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EARLY INTERVENTION IN CHILDREN WITH READING DIFFICULTIES: AN EVALUATION OF READING RECOVERY AND A PHONOLOGICAL TRAINING

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Rationale for the Research

Introduction

This report summarises the findings of a two-year longitudinal evaluation of the effectiveness of two different interventions designed to help six-year-olds who have made a slow start in their reading.[1] The two interventions studied, both delivered in a one-to-one setting, were Reading Recovery and a specifically phonological and less intensive programme (Phonological Training). Almost 400 children from seven local authorities participated in the evaluation: Bexley, Greenwich, Hammersmith and Fulham, Islington, Surrey, Wandsworth and Westminster. These authorities offer a diverse sample of children in terms of socioeconomic status and home circumstance. However, inner-city children are overrepresented in terms of the national picture.

The case for early intervention

The importance of investigating ways of helping young children who are struggling with reading is to some degree self-evident. Reading problems in childhood can cause distress to children and their parents, having an impact on children's self-esteem. As children progress through the primary year, reading difficulties will affect their ability to participate in many classroom activities, limiting their progress not only in English but in other subject areas.

Traditionally, children have not been offered additional help with reading problems until they have been in the school system for several years. However, there is a growing body of evidence to suggest that intervention should be offered at an earlier stage if it is to be effective. The reluctance to intervene at an early stage stems largely from the belief that it is not possible to identify children who are going to have intractable problems with reading until they have had several years schooling. However, assessments using pre-reading tasks such as letter recognition, and examination of children's concepts about print [2], or phonological awareness, can discriminate well between children of five and six years and are also highly predictive of their subsequent progress in reading.

The consequences of reading problems for children's learning

The negative consequences of reading problems are likely to increase with time. Early reading problems can initiate a causal chain of effects. Very quickly, poorer readers encounter less text than their peers. By the time children reach middle primary years it has been estimated that the least motivated children might read 100,000 word a year, while the average reader might encounter 1,000,000 words of text. The more voracious readers might read as many as 10,000,000 words. The situation is exacerbated by the fact that poorer readers are often given books to read that are too difficult for them. As word reading skill develops, more general language skills become the limiting factor on reading ability. But the greater reading experience of the better reader has provided an enormous advantage even here. Reading itself is an important contributor to the development of many language and cognitive skills. For example, much vocabulary growth probably takes place throughout the learning of work meanings from context during reading. Similarly, much general information is gleaned through

reading. In short, much that facilitates further growth in reading comprehension ability—general knowledge, vocabulary, syntactic knowledge—is developed by reading. These feedback effects appear to be potent sources of individual differences in academic achievement.

Children who experience repeated failure in reading also become demoralized. This influences their self-esteem and may cause them to approach future learning tasks in negative, passive and inefficient ways. Poor reading may even lead to a drop in IQ. In a highly literate society the consequences of illiteracy can be very marked.

Early intervention versus remediation at a later stage

The research evidence points to the fact that, for reading difficulties, early intervention appears to be more effective than remediation at a later stage. Remediation of reading problems in older children has been found to be largely ineffective. However, there has been greater success with younger children in their first year or two of school. It may be that it is easier to prevent reading problems in the first place than to attempt to remediate them further up the school. Wasik and Slavin (1993) have recently reviewed one-to-one tutoring for preventing early reading failure. They looked at 16 separate studies of five different tutoring methods, all carried out in the USA, and found children's reading to be improved in nearly every case.

However, not all the interventions reviewed were equally successful. Those with the most comprehensive models of reading, tackling a broader range of reading skills, had the largest impacts over a wider range of reading skills. This observation is consistent with information from other sources. For example, Direct Instruction (DISTAR), an intervention that relies heavily on a word building, phonic approach, has been found to be effective at improving word reading and decoding skills but not reading comprehension.[3] In general, interventions with a narrow focus are in greater danger of missing their target, either because of the inadequacy of their model of reading or because they are only effective for a limited range of children, or a limited range of skills.

Programmes with a phonological focus deserve particular consideration in this context. On the basis of current knowledge, it seems likely that if there is a specific cause of reading disability at all, it resides in the area of phonological awareness. It is now fairly clear that reading progress is greater where there is explicit phonics teaching in the classroom than where there is not. There is also evidence to suggest that early interventions which include explicit phonic instruction are more powerful than those that do not. However, it is also the case that children can make better use of this type of instruction where it is taught in the wider context of reading meaningful and interesting text.

Beyond content, the effectiveness of any intervention depends on the quality of implementation, an obvious fact which is nonetheless frequently overlooked in research reports. It has also been a consistent finding that children learn more when they are taught by an enthusiastic and motivated teacher. A good way of encouraging enthusiastic and high quality instruction is through training, and Wasik and Slavin (1993) found in their review that programmes taught by more fully trained teachers were more effective.

How long do children maintain their gains?

Because tutoring is expensive (especially one-to-one tutoring), its lasting effects are of great importance. Despite this, few follow-up studies have been carried out. There is a tendency for remedial programmes to lead to short-term gains only. From the earlier discussion of the ever widening effects of reading problems, it might be expected that successful early interventions should have long-lasting effects. The evidence is limited because of the paucity of studies but there seems to be reason for cautious optimism, with the proviso that children may fail to make progress in areas that were not originally addressed in the intervention (for example reading comprehension under Direct Instruction).

