

## Article

# Assessing the Differential Effects of Peer Tutoring for Tutors and Tutees

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**Abstract:** There is strong evidence that peer tutoring, as a form of cooperative learning, has a positive impact on tutor and tutee outcomes. However, little previous research has been reported as to the differential effects of engaging in cooperative learning in dyads for peer tutors and peer tutees, respectively. A randomised controlled experimental study was undertaken involving 295, 11- to 13-year-old students, drawn from 12 classrooms, across three secondary/high schools situated in areas of low-socio-economic status, in the north east of England. In total, 146 students engaged in cooperative learning for a period of 12 weeks, and 149 students served as a comparison group. Gains were significantly greater on independent standardised reading comprehension tests for those engaged in cooperative learning than those in comparison classes, and greater for tutors than tutees. The results are explored by critically reflecting on the underlying theories of education that may be at play in classrooms using this form of cooperative learning.

**Keywords:** cooperative learning; peer tutoring; reading comprehension; paired reading; high school; secondary school



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## 1. Introduction

Peer tutoring (often referred to as 'tutoring') is a structured form of peer learning. It involves two students working together in a structured manner, with one taking the role as tutor, and the other taking the role as tutee. Paired reading is a form of peer tutoring that has been the subject of historical and recent research endeavor. There are a number of distinct forms of paired reading. Therefore, the literature presented in this manuscript will confine itself to reported research where the form of paired reading was of the same design and nature as the technique used by the research team in this study. Paired reading is generally implemented as a cross age/cross ability intervention, where the teacher manages the overall classroom, but has little individual interaction with pairs during the peer tutoring process. There is strong evidence that peer tutoring, as a form of cooperative learning, has a positive impact on both tutor and tutee, with an indicative average effect size (ES) of +0.48 [1]. It has been found to be particularly beneficial for children in high areas of social disadvantage and those with special educational needs [2]. However, previous studies have not explored the differential outcomes of peer tutoring/paired reading for those acting as peer tutor and peer tutee, respectively. The research used a randomised controlled trial experimental design to study whether tutors or tutees gain greatest benefit when undertaking cooperative peer learning (in the form of paired reading) in dyads, when reading in secondary/high school. The peer tutoring intervention reported in this manuscript was similar to a paired reading used in previous interventions that had been reported to result in positive ES of +0.2 in a randomised controlled trial in 129 elementary schools [3]. The peer tutoring intervention included training for teachers that focused on the theory and pedagogy of cooperative learning. Teachers implemented the intervention

over a 12-week time period, during which the research team made observations on the efficacy of the implementation in schools, and measured pre/post intervention changes in reading comprehension using an independent, age-standardised reading test.

Three interlinked theoretical perspectives are appropriate to consider when thinking about peer tutoring. Piaget [4] proposed that understanding developed in children, through the processes of assimilation and accommodation. If Piagetian based peer tutoring can provide the right balance between the disequilibrium, caused through cognitive challenge, and social exchanges between peers, effective learning takes place [5]. In the described process of paired reading that follows, this process may be thought to be in action when students acting as peer tutors correct reading errors of peers to improve the lexicon of their tutees. The second theoretical frame at play in paired reading is Vygotsky's theories around supported performance and the Zone of Proximal Development [6–8]. This process will be evident in paired reading as the peer tutee is asked to pick a challenging book that is just beyond their independent readability level. The third theoretical perspective that is relevant here is Social Interdependence Theory [9,10]. This combines elements of individual and group performance. Peer tutoring, in the form of paired reading, involves cognitive challenge from peer tutors and post-interactive reflection and restructuring by tutees. Both tutor and tutee have to fulfil their roles effectively. This creates a social interdependence between tutor and tutee that underpins cognitive developments. The individual successes of tutors and tutees are linked through common goals, and mutual interdependence on each other, for gains to accrue. Without both tutor and tutee performing their roles in accordance with prescribed patterns for interaction, neither can gain benefit from the interaction. For co-operative learning to be most effective during peer tutoring/paired reading, social interdependence must be present in the form of:

- Goal structure (the pair worked together with the aim of reading a book)
- Positive interdependence (in the peer tutoring process, clear patterns for interaction were defined for both the tutor and tutee)
- Individual accountability (both the tutor and the tutee had responsibilities in paired reading, each had to reflect on their own performance and the performance of their peer partner at the end of a session)
- Interaction patterns (the peer tutoring process was structured to stimulate promotive interaction, group processing and enhanced social skills).

