Goodman & Goodman (1979) would find themselves concurring with them on this effect of instruction. Goodman & Goodman (1979) recognise the same type of early reading, referred to by Chall (1979), which is highly dependent on contextual processes. And they would accept as a verifiable observation that many children subsequently become "glued to print". To them, however, this phenomenon is the aberration, not the early, contextually constrained reading. Furthermore while agreeing with the view of Gibson & Levin (1975) that the change is brought about under the influence of instruction, they condemn this as a barrier to natural reading development.

Goodman & Goodman (1979) do not accept the existence of stages in reading development in which radically different types of reading process occur. To them, reading at all stages in its development, should be a whole and meaningful process of receiving linguistic communication. This means that top-down processes making use of the context will be characteristic of reading throughout its development. Where this is not the case the blame may be ascribed to fractionated instruction which blights the natural language-learning capacities of the child.

A question which arises at this point is how learners acquire

knowledge and use of the grapho-phonetic system which Goodman and Goodman (1979) would agree is one of the necessary sources of information in fluent reading. While they are not very specific in this regard, an answer is provided by fellow top-down theorist, Smith (1978). Smith's (1978) principle, that the child learns to read through reading, is very similar to the "learning to read is natural" principle of Goodman & Goodman (1979). One of the implications of learning to read through reading is that by sheer experience, and supported in the meanwhile by use of context, the learner will build up an ever-increasing knowledge of standard orthographic patterns as well as a stock of sight words.

In fact this comes close to what is implied by Samuels (1979) in his concept of automatization: through repeated experience of reading the learner's knowledge of orthography and the sound-equivalents of letters and letter-patterns will be increased and consolidated. The beneficial effect of reading per se on reading development is thus not confined to either a top-down or a bottom-up framework.

The criticism by Stanovich (1980) of Smith's (1971) statement of the lesser dependence of fluent readers on graphic information has already been referred to. The substance of his criticism is that the research literature has failed to substantiate the claim and in fact provides evidence of a decreasing reliance on context. While this does indeed contradict the views of Smith (1971) and those of other top-down theorists on fluent reading, it is not necessarily inconsistent with their general principle of reading development. If "learning to read through reading" can extend to knowledge of the orthographic system, then it is quite conceivable that as this knowledge develops the reader may come to rely less on the use of context.

2.4.4. Implications of the levels-of-processing perspective for instruction

Some broad conclusions may be drawn on the basis of the preceding discussion:

- (i) A bottom-up view of beginning reading does not necessarily exclude a top-down, or an interactive, view of fluent reading.
- (ii) The type of instruction to which the learner is exposed may alter the balance between the levels of processing in beginning reading.
- (iii) Experience of reading itself, apart from any direct instruction provided by a teacher, may be a powerful facilitating factor in reading development.

With regard to this last point some confusion may arise as to what actually constitutes instruction. Instruction in phonics or structural analysis of words are clear cases of "direct instruction provided by a teacher." Supplying a child with a selection of interesting books at his level, and discussing with him where to begin and how much to read daily, is probably not. But some sort of teacher activity is involved and so, in the broadest sense, we may say instruction has occurred. Getting a child to read passages repeatedly would qualify for the label "instruction" even more so. Repeated reading of this sort would nevertheless still share the holistic nature of reading qua reading which characterises our example of minimally guided independent reading.

The type of reading experience and instruction to which beginning readers are exposed will influence the nature and therefore the development of their reading processes. Theorists as different as Gibson & Levin (1975) and Goodman & Goodman (1979) are agreed on this.

While these authors argue from bottom-up and top-down positions respectively, Frederiksen (1979) places the issue in a framework which encompasses both. He too recognises the influence of instruction and states that instruction designed to teach decoding skills may have "demand characteristics that cause children to approach reading in a relatively bottom-up manner, whether or not they experience difficulty in decoding" (p.164).

This leads Frederiksen (1979) to express a concern which is essentially similar to the major points of the paper of Goodman & Goodman (1979).

"If the increase in efficiency in teaching decoding is bought at the expense of producing children who process written discourse in a manner fundamentally different from the way they process oral discourse, it may not be worth the cost." (Frederiksen, 1979, p.164.)

It is implied that the normal processing of oral discourse has a strong top-down orientation, relying on the application of powerful inferential processes.

Frederiksen (1979) draws a conclusion which avoids the polarised options offered by Chall (1979) on the one hand, who would have learner readers subjected to a programme strongly emphasising instruction in decoding skills, and by Goodman & Goodman (1979) on the other who would insist on an instruction-free, natural, communication-based approach. This "middle way" has as its primary objective encouraging children to process written discourse in the same manner as oral discourse. The development of efficient processes for decoding written language would be a second, although subsidiary, objective, which should not be allowed to detract from the achievement of the primary objective.

This view of learning to read can be accommodated within the general levels-of-processing paradigm and, specifically, an interactive model. Both the inferential processes, with which Frederiksen is par-

ticularly concerned, and the lower level processes of grapho-phonemic analysis, may develop simultaneously. Only when too great a stress is given to the latter, would effects of a negative nature ensue and interfere with higher level processes.

This view is also compatible with the conclusions of Stanovich's (1980) review of research concerning developmental changes in contextual facilitation of word recognition. For while general comprehension strategies are continuing to develop, it is quite feasible that the rapid context-free word recognition skills of the fluent reader may also be developing.

2.4.5 The need for holistic instruction in developing reading

What appears to emerge from applying the levels-of-processing paradigm to beginning reading, is a need to employ an holistic instructional approach. From a top-down viewpoint, or even from an interactive perspective which allows the importance of developing bottom-up processing abilities, this is a consequence of the need to preserve the nature of reading as a meaningful communication process. Only then will learners be encouraged in their development of general comprehension strategies, such as inferential processes. But we have seen that even from a bottom-up position Samuels (1979) recommends an holistic approach to instruction, although for the quite different purpose of achieving efficiency in grapho-phonemic processing.

Samuels' (1979) concept of the automatisisation of these lower processing levels can also be accommodated within the interactive framework. Brown (1980) refers to how all the top-down and bottom-up skills of good readers are so fluent that they can proceed on "automatic-pilot", without consciously devoting attention to them (until a triggering event alerts them to a comprehension failure).

The necessary holistic reading experience to develop this fluency of all the reader's processes is probably adequately provided for, in the case of most children, by the reading experience which is provided by class reading schemes. To the extent that the child is encouraged, explicitly or as a result of this school experience, to read independently, the achievement of fluency will be facilitated all the more.

Recommending continuance of this very ordinary aspect of the educational status quo might appear a trite conclusion to derive from the preceding discussion on theoretical approaches to reading and learning to read. However, the issues involved in the theory and practice of holistic instruction in the normal process of learning to

read need to be carefully thought out in order that their application in the instruction of poor readers may be properly understood. Prior to this, though, we must give some consideration to different views on the nature of difficulty in learning to read.

2.5 DIFFICULTIES IN LEARNING TO READ

2.5.1 Reading difficulty and reading disability

The importance of theory has already been argued with regard to understanding the reading process and learning to read. The close link between how the reading process is conceptualised, and the form that instruction takes, was outlined. When we turn to the study of problems in learning to read a rather different situation confronts us. Harris (1982, p.456) refers to the profusion of "researches with results that are barely significant statistically and of little or no practical utility." Harris attributes this state of affairs to confusion about what constitutes a disability in reading. If, for example, the phenomenon is multifactorial then studies of groups of "disabled readers" are inevitably going to yield results which are contradictory. Or, more likely, results will be obtained in which the effects of the various factors operating in the different subjects will obscure and cancel each other.

Doehring (1976), drawing on the conceptual analysis of Wiener & Cromer (1967), also refers to the research implications of conceptualisations of the nature of "reading disability." The theoretical possibilities range from a unitary disorder resulting from a single antecedent condition to a multiplicity of disorders originating from a variety of antecedent conditions with complex inter-relationships between them. Doehring (1976) concludes that the ultimate model or models for "reading disability" might be "impossibly complex".

It is in this context that we must view the variety of explanations which are offered for difficulties in learning to read. Those current in the literature range through icon-persistence in visual information processing (Farnham-Diggory, 1978), phonological processing (Shankweiler & Liberman, 1976), attention (Dykman & Ackerman, 1976; Ross, 1976), verbal labelling (Vellutino, 1977, 1979),

syntactic processing (Vellutino, 1979) and others, some of a more unusual nature, such as that offered by Levinsohn (1980) which implicates disorders of cerebellar-vestibular function closely resembling motion-sickness.

Harris (1982) likens this proliferation of theories to the fable of the six blind men each attempting to describe an elephant on the basis of the part they have grasped. He regards proponents of a single causation as probably each having found what is only part of a very complex situation. Harris (1982) goes on to review various multiple-causation theories, all of which implicate processing disorders and deficits of different types. Several involve a restatement of Johnson & Myklebust's (1964) views on auditory and visual processing deficits.

Valtin (1980) criticises the deficit approach on methodological grounds, pointing out that the criteria used in selecting samples of good and poor readers will influence the characteristics on which these samples are found to be different or similar. A different and telling type of criticism is offered by authors as diverse in their theoretical orientation as Clark (1976) and Bateman (1979). This is that in their concern to pinpoint processing disorders the deficit-theorists fail to take into account those who have become successful readers despite their deficits.

Valtin (1980) offers a broader view of multiple-causation which takes account of other factors also, such as motivation and intelligence, but still cautions that a child may have problems with any or all of these and yet learn to read. Clark (1979), in a large scale study involving 1544 children, found no severely retarded readers of high intelligence and concluded that dyslexia is a rare phenomenon. Dyslexia can be understood here in terms of cognitive disabilities, general organically based, along the lines discussed by Critchley & Critchley (1978).

Malmquist (1978, 1981), also on the basis of large scale studies, identifies the factors mostly clearly differentiating poor readers from good readers as including self-confidence, emotional stability, parent's level of education, socio-economic group and attitudes to reading in the home, in addition to abilities of the cognitive type. Malmquist claims that the data demonstrated conclusively that there were no qualitative differences, as opposed to differences of degree, between even the poorest readers and the good readers. Instead a relatively smooth and continuous gradation was found from the poorest to the best readers.

This would altogether exclude the category of dyslexia, or primary reading retardation to use the term of Rabinovitch (1962). Rabinovitch's category of secondary reading retardation, in which a normal capacity for learning to read is prevented from being actualised by external factors, such as emotion, would be characterised by the gradation of quantitative difference described by Malmquist. It is, perhaps, unwise to be as dogmatic about the non-existence of primary reading retardation as Malmquist, in the light of neuranatomical studies (like that of Galaburda, 1982) and other epidemiological studies, for example of Yule & Rutter (1976). But at least the rarity referred to by Clark (1979) should be borne in mind.

There is a pragmatic reason for caution in relying on concepts such as dyslexia, primary reading retardation or even reading disability. As Ross (1976) points out, a medical interpretation of reading problems has no instructional consequence. It may in fact inhibit motivation to develop appropriate instructional programmes.

On the other hand, if we wish to assume that a cognitive ability, such as selective attention or verbal labelling, displays a range of quantitative variation in the population of learner-readers, this does not imply accepting the existence of a separate, qualitatively different group of disabled readers. Rather, those on the lower end of the distribution of the ability concerned might be expected to run a

higher risk of experiencing difficulties in reading. From this point of view, even accepting that some learner's processing abilities may be relatively weaker, we are able to concentrate on the instructional means for achieving fluent reading in their case also. In this regard, the comment of Clark (1976) is relevant, that too little attention is given to the reasons for the success of children whose failure is predicted by diagnostic tests of these processes. Similarly, Bateman (1979) questions the utility of the etiological approach - the only sure way to prevent learning to read is, according to her, to preclude the necessary instruction. Bateman identifies this with learning the associations of letters and their sounds, but it is possible to place a broader construction on her comment.

For this reason it is wise to use the term "reading disability" only with great caution. If the "disability" can be overcome with suitable instruction then, as Ross (1976) points out, rather than postulating a deficit in the child we should focus our attention on the deficiencies in the instruction that is offered.

If the learner's problem is such that anything approaching normal reading performance is forever impossible then such a condition could, with impunity, be labelled as a reading disability. The "deep dyslexia", arising from clear structural and functional pathology of the brain, referred to in the volume of papers of Coltheart, Patterson & Marshall (1980), would no doubt fall into this category. The existence of an equivalent syndrome of a developmental nature cannot, on purely logical grounds, be excluded. Fisher (1979) argues for the existence of a syndrome of this type in which ordinary reading processes are a permanent neurological impossibility. However, the survey studies quoted previously would, at the very most, limit this to a minute proportion of the population of poor readers.

In view of this, the term "reading difficulties" would be preferred as a means of referring to the whole group of poor readers. "Reading disabilities" has been retained in the title of this study because this is a term generally used to designate those who encounter significant problems in learning to read.

2.5.2 The relationship of instruction to etiology

The principle that most, or even almost all difficulties in learning to read may be overcome under suitable conditions has already been referred to. The conviction of Smith (1978) and Goodman & Goodman (1979) that instruction may itself cause reading difficulties has also been outlined in previous sections of this chapter. Kohl (1974 p.9), one of the "deschoolers", makes this point in a pungent manner:

"If talking and walking were taught in most schools
we might end up with as many mutes and cripples as
we now have non-readers."

Kohl then advocates the same "natural and informal" manner of acquisition for which Goodman & Goodman (1979) argue. But while this point of view is worthy of further consideration, for the present it is necessary to follow through the argument concerning the susceptibility of reader deficits to suitable instructional approaches.

Hallahan & Kauffman (1976) point out that in view of the heterogeneity of "learning disabilities" it is a more practicable approach to group these learners on specific behavioural characteristics than on the basis of the constructs of diagnostic tests whose character is unspecified or of dubious relevance for instructional application. They refer to the fact that despite differential categorisation of learning disabled, mentally retarded and emotionally disturbed children, the instruction which is given is generally little different.

Thus it may be profitable to treat difficulties in reading according to behavioural indices such as rate or accuracy, or finer characteristics such as the particular letter-sound confusions manifested in reading. This is not to say that research into cognitive processes involved in reading problems should not continue. But in view of the many unresolved theoretical issues, it may well be wise to heed the advice of Myers & Hammill (1976), based on their own hard experience, as well as their assessment of the literature, that a process-oriented, diagnostic-prescriptive model for instruction is

inappropriate at this stage in the development of knowledge.

Hallahan & Kauffman (1976) refer to the successful application to learning problems of developments in behaviour modification such as precision teaching. The holistic methods of instruction which are the concern of this study are amenable to use with behavioural principles of this type, but more basic to the present argument is the general applicability of these methods, and especially the method of repeated readings. The MRR, and other holistic methods, although they can be clearly related to the top-down, bottom-up and interactive processes described previously, are not tied to a diagnostic-prescriptive approach to the treatment of reading problems. These methods and their application will be discussed in greater detail in the rest of this chapter.

2.6 HOLISTIC METHODS OF READING INSTRUCTION

2.6.1 The rationale for holistic methods

An holistic method has earlier been described as one which maintains the integrity of reading as a whole act of meaningful communication. Therefore the task with which the learner is faced during holistic instruction shares the same essential feature characteristic of fluent reading: it is to engage in the apprehension of the author's intention.

Obviously excluded by this definition are forms of instruction which require the learner to deal with letters, letter patterns, syllables, or even whole words in isolation. It applies equally, although not as obviously, to the "linguistic" methods so strongly advocated by Lamb (1977). Although these superficially maintain the wholeness of reading, sentences such as "Dan can fan a pan," are so contrived that the intrinsic intentional communicative character of reading referred to by Goodman & Goodman (1979) is lost. This would tend also to apply to the "primerese" (Hunter-Grundin, 1979) of basal readers whose content is a stilted composition using only a limited sight-vocabulary.

It is important to note again that holistic instruction can be recommended from a bottom-up as well as a top-down, or an interactive perspective. In the case of the former, the holistic instruction would be seen as complementary to training in the discrete skills of word recognition. Its purpose could be construed as facilitating either the development of skills in the higher levels of the bottom-up hierarchy, or the integration and automatisisation (LaBerge & Samuels, 1974; Samuels, 1979) of lower level skills which have already been learned in a "fractionated" manner.

Thus it is not necessary to link holistic approaches to learning to read with the view of Goodman & Goodman (1979) that reading

is a parallel receptive language process to listening, learned after the same fashion as, but independent of oral language.

From the bottom-up perspective, holistic experience puts the final touches to the process of learning to read. But to those who view reading as an independent language process it is the essential and sufficient condition for learning to read. Smith, Goodman and Meredith (1976) state that language is not learned piece by piece. "Fractured, it becomes a set of abstractions, hard for children to learn. Whole and in proper relationship to relevant meaning it is easy to learn." (Smith et al, 1976, p.287).

The reference to abstraction leads us directly into the issue of metalinguistic awareness. Fischer (1980) states that while in initial language learning the child only gradually becomes aware of rules covertly inherent in his language use, reading is quite different. Reading requires the child to begin with explicitly stated rules, such as those relating to orthographic and phonic principles. Only as reading becomes rapid and automatic does the use of rules become covert and below the level of awareness. Mattingly (1972, p.133) expresses the view of reading implied in this position as follows,

"Speaking and listening are primary linguistic activities; reading is a secondary and rather special sort of activity that relies critically upon the reader's awareness of these primary activities."

The implication that this metalinguistic awareness is critical to success in learning to read, is taken up by a number of authors including Fischer (1980), Rozin & Gleitman (1977) and Downing (1973).

In direct opposition to this stands the view of Smith et al (1976), expressed previously, that by turning reading into a set of abstractions, to be consciously learned, it is made more difficult to learn. Goodman & Goodman (1979) go further and identify the attempt to provide systematic instruction as the major barrier to

learning to read naturally. This view finds some support in Halliday (1978) who points out that writing did not evolve as a part of language, that is, oral language, but as an independent means of visual communication. He argues that to take learners along the evolutionary path by which the visual communication system became linked to words and sounds would take too long. And therefore, he concludes, it is important to place initial literacy squarely in the context of language development as a whole, so learners may appreciate it is a natural extension of something that they have been deeply involved in since birth.

It is significant in the present context that Halliday's comments form part of his foreword to the Breakthrough to Literacy Teacher's Manual (MacKay, Thompson & Schaub, 1978), which is a language experience approach - a form of holistic instruction. For whatever else may be achieved by the use of an holistic method, it does place the task of learning to read squarely in the context of the development of the communicative function which is the essential nature of language. Goodman & Goodman (1979), in fact, base much of their argument on the work of Halliday. In particular they take the functions of language described by Halliday (Instrumental, Regulatory, Interactional, Personal, Heuristic, Imaginative and Informative) and demonstrate how these relate to the learner's experience of written language.

This brings us back to the idea of learning to read through reading. It is the thesis of Goodman & Goodman (1979) that reading ability, in a manner similar to initial language development, develops as a result of the child's attempts to make sense of print. This endeavour, they submit, will be disturbed by directing the learner's attention away from the linguistic task, of the communication of the message, to metalinguistic abstractions which deal with the medium and not the message it carries.

There are, then, two opposed types of rationale for the provision of holistic reading experience to learners, which correspond to

the bottom-up versus top-down distinction. The interactive synthesis of the bottom-up and top-down positions therefore requires a re-interpretation of holistic methods, as regards both their rationale and the manner in which they are used.

2.6.2 An interactive approach to holistic methods

Goodman & Goodman (1979), in rejecting outright any metalinguistic approach to providing instruction in rules such as those governing orthographic patterns and their phonic equivalents appear to assume that learners construct these rules themselves, but not at a level of conscious awareness. Weaver (1980) illustrates this type of construction of rules by referring to the ang pattern and the various sounds it represents in words such as anger, hanger, and danger. She demonstrates the the rules constraining the use of this common pattern are such as to render an explicit instructional approach too complex to be practicable.

But though we may accept that this type of instruction could hinder the process of learning to read, many authors would argue that it is not necessary that this should happen. This does not refer only to proponents of instruction based on metalinguistic awareness or on a bottom-up view. It includes authors such as Frederiksen (1979), McKenzie (1978) and Weaver (1980) who tend to be favourably disposed towards the views of Goodman & Goodman (1979). Thus, although Weaver sees herself as sharing in the psycholinguistic perspective of the Goodmans, she is not averse to recommending a limited amount of direct phonics instruction dealing with simple, common letter-sound patterns. We have already seen that Frederiksen (1979) similarly recommends this type of subskill training as a supplement to a main instructional approach which is holistic and centred on the communication of meaning.

Although both Weaver (1980) and Frederiksen (1979) make their comments in apparent ignorance of the interactive view of reading worked out by Rumelhart (1977), their ideas on instruction are entirely compatible with an interactive approach. In an interactive framework it is quite reasonable to place a strong emphasis on meaningful communication throughout reading development while at the same time seeking to provide instruction which will practise lower level processing skills.

The only proviso, along the same lines indicated by Frederiksen (1979), would be that the attention given to orthographic and phonological processing skills, and the metalinguistic awareness which this entails, should not detract from the understanding of reading as a flow of meaning.

Thus, in a bottom-up view, holistic instruction merely provides a means to the final integration and automatisisation of the subskills which constitute the reading process. In a strict top-down view, holistic reading experience is the only valid and necessary means of bringing about reading development - if the "pounds" of meaning are taken care of then the "pennies" of letter-patterns will take care of themselves! But from an interactive viewpoint both holistic and subskill approaches can be employed in instruction, although opinions on the balance between them might vary. One approach, which in a limited sense would maintain the overall wholeness of the reading task, could be to make the words of the instructional text itself the subject matter for instruction in phonic and structural skills.

2.6.3 The relation of holistic methods to the constructivist thesis

In a paper, entitled "Learning to read through reading", McKenzie (1978), looking to Clark (1976) and Downing (1980) for support, states that the two requirements in learning to read are getting to understand both the communicative functions of written language and the technical features of the medium. This statement presupposes the necessity of metalinguistic awareness for learning to read and a denial or at least a down-grading of the constructive role of the learner in reading. According to its protagonists, this role parallels the child's construction of the rules of language in early childhood. Torrey (1979) goes so far as to compare reading to a new language which must be learned. Chomsky (1979) is more moderate, suggesting merely that reading instruction should take the active constructive capabilities of the learner into account.

Thorough-going constructivists, such as Goodman & Goodman (1979) and Smith (1978), would hotly contest the latter requirement cited by McKenzie (1978). Their assertion that this is a major cause of reading difficulty is open to serious question though, in view of the large proportion of learners who become successful readers in spite of exposure to this type of instruction. Their reply would be that the phrase "in spite of" is the crucial point. However, despite the well established fact that young children can learn to read spontaneously (Clark, 1976; Torrey, 1979; Cohn, 1981; Teale, 1982), there is no proof that all children would learn to read without instructional intervention.

MacKay, Thompson & Schaub (1978) claim that many children would never learn to read if left to themselves. Goodman & Goodman (1979) would counter that as children experience the need to communicate through the medium of print they will use their own constructive learning capacity. But this is precisely the point which MacKay et al wish to make: many children will never feel the need, or feel it

sufficiently strongly, to develop a second channel of linguistic communication. The issue then becomes a matter of educational ethics. Should all children learn to read? Suggestions in the literature, that a passive approach to the task of learning may underlie some cases of failure (Hagen & Kail, 1975; Stott, 1978; Ryan, 1981; Smith, 1981), would indicate that this ethical decision is all the more necessary. For if, as a result of cognitive or personality characteristics, certain children cannot apply their innate learning capacity to the task of learning to read, and if we accept universal literacy as a worthwhile aim, then we will need to provide suitable instruction.

In the light of the discussion in this chapter there appears to be some justification for the contention that holistic methods would provide the most suitable instruction in such cases. In addition to allowing learners to use their available schemata in the reading task, these methods retain the natural use of language in the reading task advocated by Clark (1977) and Clay (1979). Furthermore the efficacy of this holistic instruction may be enhanced through the use of supplementary analytic instruction, as recommended by McKenzie (1978) and Frederiksen (1979).

2.6.4 Characteristics of holistic methods

The application of holistic methods is not restricted to the field of remedial reading. The use of the old story method as a means of introducing children to the act of reading (Morris, 1973; Ollila & Nurss, 1981) has already been described. The principles of letting pupils listen to the story, then reading it with the teacher, and finally reading it repeatedly on their own, form the basis also of modern revivals of this method for initial instruction (Teale, 1981; Park, 1982; Tompkins & Webeler, 1983; Slaughter, 1983; Bridge, Winograd & Haley, 1983).

These authors stress this approach as a means of building literacy on the foundation of learners' natural ability and desire to engage in communication. Holdaway (in Park, 1982) refers to this intrinsic source of motivation for learning to read. The fascination with a simple yet intriguing story and the natural desire to hear it again provide the motivation for the process of listening, reading along, and repeating.

Bridge et al (1983) recommend a metalinguistic approach as an immediate follow-up, in the form of matching sentence strips and word cards with the story which is written out on a chart. This could be carried further by then directing pupils' attention to letters or sounds within words. On the other hand, a constructivist, like Torrey (1979), might feel this to be unnecessary, at least for the majority of pupils. But, whether through relying on implicit constructive processes or explicit metalinguistic strategies, one of the aims of the story method would be to develop an ability for dealing with the printed medium. This ability would then be applied by the learner in making sense of texts other than those used in instruction.