Lessons from the research literature

In conclusion, preventing reading difficulties could greatly improve children's school experience and add to their success in later life. We know from cost-benefit analyses carried out by the developers of High/Scope[4] that this success can be translated into considerable financial benefits for society as a whole, for example by reducing the numbers of those who break the law or those on social benefits and by increasing tax revenue on income. There is strong evidence to suggest that early intervention, as opposed to later remedial treatment, stands the highest chance of success; but to be effective, it will require high standards of training and a reasonably extended period of intervention. Programmes with a broad model of reading seem likely to produce a wider range of improvements in reading, but some element of explicit phonic instruction seems advisable as well.

Aims of the research study

The main aim of the present study was to investigate practical ways of helping children in the early years of formal schooling, who had made a slow start in their reading. It was decided to evaluate two programmes, both with a proven track record, but with very different approaches. The first, Reading Recovery, is one of the most successful early interventions with a broad model of reading. The second, a phonological intervention closely based on that of Bradley and Bryant [5], is one of the most successful interventions (albeit in a research setting) with a narrower focus.

Bearing in mind the expensive nature of individual tuition, it was decided to monitor costs as well as effectiveness. It was also deemed important to investigate whether either one of these programmes was particularly suited to certain groups of children.

The interventions

Reading Recovery

Reading Recovery is a sophisticated intervention designed to help children who are in the bottom 20 per cent of their class after one year of schooling. It is best characterized as a preventative intervention, rather than a remedial programme, as many of the children who are offered Reading Recovery are barely reading at all. The

aim is early correction of inadequate strategies used by these children so that they will become independent readers.

The features of Reading Recovery that mark it out as sophisticated reside not only in the programme curriculum but also in its attention to implementation issues. Clay argues[6] that, to work effectively, Reading Recovery must achieve change along four dimensions:

- behavioural change on the part of teacher;
- child behaviour change achieved by teaching;
- organizational changes in schools achieved by teachers and administrators;
- social/political changes in financing by controlling authorities.

The unusual attention to the educational system into which the programme must fit makes Reading Recovery unique, especially its inservice training and support of teachers. This relates directly to the argument made in the Introduction concerning the importance of the quality of instruction.

Experienced teachers are selected for training as teachers or tutors. Teachers' training takes one year during which the trainee teaches four pupils. They attend weekly seminars where they acquire skill in observational, diagnostic and assessment techniques and are taught about the model of reading that underpins Reading Recovery. Additional training is required of tutors who are certified to train and support Reading Recovery teachers in their Education Authority. The continuing support and monitoring role of the tutor is seen as crucial to maintain the quality of implementation in the post-training years.

The Reading Recovery teacher training is expensive. Some argue that such extensive training is unnecessary. However, Pinnell and her colleagues (1994) found that the programme ceased to be effective when implemented by teachers who had been trained in a much shorter course. The longer course is likely to ensure a more accurate delivery of the programme and to gain the commitment of the teachers, an element which has been identified as one of the hallmarks of a successful intervention.

Reading Recovery: the model of reading and learning

According to Clay, reading is defined as a "message-gaining, problem solving activity which increases power and flexibility the more it is practiced".[7] She suggests that children make use of a variety of strategies to help them in this problem solving activity, the most central of which are:

- their understanding of the concepts of print;
- their phonological awareness (both of the sounds in words and of the letters and letter strings on the page);
- their understanding of the meaning of the text;
- and finally, their knowledge of syntax.

Meaning is not derived from the print alone but also from the knowledge of the world that readers bring to the task, for example their knowledge of the language of books and language in general, their prior knowledge of the subject matter of the text and/or their ability to make inferences. The goal of Reading Recovery is to help children to use all the skills or strategies that they have at their disposal. An important aspect of this is to encourage children to monitor their own reading, detecting and correcting errors by checking responses against all the possible strategies.

Reading Recovery: selection, structure of the sessions, and discontinuation

The children who have been in school for one year (aged around six years old in New Zealand and the UK) and who are the poorest readers in their class are eligible for Reading Recovery. Selection is made on the basis of a battery of tests which cover concepts about print, letter identification, word reading, word writing and dictation, and the text reading level.[8] The precise selection is a clinical judgement, made on the basis of the child's profile of scores. It is recommended that the bottom 20 per cent of readers in the age band be offered the programme.

Once, selected, children are withdrawn from their class for individual tuition of half an hour daily, until they have reached the average reading level of their classmates. For the first two weeks, the teacher and pupil 'roam around the known,' reading and writing together in an unstructured supportive fashion, to build a positive relationship and to give the teacher information on which to build a structured sequence of activities.

Children graduate or are 'discontinued' from the programme when they have reached the average reading level for their class. Some children fail to reach a satisfactory reading level and it is recommended that they be referred to a remedial service. In any case, the maximum number of weeks recommended is between 20 to 26 weeks. The average number of weeks varies but would appear to be around 16 weeks in mature programmes.