Paired reading is a structured form of cooperative learning, with high focus error correction, questioning for understanding, and formative feedback on performance [11]. During paired reading, two students read a book together. The peer tutor is generally an older student with more advanced reading comprehension ability than the tutee [11]. The text read should be above the independent reading age of the tutee, but below the independent reading ability of the tutor. This allows the tutor to correct any errors in reading. In addition, the tutor needs to understand what is read, and think about what questions need to be asked of the tutee during the interaction. The tutee needs to answer questions posed by the tutor. Without the appropriate gap, both tutor and tutee can be under stimulated [12]. Both of these processes require social interdependence [9,10] and processing of prior knowledge using a metacognitive strategy to link previous learning to the text being read. This also facilitates self-regulation and should concomitantly result in enhanced metacognition [13]. This may facilitate assimilation of the learning and accommodation of new ideas, eventually leading to the development of new cognitive understandings and equilibration as a result of post-interactive reflection.

When paired reading is implemented with reasonably high integrity, improvements in reading comprehension are typically good [3,14,15]. Paired reading has been reported to be an effective way of raising reading attainment in both primary/elementary aged students [16] and secondary/high school aged students [11]. In an experimental study, positive effect sizes were reported for experimental classes in respect of the number of words read correctly in reading aloud (ES = +0.22), and the number of questions answered correctly about passages read (ES = +0.55) in a study of paired reading in 20 experimental and

20 control schools. The study involved paired reading amongst nine-and-a-half-year-old pupils for 35 min per day, 3 days a week over a 15-week period [17]. Process observations have been reported to be an effective way of assessing implementation integrity in paired reading initiatives. In a 4-year study involving 33 control and 56 experimental students aged 7–10 years-old, undertaking paired reading for 30 min per week process observations showed significant advantages for experimental pupils in reading aloud ( $F(2,46) = 21.26$ ,  $p < 0.001$ ), academic talk ( $F(2,46) = 10.34$ ,  $p < 0.01$ ) and question asking  $F(2,46) = 4.73$ ,  $p < 0.05$ ) when compared to control pupils. In this study, significant advantages in reading attainment were also reported for experimental pupils ( $F(2,175) = 16.43$ ,  $p < 0.0001$ ) [12]. In a small-scale study, paired reading was shown to enhance positive learning interactions amongst socially rejected and isolated boys during a five-week trial [18]. Cross-age co-operative learning in reading with second and fifth graders was reported to enhance reading attainment in a quasi-experimental study involving 454 students from 19 schools in Belgium. Multi-level modeling revealed gains for cross-age pairings, but no significant gains for same-age pairings compared to control groups [14,15]. Oral reading with scaffolding from teachers and parents was demonstrated to be effective at raising oral and silent reading ability in a randomised study of 400 students in Grades 3–5 [19]. Therefore, there is significant evidence that paired reading has beneficial effect on student reading comprehension attainment [3]. However, whether it is tutors or tutees who actually get the most gain is generally not reported. This is because results are reported as an overall effect for both tutors and tutees. This gap in the reported literature led to the development of the following research question:

What are the differential effects on reading comprehension, for tutors and tutees, when engaged in peer learning?

In order to answer this research question, a research programme was developed that had the following aims and objectives:

1. To recruit a sample of teachers and pupils in schools with sufficient power to explore whether there were differential outcomes for tutors and tutees when engaged in paired reading.
2. To use a pre/post-test randomised, controlled design to explore outcomes for tutors and tutees relative to a comparison group and test the hypothesis that tutors are likely to gain more during the paired reading process.
3. To undertake a process evaluation to look at the efficacy of the use of paired reading for tutors and tutees.