The same principles of listening, reading along with the teacher, and repetition, characterise the remedial applications of the holistic approach to instruction described by Harris, (1981); Ashby-Davis,

(1981). In any particular method these principles may receive different degrees of emphasis and one or the other may be omitted altogether.

Word-analysis and word-recognition activities, along the lines described by Bridge et al (1983), are usually not mentioned in connection with these remedial methods. This does not imply that these methods involve acceptance of the constructivist assumption. Rather, as in Heckelman (1966) and Samuels (1979), this indicates a view in which an analytic approach is seen as the major element of instruction and the holistic method as a supplementary element.

Where a bottom-up view is held there is a tendency to ignore or give lesser emphasis to the syntactic, semantic and inferential factors which are brought into play by the use of an holistic method. But whether recognised or not it can be expected that these factors will exert an influence on the reading processes of the pupil.

This leads us directly to consider the importance of the quality of the language of the texts used for instruction. Clay (1979) argues that this language should be natural, retaining all the qualities and cues of language as the child has learned to use it. The aim is "that the language processes he has operated for three or more years can guide not only his spoken language but also his reading." (Clay, 1979, p.154.) Bridge et al (1983) carry this point further, referring to the plotless strings of disconnected sentences, in pre-primers and primers, which may cause interference with comprehension by failure to match the children's schematic expectations. Shuy (1979) identifies grammatical mismatch between children's language and "school language" as a critical factor in reading failure.

On this view, the language of instructional texts based on phonic regularities or on a limited stock of sight words would be unsuitable for use in holistic instruction, although a theorist such as Samuels (1979, 1980) might possibly take issue with this contention.

The language experience approach to learning to read (Stauffer,

1980) is an holistic method which capitalises on the support of the qualities and cues of the child's natural language referred to by Clay (1979). By making transcriptions of the child's own meaningful utterances the material for instruction, this method powerfully facilitates his use of syntactic, semantic and inferential processes in the act of reading. Thus the child's own production is substituted for the listening aspect of story methods. The remaining principles, of reading with the teacher and repeated reading, especially the latter, are equally applicable in a language experience approach.

2.6.5 Holistic methods in the remedial context

Apart from language experience approaches, whose use for remedial purposes is well established, there are other holistic methods specifically designed for remedial use. Examples of these are the "Neurological Impress" Method (NIM) of Heckelman (1966) and the Method of Repeated Readings (MRR) of Samuels (1979). These methods, which are described below, differ primarily in the emphasis they give to the previously listed principles of listening, reading with the teacher, and repetition. An intermediate approach developed by Chomsky (1978) is but one of several other possible variations which differ in the emphasis placed on each of these principles.

Although Heckelman (1966) presents the NIM in terms of the neurological and perceptual ideas which were popular at the time of his writing, the method is open to reinterpretation according to holistic language-based principles. The NIM is based on the principle of reading along with the teacher. The teacher is required to move his or her finger along, under the text, in exact synchrony with their verbal reading. Heckelman (1966) emphasises that the major concern is with the style of reading rather than reading accuracy. Deficiencies in the pupil's recognition of words are immediately made good by the teacher's verbalisation. Therefore, after a little initial practice, the pupil is able to enter into an experience of fluent reading, supported where necessary by the teacher's reading.

By "style of reading" is meant the fluency of the pupil's verbal production, which the method is intended to facilitate by overcoming the tendencies to word-by-word or even letter-by-letter reading. Although not considered by Heckelman (1966), contextual and inferential processes may also be expected to operate under these conditions. Heckelman (1966) stresses the effects on word recognition of exposure to as many as two thousand words, simultaneously seen and heard, within each daily fifteen minute session.

The amount of research conducted on the NIM is relatively small and results are contradictory. Various improvements in rate, accuracy and comprehension have been reported (Gardner, in Lorenz & Vockell, 1979; Embry, in Kann, 1983; Heckelman, 1969; Hollingsworth, 1970, 1978; Langford, Slade & Barnett, 1974). But Hollingsworth (1970) reported no gains in reading fluency, and Lorenz & Vockell (1979) found no gains in comprehension and word recognition. However, Lorenz & Vockell (1979), on the basis of informal observation reported improved attitudes to reading, greater confidence and increased fluency. Kann (1983, p.90) concludes that in view of the unclear empirical basis of the NIM, the MRR "may provide the practitioner with a clear sense of direction."

Success as a result of using a repeated readings procedure has been reported with normal children experiencing reading difficulty (Chomsky, 1978; Samuels, 1979), with mentally retarded children (Samuels, 1979), with weak readers at secondary level (Neill, 1980) and at college level (Lopardo & Sadow, 1982), and with adult cases of acquired alexia (Moyer, 1982). In the version of Samuels (1979) it is the repetitive principle which is given almost exclusive emphasis although Kann (1983) lays great stress on the effect of the teacher reading to the pupil. Chomsky (1978), in her version, relies on the pupil reading along with tape-recordings, so much so that Harris (1981) classifies it as a variant of the NIM.

The use of tape-recordings, without necessarily making use of repetition (Carbo, 1978), is a workable variation on the NIM, although Cunningham (1979) and Ashby-Davis (1981) prefer to classify this as an imitative method with impress and repetitive methods constituting two more separate categories. Kann (1983), on the other hand, regards even the MRR as merely an expansion of the NIM.

Notwithstanding different approaches to their classification, holistic remedial reading methods all share one essential feature. They give poor readers the benefit of the same type of natural holistic read-

ing experience which is an indispensable factor in the development of all readers. This is achieved by the supporting and enhancing effects of one or more of: hearing the text read first, reading along with another person ("live" or taped), and repeated reading of the text; with the exception that in a language experience approach the pupil's composition of his own text may be substituted for hearing the text read.

2.7 THE USE AND POSSIBLE EFFECTS OF THE MRR

2.7.1 The nature and effects of reading experience provided by the MRR

As we have already seen, holistic methods cannot always be clearly distinguished from each other in practice. Thus Heckelman (1966) states that some repetition may be desirable in the introduction of a pupil to the NIM, while Samuels (1979) reports sometimes using listening while reading in the early stages of the application of the MRR. Similarly the nature of the effects of the MRR cannot always be clearly distinguished from those of the NIM, although the consistent use of repetition may have effects over and above those of non-repetitive continuous reading. In what follows, consideration will be given to effects specific to the MRR, and those shared with other holistic methods, as well as the possible effects of supplementary activities such as hearing the text read or performing word analysis exercises on words of the text. In addition the possible effects of the MRR on different types of difficulty in reading will be discussed.

As with the NIM, the reading experience provided by the MRR results in the exposure of the learner to a large number of words under conditions in which they are simultaneously seen and heard, or spoken. The approximation to the NIM would be closest when the passage is read with or to the child, at least once initially. Far fewer than the two thousand words, which Heckelman (1966) claims would be covered in a fifteen minute session of the NIM, could be covered in a similar session of the MRR. The repetition of the reading of the text would nevertheless provide more opportunity for strengthening and consolidating the learning which might occur.

In addition to facilitating the recognition of whole words by sight, the method would provide opportunity for increasing knowledge of the orthographic regularities of written language, which

Venezky & Massaro (1979) claim is essential for efficient word recognition. These authors believe that word recognition is mediated directly on the basis of knowledge of orthographic patterns, without the intermediary phonological processing postulated by Shankweiler & Liberman (1976). However, the MRR, by virtue of repeated simultaneous experience in seeing and pronouncing words, might also be expected to encourage the association of letter patterns and their sound-equivalents, at least with larger units, such as th, igh or ong, if not for individual letters.

In the case of recognition of words as wholes, or by means of orthographic or phonic patterns, the MRR may be beneficial in two different ways. It may result in the pupil learning words or patterns which were not known previously. The use of the story method in initial instruction would rely on this effect of repeated reading. Secondly, it may overcome the problem of what Goodman & Goodman (1979) refer to as "getting it all together." Samuels (1979, 1980) might approve of this as an alternative to his term "automatisation", although the Goodmans are concerned with the efficient operation of higher level processes rather than rapid and automatic orthographic and phonological processing. In this latter sense "getting it all together" implies that the material (words, letter-patterns or letter-sound correspondences) is already known but that these discrete items of knowledge still need to be integrated to produce a fluent ability for processing print. It is on the grounds of its efficacy in achieving this fluency that Samuels (1979, 1980) advocates the MRR. But where the pupil's knowledge is deficient the initial learning effect can also be expected to operate.

From an interactive perspective it is possible not only to recognise the need for bottom-up automatisation but also to take into account higher level processes such as those involving syntactic structures, story schemata and inference. In order to give practice in applying these levels of processing in reading an holistic approach is required. Analytical instruction excludes these processes which can only operate when the reader deals with connected discourse. The

automatisation of higher level processes (Brown, 1980) is a further possible benefit which might therefore be gained from the use of the MRR.

The manner in which the MRR may influence both higher and lower level processes is of importance theoretically and practically. This is particularly so in view of evidence in the literature, reviewed by Stanovich (1980) and Garner (1981), which indicates that proficiency in lower level processes is not necessarily related to good comprehension. Garner (1981) refers to these poor comprehending proficient decoders as engaging in "piecemeal processing". In her study she found that this type of reader was insensitive to informational inconsistency, and she suggests that is because they manage written language as bits and pieces, rather than as textual wholes. It would, then, seem reasonable to suppose that a method providing consistent experience in reading texts as wholes would be a necessary condition for improving the reading ability of these individuals. The MRR could be used in combination with supplementary activities based on schema theory (Strange, 1980; Moldofsky, 1983), in which the pupil is brought to grips with the story schemata of the texts used.

Seidenberg (1982) also stresses the implications of schema theory for dealing with the phenomenon of poor comprehension with proficient decoding. She criticises the idea that automatisation of decoding skills is a sufficient condition for fluent reading, where this is understood to include comprehension. Nevertheless from an interactive perspective the importance of "rapid context-free word recognition" (Stanovich, 1980) can be appreciated. Thus a dual function of the MRR may be recognised, in automatisation of lower level processes and in overcoming the poor comprehension strategies of "piecemeal-processors".

Still further light is thrown on the effectiveness of instruction based on connected text, and on repeated reading procedures, by Jenkins and Pany's (1981) research review. These authors, although

agreeing with Garner (1981) that proficient decoding does not necessarily imply good comprehension, point out that good comprehenders tend to be good decoders. The studies cited by Jenkins & Pany (1981) demonstrated no effect on comprehension, and little transfer to fluency, of training in rapid recoding based on isolated words. Training in rapid decoding of words in context, using repeated readings, resulted in gains in comprehension (measured by cloze tests), accuracy and rate, as well as on ability at isolated word recognition.

Jenkins & Pany (1981) admit that this holistic practice could have improved higher level processes, such as the ability to "segment, complex sentences into meaningful units". This would represent an additional factor facilitating fluency and comprehension apart from the effect that rapid decoding might have on a possible processing bottleneck (Perfetti, 1977; Perfetti & Lesgold, 1979). But Jenkins & Pany (1981) fail to recognise that enhanced ability at isolated word recognition could have been brought about as a result of interactive functioning of lower and higher level processes. The holistic practice afforded by repeated readings would allow this interaction to occur, while instruction in decoding isolated words would preclude it.

Chomsky (1978) provides a further development with regard to the relationship in instruction of holistic reading practice and practice in analysing words. Word analysis and word recognition instruction can be based on words encountered in the texts used for repeated reading. This does not imply that instruction in these skills should not be given prior to the holistic practice. But by providing such analytic instruction in the context of holistic practice, the wholeness of the act of reading is maintained. Thus the tendency to abandon meaning in a piecemeal approach to processing is counteracted.

The MRR can, therefore, be supplemented by both schema-based and analytically-based activities, in a manner integrated with the repeated reading of the instructional text.

2.7.2 Effects of the MRR in relation to various types of reading difficulty

Brief mention has already been made of possible sources of difficulty in learning to read, including personal, emotional and social factors, as well as instructional factors and a variety of deficits in cognitive processing, such as visual information processing, phonological processing, verbal labelling and attention. To consider these adequately would require a series of detailed studies. We must restrict the discussion here to an examination of how a few of these factors may influence the results obtained when applying the MRR to cases of reading difficulty. In doing so, the previously stated principle of seeking to establish how problems may be overcome, rather than which deficits result in failure, must be borne in mind.

Lack of motivation for reading deriving from socio-culturally based attitudes is one of the factors identified by Malmquist (1978) as being associated with poor reading performance. Halle (1972) describes how amongst the Western Cherokee the literacy rate in Cherokee was 90% by 1830, while by the 1880's the literacy rate in English was higher than that of whites in Texas or Arkansas. But by the time of writing the illiteracy rate was very high, with schools being viewed as a white man's institution forced on the Indians, and literacy as something leading to children moving away from their family and people. To deal with situations such as this, something more than a particular remedial method is required. But whatever the nature of that "something more", an instructional approach which presents reading as a whole process of meaningful communication will probably be a necessary part of the solution.

The MRR has a much clearer and more straightforward application in overcoming the motivational and emotional problems of pupils who have experienced difficulty or failure in learning to read. The method provides a degree of emotional security by virtue of the fam-

iliarity with the text afforded by the repetition. And by the teacher's initial reading of the text to or with the pupil (Samuels, (1979; Kann, 1983) or by audio-tape support (Chomsky, 1978) relative freedom from failure can be assured the child from the start.

Samuels (1979) stresses the use of record-keeping, in which pupils compete against their own previous performances, as a source of motivation. Lauritzen (1982) prefers to use the appeal of the reading material. This approach is relied on in the use of the story method for initial instruction (Park, 1982; Slaughter, 1983). There is no need, though, to set these extrinsic and intrinsic sources of motivation up in opposition to each other. Certainly intrinsic motivation for learning in general, as well as learning language, is a powerful force which can be expected to operate in reading (Gibson & Levin, 1975). But for the pupil whose intrinsic motivation for reading has been dulled through negative experiences, the use of record-keeping might very well be essential at least until the intrinsic appeal of reading can be established or re-established.

Despite the long history and wide popularity of visual-processing deficits as factors in reading difficulty, these will not be discussed here. In their research reviews Vellutino (1979) and Stanovich (1982a) convincingly discredit the visual deficit hypothesis. They demonstrate how easily supposed measures of visual processing are "contaminated" by phonological coding and verbal labelling at stages beyond the initial processing of visual information. Ross (1976) demonstrates how poor selective attention can also account for supposed disorders of visual perception.

Shankweiler and Liberman, with their associates (for example, Shankweiler & Liberman, 1976; Liberman, Shankweiler, Liberman, Fowler & Fisher, 1977) have done much work elucidating the role of phonological processing in learning to read and in reading difficulties. Vellutino (1977, 1979) has done the same in the case of verbal labelling. While Vellutino (1979) argues for verbal labelling and against

phonological processing, Stanovich (1982a) treats them in a complementary manner as being bound up together as factors associated with reading difficulty.

Stanovich (1982a, 1982b) cites weakness in phonological processing as affecting initial learning of grapheme-phoneme correspondences, but also the abilities to rapidly access the lexicon via a phonological code and to form a relatively stable short-term memory code. These latter abilities become increasingly important in reading development beyond the initial stage. Thus variation in phonological processing ability may operate via verbal labelling to affect even whole-word processing.

The discussion above represents only the briefest presentation of processing deficits which are currently receiving attention in the literature. In relation to the purpose of the present study the question which must be asked is how effective holistic methods, especially the MRR, might prove to be in overcoming these types of deficits. If phonemic analysis and synthesis are indeed important skills then analytically-oriented instruction meets a need which holistic instruction is unable to supply. This is the argument of Bateman (1979) and Samuels (1980). Holistic instruction might have its place in bringing about further development but would not displace analytic instruction as an initial first step in remediation.

If the compensatory assumption in the interactive model of Stanovich (1980) is valid then deficits in grapheme-phoneme processing below the word level might be compensated by facility in processing whole words. By virtue of its holistic nature and the repeated experience in reading words, the MRR could provide a means of effecting such compensation. But in view of the lack of clarity which exists in the literature concerning alternative means of access to word meaning (with and without reliance on grapheme-phoneme relationships) this must be recognised as conjecture. The objection raised against the compensatory assumption by the study of Freebody & Anderson (1983) is also pertinent.

The effect of an inadequacy in the control of selective attention (Ross, 1976) has serious implications for the use of the MRR. Bateman (1979), in her argument for direct analytic instruction, takes into account the possible role of selective attention problems as a major cause of difficulty in learning to read. Particularly if the text is read to or with the pupil there is little to guard against mere verbal memorisation of the passage with no attention being directed to the words or letters of the visual representation. Even from a top-down perspective the role of attention is crucial. Goodman (1976a) places some stress on the need to attend selectively to the different cue systems. Repeated reading of a passage might thus take place without the pupil deriving benefit to lower or higher level processes. This issue is not addressed further by this study but is deserving of research, particularly in view of the query it raises regarding the general applicability of the MRR.

A final class of deficits to be discussed may be related to Garner's (1981) piecemeal processing phenomenon. These are the comprehension deficits, discussed by Stanovich (1982b) and Adams (1980), which are independent of word recognition abilities. These may be due to deficient syntactic and semantic abilities and general meta-cognitive strategies.

While the MRR in itself provides no explicit techniques for dealing with these processes it has already been pointed out that it does at least provide a context within which they may be exercised. Adams (1980) refers to the way in which the material used for reading instruction may divert attention from meaningful levels of analysis: unless the material is potentially meaningful, processing will naturally stop at lower levels of analysis. This underlines the need for an holistic approach which employs materials which are both meaningful and appealing to the pupils. The use of supplementary schema-based activities, which are integrated with the application of the MRR, is relevant here.

2.7.3 Other variations in the use of the MRR

Variations in the use of the MRR which have been discussed include placing greater emphasis on reading to or with the pupil, and using supplementary activities which focus attention more on top-down or bottom-up strategies. Lauritzen (1982), in addition to suggesting greater reliance on the intrinsic appeal of the material than on record-keeping for motivation, offers a modified version of the MRR suitable for group instruction.

Lopardo & Sadow (1982) used not only oral reading but also silent reading as a means of practising the passages used for the MRR. Silent reading, by far the most functional form of reading in post-primary school life, requires recognition as a process somewhat different from oral reading (see Pugh, 1978). Therefore it could be argued that if the MRR is concerned only with the development of oral fluency, the most important purpose of reading may be neglected. Unlike other studies on the MRR, though, Lopardo & Sadow's (1982) study involved college students. Allington (1983), in a paper which is concerned with fluency as a goal of reading instruction, states that although there is no clarity in the literature it does seem that oral fluency is at least indirectly related to silent reading comprehension.

Universal instructional practice implies support for this notion, but it is wise to take cognisance of the indirectness of the relationship in view of anecdotes, which most reading teachers are able to relate, concerning pupils with excellent oral fluency who on questioning reveal little or no comprehension of what they have read. Nor is it unknown to find individuals with good silent comprehension despite poor oral fluency.

The practice of Lopardo & Sadow (1982), in using comprehension questions with the MRR, is a simple means to avoid too great an emphasis on mere verbalisation.

C H A P T E R 3T H E R E S E A R C H

3.1 THE FOCUS OF THE RESEARCH

A question to be asked of any method proposed as a means of helping to overcome reading difficulties is, "Does it work?" Some caution is called for in addressing a question of this type, though. As Burroughs (1975) points out, educational research is seldom able to provide answers as clear-cut as the phrasing of this question suggests is possible. Science in general is tentative in nature, but the efficacy of a method of instruction will vary not only with the conditions under which it is applied, but also according to the personal characteristics of the pupils.

Earlier studies (Chomsky, 1978; Samuels, 1979) have investigated the effectiveness of the MRR and have produced positive findings. Further research may confirm or dispute these findings, but this was not the purpose of the present study. The issue which this study set out to investigate was whether the course of the MRR would differ if greater emphasis was given during its application to either or both of top-down and bottom-up processing.

This entailed comparing the effects of the MRR under conditions in which

- (i) the method was applied without any additional instructional assistance;
- (ii) assistance was provided in mobilising appropriate schemata for the passages which were read;
- (iii) assistance was given in analytically "attacking" unknown words in the passages which were read;
- (iv) both types of assistance were provided.

These comparisons imply the use of different variants of the

MRR. In order that the hypotheses of this study may be delineated it is necessary first to specify the nature of these different forms of treatment. A basic principle which had to be borne in mind in the formulation of these experimental forms of the MRR was determined by the MRR's role in this study as representative of holistic methods of remedial instruction. Whatever the forms of the experimental application were to be, the essential holistic character of the method had to be maintained.

In its unelaborated form the MRR would involve presenting a passage repeatedly to the subject to be read with no intervention barring recording and communicating performance data to the subject after each reading. However, supplementary activities immediately suggest themselves. Under ordinary instructional circumstances it is likely that words not known by the pupil would be supplied after reasonable opportunity had been allowed to the pupil. The use of a tape recording for imitative purposes (Chomsky, 1978) would result in such words being made immediately available to the child. Reading the passage to the pupil before his first attempt (Kann, 1983) is another possibility, as is the provision of help in analysing problem words.

None of these supplementary activities detracts from the holistic character of the reading experience provided by the MRR. Even the supplementary analytic instruction described would, in a broad sense, be holistic. The words to be analysed would be taken from the context of a meaningful passage and in the subsequent re-reading would be placed within the whole, linguistically meaningful context once more.

The specific hypotheses, which were concerned with the comparative effectiveness of variants of the MRR, were set within the framework of a broader hypothesis. This more general hypothesis proposed that use of different supplementary activities would influence different levels of processing and this would affect the rapidity with which fluency would be attained on the passages used for the MRR.

In order to make the comparisons outlined above, four different procedures for the application of the MRR were decided upon.

- (i) A "bare" form (Treatment A)
- (ii) A form in which increased emphasis was given to top-down processing through the use of schema-oriented supplementary assistance (Treatment B). This assistance is specified later in this chapter.
- (iii) A form in which increased emphasis was given to bottom-up processing through the provision of assistance in the analytic "attack" of words which the subjects had been unable to read in the passages used (Treatment C).
- (iv) A form in which increased emphasis was given to both top-down and bottom-up processing by means of these supplementary activities (Treatment B+C).

An objection which could be justly raised against interpreting the effects of treatments B and C in terms of their effects on processing levels, is that the effects of both would lie merely in providing those words which subjects were unable to recognise on their own. To meet this objection a further treatment (A+) was included, in which unknown words were clearly pointed out to subjects, and named. Furthermore, it was decided that during treatment A words which had been incorrectly read, would be pointed out, although not named. This was done in order to equate conditions as closely as possible in the various treatments.

In the following section the specific hypotheses of this study are delineated. Thereafter consideration is given to some issues which affect the interpretation of the different treatments outlined above.

3.2 THE DELINEATION OF THE HYPOTHESES

On the basis of the review of the literature it was hypothesised that the different forms of the MRR would differ in the effectiveness with which they would produce fluency on the passages read. Fluency was defined for operational purposes in terms of a criterion level of words read per minute. The actual criterion rates are given later under the description of procedures. It must be noted that in using the term "effectiveness" it is not implied that the most "effective" form of the MRR will necessarily produce the greatest long term increase in reading ability. This might be the case but this would represent a further hypothesis beyond those which are listed below. In this study the effectiveness of a treatment refers merely to the facility with which it brings about the attainment of fluency on the practice passages.

In listing the hypotheses they have been expressed additionally in symbolic notation in order to make subsequent reference to them less cumbersome. $E(X)$ would represent the effectiveness of treatment X in achieving fluency on the passages which were read. The following were hypothesised:

(Where A represents the unelaborated MRR,

B represents the MRR with schema-oriented emphasis,

C represents the MRR with analytically-oriented emphasis.)

(i)	Treatment B is more effective than treatment A	$E(B) > E(A)$
(ii)	Treatment C is more effective than treatment A	$E(C) > E(A)$
(iii)	Treatment B is more effective than treatment A+	$E(B) > E(A+)$
(iv)	Treatment C is more effective than treatment A+	$E(C) > E(A+)$
(v)	Treatment B+C is more effective than treatment B	$E(B+C) > E(B)$
(vi)	Treatment B+C is more effective than treatment C	$E(B+C) > E(C)$
(vii)	Treatment B is more effective than treatment C	$E(B) > E(C)$

In summary, $E(B+C) > E(B) > E(C) > E(A+)$, $E(A)$.

To test whether $E(A+)$ was greater than $E(A)$ would have been trivial since reading rate cannot but be increased by supplying unknown words to readers. It could be argued that any comparison with $E(A)$ would be similarly trivial, and that hypotheses (i) and (ii) should therefore be excluded. However, comparison with treatment A clearly is important: the effect of the MRR in a basic form, without supplementary instructional activities, provides a standard against which the other treatments may be compared.

If either $E(B) > E(A+)$ or $E(C) > E(A+)$ it is probable that $E(B+C) > E(A+)$. Hence it was not felt to be necessary to test $E(B+C)$ directly against $E(A+)$. This reasoning rests on the assumption that no adverse effects result from providing the schema-based and analytic assistance of treatments B and C together. If this were to be the case these adverse effects would be manifested in the comparison of $E(B+C)$ with $E(B)$ and $E(C)$. The $E(B+C) : E(A+)$ comparison would then only be worth testing if there were prominent effects of $E(B) > E(B+C)$ and $E(C) > E(B+C)$.