A full review of all the research studies that have evaluated Reading Recovery was prepared by Jim Demetre in 1993 and can be seen in Appendix 1 of the Full Report.[9]

In Reading Recovery a typical tutoring session would include each of these activities, usually in the following order, as the format of the daily lessons:

• rereading two or more familiar books	text
• rereading yesterday's new book and taking a running record	text
• letter identification (plastic letters on a magnetic board) and/or words and word-making and breaking	letters
• writing a story (including hearing and recording sounds in words)	text and sounds
• cut-up story to be rearranged	text
• new book introduced	text
• new book attempted	text [10]

Phonological Intervention

The Phonological Intervention grew out of the work of Peter Bryant and Lynette Bradley, who were interested in the observed relationship between poor phonic awareness and subsequently delayed reading.[11] They devised an experimental intervention for six-year-olds with poor phonic awareness, closely based on Lynette Bradley's experience as a teacher.[12] The circumstances surrounding the development

of the Phonological Intervention differ sharply from those of Reading Recovery, hence implementation issues were not considered, beyond ensuring that the researchers delivered the intervention adequately.

The Bryant and Bradley intervention

The intervention designed by Bryant and Bradley was based on their research into the normal developmental stages of phonological awareness. They had already found that preschool children who could not read were nonetheless able both to hear and to produce rhymes with evident relish. Bradley and Bryant argued that the most natural division of words into smaller sound units was that of onset and rime, i.e. *b* + *at; r* + *ing*. Thus their training placed emphasis on an awareness of various methods of sound categorisation, starting with rhyme and initial sounds. Its aim was to develop awareness of sound, concentrating at the outset on alliteration and rhyme but moving toward more sophisticated phonic distinctions in response to the child's progress. Each child was given 40 ten-minute, individual sessions, spread over two years. During these sessions, the children were introduced to a series of pictures of familiar objects. Typically, they would be shown three or four pictures, where all but one showed objects with a common sound, and would then be asked to identify the *odd one out*, in terms of rhyme, alliteration, etc. For example, the odd one out for the words *cat, mat, pen* and *bat* would be *pen*. Children were also asked to think of examples in their heads, especially as their training progressed. Plastic letters were used to make explicit connections between letter/letter groups and sounds.

In the resulting study, the children who received this intervention made significantly more progress than the Control children, with reading and spelling ages at least ten months in excess of the Control groups. They did particularly well in spelling.

The Phonological Intervention in the present study

In the present study, the content of the intervention was very similar to the sound and plastic letters intervention of Bradley and Bryant. However, it was not suitable to give the intervention over two years, as in the case of the original successful experiment. In the light of Bradley's unsatisfactory experience with a condensed programme[13], the 40 x ten-minute sessions were retained but spread over seven months instead of two years.

The phonological tutors, all of whom were experienced primary teachers, were given three days of training in the techniques required to teach the Phonological Intervention, spaced over three months, together with a training manual. They were also given an opportunity to rehearse their newly acquired skills with children not involved in the study. The tuition was given by researchers involved in the original Bradley and Bryant studies (Bryant & Bradley, 1985; Bradley & Bryant, 1985; Kirtley, et al., 1989), who administered the phonological programme in those projects.

Comparing the intervention

Both the interventions being evaluated have been found to be effective in the past, though the research on Reading Recovery has been more extensive. They both have in common their target population: six year olds with reading problems, and the

fact that they are designed for individual tuition. However, each intervention is based on a different model of reading. Reading Recovery has been developed to offer children a complete teaching programme for the initial stages of reading, whereas the Phonological Intervention offers additional tuition in a specific area, that of phonological awareness. There is no intention that the Phonological Intervention should be a self-sufficient method of teaching reading. Thus the focus of Reading Recovery is wider, and the amount of time given to each individual child greater.

The interventions also differ in the history of their development. Reading Recovery was designed for use in primary schools on a national scale, whereas the Phonological Intervention was originally designed as a part of research on the process of reading development. As a result, Reading Recovery deals much more thoroughly with implementation issues, and a sophisticated system has been designed to cope with training and the ongoing aspects of programme maintenance. Issues surrounding both the accuracy with which a particular programme is taught over a period of years and the commitment of the teachers involved are absolutely crucial to the practical value of that programme. However, they are all too frequently ignored and the attention to this aspect of intervention is a hallmark of Reading Recovery.

Research methods

To evaluate the effectiveness of these interventions, we compared children who had received the programmes with similar children who received no special programme.

Sampling

Schools sampled

Reading Recovery programmes were evaluated in seven LEAs: Bexley, Greenwich, Hammersmith and Fulham, Islington, Surrey, Wandsworth and Westminster. The number of Reading Recovery schools sampled was 22. For each Reading Recovery school, the LEA was asked to identify two other similar schools which were then randomly assigned to the Control (18 schools) or Phonological Intervention (23 schools) condition.

Children in the sample

Six children were included in the study from each selected school. The six poorest readers in each school in the range six years to six years six months were selected. In the Reading Recovery schools, three or four of these bottom six readers entered the intervention programme in September and October 1992. Those children not selected for Reading Recovery formed the *within school* control group. In the Phonological schools, four of the six poorest readers in each school were randomly assigned by a member of the research team to the Phonological condition. The remaining two children formed the 'within school' control group for the Phonological schools. In the Control schools, all six of the bottom readers went into the control group. Table 3.1 illustrates the number of children in each condition at pre-test, at first post-test in June/July 1993 and at second post-test in May/July 1994.

Procedure

The reading abilities of all the children in the study were assessed on a battery of reading tests in September and October 1991, before the start of either of the two interventions. The children were then retested in June and July 1993 after the interventions were completed. There was a further follow-up in May, June and July 1994. Figure 3.1 presents the timetable of these events.