## 2. Materials and Methods

### 2.1. Reading Attainment Measure

The main outcome measure was the Granada Learning New Group Reading Test (NGRT). The NGRT was an independent, standardised measure of attainment in reading comprehension that involved students completing stand-alone sentences by filling in the missing word, choosing the correct word to complete sentences within passages of text and selecting the correct answer to questions about passages of text that were presented with increasing levels of difficulty. The versions used were electronic tests A (pre-test) and B (post-test). The computer test self-adapts according to the response of the test taker. This process continues until a convergence is reached between the difficulty level of the questions and the ability of the pupils to answer them correctly. Passages are also of different difficulty levels, and students are presented with texts of greater or lesser difficulty according to their previous answers. The tests are internationally available, independently designed instruments with good reliability. Cronbach alpha was reported to be 0.846 for a sample of 2574 students drawn from the schools selected in this study [20]. The NGRT measured two dimensions of reading comprehension: sentence completion and passage comprehension. These are combined to give an overall standardised reading age score, where 100 is the age-standardised score for the age of the child and 10 is one standard deviation from the norm. The choice of this reading comprehension test was made by the

funder who expressed a desire to be able to track reading comprehension development across a number of funded studies.

## 2.2. Observations

Researchers visited all six intervention classes to undertake classroom observations. These were conducted using standardised, previously validated, observation templates to determine efficacy of paired reading, developed in previous research [3]. All observations were conducted by one member of the research team. All data were recorded in written format, in real time. The observation process was as follows. Firstly, the observer made general written notes regarding the classroom atmosphere and structure for cooperative learning. Then the observer moved to undertake observations on the efficacy of the paired reading process. Whilst the class undertook paired reading, a random sub-sample of five pairs were selected for observation from each class. Behaviours were observed and recorded in real time during a series of three, one-minute observation windows for each of the five pairs (15 min total observation time). During observations, the researcher observed and recorded behaviours during reading and looked to record the frequency and efficacy of the error correction process (a process that should have contained a mistake in reading, a mistake corrected by the peer tutor, evidence that the tutee repeated the corrected word, and that the tutor praised the tutee for reading the mistaken word correctly), and also recorded the number of times the peer tutor asked questions about the book.

The format of each observation was as follows: Pair 1 was observed for a one-minute window and behaviours recorded. Next, pair 2 was observed, then pairs 3, 4 and 5. After the cycle was completed, observation again cycled to pair 1, pair 2, pair 3, pair 4 and finally pair 5 for the second window. This sequence was repeated for the third observation window (resulting in a 15-min period of observation). This meant that there were 90 one-minute observation windows spread evenly as 15-min observation periods undertaken in each of the six classrooms implementing paired reading. Behaviours were recorded as they were observed. So, for instance, if a pair was reading alone and made a mistake, the mistake was corrected by the tutor, praise was given, the pairs started to read together, and the tutee signalled to read alone; each of these behaviours would be recorded each time it occurred. Total behaviours in each category of observed behaviour were tallied for each pair. The same person conducted all observations. Reliability trials were conducted at the start and the end of the observations using pre-existing videos of the paired reading process to measure intra-rater reliability during the observation timeframe. The reliability trial involved undertaking observations on a 15-min prerecorded video. The mean alpha for observation reliability was 0.93.