A note on the interpretation of the effects of treatments B and C: It must be noted that in none of B, C nor B+C was any attempt made to quantify by how much the use of top-down or bottom-up processing was increased. Nor was it assumed that these would suddenly be created where they were previously absent. Except in extreme cases it was assumed that a subject exposed to treatment A would begin to activate content and syntactic schemata. With repetition the schemata would be confirmed and used to a greater extent. Treatment B would add to this. Relevant schemata would be more rapidly and readily activated and be available to facilitate and guide the use of top-down processing.

In the same way during treatment A it was almost inevitable that subjects who had received analytic instruction previously would apply analytic techniques to some extent. Thus it was expected that

this type of bottom-up processing would be occurring, but that the degree to which it occurred would vary between subjects and across different passages. No claim is made here that the degree to which bottom-up processing occurs can be quantified, nor that this can be done for the increase which would be brought about by employing treatment C. It was assumed merely that analytic practice on the unknown words would bring about an increased use of bottom-up processing and that this would have a discernible effect on the course of the MRR. This second assumption, of the impact of the effect, might reasonably be contested. But if a meaningful difference were to be produced in resulting measurements by the inclusion of this supplementary analytic instruction then the assumption may be considered to have been justified.

3.3 ISSUES IN THE SELECTION OF A RESEARCH DESIGN

A possible aim of research in this area of study could be to determine the relative effectiveness of instructional methods based on top-down and bottom-up views of the reading process. If so, there would be a strong case for employing a group-comparison design in which different groups of subjects received different types of remedial instruction. The interactive view of reading casts a quite different light on the holistic-versus-analytic instruction issue. Both the MRR and the NIM, although advocated on bottom-up grounds (Samuels, 1979; Heckelman, 1966), preserve the holistic nature of the reading process and so presumably invoke top-down processing strategies.

Within an holistic approach to reading there can be no question of isolating top-down from bottom-up processing. Both modes of processing will occur simultaneously and it is only the balance between them which will vary. A research design which is capable of monitoring the balance between levels and directions of processing is called for.

Francis (1982), in a detailed longitudinal study of the development of children's understanding of the nature of writing and reading, and especially of the orthographic system, decided against the use of an experimental design. The reason stated was that "the objectives of the study did not indicate an experimental design for no comparisons were to be made" (Francis, 1982, p.9). Instead the development during learning to read, of the aspects of interest, was traced using intensive observation in a case study approach.

This type of research is in line with Goodman's (1976b) paper on "linguistically sound research in reading." It is Goodman's argument that conventional group-comparison research has a strong tendency to treat reading as something less than the whole language process that it is. According to Goodman reading is essentially a matter of achieving coherent meaning, and like all language processes cannot be studied by reducing it to manipulation of constituent units or by looking at it in highly limited and unusual circumstances. Goodman (1976b, p.98) concludes that, for reading, "research studies of large numbers of subjects

must give way to depth studies of small numbers, such as those popular in linguistics and developmental psycholinguistics." He continues, "If a researcher can find through the study of a single subject how reading is used to comprehend a writer's message, an important contribution will be made to human knowledge."

There does appear to be some logical confusion in Goodman's argument. Even if present group-comparison research has often attempted to force reading into a Procrustean framework for easier experimental analysis, there is no essential reason why it should be bound to this approach. It is conceivable that a comparison could be made between a group exposed to the linguistically "natural" approach to reading favoured by Goodman, and another group subjected to the analytically-based instruction which he so vehemently rejects. This is, however, a crude type of investigation in which only pre- and post-treatment measurements are obtained on each individual. Furthermore, with the averaging of these measurements across each sample group, whatever information is available on each individual treatment outcome is obscured (Hersen & Barlow, 1976). As Francis (1982) recognises, if a perspective on the ongoing development of reading ability is to be obtained, then a focus on what is occurring with the individual learner is essential.

Unlike Goodman, a theorist with greater interactive leanings might be prepared to allow the value of the type of research exemplified by Shankweiler & Liberman (1976), in which a group-comparison methodology was used to investigate the role of phonological abilities in the processing of words. But useful though such an approach may be in the investigation of elements in bottom-up processing, if one's purpose is to investigate reading as an holistic meaning-conveying act, a group-comparison design does not seem the most appropriate form of research.

In the present study the purpose was to investigate the effect of the MRR on reading ability as a whole, and particularly the effect of increasing the emphasis on the use of either one or both of top-down and bottom-up strategies. At all times the MRR was to be used as an holistic method which would preserve the integrity of the act of reading, whether or not bottom-up strategies were to be emphasised. Therefore some design other than comparison between groups was sought. While Francis (1982) chose a case study approach as no comparisons were to be made in her

research, comparisons between the effects of different forms of the MRR were to be central to the present study. In view of this, and of the weakness of what Campbell and Stanley (1963) term pre-experimental designs, it was decided that while this study would focus on subjects as individuals it should also approximate as far as possible to a true experimental design.

It is in the field of behaviour modification and applied behaviour analysis that a precise and well-tried experimental methodology for single subject research has been developed (Sidman, 1960; Hersen & Barlow, 1976; Kratochwill, 1978). The application of these research designs to this type of study of reading might draw severe criticism from two different sides. Theorists who are cognitively and psycholinguistically oriented might argue that a methodology grounded in the principles of behaviourism is inappropriate for the investigation of a problem which, it is purported, is rooted in ideas on the processes of cognition and language. The objection of orthodox behaviourists would be very similar : a methodology designed for the investigation of observable behaviour cannot be employed for the investigation of theories concerning supposed processes underlying observable reading behaviour.

In answering these possible objections it must be established firstly that the utility of a research design for any particular problem depends not so much on its origin, or even its customary use, as on the extent to which it is capable of elucidating the problem. The group-comparison methodology, so widely used in the study of human psychology, originated, after all, in an agricultural context with the purpose of investigating factors influencing crop growth (Hersen & Barlow, 1976).

In studying the effect of the MRR as the details of its application are varied, we are dealing with reading as a whole and observable behaviour. Both the independent and the dependent variables are easily observed and capable of clear specification (as will become apparent later in this chapter). Therefore a single subject design of the applied behaviour analysis type may be employed to investigate the effect on reading performance of various instructional procedures. Furthermore, the different instructional procedures may have direct implications in terms of the levels of processing described in reading theory. If so, the changes observed in reading performance may be related to the balance

between these different levels of processing. It is this line of reasoning which has been adopted in this study.

3.4 THE RESEARCH DESIGN

Among the single-subject designs which have been developed in the field of applied behaviour analysis the most favoured form has, according to Lovitt (1975), been the O X O design, or A-B-A, withdrawal design (Kratochwill, 1978). In this design, after the initial O (or A) phase, in which no treatment is provided, treatment is provided during the X (or B) phase and then removed in the second O phase. The rationale is that "if the behaviour changed in the X phase, from the first condition, and changed back to its original level in the return to the O phase, a convincing case can be made that a functional relationship has been discovered" (Lovitt, 1975 p.434).

Some general limitations and weaknesses of this design are pointed out by Hersen & Barlow (1976), Christensen (1980) and White (1981). There are also particular queries which arise concerning its use in the present study. Nevertheless, it was felt (with Hersen & Barlow, 1976) that the A-B-A strategy is acceptable from an experimental viewpoint, and that reservations against its use could be addressed in this study.

The A-B-A design was thus accepted as the basis for testing the hypotheses of this study. In certain cases variations of this design, specifically B-A-B and B-C-B, were regarded as preferable. The reasons in these cases will be advanced in Chapter 4.

Regarding problems with the A-B-A design, Hersen & Barlow (1976) state that its major undesirable feature, from the clinical (or educational) point of view, is that it ends with a condition of no-treatment. The ethical objection to this is particularly relevant in studies in which a desirable behavioural change is undone by the return to the no-treatment phase. What is more, as White (1981) states, if removal of the treatment does result in reversion to the pre-treatment level then the educational value of the treatment is suspect. It must be assumed to be prosthetic rather than therapeutic in nature. On the other hand if no return to baseline occurs in the third phase then one is unable to rule out rival hypotheses, for the change in behaviour, such

as events in subject history co-occurring with the implementation of the B phase, (Christensen, 1980).

Faced with this dilemma White (1981) concludes that most educational programmes cannot "win" with a simple A-B-A design. However, the particular nature of the behavioural change investigated in this study avoided these difficulties and thus rendered it unnecessary to turn to more complex designs such as multiple baseline, multiple schedule or concurrent schedules designs. None of these seemed more suited to the purposes of the present study.

With reference to the first problem, that of ending with a no-treatment phase, it must be borne in mind that instruction in reading differs fundamentally in nature from treatments such as reinforcing co-operative or attending behaviours. While withdrawal of reinforcement in these cases may lead to re-appearance of undesirable behaviours, this is unlikely to occur with remedial reading instruction. The worst that may reasonably be expected to occur, is that progress in reading development will be less than it could have been. Reading instruction is cumulative in the sense that whatever improvement is brought about by practice in reading will not immediately be lost on cessation of such practice.

The cumulative character of reading, while helping to answer this first objection, would seem bound to cause difficulty with regard to failure to return to baseline levels on removal of the treatment. In a straightforward graph of reading fluency against time, one would expect a line which might level off but which would not descend, (figure 1). This differs from the basic pattern of response envisaged by Lovitt (1975), (figure 2). There seems no reason why conclusions regarding the effectiveness of treatment cannot be drawn from the type of pattern displayed in figure 1, since this cannot be equated with the type of non-return to baseline referred to by White (1981), (figure 3).

A further characteristic of this particular study differentiates it from the situations illustrated in figures 1, 2 and 3, and

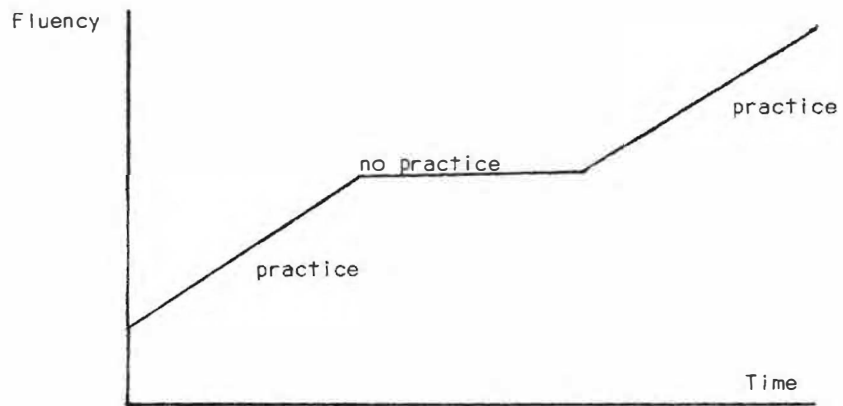


fig. 1 The cumulative effect of practice on reading fluency in an A-B-A design in which reading practice is alternately provided and withdrawn.

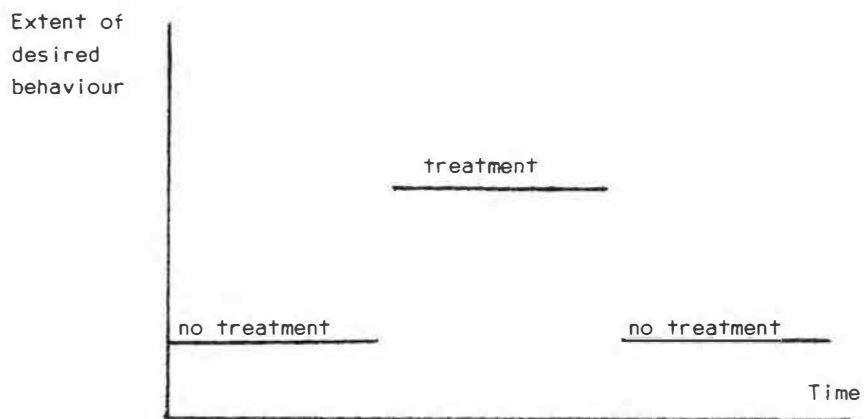


fig. 2 Commonly expected pattern of results in A-B-A designs.

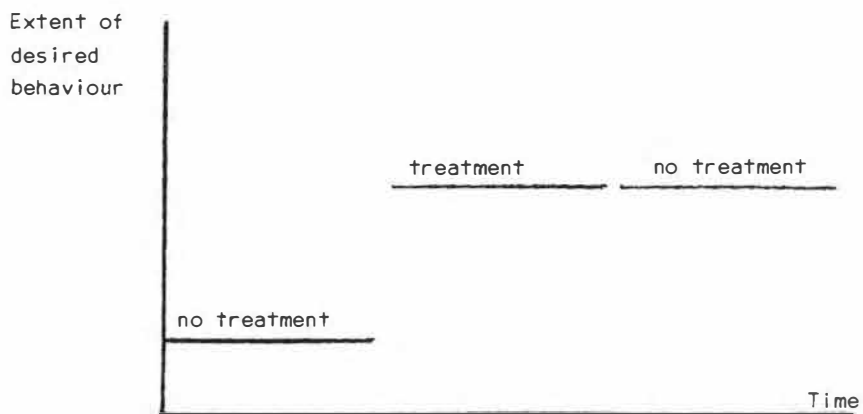


fig. 3 Expected pattern of results in A-B-A designs in which the effect of treatment persists after withdrawal.

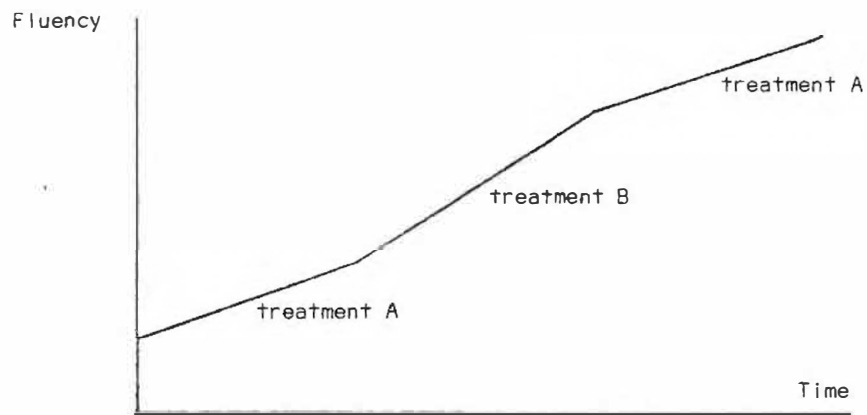


fig. 4 The cumulative effect of practice on reading fluency when two effective forms of treatment are alternated.

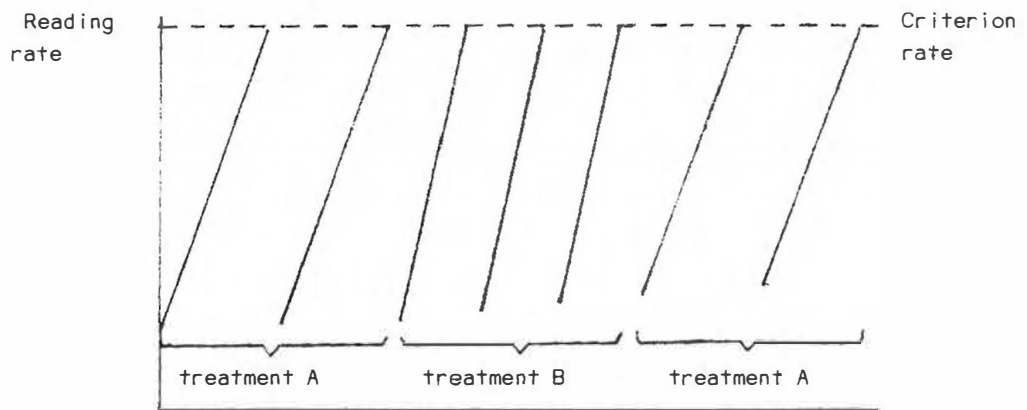


fig. 5 Expected pattern of results in applying the A-B-A design in this study.

calls into question, in a different way, the utility of looking for changes in gradient or level of the type already illustrated. In all phases some treatment was to be provided. The phases differed only in the presence and nature of additional elements of instruction. Interpreting the results of an A-B-A design along the lines of figure 1 would therefore produce a less well-defined pattern (eg. figure 4). But, by focussing on the achievement of fluency on each consecutive passage, the limitations of the A-B-A design are circumvented, and a pattern of results more amenable to interpretation may be expected.

Figure 5 illustrates this expected pattern from an A-B-A design applied to the hypotheses of this study. Differences in both number of passages and gradient of change on passages appear. These changes can be expected to occur with the onset of a new treatment condition and to revert to the initial pattern on its termination. Thus, while the resulting pattern differs from that normally expected from an A-B-A design, it is not subject to the problems normally inherent in the use of an A-B-A design. Though reversion is expected to the previous rate of progress, the cumulative nature of reading development is still evident in figure 5 in the successive rise in the starting points for each passage.

3.5 APPLYING THE WITHDRAWAL DESIGN TO THE HYPOTHESES

For the purposes of testing the hypothesis of this study, the following applications of the A-B-A withdrawal design appeared to be indicated:

<u>No.</u>	<u>Hypothesis</u>	<u>Strategy</u>
(i)	$E(B) > E(A)$	A-B-A
(ii)	$E(C) > E(A)$	A-C-A
(iii)	$E(B) > E(A+)$	A+-B-A+
(iv)	$E(C) > E(A+)$	A+-C-A+
(v)	$E(B+C) > E(B)$	B-B+C-B
(vi)	$E(B+C) > E(C)$	C-B+C-C
(vii)	$E(B) > E(C)$	C-B-C

Difficulties arise, though, with certain of these applications. One major difficulty was concerned with the issue of the cumulative nature of reading instruction. This related especially to the analytic instruction of treatment C. Although this treatment was aimed specifically at those words in the passages being read which were a source of difficulty to the subject, there was a strong possibility that certain subjects, at least, might develop a tendency and a facility for analysing unknown words in general. Therefore, as already pointed out (White, 1981), even though treatment C might apparently be withdrawn, it could continue to operate, for example in the last A phase of the A-C-A strategy. Similar effects might occur in the A+-C-A+, B-B+C-B and C-B-C cases.

Ideally, then, it would have been desirable to avoid relying on a reversion effect on withdrawing C. So, for example, the C-B-C strategy for hypothesis (vii) could have been replaced with a B-C-B+C strategy, although in this case the third (B+C) phase would not actually be a straightforward reversion to the first phase. An adverse effect as a result of using B and C together in B+C could mask the positive effect that might be produced by reverting to B. The B-C-B strategy might then be preferable as an alternative to C-B-C. Although a C

phase would still appear after a B phase this would occur only once, and if the carry-over of C was strong this would lead to questioning of a hypothesis that was possibly correct, and not to the confirmation of an incorrect hypothesis.

This line of reasoning could also be applied to the use of A-C-A and A+-C-A+ strategies. These would also run the risk of a non-reversion in the third phase, although this might not happen. In the event of it occurring, though, replication with different subjects, along the lines of a multiple baseline strategy (Hersen & Barlow, 1976), would provide a more effective research design.

A carry-over of the effect of treatment B, facilitating activation of schemata by reading and discussing the passage with the subject, seemed less likely to be a problem since these supplementary activities were concerned specifically with the content of the particular passage. Nevertheless a carry-over was possible in that a subject, who previously treated reading mainly as an exercise in word-attack and word-recognition, might start to use the semantic and syntactic context more generally. Indeed, from an educational viewpoint, this is to be hoped for. For experimental purposes a strong carry-over of the effect of B could only be dealt with in the same way as discussed for C.

A different variation in the basic A-B-A design which would be more desirable from the educational rather than the experimental viewpoint is a B-A-B sequence. Hersen & Barlow (1976) state that the disadvantage in this case is that no indication of the initial baseline level is obtained. It is doubtful, though, whether the term baseline has any meaning in this study since treatment was provided in all phases with every subject. And where replication was to be carried out, the extra instructional benefit afforded would encourage the use of this variation for the replication.

Therefore, while the strategies initially listed were regarded as a provisional plan of action for the research, the possible need to proceed to somewhat varied replication procedures was recognised from the outset.

3.6 THE SELECTION OF THE SUBJECTS AND THE SETTING

The entire group of children in class two and standard one, being years 2 and 3 of schooling, at a Provincial primary school in Pinetown, consisting of 64 and 65 children respectively, were assessed for their reading ability during the second week of the school year. Children in each year were asked to read a passage of 100 words from a reading book of a level appropriate for use with the middle reading group of each class. Appropriateness was determined by discussion with the class teachers. The books used were from series forming part of the school's standard reading instruction programme.

Selection criteria for year 3 were set at a rate equal to or less than 35 w.p.m., and an error percentage of 8 percent or greater. Those falling within these limits were re-assessed on another passage of the same story and those who once more fell within the limits were considered as suitable candidates for the research. Pupils who were receiving remedial instruction were excluded, although those who had previously, were not. No pupil was included who was more than 12 months above or below the usual age range for the year group, as determined by admission criteria for schooling.

In the case of pupils in year 2, rate and accuracy on the grade-appropriate material were considerably poorer by comparison and therefore those whose rate was equal to or less than 12 w.p.m. were retested on material considered appropriate for children in the middle of the second half of year 1. Those children who still fell within limits of 35 w.p.m. and 8 percent word recognition errors were regarded as potential subjects.

Selection from among these potential subjects, in order to obtain the required number of subjects, was based on the class teachers' recommendations and on one further objective criterion in the case of the year 2 pupils. Several of these pupils were obviously extremely weak even on the less demanding retest. In order to preserve the nature of the research as an investigation into the effects of instruc-

tion on children with reading difficulties, rather than non-readers, no child was included whose percentage errors exceeded thirty. (As instruction for some of the subjects took place in the second term, some three months after the initial assessment, this implied a further reassessment for borderline cases who might have developed to the point of meeting this criterion.)

All subjects chosen were, therefore, readers who experienced difficulty with materials appropriate for average and even somewhat below average readers at the same stage of schooling. It would have been possible to include readers experiencing a similar level of difficulty but who were older and in higher classes. This would have introduced greater complexity into the research situation as a result of the effect of prolonged failure or weakness on such children. It may well be that holistic methods including the MRR (and perhaps especially the MRR) are particularly useful in these circumstances. But, although the affective aspects of a method's mode of operation require research, these aspects were considered to lie beyond the scope of the present study.

As regards the setting, it was decided that subjects should be provided with instruction on the school premises in an empty classroom. Apart from allowing easier access to the subjects this arrangement corresponded to the normal organisation of remedial instruction in the school. Also, since it is in the schools that reading instruction does or does not take hold, it was appropriate that the effect of the experimental instruction should be shown to occur in the school setting. Effects obtained in unusual or specially arranged settings would have limited external validity.

3.7 PROCEDURES FOR THE EXPERIMENTAL APPLICATION OF THE MRR

In all forms of the MRR the passage was read three times each day. The supplementary activities provided in treatments A+, B, C and B+C were carried out after the initial reading each day.

In treatment B the assistance was schema-oriented in nature. The passage was read to the subject and then discussed. This discussion consisted of simple questions, with answers supplied by the subject, on the successive points of the story. The bottom-up-oriented assistance of treatment C consisted of practice in phonic and structural analysis of words. The words used were those with which the subject had experienced difficulty in the previous reading. Where these words amounted to less than one tenth of the total in the passage, analytic practice was provided on the longest of the remaining words. Sufficient of these were used to make up one tenth of the total. The practice varied with the words but consisted of one or more of the following: guiding the subject in "sounding out" the word or a syllable within it, or asking the subject to identify digraphs, blends, syllables or component words within the word. In treatment A+ the unknown words were simply named after the initial reading each day.

Passage length was set at 100 words, or, for the weaker children in year 2, at 50 words. This follows the recommendation of Samuels (1979) that passages of 50 to 200 words be used. Passages were re-read until the criteria set for fluency and accuracy were attained. These criteria are described in the following section of this chapter. On beginning a new treatment phase a subject was placed on a new passage whether or not the criteria had been achieved on the previous passage. Phase length was set at three weeks, giving a total of nine weeks' work with each subject.

In no treatment was an attempt made to provide unknown words during the course of a reading as would probably occur under classroom conditions. The purpose here was to provide subjects with the opportunity to handle the task on their own without intervention during their

performance. In order to avoid a complete halt, when a subject was unable to obtain a word by any strategy, the following instructions were given on the first and second days and repeated each time a new passage was begun: "If you do not know a word you can try to guess it or work it out. If you still cannot get it you can decide to leave it out so it does not slow you down too much."

The reading materials used were from Webster's series, Young Shorty Books, (Webster, 1978). These books are widely used as supplementary and remedial readers in the first phase of schooling in Natal, and in content and language are intended to be appealing to children of this age. Passages of the required length were selected in sequence and in such a way that each was in itself a meaningful section of the story. Where necessary, continuity between passages was maintained by reading the intervening narrative to the subject and discussing it briefly.

Instruction was carried out during the daily reading period, after tea-break, except in the case of two of the year 3 children (subjects 1 and 2) with whom it took place after the lunch-break.

3.8 MEASURING PERFORMANCE ON THE MRR

Measurements were taken on the first reading of the passage each day, before any supplementary assistance of any kind was given. Thus, while such assistance could be applied in the subsequent repetitions of the passage it could only affect a subject's record of progress to the extent which its influence on the subject's behaviour survived after a twenty-four hour period (or after a weekend).