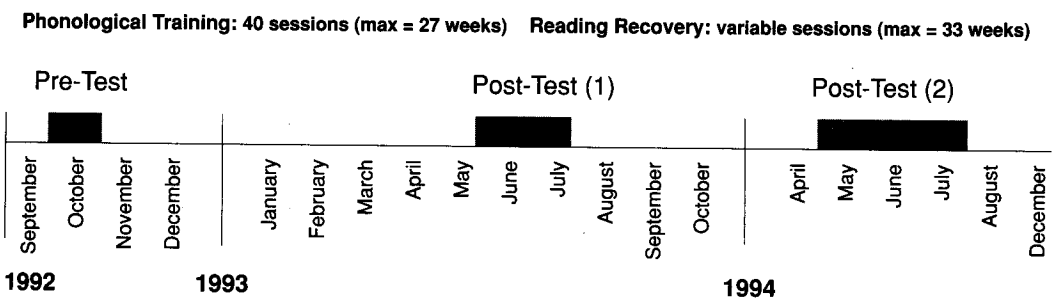
On the basis of the research design, four comparisons are made in the current report as follows:

1. Phonological children with control children in the same school ('within school' Controls).
2. Phonological children with control children in control schools ('between school' Controls).
3. Reading Recovery children with control children in the same school ('within school' Controls).
4. Reading Recovery children with control children in other schools ('between school' Controls).

Table 3.1
Sample

School/Experimental Condition	Number of Children Tested		
	Sept/Oct 1992	June/July 1993	May/July 1994
Reading Recovery Schools (22)			
Children who received RR	95	89	92[14]
Within school Control children	41	40	36
Phonological Schools (23)			
Children who received Phonological Intervention	97	91	87
Within school Control children	46	44	44
Control Schools (18)	**111**	**109**	**107**
Total	**390**	**373**	**366**

Figure 3.1. **Timetable of Research.**



Measurement

Measuring reading ability in the lower achievers in this young age group is quite difficult. Many of these children are unable to read much at all. Two standard reading tests, the British Ability Scale Word Reading test (Elliot, et al., 1982) and the Neale Analysis of Reading (1988) were used. In addition, the tests used in the Reading Recovery selection procedure were used. The Diagnostic Survey (Clay, 1985) consists of a battery of five tests which takes about 30 minutes to administer and assesses lower-order reading and writing skills, letter identification, concepts about print; a word test, written vocabulary and dictation. In addition to the Diagnostic Survey, a Book Level was established for each child, as is the Reading Recovery practice. This entailed establishing which of a series of texts, graded by difficulty from 1 to 26 according to the Reading Recovery levels, children could read with 90 per cent accuracy.[15]

Phonological awareness was also assessed. Like letter identification, it is a measurable ability in pre-readers, which has been found to predict subsequent reading progress.

All of the above assessments were made at pre-test and first follow-up. At the second follow-up, the Clay Diagnostic Survey and Book Level were dropped as it was believed they would be too easy for many of the children by this stage. Instead, as a measure of spelling ability, the British Ability Scale Spelling test was used at second follow-up.

In addition to this extensive battery of tests, background information was also collected on each child: gender, age, ethnicity, take-up of free school meals both at the beginning and the end of the study, their number of days absent in Summer terms 92 and 93, and whether or not English was their second language.

Characteristics of the children in the study

The children who have taken part in the research have been drawn from seven different boroughs to offer a diverse sample in terms of socioeconomic status and home circumstance. However, inner-city children are overrepresented in terms of the national picture. For example the average percentage of children taking free school meals for England as a whole was 16 per cent at the time of the study, about half the figure for the schools involved in the evaluation.

Characteristics of the reading measures

Children's performance on all the reading measures at the beginning of the study were quite good predictors of their performance in nine months and 21 months later. However, some of the tests were rather insensitive for these children with very limited reading skills. When the children were first tested, many either failed to score at all, or scored very little in the three tests that measure reading rather than pre-reading skills. The Diagnostic Survey was the most sensitive measure for this ability range.

Initial differences between experimental groups

Reading Recovery, Phonological, and Control children were similar in terms of gender, social disadvantage and English speaking status. However, there were

significant differences between children's average reading abilities. As was to be expected from the nature of the selection procedure, the Reading Recovery children were the poorest scoring group.[16] The children who attended the Control schools are also slightly more advanced readers on average than those children attending either Reading Recovery or Phonological schools. In order to compare like with like, we therefore matched children in the different groups on the basis of their initial reading ability.

The Effect of Reading Recovery and the Phonological Intervention on children's progress in reading and phonological awareness

In this evaluation, the heart of the matter is whether either of the interventions under examination can be demonstrated to improve children's reading in both the short and medium term.

Reading Recovery

Progress in the first year (intervention year)

The overall finding is that Reading Recovery is a very effective intervention, in the short term, for improving reading in this group of children in difficulty. For both sets of comparisons, within school and between school, Reading Recovery children made significantly more progress than the Control children on every measure of reading.

To take account of the fact that Reading Recovery children were significantly poorer readers on average at the beginning of the study, we created a group of matched controls[17], that is Control children with the same initial reading ability as the Reading Recovery children.