## 2.3. Sample

The study was conducted in a large metropolitan borough in the north east of England, United Kingdom. It occupied around 80 km<sup>2</sup> and had a population of 191,659. The borough had areas of extreme deprivation, with at least one ward in the most deprived 1% of all electoral wards in the United Kingdom [21]. The project comprised 12 classes, including six Year 7 classes and six Year 9 classes, drawn from three of the eight secondary/high schools within this geographic area comprising 295 (149 control/146 intervention) students. The mean age of students at pre-test was 155.32 months (*SD* 12.48); Special Educational Needs provision was 101 students with Action/Action Plus and 10 Statement of Special Educational Needs. Six students were reported as having English as Additional Language. Ethnicity of the sample, as reported on the school information management system, reported by parents at school enrollment was: 283 Caucasian, 3 Chinese, 1 Pakistani, 1 White-Asian, 1 White-Other, 1 Asian-Other, 1 Black-Other, and 4 Other-mixed). Free School Meals rates were School A = 36.5%, School B = 30.1%, School C = 34.1%, compared to a national average = 28.8% [22]. Free School Meals are a measure of social deprivation often used in the United Kingdom. Children are entitled to Free School Meals if they received certain government benefits paid to families who have low incomes. The chronological age

of the sample at pre-test was 155.32 months ( $SD\ 12.48$ ), and the reading comprehension age determined by NGRT pre-test was 149.06 months ( $SD\ 37.81$ ). However, the range of chronological age was 137–174 months, whereas the range in NGRT reading comprehension age was 60–291 months.

#### 2.4. Randomisation

Classes were randomised to condition pairwise for each teacher who volunteered to implement the technique. Classes were grouped in pairs for each of the six teachers (12 classes in total). Then each pair of classes was randomised to condition using a random number generator programme for iPhone: Version 5.5 123 The Random Number Generator by Nicolas Dean. This was set to generate a number of 0 = control ( $n = 6$ ) and 1 = paired reading ( $n = 6$ ) classes. This generated a sample of equal number of classes, where control classes and intervention classes were taught by the same teacher. Teachers signed Memorandum of Understanding stating that they would only use the paired reading technique with target classes, and would use business as usual for control classes.

#### 2.5. Paired Reading

The paired reading technique involved supported reading, error correction, and switching between the tutor and tutee reading together, and the tutee reading alone. The book chosen by pairs had to be above the independent readability level of the tutee, but below that of the tutor and appropriate to their interest. This facilitated the tutor helping the tutee through the error correction process. Readability level was decided by using a simple test. Tutees randomly selected 20 words from the book from four different pages. If the tutee could read between 15 and 19 words, the book was deemed to be at the right level of readability. Tutees could select any genre of book or reading material (whether fiction, non-fiction, comic, magazine, newspaper). Teachers also occasionally checked the appropriateness of readability of books during observations. The tutor and tutee started by reading together. The tutee signalled to read alone. Upon making an error, the tutor waited 4–5 s and if the tutee did not self-correct, the error was corrected by the tutor. The tutee repeated the error word correctly and the pair read together again until the tutee signalled to read alone. The tutee read alone until the next error at which point the error correction process would be repeated. The tutor was also asked to formulate questions to ask the tutee as reading progressed. In the form of paired reading employed, the asking of questions was reserved for the role of tutor (as it had been in earlier iterations of the technique). The other important role for the tutor was to praise the tutee's reading. There was a set number of times to use praise which included after mistakes were corrected, when switching to reading alone, when the tutee was reading difficult sections of text independently and during reading alone by the tutee (e.g., for good use of expression). Both the tutor and tutee recorded sessions in a logbook. This noted what went well and what the pair were working to improve.

#### 2.6. Matching of Pairs

Pairs were matched on the basis of previous reading comprehension attainment. Students within classes were ordered from highest to lowest in reading comprehension attainment using the pre-test NGRT result. The top-attaining tutor in the Year 9 class tutored the top-attaining tutee in the Year 7 class; the second top tutor tutored the second top tutee in the younger class, and so on. Once matched, the advice given to teachers was that pairs stayed together for the duration of the intervention period. At the beginning of the intervention period, teachers were allowed some latitude to switch pairs who were clearly not able to form a working partnership. These processes were adopted on the basis that previous research indicated that an attainment gap was preferable to optimise the interactions and benefit within pairs [16]. The matching technique was originally reported and described in some detail by Fuchs et al. [17,23]. It had also been used for paired

reading in the Fife Peer Learning study which used a similar technique with primary school students [3]. A manual describing the technique used is available online [24].