Differences exist in the literature regarding the variables which are taken as representative of reading ability. While Samuels (1979) focussed primarily on rate expressed in words per minute, and used percentage accuracy of word recognition mainly as a counter-balance to discourage excessive rushing, Lopardo & Sadow (1982) gave equal weight to rate, accuracy and comprehension as measured by simple questions on the passage. Comprehension seems to be an eminently appropriate variable to measure in a study that is concerned with reading as a whole, meaning-carrying process. However, comprehension is ill-suited as a measure of progress with a procedure that works with relatively short passages. (Lopardo & Sadow worked with college students on passages of 400 words.) The reliability of the comprehension measure may tend to be low when it is based on the small number of questions which are possible on passages of fifty words.

Accuracy of word recognition is a measure of reading ability which fits very well within a bottom-up framework. Work on miscue analysis (Goodman 1973b, Donald 1980, Weaver, 1980) demonstrates that top-down processing may result in the same proportion of "errors" in a reader with a high level of comprehension as in one who has a much lower comprehension level. Accuracy is therefore a dependent variable of doubtful validity in a study which seeks to investigate the relevance of top-down and interactive models in dealing with reading difficulty.

Further objections to the use of accuracy in measuring change in behaviour comes from a different source. White & Haring (1980), writing in the context of applied behaviour analysis, argue against the

utility of accuracy as a measure of change. The most pertinent of their points, for reading instruction, is that individuals who are 100 percent accurate have not exhausted their capacity to improve. The child who painstakingly yet correctly works his way through all the words in a passage is not a fluent reader, and will be unlikely to comprehend the meaning of the passage at all well (Smith, 1971). Therefore the approach of Samuels (1979) in concentrating on fluency, indicated in words read per minute, was adopted in measuring reading development.

The danger of a subject being overconcerned with rate, pointed out by Samuels (1979), was nevertheless a matter of concern. In accordance with Samuels' approach, accuracy was retained as a subsidiary criterion to regulate advancement to new passages. Even from a top-down perspective there would be cause for concern if there were a discrepancy of the order of twenty percent between a pupil's reading and the actual text. In view of the foregoing it was felt that the accuracy criterion should not be too strict. Lopardo & Sadow's (1982) criterion of 95 percent accuracy agrees with the traditional view of what constitutes independent reading (Otto, McMenemy & Smith, 1973). An accuracy of 90 percent is regarded by them as indicating that reading is at an instructional level. A criterion of 8 percent was selected, therefore, as being sufficiently flexible.

With regard to rate, Lopardo & Sadow (1982) set a criterion of 100 w.p.m. for advancement to new passages. This, however, was for college students. Samuels (1979) used 85 w.p.m. From the selection procedures it was evident that approximately one third of the pupils exceeded a rate of 80 w.p.m. This was considered to be a sufficiently challenging goal for the weakest readers to work towards. Therefore a general rate criterion of 80 w.p.m. was set, with the proviso that with particularly weak readers this might be changed to 70 w.p.m. Where a change was contemplated the decision was to be made early, during the first phase of working with the subject, and maintained throughout the succeeding phases.

C H A P T E R 4RESULTS AND DISCUSSION OF RESULTS

4.1 THE PRESENTATION OF THE RESULTS

4.1.1 Introduction

It is one of the strengths of single-subject research designs that they provide for the monitoring of performance at frequent intervals throughout the research period (Sidman 1960; Hersen & Barlow, 1976). A natural adjunct to this approach is the use of charts for the graphical display of the measurements thus obtained. This characteristic element of the interpretation of the results of single-subject research was adopted in this study.

Notwithstanding the almost universal use of graphical presentation of results, and the frequent exclusive reliance on it, statistical procedures are strongly advocated by some authorities, although deprecated by others (Kazdin, 1976). The issues involved are discussed in this section prior to the actual presentation of the results. Also discussed in this section are the form of graphical presentation and the procedures followed in charting the results.

4.1.2 The issue of statistical versus graphical analysis of results

The use of statistical analyses in single-subject research remains an unsettled issue. In group-comparison research in psychology and education, statistical analysis is so established a feature that its omission is almost unthinkable. Campbell (1963) refers to the lesser dependence of "the more advanced sciences" on tests of significance and attributes this to the magnitude and clarity of the effects with which they deal. In attempting to evaluate the factors which determine or contribute to human behaviour one generally has to deal with a complex of interrelationships from which it may often be impossible to isolate a particular factor in order to study it in its "pure form." Statistical analysis then becomes the method of choice for revealing whether the contribution of the factor of interest, to the measured behaviour, is of any note.

Kazdin (1976) questions the assumption of Campbell (1963) that workers in the human sciences are restricted to working "low-grade ore" in which statistical tests are necessary to reveal whether the effects of factors being studied are significant. Kazdin's (1976) statement that many researchers view the search for marked unambiguous effects as a logical priority in psychological research has certainly been true of the field of behaviour analysis within which the single-subject approach has been developed.

The relatively low degree of reliance on statistical analyses in single-subject research is directly related to the amount of control which can be exerted over the experimental conditions. As Hersen & Barlow (1976) point out, group-comparison designs, by employing large numbers of subjects, attempt to discount the effects of extraneous variables. An important asset in conducting an experiment with a single subject is the opportunity to monitor closely the conditions under which behaviour changes are evaluated. Extraneous influences during the experiment may be noted and taken into account if not excluded (Michael, 1974).

With the extension of this type of research from well-controlled settings to open field settings it has been argued that the greater degree of uncontrolled variation renders the effects of intervention less obvious and increases the need for statistical aids in evaluating these effects (Kazdin, 1976). Kazdin's concern is that without tests of statistical significance effects of potential practical significance may be overlooked. White (1984) cites the contrary argument that, as in group-comparison approaches, statistical procedures may be too powerful in detecting changes which are of no functional value. He rejects this, pointing out that a magnitude criterion can be used in conjunction with the statistical test. White (1984) goes on to state that statistics can refute the existence of a change which visual inspection of a graphical presentation might suggest exists. Kratochwill (1978) demonstrates that there is in fact a very real danger of visual inspection leading to this type of spurious conclusion especially when results display a large degree of within-phase variability.

Gentile, Roden & Klein (1972) present an analysis-of-variance model for analysing single-subject data. The validity of their crucial assumption, that successive scores within a treatment phase may be considered to be independent of one another, is contested by Kratochwill, Alden, Demuth, Dawson, Panicucci, Arntson, McMurray, Hempstead & Levin (1974) as well as Hartmann (1974) and Thoreson & Elashoff (1974). Kratochwill et al (1974) suggest the utility of some nonparametric models, and in the series of papers edited by Kratochwill (1978) detailed accounts of procedures which do not rely on the independence assumption are presented.

A typical comparison which might be made in a single-subject design would be between the magnitude of the scores recorded for the individual during treatment and no-treatment phases. If data-points in treatment phases are uniformly and considerably higher than those in the no-treatment phases then nothing more than visual inspection of the charted results is required to reveal this difference. However, within-phase variability which produces some overlap in the ranges of scores in different phases would render visual inspection more difficult

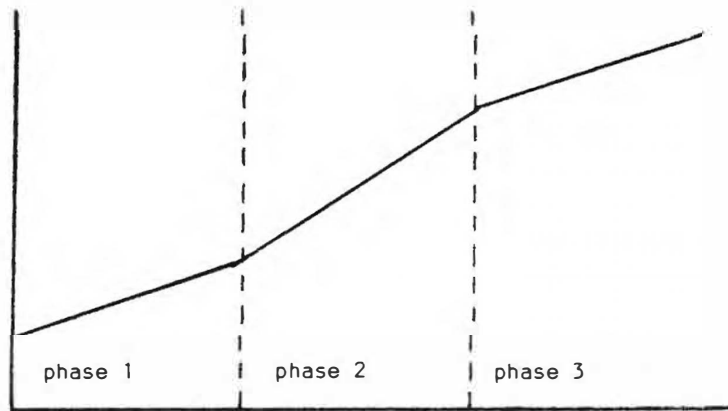
and less reliable. Another common type of comparison (Kazdin, 1976) involves looking for an increase in an already existing gradient of change. Extraneous sources of variability would in this type create even more difficulty in using visual inspection.

In this study the expected effects do relate strongly to gradient but not in the sense referred to above. Instead of involving a single change in gradient between phases, the hypothesised effects in this study would be revealed in the gradients of the several curves occurring in each phase. Thus, for example, the gradients of the curves in phase 2 might be steeper than those in phases 1 or 3. (See figure 6.) This has important implications for comparing performance during the different phases.

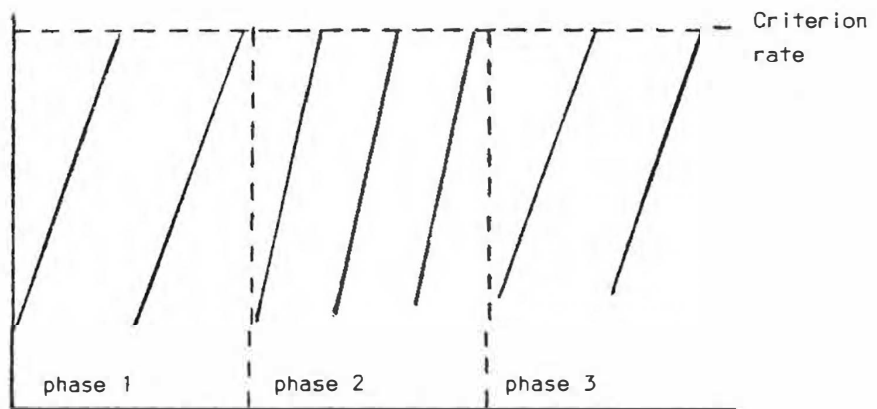
In the case of a straightforward single gradient comparison, if a change is not visually discernible then a statistical analysis may make a comparison possible by expressing the differences of gradient in numerical terms. In this study a numerical expression for gradient differences is immediately available by means of a simple count of the number of fluency progress curves in each phase. The steeper the gradient, the more rapidly will the criterion be attained and the greater the number of progress curves which will be completed.

The curve count which is obtained in this manner makes a simple direct comparison between phases possible even when within-curve extraneous variability makes it difficult to make a comparison visually. In view of this the application of statistical procedures was not felt to be strongly indicated particularly in the light of the unresolved nature of the issue of statistical analyses on single-subject research described by Kazdin (1976). (See, however, the further discussion on judging significance.)

Further consideration is given to curve shape and variability within curves in subsequent sections of this chapter. Subjects' results are displayed graphically near the commencement of this chapter. Later, when results of each individual subject are discussed, summary tables



a) Gradient change in a single curve.



b) Gradient changes in the several curves of each phase.

fig. 6 Different types of gradient change.

will be used indicating merely the number of curves per phase.

In addition, consideration is given to the extraneous variables which could have influenced the results. This discussion forms a major part of the present chapter, preceding the discussion of the results of individual subjects.

4.1.3 Judging the significance of the results

While the use of statistical methods for evaluating results would provide a mathematical statement of the probability of those results, a non-statistical approach to evaluation of results raises questions as to the basis on which the results may be judged to be significant. It has already been pointed out that in a science such as physics the magnitude and clarity of the effects (Campbell, 1963) would be the basis on which a judgement of significance would be made. It is argued, for example by Michael (1974), that it is on this basis that judgements of the significance of behaviour analysis results should be made.

The phrase "magnitude and clarity of results" is very broad and needs to be specified in terms relevant to the nature of the results being evaluated. Martin & Pear (1983) provide a number of criteria for judging the significance of the results of behaviour analysis studies. They state that greater confidence depends on the following conditions:

- (i) the greater the number of successful replications that are carried out;
- (ii) the fewer the overlapping points there are between baseline and treatment phases;
- (iii) the sooner the effect is observed following introduction of the treatment;
- (iv) the larger the effect of the treatment in comparison with baseline;
- (v) the more precisely the treatment procedures and response measures are specified;
- (vi) the more consistent the findings are with existing data and accepted theory.

The criteria of minimal overlap between the ranges of the scores of different phases, and the relative magnitude of the treatment effect compared with the baseline phase, have previously been demonstrated to be inapplicable to the results of this study. This is because

the effect of differential treatment would not be expressed in change in the magnitude or level of the individual scores. The effect would be observed instead in the rate (or gradient) with which the predetermined criterion score would be attained on successive passages. Thus the degree of significance would be sought rather in the relative number of progress curves completed in different phases. The rapidity of the appearance of effects following treatment changes is another of the criteria of Martin & Pear (1983) whose utility is limited when the curve count is the means of comparison between phases.

The number and success of replications, the precision of the specification of the procedures and measures, and the consistency of the results with previous work, are criteria which will be considered below. Apart from these broader criteria which are external to the data, in this study one must look to the curve count comparison for an indication of significance.

A curve count pattern of 3-6-3 obtained with an A-B-A design would, if borne out by the "external" criteria of significance, probably be generally acceptable as clear evidence for the greater effectiveness of treatment B. A 5-6-5 pattern, unless borne out consistently by a number of replications, would probably not. At most it could be interpreted as slight evidence for the probability that treatment B is more effective in bringing about progression towards fluency on a passage.

This tends to call into question the previously discussed decision to rely on curve count as a numerical index in the interpretation of the results. Once reference begins to be made to degrees of probability, it may legitimately be asked why a statistical procedure is not employed to specify these probabilities precisely. It must, however, be remembered that curve count was advocated specifically as a simpler means for comparing progress when irregularity in curve shape precludes straightforward visual comparison of gradients. The numerical expressions provided by either curve count or a more sophisticated statistical procedure would be mathematical functions of the

curve gradients and would facilitate their comparison. But while for this purpose curve count may be preferable, it does not express the probability that effects are not due to chance.

Ideally, therefore, some statistical determination of the probability of these effects should be made, but in fact those procedures which have been developed for single-subject designs are not suited to the results of this study. Conventional single-subject studies are concerned with the effect of the experimental treatment in changing the level or the gradient of change of performance, not with analysing a relatively large number of progress curves (ranging from eight to twenty in this study).

The comments of Hersen & Barlow (1976) on clinical significance as opposed to statistical significance are relevant though. A curve count pattern of 5-6-5 may well reveal an acceptably high level of statistical significance but its actual significance in the course of instructional practice would not be great. Therefore, in interpreting the results of the subjects in this study, the policy has been to look for clear, relatively large differences in curve count while acknowledging that the cases in which less dramatic differences appear may point to an effect worthy of further investigation.

4.1.4 The form of the graphical presentation of results

While the simplest form of graphical presentation would be to use linear scales on both axes, a variety of different forms are commonly used. Even when linear scales are used, the sizes of the units employed may facilitate or hinder the perception of relationships by visual inspection. For example, the gradients of a series of progress curves may appear to be not too different if the time scale on the X-axis is relatively compact. If this scale is expanded the difference in gradients can become more obvious to the eye.

Where strongly curvilinear relationships are present, the choice of scales other than linear scales may be indicated (Tukey, 1977). White (1984) points out that the type of chart selected for portraying data can influence the conclusions reached, and states that a chart should be selected to maximise linearity in the progress record. Because many growth or developmental processes proceed exponentially rather than linearly, progress is often expressed in a curved form when a linear chart is used. The use of a semi-log chart, with a logarithmic scale on the Y-axis, will tend to produce straight lines in these cases.

Such use of a semi-log chart will, on visual inspection, emphasise the rate of change in the initial stages when progress appears slow, and will reduce the perception of what appear to be very large differences in the later stages when progress is occurring by leaps and bounds. Where charting of results is used as a means of motivating subjects the extra emphasis given to progress in an initially difficult stage can play an important role in encouraging subjects to persist in their efforts.

Apart from representing these types of results in a linear form, a logarithmic scale on the Y-axis has the effect of smoothing out jaggedness in later stages of progress, resulting from irrelevant sources of variation.

Because the progress displayed in the results of the subjects in this study displayed a strong tendency to linearity, linear scales were employed. The reasons for this linearity of progress are discussed in a subsequent section of this chapter, as will be the relative smoothness of the curves produced in this study and the motivational aspects of charting on the subjects. The use of curve-count as an index of phase differences is also relevant to the choice of a simple linear charting procedure and this too will be dealt with below.

4.1.5 Procedures adopted in charting the results

The results obtained with each subject are displayed below in graphical form. In these graphs rates scored in words per minute are shown for the initial readings on successive days in each phase. The tabulated scores, including accuracy scores, are presented in an appendix. For ease of comparison between phases, the three phases' results for each subject are presented below each other. The criterion rate for transfer to new passages is indicated by a horizontal dotted line at the appropriate rate.

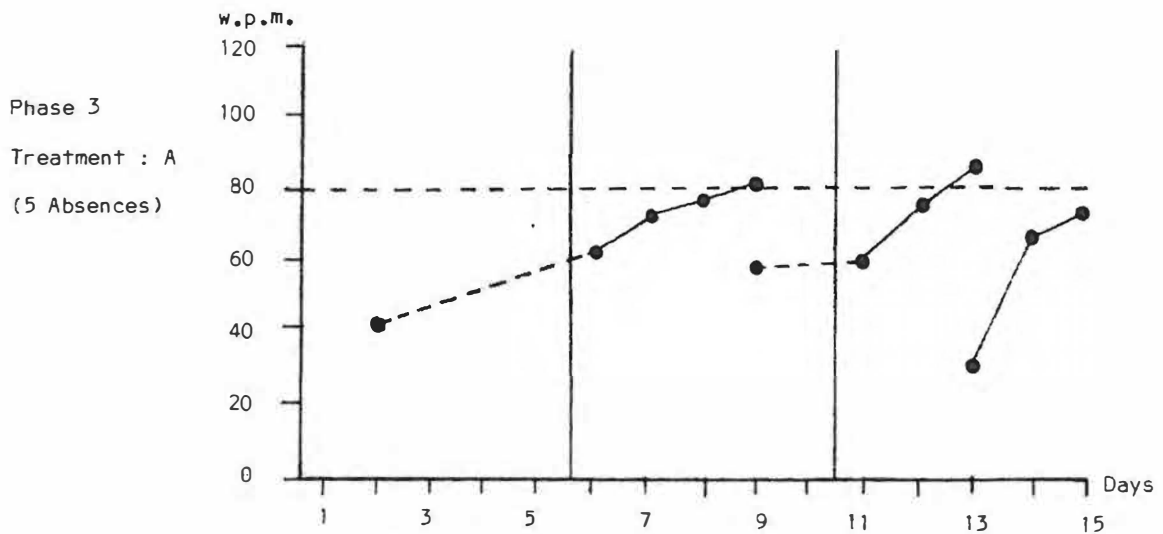
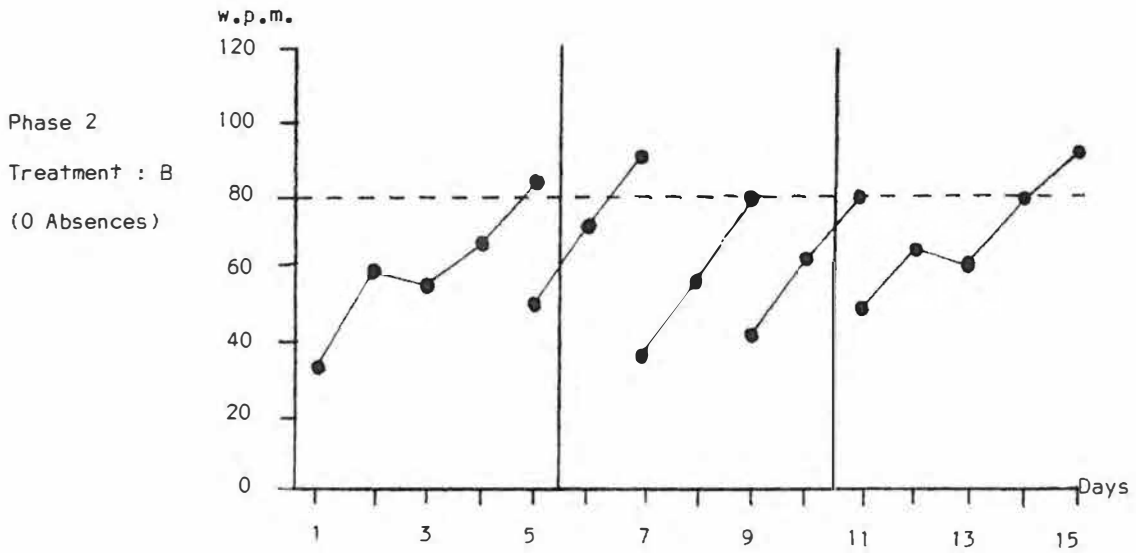
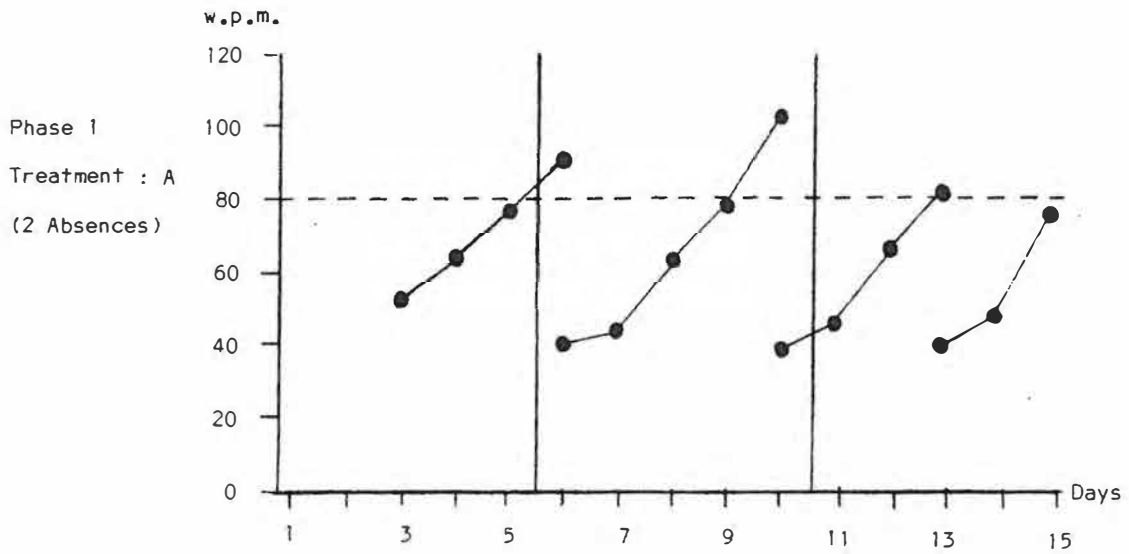
Because of the minimal tendency to a drop off in rates after weekends (dealt with in more detail later) the X-axis for each phase contains fifteen successive measurement points, representing only the school days for the three week period. Although weekends are not taken into account in this scale, their position is indicated between Friday and Monday sessions by an unbroken vertical line.

This procedure has not been adopted in respect of days when subjects were absent from school. This was done in order that the standard form of the graphs might be maintained in all phases and across subjects. Where such absences have occurred this is indicated by dotted lines in the affected section of the progress curve. In interpreting the graphs it should be borne in mind that in these places the curve gradient should be steeper, as it would be if the absent day's point had been omitted from the X-axis. This also means that the affected curves are slightly more extended than is warranted by the subjects' actual progress. In order to help the reader to make allowance for absences, the number of days absent is indicated next to the graph for each phase.