In the space of the eight or nine months between pretest and first follow-up, the Reading Recovery children made around 17 months progress in reading (Table 4.1). In the same time, the Control children in non-Reading Recovery schools made about nine months progress. The Reading Recovery children had made about twice as much progress as could be expected on the basis of standardised scores, and about twice as much as the Control children in non-Reading Recovery schools. The Control children in the Reading Recovery schools had made more progress than the other Control children, about 13 months as opposed to none, although less than the Reading Recovery children. It may well be that the classroom programme in Reading Recovery schools had benefited by the presence of the intervention in the school. Reading Recovery teachers and tutors made efforts to share Reading Recovery techniques with colleagues in their schools. Most of the classroom teachers in Reading Recovery schools (84 per cent) reported that having the intervention in their schools had made a difference to the way they taught reading in the classroom.

Progress in the second year (when no intervention was given)

One full school year later, Reading Recovery children had still made significantly more progress in all the reading measures than Control children in non-Reading Recovery schools. However, the gap between the two groups had narrowed somewhat.

Reading Recovery children still had a six months advantage in reading age over the Control children in non-Reading Recovery schools at second follow-up (Table 4.2). The Reading Recovery children had made 25 months progress in the space of 20 months. The Control children from different schools had made 19 months progress.

Table 4.1
The effect of Reading Recovery at first follow-up: a matched controls comparison

Mean Scores at first follow-up: Reading Recovery comparison				
Reading Measures	Within Schools		Between Schools	
	Reading Recovery (28)	Controls (32)	Reading Recovery (83)	Controls (88)
Reading Age at the beginning of the study	4 years 11 months		5 years	
Word Reading (Reading Age)	24 (6 yrs m)	16 (6 yrs 1m)	20 (6 yrs 4m)	9 (5 yrs m)
Prose Reading	14	10	12	5
Book Level	16	9	14	5
Diagnostic Survey	0.8	0	0.5	- 0.6

The comparison between the Reading Recovery children and the smaller group of Control children attending the same school failed to reach statistical significance at conventional levels, though the Reading Recovery children had made consistently greater progress than Control children on every measure. Reading Recovery children had made four months more progress in terms of reading age (Table 4.2). The lack of statistically significant findings in this comparison within Reading Recovery schools is partly a result of the smaller sample size of this group. Another possible explanation is that the Control children in Reading Recovery schools may have benefited from an improvement in classroom tuition due to dissemination of Reading Recovery principles (programme 'leakage').

Phonological Intervention

Progress in the first year (intervention year)

The short-term effect of the Phonological Intervention was much more specific than that of Reading Recovery, and not as secure. The intervention successfully improved children's performance on the test of phonological awareness that most closely matched the training given in the intervention. However, this was the only area of skill where the Phonological children had significantly improved in comparison to the Control children attending the same schools (Table 4.3). The failure of the Phonological Intervention to show any but the narrowest effects in this powerful within-school comparison is powerful for two reasons. First, unlike the children in Reading Recovery schools, children in Phonological schools had been randomly assigned to experimental

or control condition. Secondly, there was no attempt to disseminate the Phonological intervention to classroom teachers, although it is possible that the profile of phonics instruction was slightly raised in participating schools.

Table 4.2
The effect of Reading Recovery at second follow-up: a matched controls comparison

Mean Scores at Second follow-up: Reading Recovery Comparison				
Reading Measures	Within Schools		Between Schools	
	Reading Recovery (29)	Controls (30)	Reading Recovery (86)	Controls (87)
Reading Age at the beginning of the study	4 years 11 months		5 years	
Word Reading (Reading Age)	40 (7 yrs 4m)	32 (7 yrs)	34 (7 yrs)	24 (6 yrs 6m)
Prose Accuracy	25	19	20	13
Prose comprehension	9	6	7	5
Spelling	21	18	18	14

Table 4.3
The effect of a Phonological Intervention at first follow-up: a matched controls comparison

Mean Scores: Phonological Comparison				
Reading Measures	Within Schools		Between Schools	
	Phonological Children (n=91)	Controls (n=44)	Phonological Children (n=67)	Controls (n=67)
Reading Age at the beginning of the study	5 years 1 month		5 years 1 month	
Word Reading (Reading Age)	13 (5 yrs 11m)	14 (6 yrs)	14 (5 yrs 11 m)	11 (5 yrs 9 m)
Prose Reading	7	8	8	6
Book Level	7	8	7	7
Diagnostic Survey	- 0.2	- 0.1	- 0.2	- 0.5

In the comparison between Phonological children and children in Control schools, Phonological children, although making a bit more progress in reading than the Control children, were not significantly better off. Phonological children made a reading age gain of around ten months in the space of eight or nine months from pretest to first follow-up, as compared with the eight months gain made by the matched children in

the Control schools (Table 4.3). However, the Phonological children had made significantly greater gains in their phonological awareness and on the Diagnostic Survey. The three areas of their performance on the Diagnostic Survey responsible for this were letter identification, the written vocabulary test and the dictation test, which is specifically scored for phonic word analysis. As has been found by other researchers, phonic interventions seem to be particularly powerful in helping children of this age to write and spell.