### 2.7. Continuing Professional Development

The first continuing professional development (CPD) event for teachers took place at the end of February (one day), prior to the implementation of the 12-week peer tutoring programme in schools. In mid-April, following the implementation of four weeks of the programme in schools, a second CPD event was held (half day). Following implementation of the programme, a final CPD event was held.

### 2.8. Training of Pupils

Training videos were provided for the intervention classes. Videos were produced during the pilot study and contained local students demonstrating the technique with local accents. Video footage was captured and edited to ensure all the components of paired reading were represented in the training video.

### 2.9. Length, Duration and Implementation of Intervention

The intervention took place for 30 min, once per week, over a period of 12 school weeks. This spanned a period from February to July in one school year (given that both half-term and Easter holidays fell within this period). This gave a total minimum and maximum duration of between 4 and 6 h. When the technique was implemented, the teachers swapped half their students (i.e., half of the Year 9 students went to the Year 7 teacher's classroom, whilst half of the Year 7 students went to the Year 9 teacher's classroom).

### 2.10. Planned Analysis

Planned analysis was to look at post-test outcomes in reading comprehension for tutors and tutees engaged in paired reading, compared to a suitable control group, on the NGRT comprehension reading test using pre-test scores as a covariant in an ANCOVA statistical test. It was calculated that if previous effects from randomised trials were replicated, that to detect an effect size of +0.23, 295 students would be required to detect significant differences between groups at  $p > 0.05$  and 80% power, assuming that correlation between pre- to post-test was 0.7. The ES used in the power calculation was a best estimate based on previous reported ES from differing reading assessments (+0.2 [3] and +0.4 [24]) from studies that researched the same paired reading techniques used in primary/elementary school.

### 2.11. Ethics

The study was approached with equipoise underpinning expected outcomes. Although a randomised trial in younger children had previously been undertaken, no previous randomised controlled trial with children of the age in this study had been undertaken. Students in the control group were in a wait-treatment group. This meant that if positive outcomes accrued for those undertaking paired reading, the resources and training would be available to those students and staff who wanted to avail of them and had been in the control group. The research was approved by the School of Education Ethics Committee at Queen's University Belfast, but also had to receive individual ethical approval from every individual headteacher (this was because in the jurisdiction that this work was undertaken, any research undertaken in the schools must be ethically approved by the school headteacher). Opt-out consent was used at the individual student level, where students, or their parents, could opt-out of having their data used for research purposes.

## 3. Results

### 3.1. Effects of Paired Reading on Reading Comprehension Performance

Data from the NGRT are presented as an age-standardised overall reading comprehension score in Table 1. ANCOVA analysis indicated that those students acting as peer

tutors in the intervention made significantly higher gains on the overall age-standardised reading comprehension scale than those acting as peer tutees ( $F(1, 140) = 8.37, p < 0.05$ ). Statistical analyses using ANCOVA indicated that gains were significant on the overall age-standardised reading comprehension scale for Year 9 students acting as tutors ( $F(1, 145) = 4.29, p < 0.05$ ) than students in the control groups. Year 7 students in the intervention actually performed more poorly than controls, with a small negative Effect Size of  $-0.07$ , but analysis indicated that this difference was not significant ( $F(1, 139) = 1.63, p = \text{not significant}$ ). These results indicated that peer tutoring, in the form of paired reading, had significant benefit in reading comprehension to those students who acted as peer tutors.

**Table 1.** Granada Learning New Group Reading Test overall age-standardised reading comprehension scores for intervention and control students.