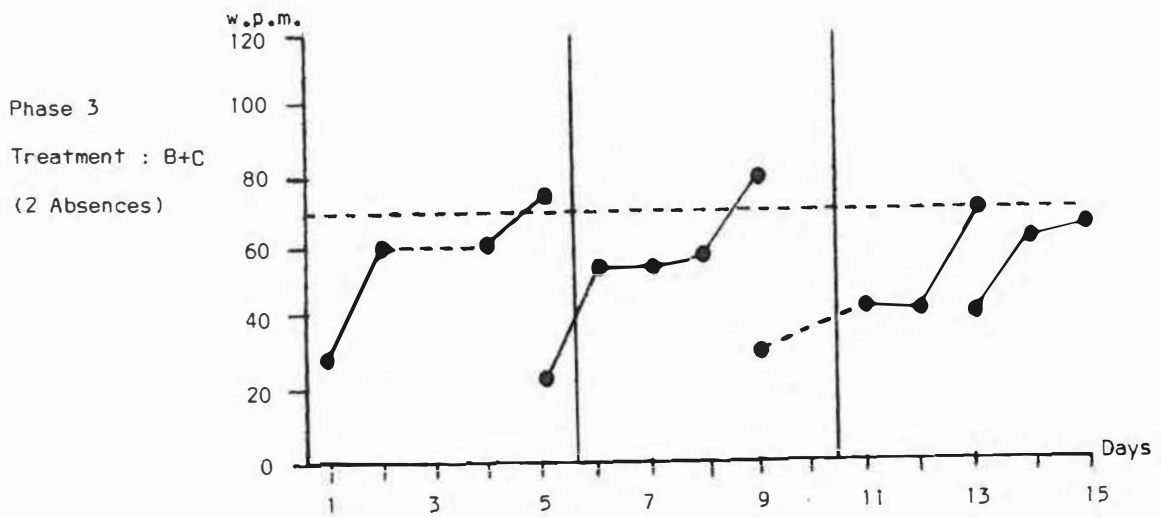
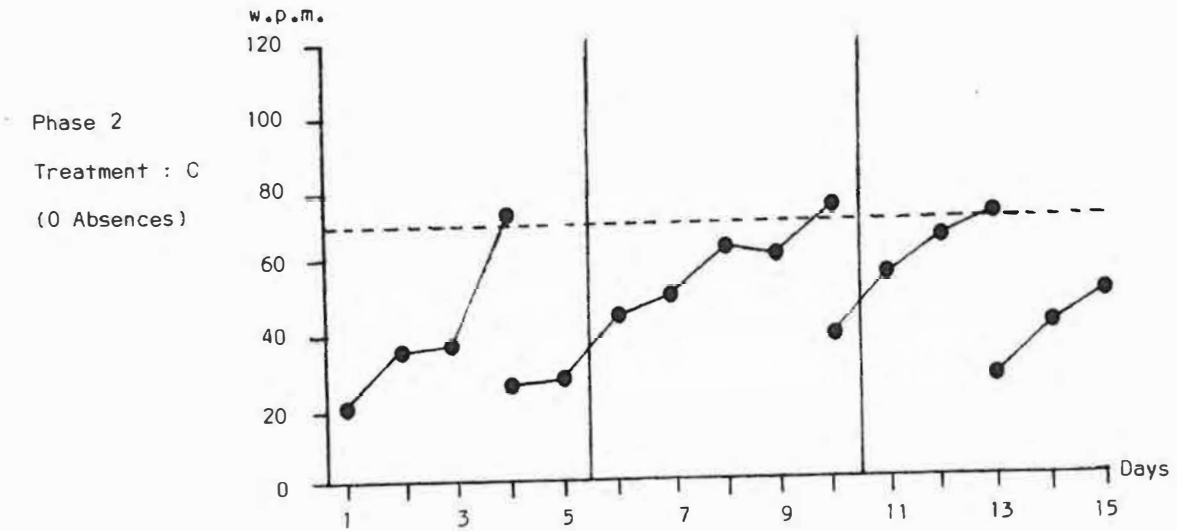
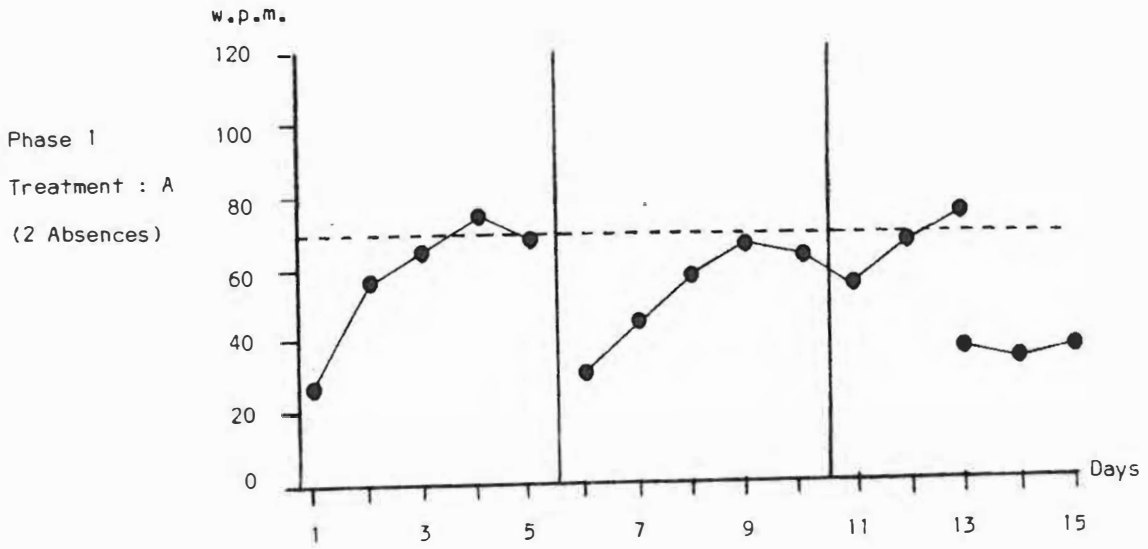
It will be noted that when a subject attained the criterion rate for a passage the practice readings were omitted and instead a new passage was begun immediately. On these days, therefore, two scores are plotted. As this policy was only decided on in the course of the first week of the first term's work, an interval appears in the

results of a few subjects between the final score of the first passage and the initial score of the second passage. In these cases an extra day's absence has been registered for the first phase. This also applies in the case of subject 2 with whom extra practice on the first passage was conducted before it was decided to drop the criterion to 70 w.p.m. in his case.

In the section of this chapter which follows these results, attention is given to aspects of the results such as the shape of the curves in the charts and the strong trend to increasing fluency across phases in the results of some subjects, as well as the effects of treatment characteristics such as treatment sequence, passage length and passage difficulty on the results. After these general issues have been dealt with, the results of each subject are discussed in the light of these factors and of the hypotheses of this study.

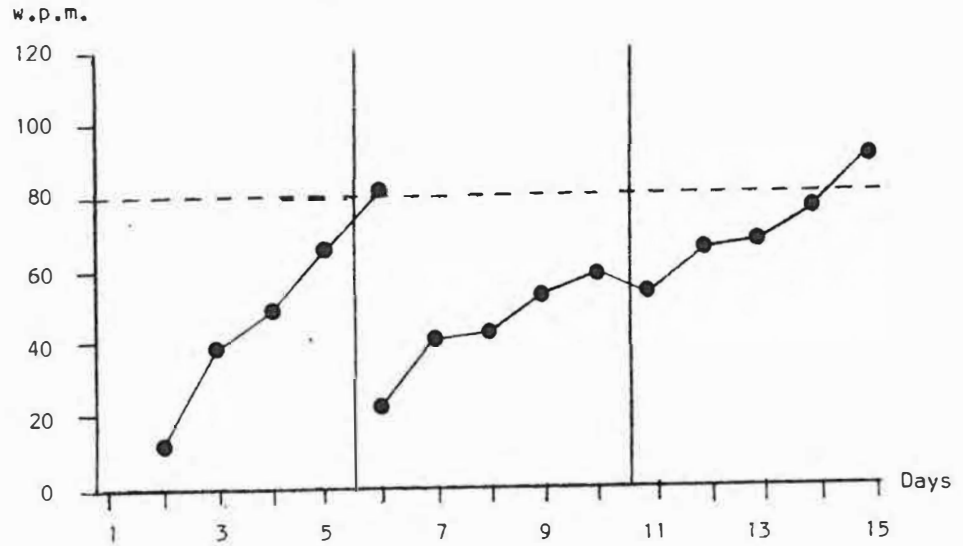


Subject 1. Treatment A - B - A.

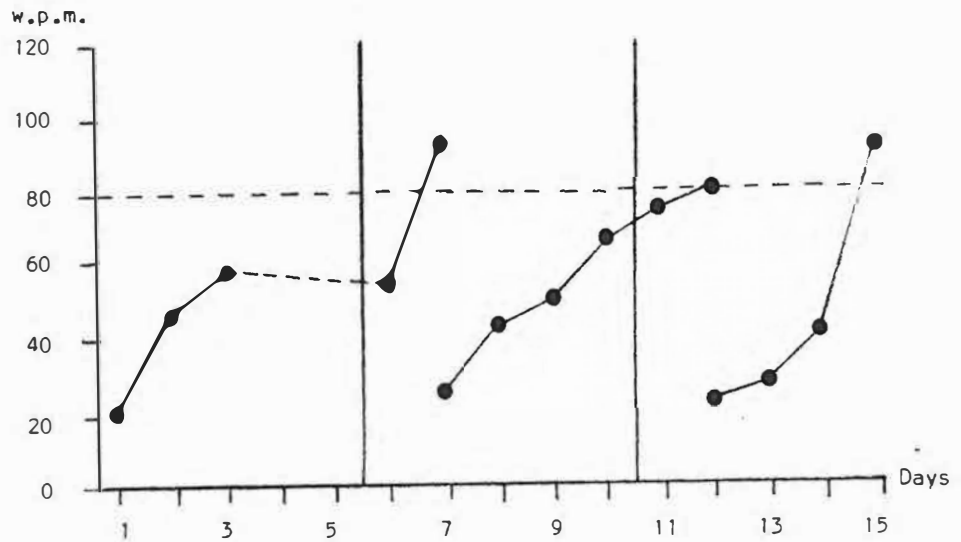


Subject 2. Treatment A - C - B+C.

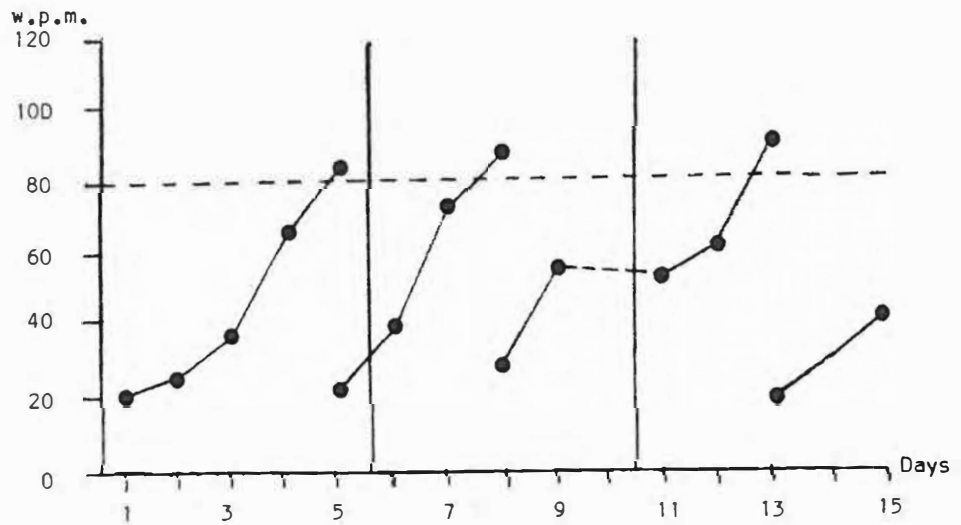
Phase 1
Treatment : A+
(1 Absence)



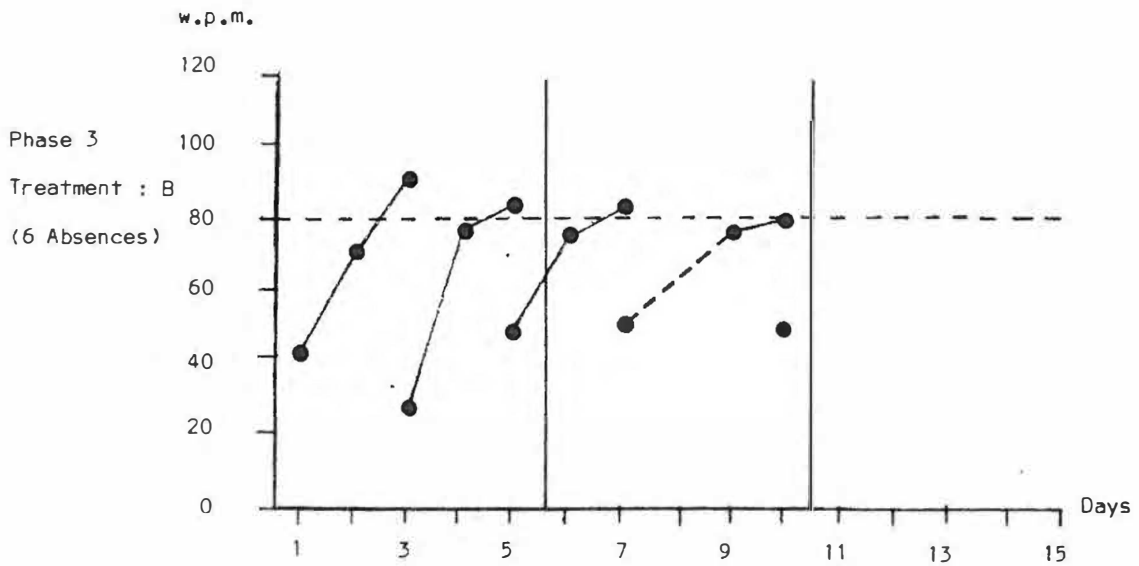
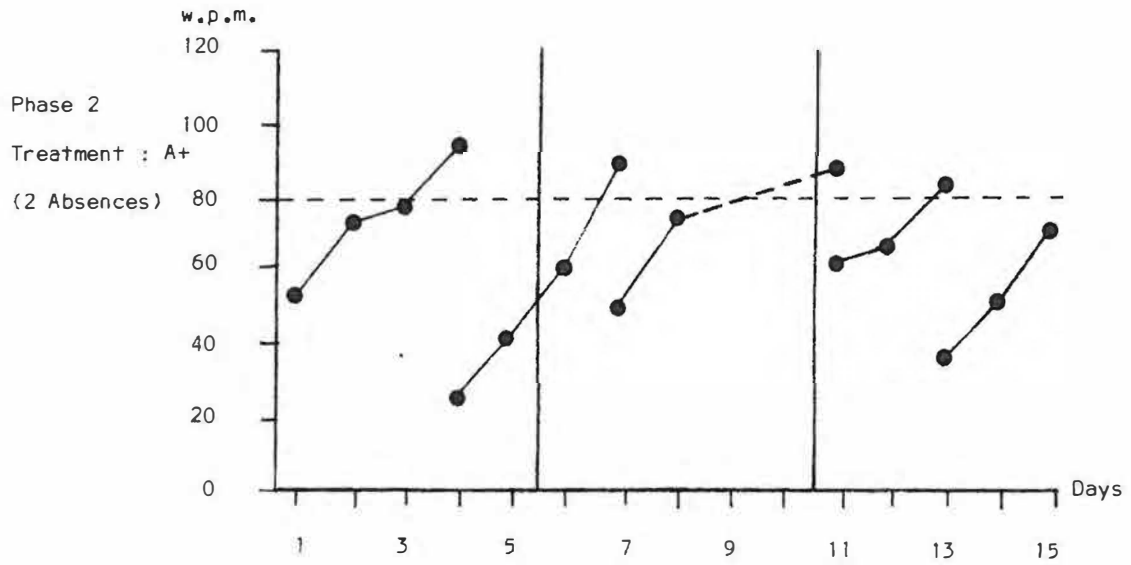
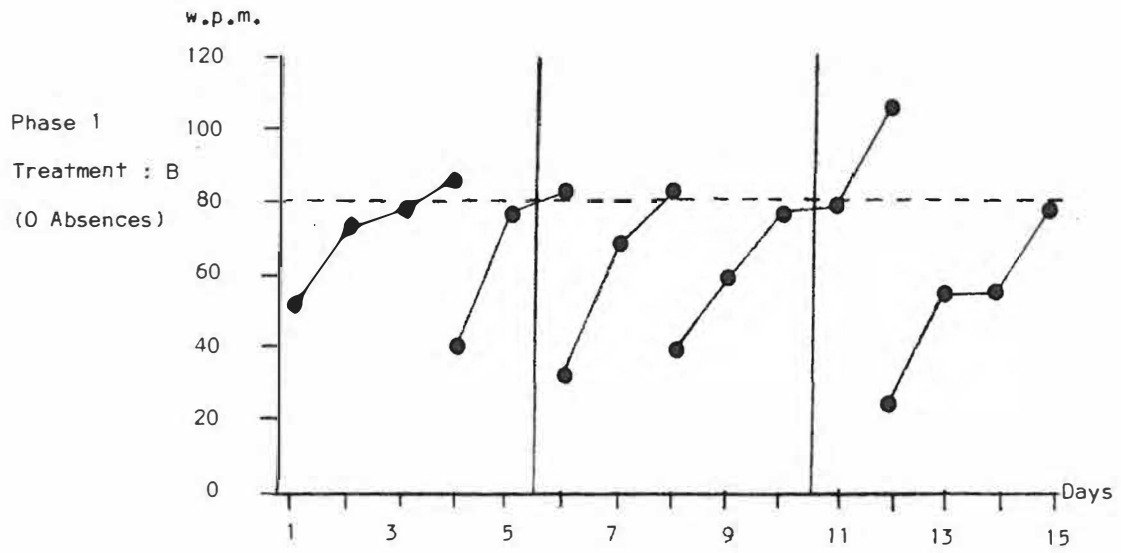
Phase 2
Treatment : B
(2 Absences)



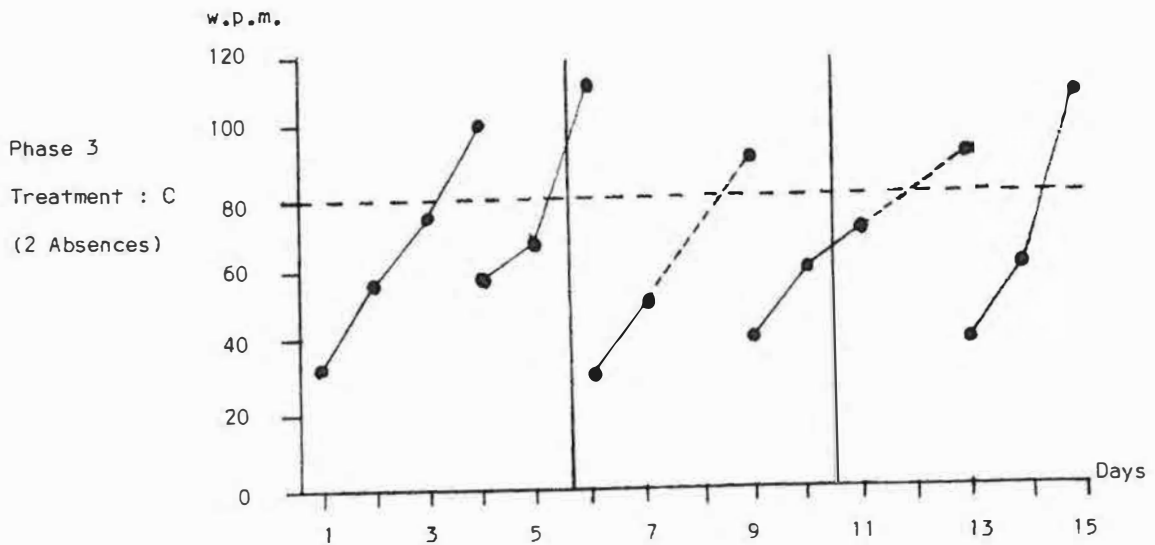
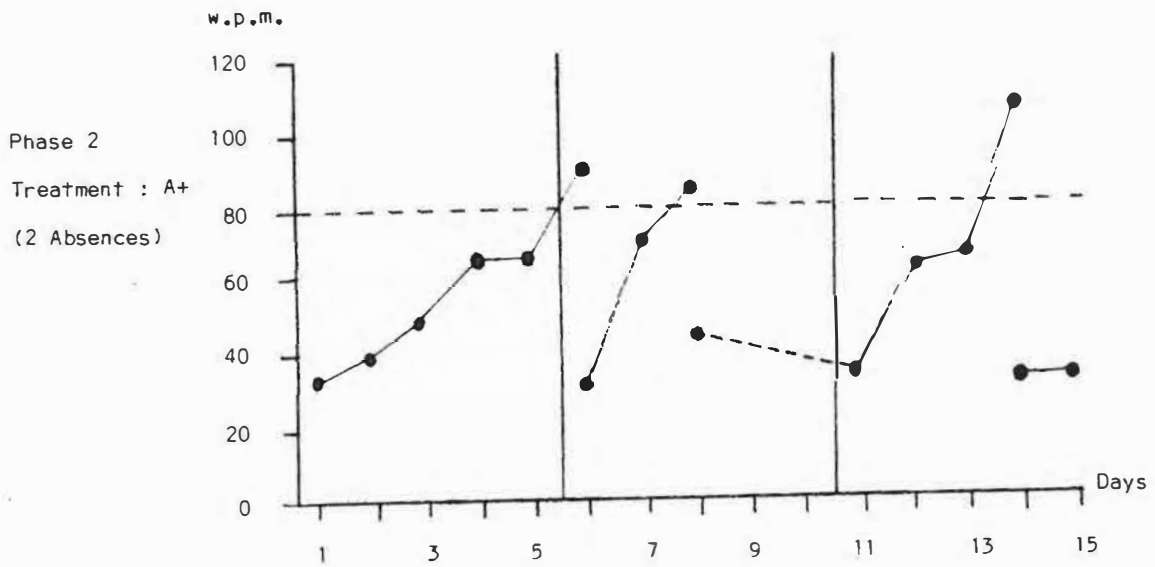
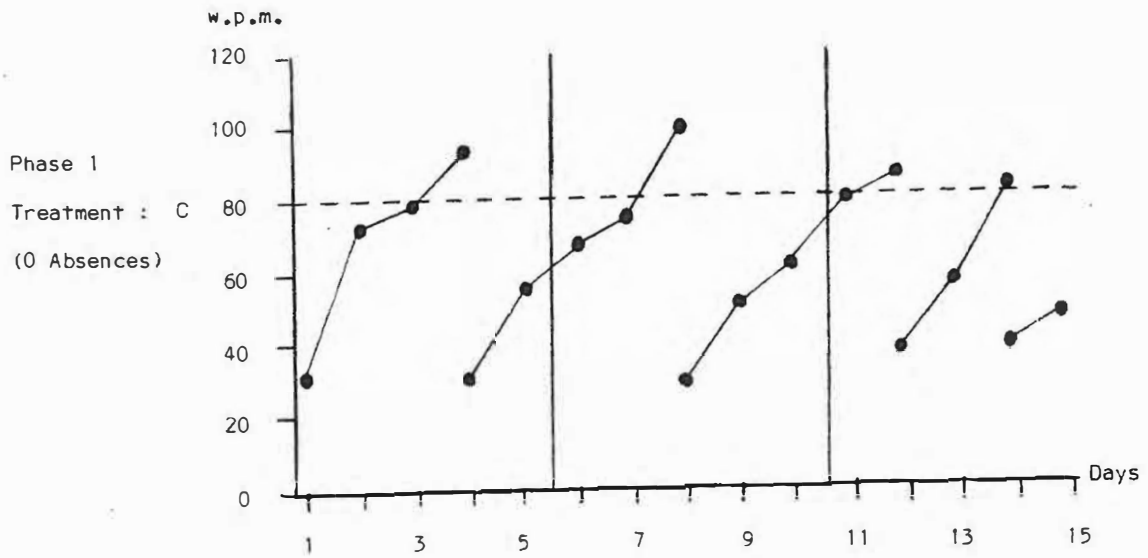
Phase 3
Treatment : A+
(1 Absence)



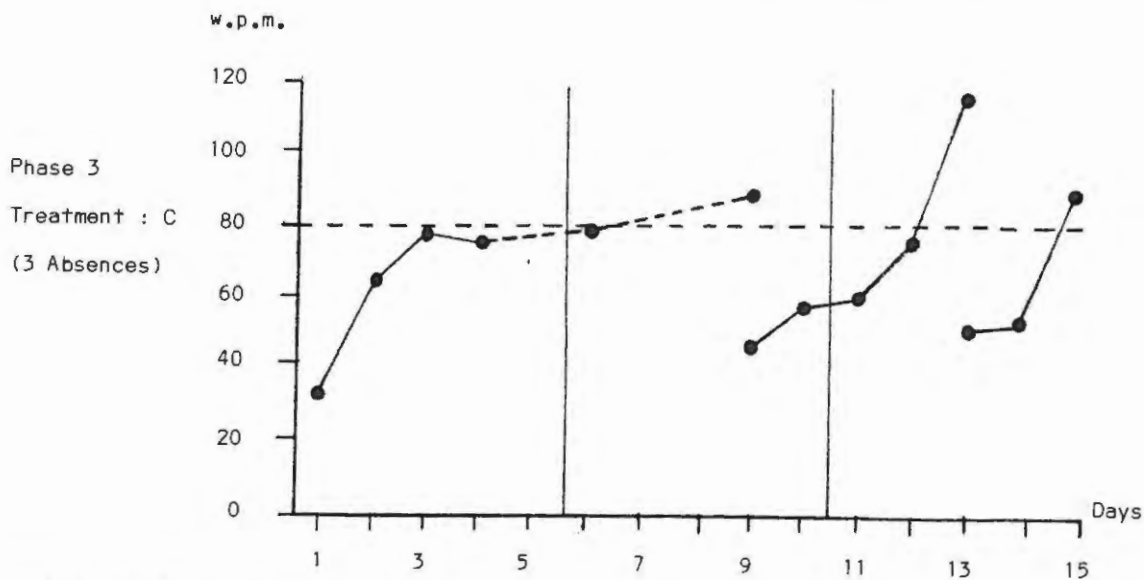
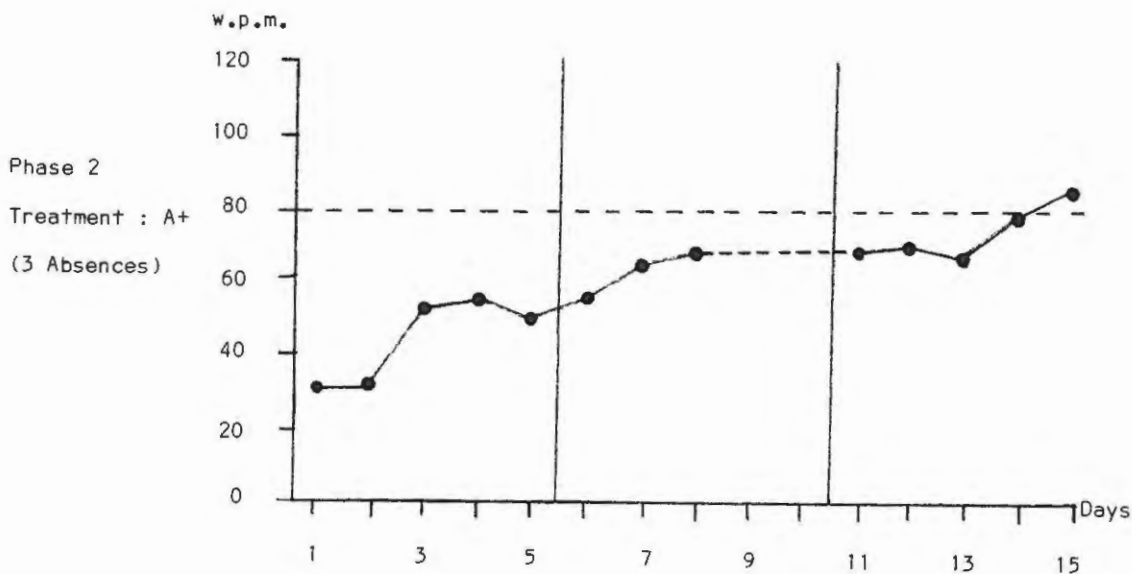
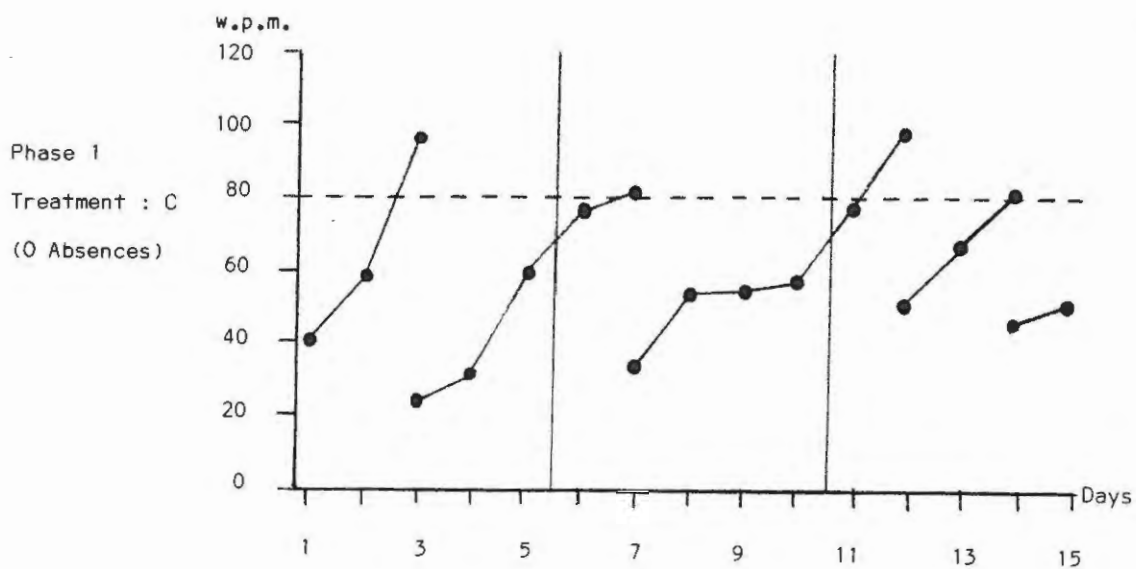
Subject 3a. Treatment A+ - B - A+