Progress in the second year (when no intervention was given)

At second follow-up, comparing the Phonological children with the Control children attending the same schools (the within schools comparison), the intervention showed a positive but relatively small effect on every measure, with particular emphasis on the non-word reading and spelling. However, none of these effects reached statistical significance. Children who had received the Phonological Intervention had made significantly more progress in reading accuracy (although not in reading comprehension) and in spelling, as well as in the directly phonological skills measured in comparison with Control children attending other schools. This pattern of results could be explained by the hypotheses that phonological interventions are particularly powerful at improving children's spelling skills, which given time will improve their word recognition. The fact that children's reading comprehension was not significantly improved is consistent with the findings of other evaluations of primarily phonics-based reading interventions. Interventions with a narrower model of reading tend to have a narrower effect.

The evidence of the effectiveness of the Phonological Intervention is mixed. Phonological children were better off in several ways than the Control children attending different schools, but not substantially better off than Control children attending the same schools. The phonological children had the same average reading age as Control children attending the same schools. However, they were three months ahead of the matched controls in other schools (Table 4.4). The Phonological Intervention is certainly less effective than Reading Recovery and the effects narrower.

Groups of children for whom the interventions were particularly effective

When we looked at how subgroups of children with different characteristics fared under either of the two interventions, we found that Reading Recovery was particularly effective for children taking free school meals. Reading Recovery was also particularly effective for the least able readers in our study. What is the explanation for this interaction between poverty and the effectiveness of Reading Recovery? Is it likely that a higher proportion of the socially disadvantaged children had less experience of books before coming to school It is not surprising that children with very limited reading experience find reading difficult. Reading Recovery offers them an intensive, daily programme of reading books in a carefully controlled environment which enriches them. For children from homes and communities where reading is more highly valued but who still find reading difficult, the explanations of their problems are more likely to include internal causes, for example some genetic factor. It is plausible that those children will be more difficult to help, and that the widening of their reading experience for a fixed time is not sufficient to overcome their long-term problems.

Table 4.4
The effect of a Phonological Intervention at second follow-up: a matched controls comparison

Mean Scores: Phonological Comparison				
Reading Measures	Within Schools		Between Schools	
	Phonological Children (n=87	Controls (n=44)	Phonological Children (n=68)	Controls (n=68)
Reading Age at the beginning of the study	5 years 1 month		5 years 1 month	
Word Reading (Reading Age)	30 (6 yrs 1m)	31 (6 yrs 10m)	32 (6 yrs 11m)	26 (6 yrs m)
Prose Reading	17	18	18	15
Book Level	6	6	6	5
Diagnostic Survey	17	17	18	15

A summary of the intervention effects

Consistent with other research, Reading Recovery is found to be an extremely powerful method of improving children's reading and writing over a broad spectrum in the short term. Even in the longer term, differences between children in the Reading Recovery programme and children in Control schools are still highly significant, but the size of the effect is somewhat less. Reading Recovery children also make consistently better long term progress in reading and writing than Control children who attend Reading Recovery schools, although the differences are not statistically different. The fact that there was a systematic effort made to disseminate various aspects of Reading Recovery practice to the classroom teachers in the Reading Recovery schools may account for this. Socially disadvantaged children benefited particularly from Reading Recovery.

The effect of the Phonological Intervention is much narrower and less powerful in the short term. In the longer term, Phonological children made greater gains than the Control school children in reading as well as in phonological awareness and writing. This is consistent with our understanding of the role of phonological awareness in the development of reading. In the initial stages, children rely more on whole word recognition for reading but use their knowledge of phonics to write and spell. In the current study, children's use of phonics in writing strengthened their ability to analyse the sounds in words and ultimately improved their reading at second follow-up. However, the lack of any apparent intervention effects when comparing Phonological children with children attending the same schools is disappointing. These findings provide only mixed support for Bryant and Bradley's work (1985) where a very similar intervention was found to improve children's reading and spelling considerably. It is possible that the Phonological Intervention is more effective if the same number of lessons are taught over two years, as was the case in the Bryant and Bradley study, rather than over two terms as in the present research.

The cost effectiveness of Reading Recovery as compared with other forms of reading support

The cost of Reading Recovery has always been a matter of concern. It is an intensive intervention and demands a year's inservice training for each Reading Recovery teacher. However, it would be mistaken to assume that children eligible to receive Reading Recovery are otherwise inexpensive to educate. These children, in the bottom 20 per cent of readers, are usually offered other forms of specialised help in the absence of Reading Recovery.

Specialised reading help at school level

Information was collected on the specialised reading help given to every child in the present study (help by a teacher in addition to that given by their classroom teacher). The average length of time spent in Reading Recovery was 21 weeks, during which time children received an average of 77 sessions each of 30 minutes duration. Over a 39-week school year, children thus received an average of 59 minutes Reading Recovery weekly. Children in the Phonological group received 40 ten-minute sessions, making an average of approximately ten minutes weekly over a 39-week year. Table 5.1 shows the average number of minutes specialised help given to all the children in the two years during which this was monitored.

Reading Recovery children received substantially more help than the children in the other groups during the intervention year. However, the children in Control schools also received considerable amounts of specialised help with reading. In the intervention year they received a weekly average of 21 minutes help, one-third of the amount received by Reading Recovery children. After the interventions are completed, the levels of specialised help given to children in the Control schools were still being maintained, unlike the Reading Recovery group who received minimal help in the second year. If this pattern were to continue, both these groups of children would have received the same amount of specialised help by the end of the junior school.