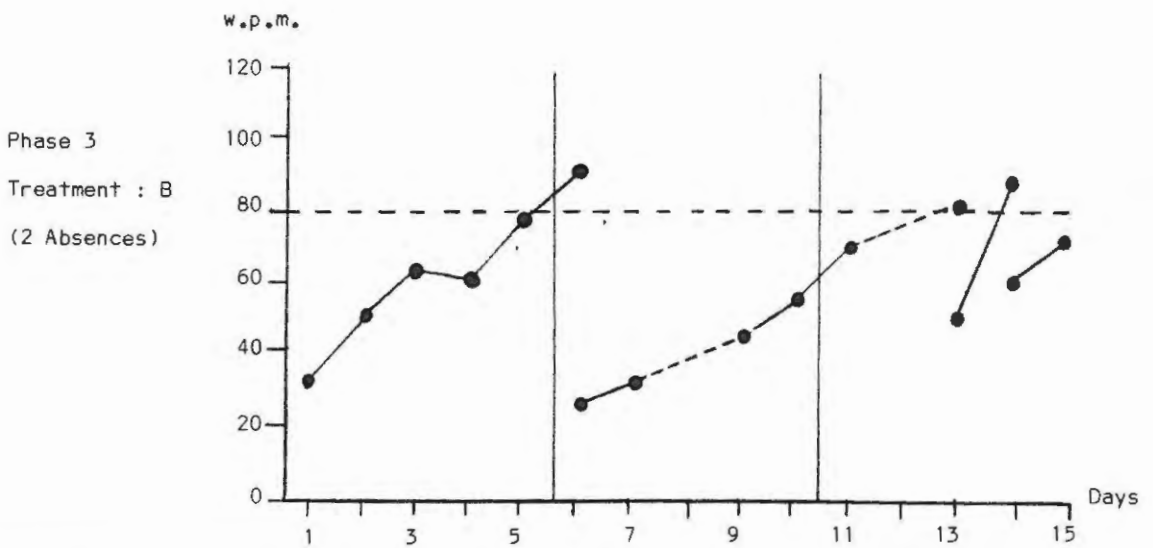
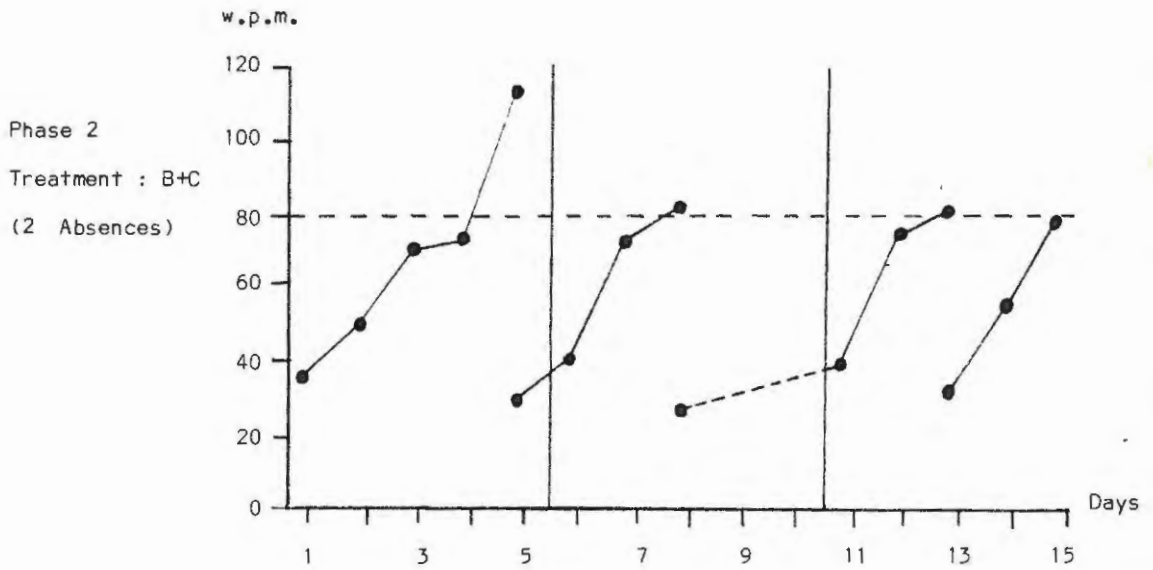
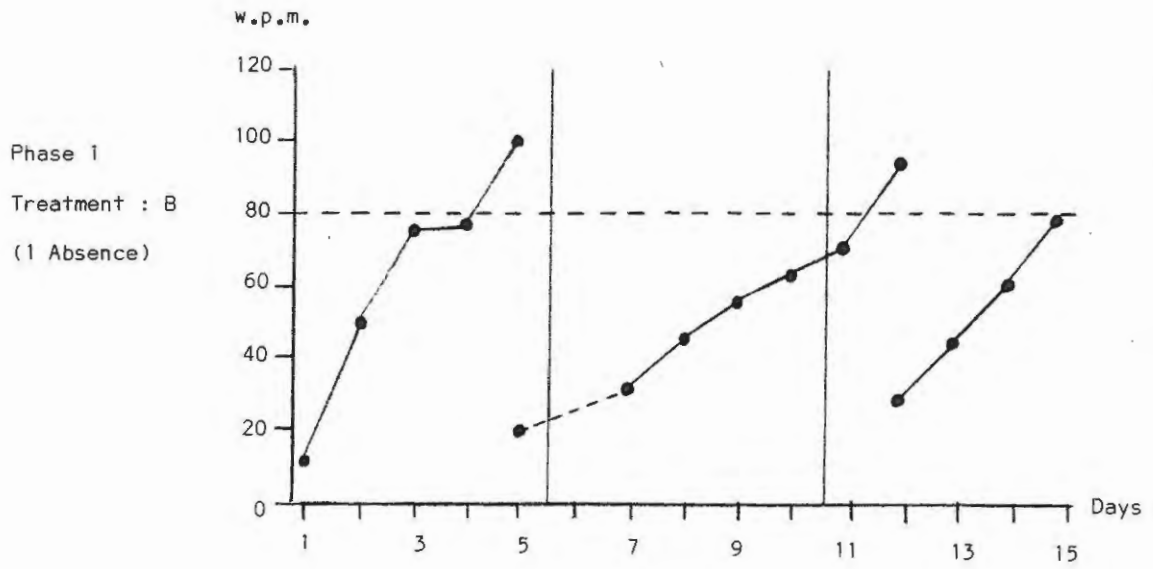
Subject 3b. Treatment B - A+ - B.



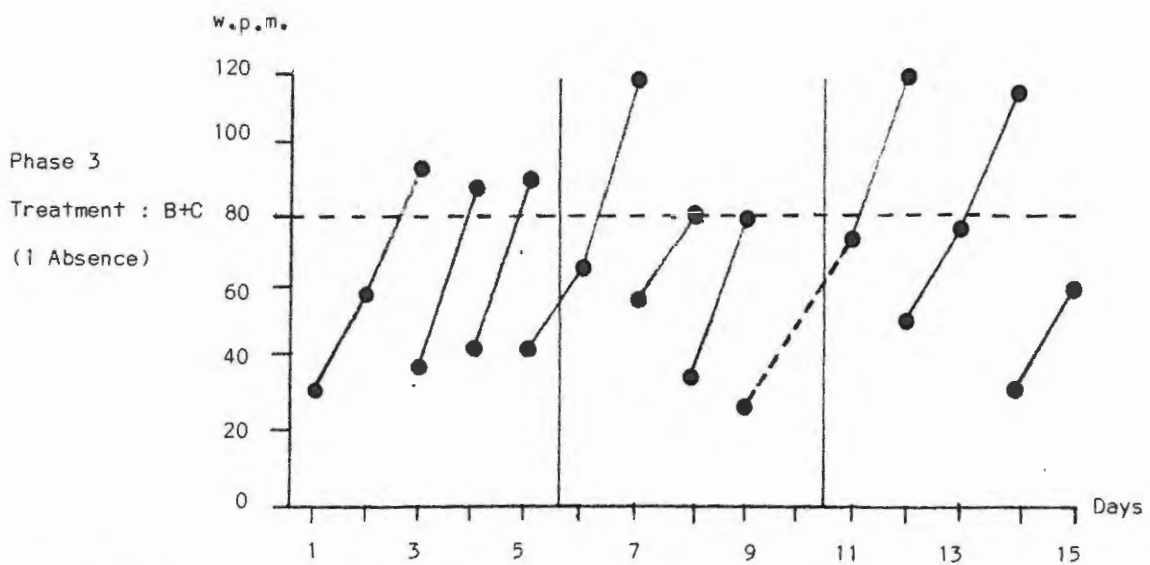
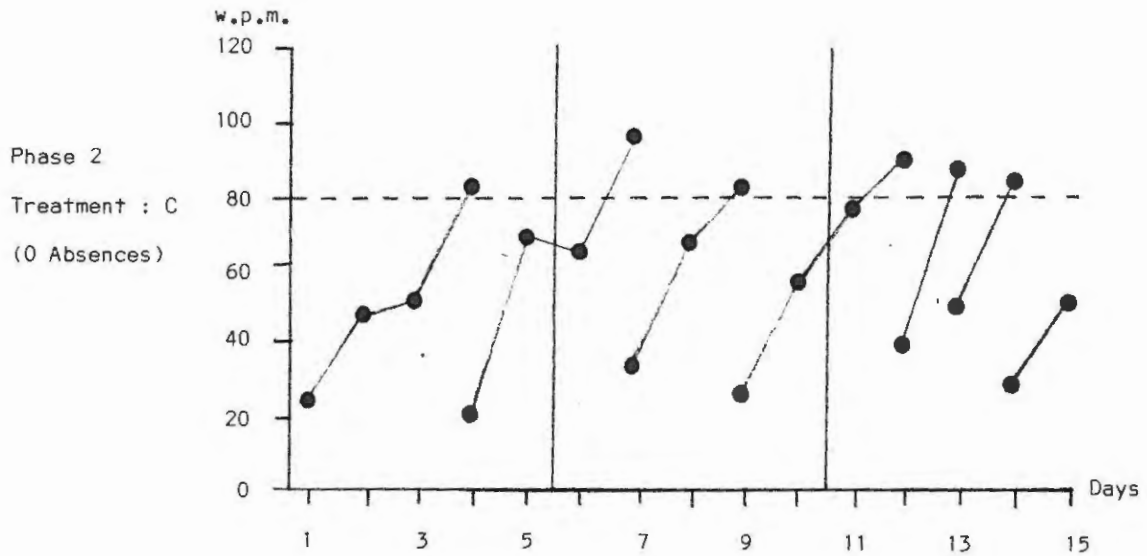
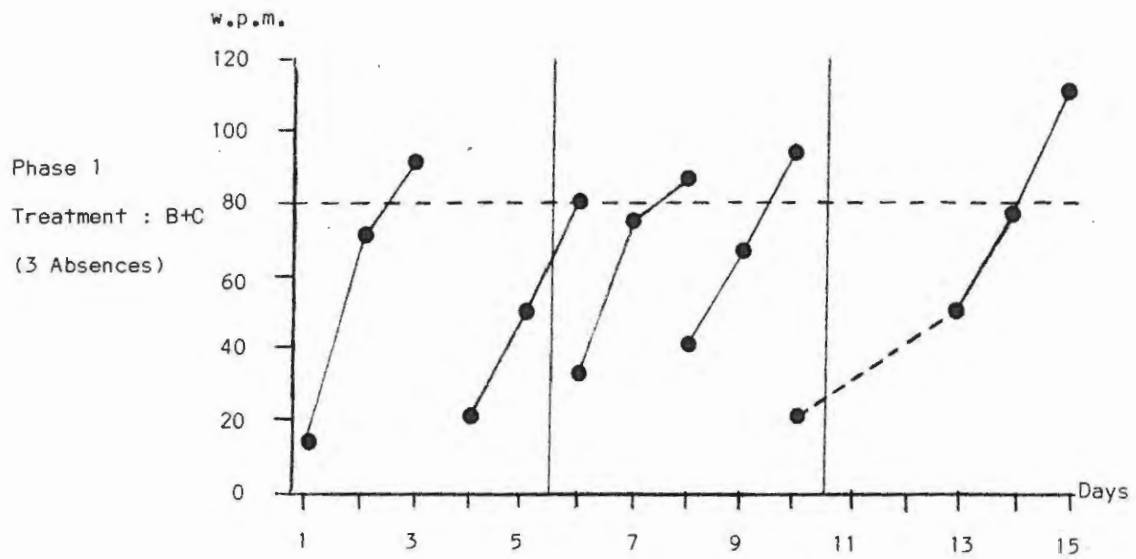
Subject 4a. Treatment C - A+ - C.



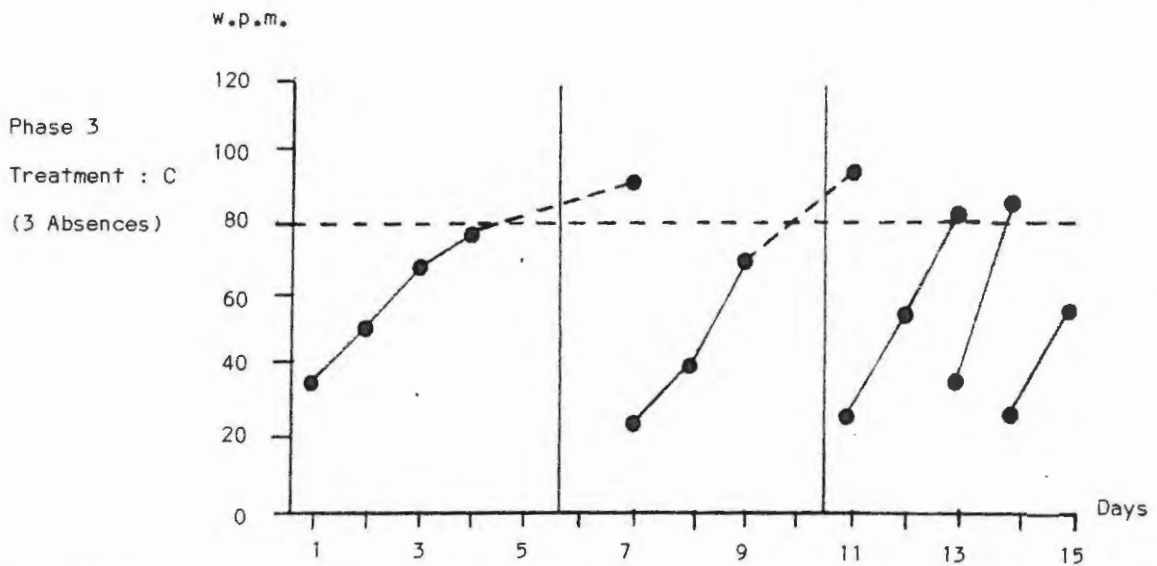
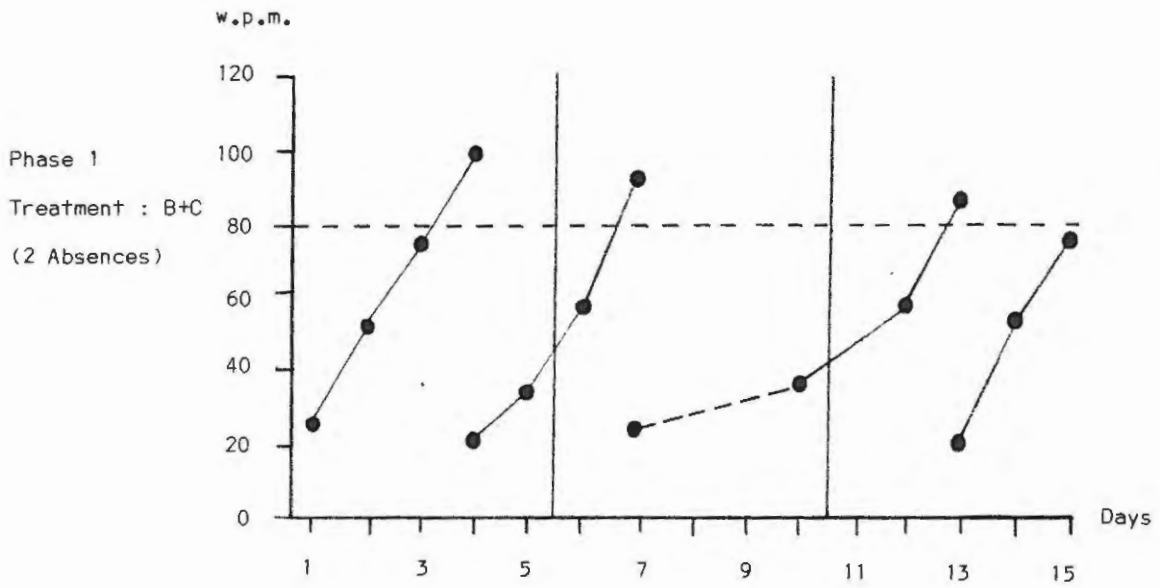
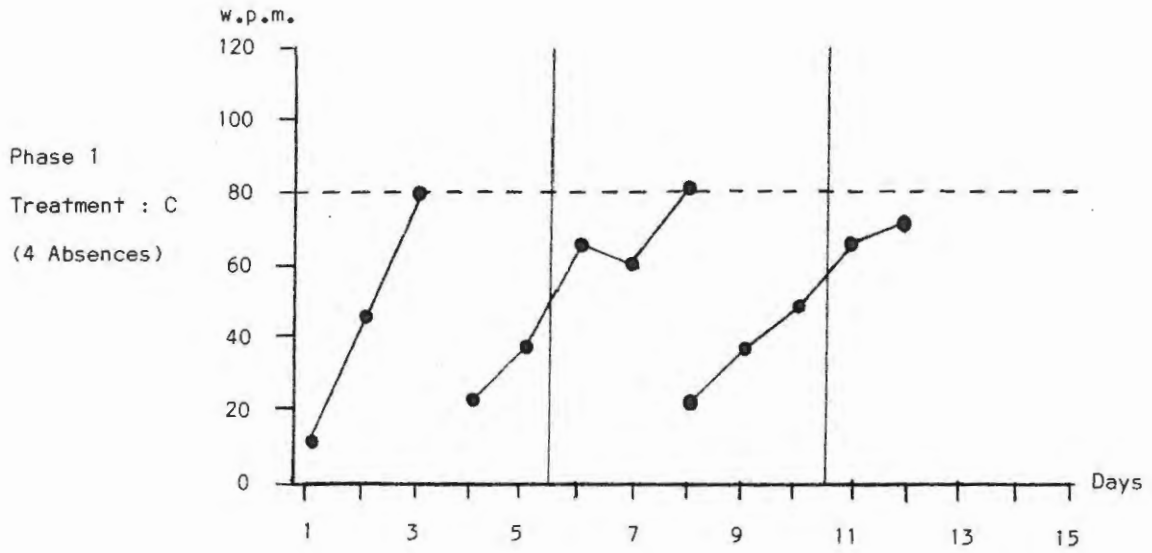
Subject 4b. Treatment C - A+ - C.



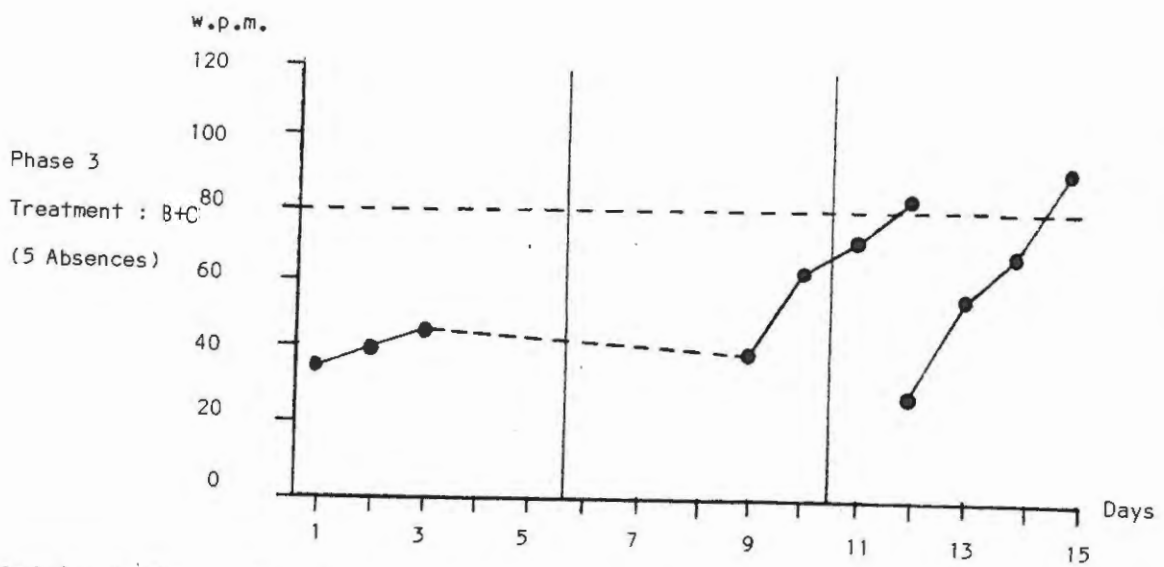
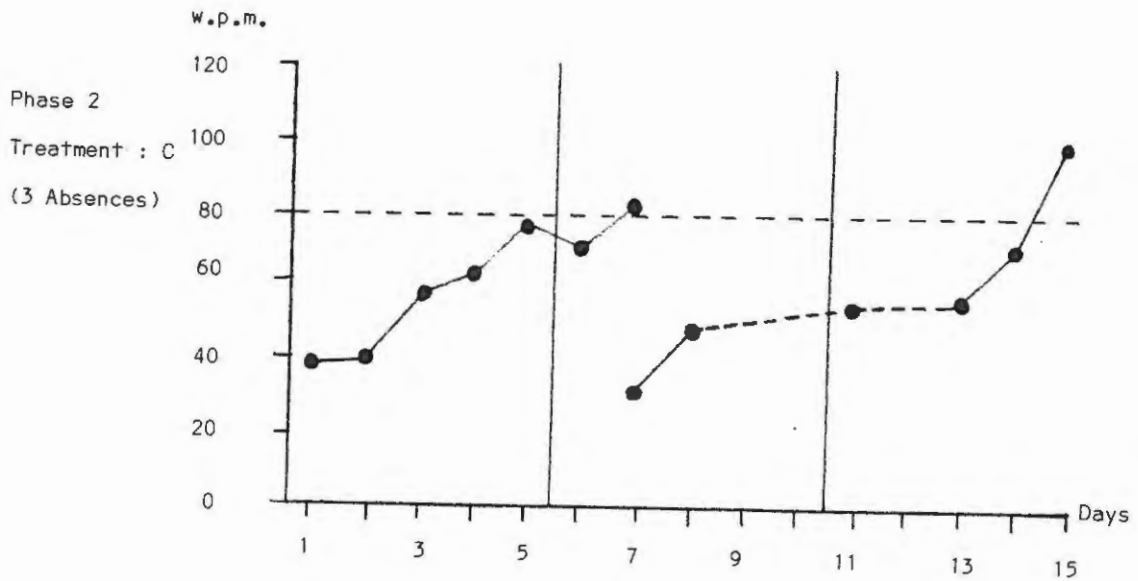
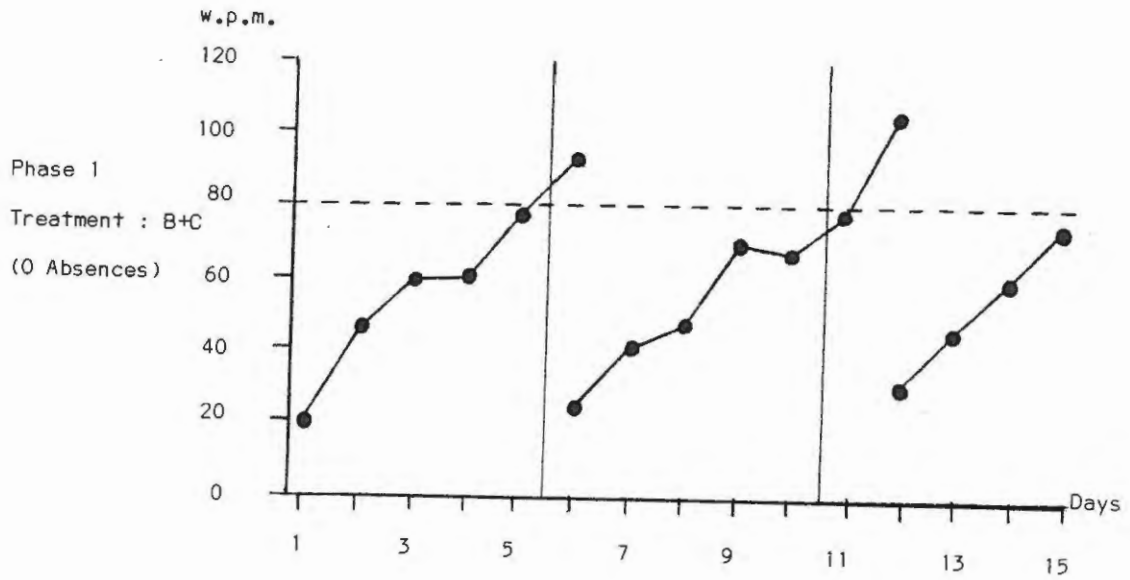
Subject 5. Treatment B - B+C - B.



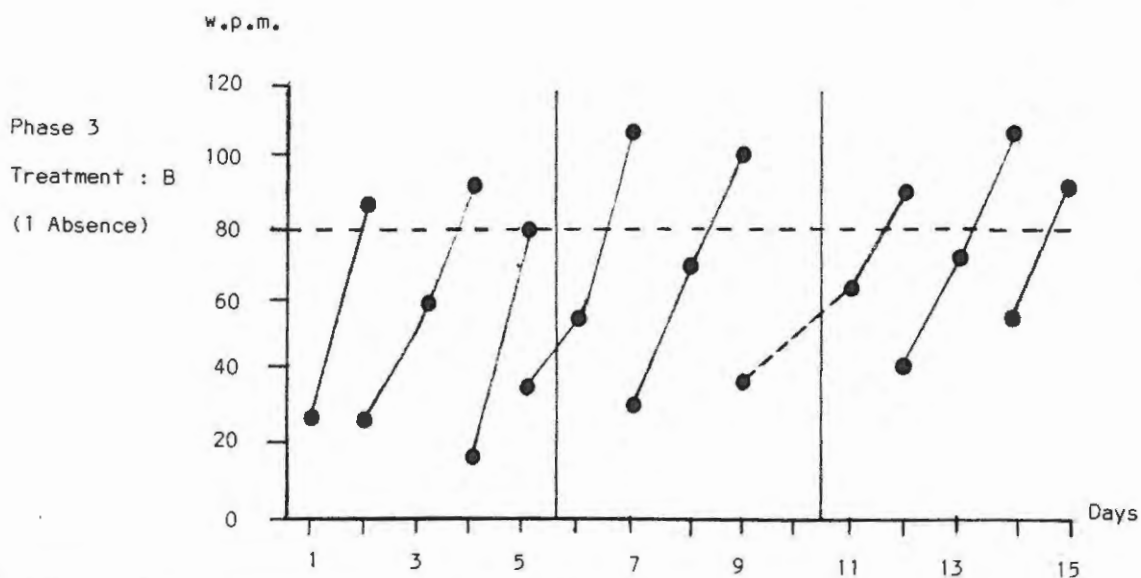
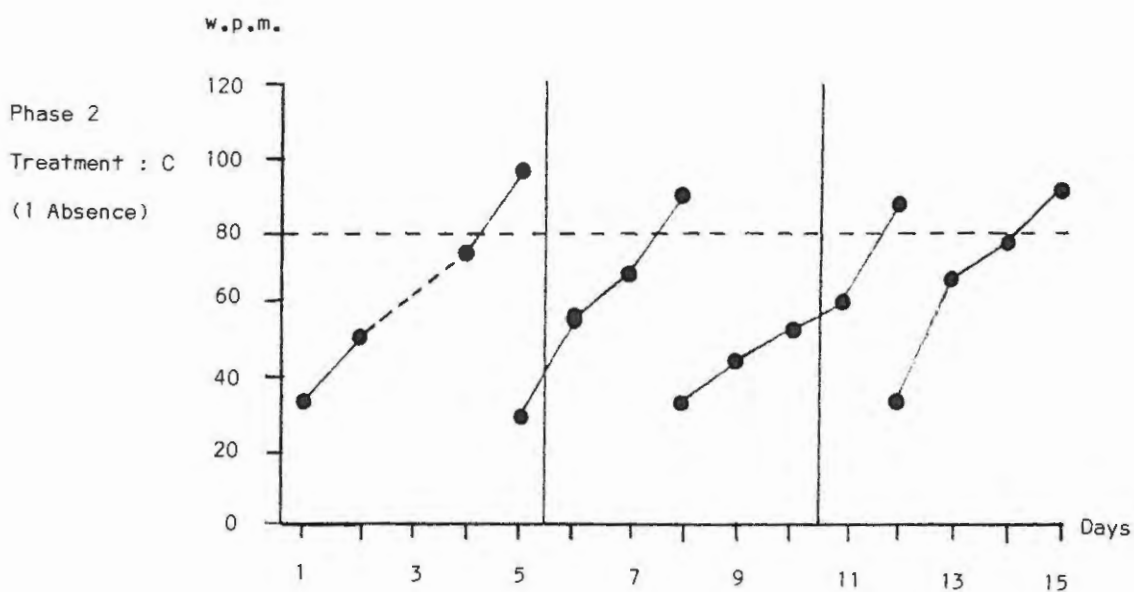
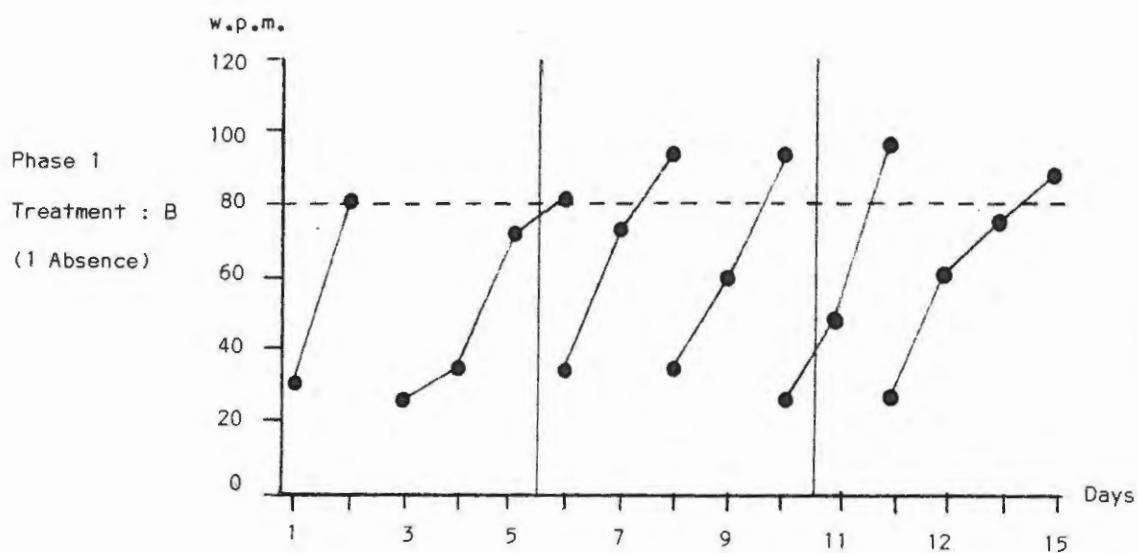
Subject 6a. Treatment B+C - B - B+C.



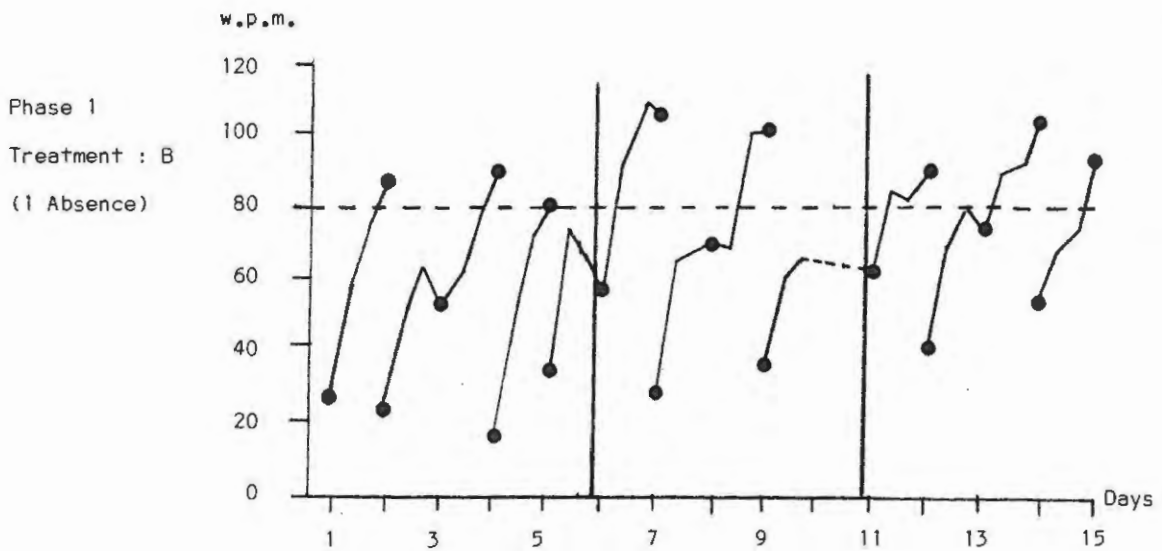
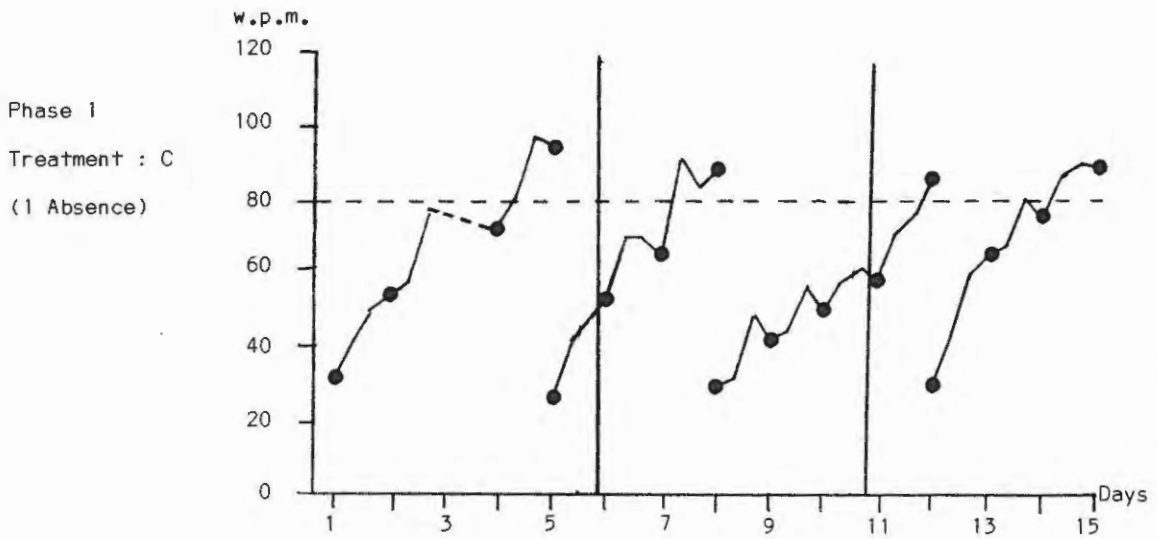
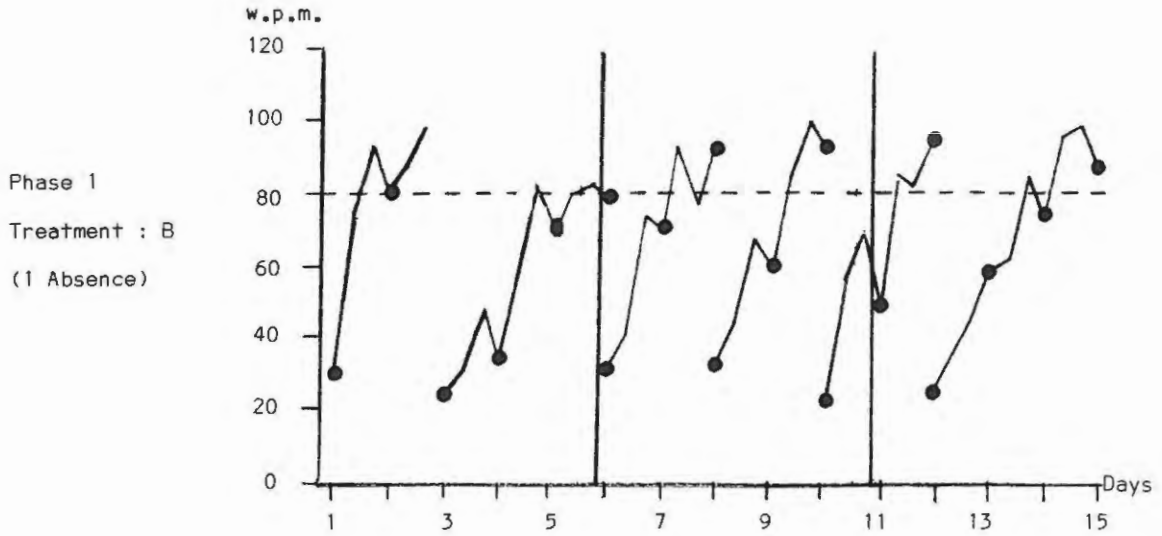
Subject 6b. Treatment C - B+C - C.



Subject 6c. Treatment B+C - C - B+C.



Subject 7. Treatment B - C - B.



Subject 7. Scores for 3 readings daily.

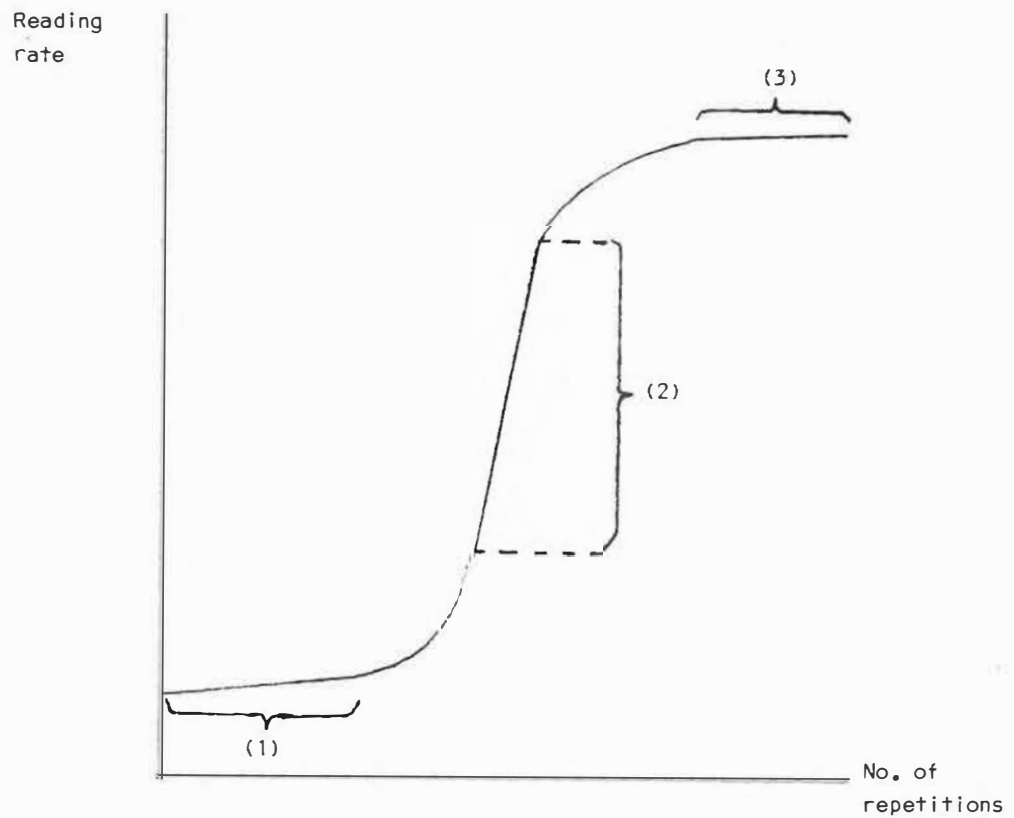
4.2 GENERAL ISSUES IN THE INTERPRETATION OF THE RESULTS

4.2.1 Curve shape in the graphically presented data

Some variation in curve shape is apparent in the charted data of the subjects but there is, overall, a tendency to a straight line form. It is important, in this regard, to recognise that the progress curves for subjects' performances on the practice passages are subject to the constraints of the parameters inherent in the instructional approach. In particular these curves fall within cut-off points determined by difficulty-level of the passage (at the lower end) and by the criteria for progress to a new passage (at the upper end).

A general curve for progress in fluency on repeated readings of a passage can be envisaged. This would be an S-shaped curve approximating to an exponential form in its lower section and a logarithmic form in its upper section. (See Fig. 7.) The exponential section would only be expressed in practice if a subject was required to read a passage rather more difficult than the level which would normally be regarded as his instructional level. Under these circumstances initial progress would be likely to be very slow. As the passage was read repeatedly the subject would become increasingly familiar with the letter patterns and words of the passage, and increasingly fuller schemata would be elicited. This would result in a stage being reached in which progress "takes-off" so that substantial progress in reading rate would be made with each repetition. This stage would be represented by the middle section of the curve, which would approach a straight line in shape.

If progress in rate was not limited by a criterion for transfer to a new passage, rate could be expected to increase until at some stage a flattening off would occur. The characteristic logarithmic form would be assumed by the curve as the ceiling of the subject's processing ability was approached. Where oral reading is required articulation would be the most likely limiting factor on rate.



- (1) Exponential section of the curve: slow initial progress on a difficult and unfamiliar passage.
- (2) Section of the curve within which the results of this study are intended to fall.
- (3) Logarithmic section of the curve: decelerating final progress as the rate ceiling is attained.

fig. 7 Theoretical S-curve for progress in reading rate on one passage.

The progress curves obtained in this study generally approximate the straight middle portion of this theoretical curve. Slight indications of exponential and logarithmic forms are present. In phase 2 of subject 3a tendencies to logarithmic and exponential forms respectively appear in consecutive curves. In phase 1 of subject 2 a more easily interpretable appearance of the logarithmic form occurred as the subject apparently neared his ceiling rate. This was particularly evident in informal observation of the subject while reading, and it was decided to reduce the criterion rate of 70 w.p.m. in his case.

The provision of supplementary activities, in the B, C and B+C, and to a lesser extent, A+, treatments, would have had the effect of helping to lift subjects' performances into the straight line section of the progress curve. In fact, as a matter of deliberate policy, weaker subjects were, where possible, not exposed to A or A+ treatments. The purpose in this was to avoid the discouragement which would be evoked in poor readers by requiring them to struggle through numerous repetitions before anything approaching fluency could be attained. The lowering of the criterion in the case of subject 2 was similarly aimed at avoiding an extended laborious effort, by the subject, to increase rate at the other end of the progress curve. These measures in effect constituted an attempt to restrict reading practice to the middle section of the progress curve by excluding the flatter end sections.

Where charting of results is used as a major source of motivation for the subject (as in this study) the use of semilog charts provides a means of giving due recognition to the difficulty in making initial progress on the exponential section of the theoretical curve. The logarithmic scale on the Y-axis expands the distance between measurement points on the initial section of the progress curve. While the perception of progress which this procedure affords suits other learning processes, and while it can have utility in reading instruction, certain difficulties in using this approach with weaker readers were apparent in this study. This extrinsic source of motivation would not

have been adequate to compensate for the discouragement resulting from prolonged efforts to read at a level of difficulty which reduces the act of reading to a grim struggle with a meaningless morass of print.

Nevertheless there are other problems which need to be guarded against if reading practice is to be restricted mainly to the straight portion of the theoretical curve. This is particularly apparent in the third phase of subject 6a where on some passages the criterion was attained on the first reading of the day immediately after commencement on the passage. In the instructional situation this would necessitate maintaining a careful balance between passage difficulty, passage length and criterion rate, in order not only to avoid discouragement but also to provide sufficient challenge to make the instructional experience worthwhile.

For the purposes of the present study, however, the forms of the progress curves for the passages which were read were not vital to the evaluation of the hypotheses. While the gradients of progress do reflect on important instructional issues, such as the choice of difficulty levels and criteria for progress, it is the relative number of passages completed in each phase which is of greatest importance in this study. For example, the B-C-B phase pattern followed with subject 7 produced a drop from six passages completed in phase 1 to four in phase 2, and a rise to eight in phase 3. Thus support is provided for the hypothesis that treatment B results in a more rapid progress to fluency on individual passages than does treatment C. This conclusion requires no reference to the shape of the curves.

Although curve shape is relevant to the management of the treatment, particularly as regards the choice of passage difficulty levels and criterion rates, the curve counts of the different phases provided an adequate basis for conclusions to be drawn.

4.2.2 The effect of the spacing of sessions

It is possible to space the readings of the MRR in various ways. Samuels (1979) appears to have adopted a massed approach such as might be suitable for intensive full-time remedial reading instruction in a clinic setting. In the normal school context short daily periods of instruction over a span of several weeks would probably be preferred from the administrative point of view. This is the approach advocated by Heckelman (1966) for the use of the NIM. Heckelman quotes fifteen minutes as the length of a session. A teacher in a regular classroom could conceivably devote a few minutes daily to each of the weakest members of the class.

While a single reading daily would probably be too diffuse for practice purposes, three readings would probably still be possible in the regular classroom setting. In this procedure, adopted in the present study, after every third reading a break of 24 hours (or 72 hours in the case of weekends) intervenes. Commonsense would suggest that there would be a greater tendency to a fall-off in scores after these breaks than might occur by chance between the readings of any particular day.

In analysing the scores of each subject the second and third readings of each day have been regarded merely as practice sessions. A major reason for this was that the supplementary activities of treatments A+, B, C and B+C were carried out after the first reading each day. It was felt that transient immediate effects might influence scores on the second and third readings. In contrast, Samuels (1979), who used a straightforward MRR procedure without supplementary activities, includes every repetition in his graphical presentation of the results.

Inspection of the charted initial daily scores reveals some instances of fall-off between days, but to a minimal extent in most subjects and not at all in subjects 3b and 7. A perusal of the charted results of subject 7, including all three daily readings, reveals an

equal or greater fall-off within daily sessions than is evident between initial daily readings of any subject. The relative lack of a tendency to fall-off between initial readings of daily sessions is evident in the whole group of subjects even where weekends intervene.

The fall-off effect is entirely absent in the sample chart presented by Samuels (1979). This accords with the minimal fall-off noted in the results of this study. In the chart of subject 7, displaying the practice readings, the fall-off effect is noteworthy only between the last practice of each day and the first of the following days. As already mentioned this is probably accounted for by transient effects of the supplementary activities. Apart from this, fall-off between readings was not greatly affected, compared with Samuels' results, by the more extended spacing of sessions.

4.2.3 The effect of increasing reading ability on the interpretation of results

In chapter two, two possible effects of the MRR on the results were described. Both of these are evident in the results of Samuels (1979). Firstly a successive rise in the starting rate on each new passage would be expected. This is in fact crucial to the value of the MRR as a means of remedial instruction, but was not directly relevant to the hypotheses of the present study. The second effect lies in the attainment of the criterion rate on each successive passage which is read. As demonstrated by Samuels (1979), criterion attainment should occur increasingly rapidly as reading ability improves under the influence of the MRR.