The cost of additional reading tuition: the teacher

The cost in terms of a teacher's time for taking one child through the programme would be approximately £1,000.[18] If supply teacher rates of pay were used, the figure would be lower, around £780 per year.[19] The cost per child for teaching time for the Phonological Intervention was £354.[20] 20 The cost for the teacher's time required to give the Control children 21 minutes individual help weekly would be in the region of £280.[21] Table 5.2 shows the approximate cost of the specialised help given to the different groups of children participating in the study.

Effectiveness of specialised help

The costs of each form of tuition must be compared with their effects on children's reading. Comparing Reading Recovery children with those in the Control schools, the Reading Recovery group made 25 months progress in their reading age over a 20 month interval as compared to the 19 month progress in the Control group. Thus Reading Recovery children made five months 'more progress' than might be expected on the basis of the standardised test scores in the time involved. Control children made a

month less progress in reading age than might be expected on the basis of standardised test scores despite the additional 21.5 minutes weekly specialised individual help over the two year period.

Table 5.1
Specialised Reading Help 92/93 and 93/94

	Specialised Reading Help: Means				
School/ Experimental condition	92/93 Minutes per week, excluding the intervention	92/93 Minutes per week provided in one-to-one intervention	92/93 Total specialised help	93/94 Minutes specialised help per week	92/94 Average weekly specialised help over two years
Read Rec. Schools					
RR children	3 mins	59 mins	62 mins	10 mins	36 mins
Control children	9 mins		9 mins	10 mins	9.5 mins
Phonological Schools					
Phonological children	12 mins	10 mins	22 mins	17 mins	19.5 mins
Control children	7 mins		7 mins	20 mins	13.5 mins
Control Schools	21 mins		21 mins	22 mins	21.5 mins

Table 5.2
Cost of specialised reading tuition (teacher time only)

	Specialised reading tuition			
Type of tuition	Average cost of tuition per child during the intervention year	Minutes tuition weekly	Cost of tuition if given for one hour weekly	Average cost of specialised tuition over two years (1992-94)
Reading Recovery children	£780-£1,000	59	£780-£1,000	£1030
Phonological children	£354	10	£2124	£581
Control children in Control schools	£280	21	£840	£573

It is also possible to examine more accurately whether the amount of help given to Control children bore any relationship to the progress they made in their reading. For each school year separately, progress in reading was compared with the amount of specialised reading help the children received. There was no evidence that the amount of specialised help (number of minutes) in either year was significantly related to children's reading progress. This is not to say that children in the Control group did not benefit from specialised tuition: some may have made additional gains, some may have fallen back. But, although specialised help differed greatly from school to school, the composite picture is not encouraging. Our findings are consistent with evaluation studies discussed in the Full Report. A recent evaluation of remedial programmes in the USA[22] found that many tended to be narrow in their focus (described by the authors as "skill-and-drill") and to result in actual loss of total reading instruction time for the children involved. The children who were withdrawn were missing classroom reading instruction. A recent UK report by the Audit Commission[23] on the quality of the learning experience offered by some special needs teacher in primary schools commented that lessons often lacked pace, that there was a lack of assessment, and in some cases there was a low level of pupil expectation.

For the two year period covered by the evaluation, each Reading Recovery child cost approximately £1,030 (£890 in the first year and £140 in the second year) in extra teacher time. For the same period, the children who received the Phonological Intervention cost an estimated £581 and the children in Control schools cost £573. We could measure no gain in reading that could be attributed to the expenditure of the £573 per control child, using either their gain in reading age as compared with the standardised scores, nor any extra gain for larger amounts of specialised help.

It is not sufficient to offer children specialised help: that help must be of a high standard. It could be argued on the basis of this evaluation that the specialised help given to the Control children was, in fact, the most expensive, compared with Reading Recovery and the Phonological Intervention, in terms of value for money.

The Phonological Intervention cost little more than the normal provision for these poor readers, but the Phonological children's reading and spelling were significantly better than that of the Control children in the Control schools.

Conclusions on the issues of cost-effectiveness

The cost of specialised help given to children on the Reading Recovery programme was considerably more than that spent on either the Phonological or the Control children. However, the cost gap between Reading Recovery and the other interventions had already narrowed between first and second follow-up, and it seemed likely that it would narrow further. This was due to the fact that a substantial amount of specialised help was offered to Control children with reading difficulties and it was offered in each year of the study, whereas the cost of Reading Recovery was concentrated in the intervention year. Moreover, there is some evidence that cost of Reading Recovery drops as teachers become more efficient in its use. Most of the teachers whose children have been evaluated in the present study were in their first post-training year. It is not possible to look at long-term cost benefits at this stage, but there are considerable long-term costs associated with illiteracy.

In terms of value for money, it seems fairly clear that the specialised help offered in the Control schools was the least cost-effective. For a marginally greater cost the

Phonological Intervention offered a significantly greater improvement in reading and spelling. The cost of Reading Recovery was substantially more in the short term, but then so was pupil progress. The costs of all forms of specialised help go beyond the school-based cost of the teacher. Training, management and monitoring are invariably involved and a cost of the Phonological Intervention. Much of the ongoing expense associated with Reading Recovery at LEA level is probably an essential aspect of any well run special needs section.

Summary and conclusions

Both interventions we evaluated have been shown to be effective in other studies. In the present study 180 children with initial reading difficulties were offered one or other of these interventions and compared with approximately 200 similar children who received their normal school programme (the Control children). Both the 89 children who went on the Reading Recovery programme and the 91 who received the Phonological Intervention on average made significantly better progress in various aspects of reading and writing when compared to the Control children. Effects of both interventions on the Children's reading progress were still apparent one year after the interventions had been completed.

Reading Recovery was the more powerful intervention, improving children's performance both over a wider range of skills and producing larger gains than the Phonological Intervention. However, it was also the more expensive. The Reading Recovery intervention was particularly effective for socially disadvantaged children who are overrepresented in special needs programmes.

We finish as we began by emphasising that the subject of this evaluation is of great importance. Children with reading difficulties suffer in our society and are disadvantaged as adults. Both on grounds of individual compassion and economic commonsense, the prevention of reading difficulties in children must be a priority. In the foregoing evaluation we have demonstrated that it is possible to tackle this problem effectively. We hope that our findings will be put to good use.

References

Allington, R., & McGill-Franzen, A. (1990). Children with reading problems: How we wrongly classify them and fail to teach many to read. *ERS Spectrum, 8*, 3-9.

Audit Commission. (1992). *Getting in on the act: Provision for pupils with special educational needs: The national picture*. London: HMSO.

Becker, R., & Gersten, R. (1982). A follow-up of follow through: the later effects of the Direct Instruction Model on children in fifth and sixth grades. *American Educational Research Journal, 19*, 75-92.

Bradley, L. (1981).The organisation of motor patterns for spelling and effective remedial strategy for backward readers. *Developmental Medicine and Child Neurology, 23*, 83-91.

Bradley, L. (1984). *Assessing reading difficulties: A diagnostic and remedial approach*, 2nd edition. London and Basingstoke: Macmillan.

Bradley, L. (1988). Making connections in learning to read and to spell. *Applied Cognitive Psychology, 2*, 3-18.

Bryant, P., & Bradley L. (1985). *Children's reading problems*. Oxford: Blackwell.

Clay, M.M. (1979). *Reading: The patterning of complex behaviour*. Portsmouth, NH: Heinemann.

Clay, M.M. (1985). *The early detection of reading difficulties: A diagnostic survey with recovery procedures*, 3rd edition. Auckland, NZ: Heinemann.

Clay, M.M. (1987). Implementing Reading Recovery: Systemic adaptations to an education innovation. *New Zealand Journal of Educational Studies, 22*, 35-58.

Clay, M.M. (1993). *The early detection of reading difficulties: A diagnostic survey with recovery procedures*. Auckland, NZ: Heinemann.

Meyer, L.A. (1984). Long-term academic effects of Direct Instruction Project follow through. *The Elementary School Journal, 84*, 380-394.

Schweinhart, L.J., & Weikart, D.P. (1993). *A summary of significant benefits: The High Scope Perry pre-school study through age 27*. Ypsilanti, MI; High Scope, UK.

Sylva, K., & Hurry, J. (1995). *Early intervention in children with reading difficulties: An evaluation of Reading Recovery and a Phonological Training. Full report*. London: School Curriculum and Assessment Authority.

Endnotes

1 A more detailed account of the research is available in the Full Report of this project, Sylva and Hurry, 1995.
2 Their knowledge of the most basic aspects of print, eg that print carries a message, that we read from left to right, the difference between a word and a letter, etc.
3 Becker & Gersten, 1982, Meyer, 1984.
4 Schweinhart & Weikert, 1993.
5 Bradley & Bryant, 1985.
6 Clay, 1987.
7 Clay, 1979.
8 Clay, 1985.
9 Sylva and Hurry, 1995.
10 Clay, 1993.
11 eg Bryant & Bradley, 1985.
12 Bradley, 1984, 1981.
13 Bradley, 1988.
14 Four children changed condition in the Reading Recovery schools, from Control to Reading Recovery. These children all received Reading Recovery late in the school year 92/93 and for a small part of the Autumn term 93/94. For first follow-up they were tested pre-Reading Recovery.
15 Level 1 texts are the simplest caption books suitable for children with very limited reading skills. Level 26 translates to a reading age of between eight and a half and nine and a half (Glynn et al. 1989, p. 9).
16 They were always the bottom three or four readers in their school, whereas the 'within school' Control children were the next poorest readers. The children in the Phonological Control schools were selected from the bottom six children.
17 Children in the matched groups were matched on the basis of their initial scores on the Diagnostic Survey. Statistical analyses were carried out on the full sample as well, and confirm the results shown for the matched groups. These analyses are available in the Full Report, Sylva & Hurry, 1995.
18 The Reading Recovery teacher's reported average salary worked out roughly as £1,000 per annum for each hour worked with pupils per week. This figure, which was for 92/932, does not include on-costs, National Insurance costs or superannuation.
19 Estimating £100 per diem, for 5 working hours, the cost of 1 hour per week for 39 weeks = £780.
20 This was the actual cost of teaching the children based on the research officer's salary (ie £17,000 pa including London weighting). This figure did not include training, traveling, supervision, etc.
21 Assuming an annual salary of £20,000 (including London weighting were applicable, but not N.I.C.s or superannuation).
22 Allington & McGill-Franzen, 1990.
23 Audit Commission, 1992.