A major premise of this study was that, apart from the effect of improved reading ability on criterion-attainment, criterion-attainment would vary across phases in which different forms of MRR treatment (A, A+, B, C or B+C) were provided. Thus, for example, in moving from an A phase to a C phase and then back to another A phase, an improvement in criterion-attainment would be expected on comparing the first and second phases. In the third phase a reversion would be expected. This reversion would be unlikely to be total because of the expected improvement in reading ability. This type of pattern is present, although not strongly, in the results of subject 1, for example.

Where the more effective treatment is provided in the first and third phases a drop in the rapidity of criterion-attainment would be expected in phase two and a reversion to more rapid attainment in the third phase. This can be clearly seen in the results of subject 7.

In the results of some subjects, for example subjects 3a, 3b, 6a and 6b, there is however an overriding trend to improvement in criterion-attainment across the three phases irrespective of the forms of treatment provided. This can be attributed to increased fluency of reading performance developing over the experimental period. This

could have originated from two sources, neither of which were expected to have a strong effect under the conditions of the present study.

Firstly, general reading development, outside of the experimental programme, could have obscured the effects of experimental variations by producing a continuous improvement in criterion-attainment. While this is certainly possible, against it must be set the facts that the subjects were the weakest, that is, the slowest progressing individuals in their class groups, and the time span involved was only nine weeks. A second possible explanation is that the effectiveness of the MRR was such that a strong cumulative effect on reading ability occurred. In view of the small amount of reading practice provided (most subjects read only one fifty-word passage three times, amounting to only a few minutes practice daily) this would appear unlikely, although possible.

The implicit assumption, that any general improvement in reading fluency which might occur would not be very large, was thus justified in the cases of certain subjects but not others. In these latter cases this general improvement obscured any possibility of tracing the hypothesised effects in the result. This constitutes a serious weakness in the design of this study.

If the improvement was a result of development outside the experimental programme, then massed sessions, rather than spaced sessions over several weeks, would be indicated. This would not be a solution if the improvement was a result of the MRR itself despite the small amount of exposure to the method. If this were so, however, it would be dramatic testimony to the effectiveness of repeated readings on certain individuals in a situation of even minimal exposure. However, it was not the purpose of this study to demonstrate the effectiveness of the MRR, and in the context of this study the overriding effect of improved reading fluency constitutes an impediment to the actual purposes of the research.

A note on the possible cumulative effects of treatments B and C:

Apart from the way in which a general increase in reading ability may obscure the effects of alternating forms of treatment, similar results may be produced by the carry-over of the effects of treatments B or C into phases after they have been withdrawn. This possibility has already been discussed in Chapter three but must be borne in mind at this point in the discussion.

In the C-B+C-C sequence, applied in the case of subject 6b, the continued rise in fluency attainment has been ascribed to improvement in reading ability. If this was a result of the experimental treatment then either the general effect of the MRR or the cumulative effect of the schema-based instruction of treatment B could have been responsible. Both of these possibilities may be classed under the heading of improved reading ability and in any particular case they may occur simultaneously. Thus they may be very difficult to disentangle in an analysis of the factors which have produced the pattern of results of particular subjects.

4.2.4 Indicators of general progress in reading ability

It has already been pointed out that it was not the aim of this study to demonstrate the effectiveness of the MRR in improving reading ability, yet this was demonstrated in the results of certain subjects to the extent that the treatment effects of concern to this study were obscured. It has also been stated that improved reading ability may be reflected both in a rise in the initial rates on successive passages and in a more rapid attainment of criterion levels. This latter effect would be expressed in an increase in the number of passages covered.

A continuous increase in the number of passages covered may be observed in the results of subject 3a, 3b, 6a and 6b. With the possible exception of subject 6b, there is no discernible pattern of increase in initial rates. This is difficult to account for, except perhaps if attainment of criterion level is a more sensitive indicator of reading progress than is change in initial rates.

In the case of subject 7, who was subjected to a B-C-B phase sequence, progress in reading fluency is indicated by the fact that despite a drop in performance in the second phase there was an increase in the third phase. This is reflected in the eight passages covered in the third phase as opposed to six in the first phase. In this case there does also seem to be an effect on the initial rates of the passages in the latter part of phase 3. Whereas initial rates in phases 1 and 2 all remained very close to 30 w.p.m., and despite a drop early in phase 3, they rise from 30 w.p.m. to nearly 60 w.p.m. during phase 3. Unfortunately termination of the experimental programme at that point made it impossible to determine whether these higher rates would be maintained or even increased, or whether the effect was the result of irrelevant variables such as inconsistency in passage difficulty level.

Though the trend to a general increase in reading ability is discernible in the results of subject 7, it did not obscure the effects of the changes in treatment.

4.2.5 The effects of varying treatment sequence

The possibility was referred to, in chapter three, of implementing the treatment of presumed greater effectiveness first. Thus in seeking to compare treatments C and B+C, a B+C-C-B+C sequence might be preferred to a C-B+C-C sequence. The prime purpose in doing this would be to generate maximum encouragement and enthusiasm in a weak reader by first presenting the treatment which provides maximum supplementary support, and thereby also presenting this treatment during two instead of only one of the three phases.

In the light of previous discussion of the possible improvement in reading ability during treatment, the effect of varying phase sequence needs further consideration.

The following discussion concerns the situation in which a trend to improved reading ability is present but is not sufficiently strong to produce a pattern of continuous increase in rate across all phases. In an A-B-A phase sequence a possible increase in the second phase would be exaggerated by the effect of improved reading ability. But in the third phase the expected decrease on reverting to treatment A might be negated because of the continuing increase as a result of improving ability. Failure to obtain a decrease in the rate of criterion attainment on reversion to treatment A would then undermine support for the greater effectiveness of treatment B.

When a B-A-B sequence is employed the upward trend in criterion-attainment could negate the hypothesised decrease in phase two. This would again undermine support for the greater effectiveness of treatment B, even though an exaggerated increase might be produced on the reintroduction of treatment B in phase three.

In the cases of both A-B-A and B-A-B sequences this possible source of distortion in the results could therefore lead to a type II error with unwarranted rejection of the hypothesis, but not to a type I

error of confirming an hypothesis which ought to be rejected.

Better control over this effect could have been achieved by employing an A-B-A-B experimental strategy. With this sequence the increase in criterion-attainment in both the second and fourth phases would provide confirmation of the superior effectiveness of treatment B even though decrease might not occur in the third phase.

4.2.6 Passage difficulty as a confounding variable

Measurement of reading rates was used in this study to provide an indication of the state of subjects' fluency in reading the practice passages. Reading rate would of course be subject to the influence of numerous confounding variables such as subjects' motivational and physical states. Physical or mental fatigue, or emotional stress, could have affected performance during particular sessions. But whereas the group-statistical approach seeks to control such influences through the use of large numbers of subjects whose scores are summed, the single subject approach relies on a large number of measurements from the one individual.

The fifteen daily sessions from which measurements were obtained in each phase reduce considerably the likelihood that conclusions drawn from a comparison of phases might be influenced by confounding variables of the type already mentioned. The use of an A-B-A and not an A-B strategy of phase variation is intended to provide control over the effects of longer term influences which might come into operation fortuitously along with the commencement of the second phase.

The comparative difficulty of the different passages used in this study must be considered in the light of these two types of control. The influence of the difficulty level of the various passages requires special consideration since, firstly, difficulty level has a direct and large effect on reading rate and, secondly, it is far more intimately bound up with the experimental set-up of this study than, for example, variations in the emotional states of subjects.

A steady increase in difficulty level in the successive books of the series used could have diminished the possible effects of treatment changes in some phase changes and exaggerated them in others. In the phase changes of the A-B-A and B-A-B strategies used

in this study, both of these effects could be expected with each subject. In the A-B-A design the expected increase in rates in the B phase would be diminished or negated by the effects of increased passage difficulty, while the expected drop in rates in the second A phase would be exaggerated. In the B-A-B design the expected decrease in rates in the A phase would be exaggerated but the expected increase in the second B phase would be diminished or negated.

Since both the diminution and exaggeration effects would be evident in each subject's results, this should not lead to a greater likelihood of confirmation of hypotheses which should be rejected. Nevertheless, as a possibly important source of interference within the results, difficulty level warranted further consideration.

Theoretically, a check on passage difficulty level could be obtained by comparing the initial rates on the fluency curves for each passage. A steady decline in initial rates would betray a trend of increasing difficulty in the series of passages used. The need to consider possible improvement in reading ability during the experimental period as a further confounding variable, complicates the matter. An interesting theoretical possibility, if these two trends were of comparable magnitude, would be that they might cancel each other.

A crude empirical assessment of difficulty level was obtained by counting the numbers of words having more than one syllable and the numbers of words containing vowel digraphs, in each of the fifty-word passages of the first four books of the series used. (Eight out of the eleven subjects practised on fifty-word passages, but of these, only some progressed to the fourth book while some only reached the second.) While Frederiksen (1979) emphasises the role of the propositional level of processing in determining the difficulty level of printed discourse, the orthographic level is another factor in passage difficulty and an important one for readers of the type used in this study (Stanovich, 1980). Furthermore these word counts were only intended to provide a rough indication of possible variations in difficulty level.

Mean counts for the passages of each of the books were found to be as follows:

	Book 1	Book 2	Book 3	Book 4
Bisyllabic words	4,0	6,6	5,0	6,0
Vowel digraphs	5,0	6,2	4,0	4,2

Thus while variation in difficulty level is indicated this does not take the form of an increasing trend, particularly in relation to the vowel digraph count. This is even more evident when comparing passages within books. For example, although Book 2 has the highest mean bisyllabic word count it included the lowest count for an individual passage (three words).

A further factor which must be taken into account is the effect of the help provided by the A+, B, C and B+C treatments. At times it was observed that a passage which was initially experienced as being relatively difficult, proved not to be particularly challenging after the schema-based supplementary help of treatment B had been provided. Similarly, in treatment C, the supplementary analytic help was directed specifically at those words which a subject found difficult to analyse - being usually words with more than one syllable or containing vowel digraphs. In these ways the effects of variations in difficulty level would tend to be reduced after the initial reading of a passage (and also with the help provided on subsequent sessions).

In view of this and of the tendency to variation in difficulty being random rather than progressive in the series used, it was concluded that while the effect of difficulty level as a confounding variable should be borne in mind, it was not such as to call the results into serious question.

4.2.7 The consideration of the differential effectiveness of the various treatments in the interpretation of results

The interpretation of the results obtained from the experiments of this study depend on there being detectable differences between the effects of the treatments which are compared. If these differences in effects are large, visual inspection may suffice to reveal them. If they are significant but not detectable in graphical presentations then statistical methods may be required to be used. Apart from these considerations, the detectability of effects may also depend on the allocation of subjects to the various treatment sequences.

One pupil who met the criteria for inclusion in this study (but who was already receiving remedial treatment) displayed a low level of fluency but a high level of word recognition accuracy. This accuracy was achieved by the painstaking application of analytical principles to those many words which he could not recognise immediately by "sight". This child might have benefitted greatly from treatment B and have produced a clear pattern of difference in an A-B-A treatment sequence. An A-C-A sequence would have been unlikely to produce a clear pattern since the supplementary analytic activities provided in treatment C would have been largely superfluous in his case. This pupil was already carrying out C-type processes well, independently, so that an A-C-A sequence would have been equivalent to a uniform A-A-A or, perhaps, C-C-C sequence.

Subject 3b provides a different example of the same phenomenon. As a year 3 pupil he was able to achieve a higher word accuracy percentage on the experimental passages than on the year 3 test passage used for selection. This meant that, although his fluency on the experimental passage was amenable to improvement by treatment, there was not much call on him to use analytic strategies. He was therefore not allocated to an A-C-A treatment sequence since no appreciable difference between A and C treatments would be anticipated in this case. For

the same reason a B-C-B sequence, though it might have yielded a significant difference between the second and the first and third phases, would in effect have been no different from a B-A -Bsequence. If minimal demand is made on C-type processing abilities then one is unable validly to claim that results demonstrate that, for example, B is more effective than C.

While these pitfalls were taken into account in this study, others of a slightly different type appear to have affected the results of some subjects.

From informal observation of the reading behaviour of subjects 6a and 6b, it appeared that they, particularly subject 6a, were adept at eliciting schemata for the material which they were required to read. They were able to apply their comprehension of a passage after one or a few readings to make good the gaps in their grasp of content or structure. Where discrepancies did exist between the actual text and their rendition these were in the nature of the sensible miscues described by Goodman & Goodman (1978).

When treatment C was applied to these subjects this meant that they were able rapidly to elicit full schemata even on passages which they initially found difficult. Rather than merely benefitting from the analytic practice provided on the unknown words in a passage, it appeared that they immediately incorporated these words in their attempts to comprehend that passage. In effect, for these pupils, treatment B was little different from treatment C because the extent of their own schematal processing rendered the schema-based activities of treatment B largely superfluous.

This throws further light on the lack of difference between phases displayed in the results of pupils 6a and 6b. If, for them, little difference existed in the practical effects of treatments B and C, then a B-C-B or C-BC-C phase sequence would have been equivalent to a straight B-B-B or C-C-C sequence. Under these circumstances the effect of improved reading ability, revealed in an increasing rate of

criterion attainment, would have been more likely to be the dominant pattern in the results.

The possible equivalence for certain pupils of the effects of treatments C and A, or of treatments B and C, constitutes another restriction on the interpretation of this study. Possibly this reflects a need, at the research level, for more stringent selection criteria which would ensure that only pupils who are weak enough to find the supplementary activities of treatments B and C of significant benefit, would be included. Despite the tendencies of these factors to reduce the magnitude of differences between treatments with some subjects, clear differences are evident in the results of other subjects. These results, at least, allow conclusions to be drawn regarding the effects of the different instructional treatments. Some caution is required even in these cases. For example, the results of subject 7 display a fall in the rate of criterion-attainment in the C as opposed to the B treatment phases. Before conclusions regarding the relative effects of B and C treatment may be drawn, it needs to be established that treatment C did in fact operate as such in this case. If not, the results may merely demonstrate that treatment B produces a greater rate of criterion-attainment than treatment A+. The results of each subject require to be evaluated in this light.

4.2.8 Allocation of subjects to treatments

As indicated above it was decided prior to commencement of the instruction to expose only year 3 pupils to treatment A. During the first term of instruction (involving subjects 1, 2, 3a, 6a, 6b and 7) it was obvious that subject 2, although in year 3, was struggling to cope with treatment A despite a lowering of the criterion rate to 70 w.p.m. in his case. Therefore, after the planned use of treatment C in phase 2, treatment B+C was used instead of reinstating treatment A. As no suitable year 3 subject was available in the second term of instruction, it was planned to use a year 2 subject (subject 4b) for a replication of the A:C comparison. She displayed such stress during the initial sessions of the A phase that treatment A+ was substituted instead.

In the light of experience with subject 6a, in the second term, the relatively stronger subjects (4a & 4b) were assigned to the A+:C comparisons rather than being exposed to comparisons involving B, C or B+C. Subjects 5 and 6c, who were noticeably weaker than the first term subjects were assigned to these latter comparisons.

Subject 3b was assigned to the replication of the A+:B comparison in the second term. This was in view of his lack of suitability for comparisons involving treatment C referred to previously.

Since the practical work was carried out in two stages, the second term provided the opportunity for replications to be performed. In particular, replications were carried out for those cases in which a general trend of improvement had obscured the possibility of differences between phases being revealed.

The C:B+C comparison was tested twice in the first term since it was felt that subject 6b would find the originally planned phase 2 change to treatment A+ too stressful. However, the results of both of these subjects were dominated by the influence of improved

reading ability so no comparisons could be made. Therefore a further replication was performed in the second term, using subject 6c.

More replications were planned than could actually be carried out. In the first term one of the year 3 subjects was excluded after three weeks as it was found that his reading ability was higher than had been indicated during the selection procedure. Another year 3 subject was excluded after one week in the second term for the same reason. One year 2 pupil who was to be included in the study in the second term was transferred from the school in the interim.

4.2.9 The effect of passage length

It was stated in chapter three that passage length was set at either 50 or 100 words. In the case of 50 word passages, all rates in excess of 50 w.p.m. obviously had to be calculated. It was intended that 100 words should serve as the standard passage length but that the weakest readers in year 2 could practice on 50 word passages to avoid stress. It became obvious on commencing the practical work that this latter provision should be applied more liberally, and so all year 2 subjects were required to read the shorter passages.

Only in the case of subject 6a did it appear in retrospect that longer passages might have been more appropriate. Conversely, it appeared that subject 2, who was in year 3, should have been allowed to read the 50 word passages. He frequently displayed signs of fatigue, particularly in the practice sessions. Furthermore it was found that when error rate was high, the number of unknown words was too large for the subject to benefit fully from the supplementary activities. These activities extended for too long a period before the subject could practice them in the context of the second reading of the day. Even in the cases of the other two year 3 subjects (1 and 3b) there were signs of fatigue at times during the first one or two daily sessions on a new passage.

In the case of subjects 1 and 3b the extra demands made by reading the longer passages compensated to some extent for the relatively low level of difficulty presented to them by the reading material used in this study. Their initial reading rates on passages were generally above 30 w.p.m., and initial error rates were also generally well within the eight percent limit. In contrast to the year 2 subject, 6a, who proceeded rapidly through passages at times, these year 3 subjects, as can be seen from their charts, found the passages sufficiently challenging for them to take a number of daily sessions in order to attain the criterion rate. There appears, therefore, to

be a tendency to a reciprocal relationship between length and difficulty of a passage in determining suitability for instructional purposes with the MRR.

Although Samuels (1979) and Lopardo and Sadow (1982) report working successfully with considerably greater passage lengths, one hundred words appeared to be the maximum, or beyond the maximum, for optimal effectiveness of the MRR with the subjects used in this study.

4.3 INTERPRETATION OF THE RESULTS OF INDIVIDUAL SUBJECTS

In the discussion below, subjects are numbered in a manner which corresponds to the hypotheses of this study. In the case of each subject, both the hypothesised effects and the possible influences of other factors will be considered. In the following section the hypotheses will be evaluated in the light of these results.

The results of each subject are summarised in a table indicating the number of completed progress curves. Thus 4 + 1 would indicate that the criterion had been attained on four passages and that a fifth passage had been begun before the ending of the phase.

As the reader will note, the results of the majority of subjects either fail to provide support for the hypotheses of this study or else offer only minimal indications in favour of the hypotheses. To some extent this can be attributed to confounding factors but in some cases it appears that the treatments which were compared do not produce a clearly discernible difference in the attainment of fluency. These latter cases are an important factor contributing to an evaluation of the MRR and as such will be considered in the final section of this chapter along with those results which do provide confirmation of the hypotheses.

The results of Subject 1

Treatment phase	A	B	A
Number of passages	3 + 1	5	2 + 1
Days absent	2	0	5

At first glance these results appear to indicate a distinct increase in fluency attainment when the schema-oriented supplementary activities of treatment B are used with the MRR. However, if the number of absences is taken into account the contrast between the A phases and the B phase is reduced. Furthermore, the illness exper-

enced by the subject during phase 3 might have contributed to a general decline in performance even on the days he was present. If so this would reduce the B:A contrast still more.

It could be argued that the remaining increase of the B phase over the first A phase resulted from the same general improvement in reading ability observed in other subjects, and that further such improvement in phase 3 was only prevented by the subject's condition of health.

Therefore, while these results of subject 1 may point to a differential effect of treatment B over treatment A, this cannot be held with a great degree of confidence.

The results of Subject 2

Treatment phase	A	C	B+C
Number of passages	2 + 1	3 + 1	3 + 1
Days absent	2	0	2

As has already been explained, the planned return to treatment A in phase 3 was not implemented in order to avoid distressing the subject. This of course reduces considerably the usefulness of these results for comparing treatments A and C.

While the curve counts of phases 1 and 2 show some difference this is not great. Taking account of absences reduces this further. Nevertheless the subject's own perception of these treatments was that A was considerably more stressful. Some objective support for this is evident on examination of the curve forms in phases 1 and 2. It was notable that to a large degree the subject lacked both content and form schemata for the passages of phase 1. This appeared to be responsible for his feelings of stress while reading during treatment A. It was noted several times during treatment C that his attempts at analysing unknown words, while often successful, had the effect of reducing his reading rate. Conversely his inability to make sense of

much of what was read in phase 1 did not prevent him from increasing the rate of his reading (such as it was) with repetition.

While the curve count shows no difference between the effects of treatments C and B+C it is interesting to compare the forms of the curves. With treatment B+C where progress occurs a fairly steep gradient is apparent, but this is offset by a plateau midway through each curve. The impression of the increased effectiveness of treatment B+C is also strengthened when absences are taken into account.

In summary the results of subject 2 appear to contain some indications of the greater effectiveness of treatment C over A and treatment B+C over C. However, these indications do not constitute firm support for hypotheses 2 and 6.

The results of Subject 3a

Treatment phases	A+	B	A+
Number of passages	2	3	3 + 1
Days absent	1	2	1

The failure to obtain a drop in the rate of criterion attainment in phase 3 calls into question the significance of the difference in curve count observed between phases 1 and 2. No clear pattern of difference can be discerned in the curve forms either, although the second curve of phase 1 is extremely drawn out. One can speculate that this slowness might have been avoided if treatment B had been provided at that stage. But, although these results offer no evidence against the superiority of treatment B, they can be adequately accounted for by a continuing increase in reading ability over the experimental period as a whole. Alternatively it may be that schema-based supplementary help, of treatment B, in phase 2 led to increased use of schema-based strategies in phase 3.

The results of Subject 3b

Treatment phase	B	A+	B
Number of passages	4 + 1	4 + 1	4 + 1
Days absent	0	2	6

If the third phase is viewed in the light of the loss of six days out of fifteen days through absence, it becomes apparent that a marked increase in fluency-attainment occurred on re-institution of treatment B. However, the failure to obtain a drop in fluency attainment in phase two precludes a definite conclusion being drawn as to the greater effectiveness of treatment B. A possible explanation of this pattern of results is that the overall increase in reading ability obscured the expected differences in fluency attainment.

Despite the lesser effectiveness of treatment A, the curve count in phase two would have been maintained at the same level of phase because of the increase in reading ability. In phase three the marked further increases in fluency-attainment could have resulted from the combination of the effects of the still increasing reading ability and the re-institution of treatment B.

This can be no more than speculation, however, and the greater effectiveness of treatment B remains unconfirmed.

The results of Subject 4a

Treatment phase	C	A+	C
Number of passages	4 + 1	3 + 1	5
Days absent	0	2	2

When absences are accounted for the contrast between phases one and two is reduced but still apparent. However, its magnitude is not such that the superior effectiveness of treatment C over treatment A can be affirmed with much confidence. As with subject 3b, the rise in curve count on re-institution of treatment C in phase 3 is

more marked than on its withdrawal in phase 2. This could be the result of increased reading ability over the experimental period.

The results of Subject 4b

Treatment phase	C	A+	C
Number of passages	4 + 1	1	3
Days absent	0	2	3

The contrast between phase one and the other phases is lessened when the number of absences is taken into account. Even so a marked contrast between the results of treatments C and A+ remains. This subject was originally to be exposed to treatment A in phase 2, but on its commencement it immediately became obvious that she would have great difficulty in coping. Even with the substitution of treatment A+, slow progress was made. The effect of phase 2 was so severe that it might be suspected that the passage involved was particularly difficult. Although the initial error rate was twenty-six per cent on this passage, the initial error rates on some of the other passages were almost as high. It appears, therefore, that this subject experienced treatment C as being more facilitative than treatment A+.

The results of Subject 5

Treatment phase	B	B+C	B
Number of passages	2 + 1	3 + 1	3 + 1
Days absent	1	2	2

Some increase in fluency-attainment is evident from phase 1 to phase 2. However, the curve count reveals no drop on the return to treatment B in phase 3. But if the graphs are examined it can be seen that the curve count of phase three has been inflated by the last two passages which were read. Both display starting points considerably higher than those of the other curves in all three phases. Further-

more the penultimate curve is also unusual, in that it passed the rate criterion on the second day. If the results of the first two and a half weeks of the third phase are taken into account, a clear decline in fluency-attainment is apparent. These results can be taken as a tentative indication of the greater effectiveness of treatment B+C over treatment B.

The results of Subject 6a

Treatment phase	B+C	C	B+C
Number of passages	5	6 + 1	8 + 1
Days absent	3	0	1

If it were not for the absences in phase 1 the results of treatment B+C in phase 1 might have equalled those for treatment C in phase 2. They would not, though, have surpassed them by much, if at all. Thus the effects of the treatment change between phases 1 and 2 does not confirm the hypothesis that treatment B+C produces a more rapid attainment of fluency than treatment C. Increasing reading ability may have averted a drop in the rate of criterion attainment. The increase in curve count between phases 2 and 3 could also be accounted for by increasing reading ability.

However, were treatment B+C to be more effective than treatment C, an exaggerated increase in curve count should be evident in the third phase with the simultaneous increase in reading ability. The observed increase in curve count in phase 3 is not so dramatic as to account for increased ability as well as greater effectiveness of treatment B+C.

The results of Subject 6b

Treatment phase	C	B+C	C
Number of passages	2 + 1	3 + 1	4 + 1
Days absent	4	2	3