Scores and Effect Sizes for Year 9 Tutors and Year 7 Tutees			
	Pre-Test	Post-Test	Effect Size Intervention vs. Control
Overall age-standardised reading comprehension score	Year 9 Control $n = 73$	Year 9 Control $n = 72$	For tutors +0.24
	100.38 (13.59)	99.64 (15.44)	
	Year 9 Intervention $n = 74$	Year 9 Intervention $n = 74$	
	103.11 (13.38)	105.78 (15.96)	
	Year 7 Control $n = 76$	Year 7 Control $n = 73$	For tutees −0.07
	97.71 (14.31)	98.05 (15.64)	
	Year 7 Intervention $n = 72$	Year 7 Intervention $n = 67$	
	92.81 (13.07)	92.17 (14.68)	

### 3.2. Observations of Implementation Fidelity

Results of observations in classrooms are reported in Table 2. Adherence to the technique was good in most classrooms. The process of paired reading was implemented with high integrity in respect of seating arrangements and book choice. All pairs observed were appropriately seated and had selected a suitable book for the observation lesson. Observations indicated good implementation of the peer feedback and error correction. In total, 28 out of 29 errors were correctly spotted and corrected, during 90 one-minute observation windows, with the error rate being slightly lower than that reported in the Fife Peer Learning Project [25]. However, opportunities for praise were lower than optimal, being observed only 12 times (whereas the number of times praise was observed, should have been higher than the number of errors made, as the rubric was that the tutor praised the tutee after they corrected a word). Questioning was less frequent than had been observed in the Fife Peer Learning Project [25], with only 16 questions asked by peer tutors during 90 min of observation. Overall, observations indicated that teachers established paired reading in their classrooms and that tutors were monitoring reading, and correcting mistakes effectively. There was an indication that tutors could have helped tutees make sense of what was being read by asking more questions. No questions were asked by tutees during observations, but this is not a surprise as they were not required to ask any.

**Table 2.** Observations of reading in classrooms.

	Observation Totals per Behaviour				
	Reading process codes				
	Mistake made in reading by peer tutee	Peer tutor corrected the mistake correctly	Peer tutee read the mistaken word correctly, after tutor intervention	Peer tutor praises reading of tutee	Peer tutor asked a question to the tutee about the book
Total number of observed behaviours in amalgamated 90-min windows (6 times 15-min observations windows, one from each classroom)	29	28	28	12	14
Mean frequency of observed behaviours/minute	0.32	0.31	0.31	0.13	0.16

#### 4. Discussion

Overall ES for tutors were similar to those previously reported (ES +0.24 for tutors), for instance an overall ES of +0.24 was reported in the Fife Peer Learning study [3]. However, the overall ES of +0.09 for secondary school students (for all tutors and tutees) was lower than the overall ES reported for primary/elementary school students in the Fife Peer Learning study (note that the Fife study did not separate gains for tutors and tutees) [3]. The main difference between the current study and previous reported studies was the fact that analysis indicated that gains mainly accrued for tutors only, rather than for both tutors and tutees. It is often reported that peer tutors should gain more than peer tutees when undertaking peer learning. However, this is the first definitive evidence that this does in fact occur, as previous studies have only reported composite effects of peer tutoring for both tutors and tutees [25]. The asking of questions by peer tutors, whilst monitoring and correcting errors (which was done with a high degree of fidelity), is a demanding role. The hope was that the work would take place in the Zone of Proximal Development of the tutee, where they developed their lexicon and their understanding of what they were reading. On reflection, had the tutees been challenged to ask questions of their tutors during reading, this may have helped them develop a more complex understanding of the text. This would be so because to ask a question, the reader must have a metacognitive understanding of what is being read. The asking of questions by tutors only may account for why gains tend to accrue for tutors, rather than tutees. Educators might wish to examine how to increase cognitive demand for tutees during the paired reading process (e.g., is there a role for tutees to ask questions also).

Previous studies had predicted greatest gains using this cooperative learning technique for tutors in high poverty areas [26,27]. However, these reports were anecdotal. This study establishes, in a scientific study, that these benefits do accrue in that way for the sample of secondary/high school students from this background (the mean Free School Meal rate for this sample was 33.56%, compared to the national average of 28.8%), who also had lower than mean age-standardised reading comprehension attainment scores than the normalised sample with which psychometric properties of NGRT were established. In this study, it was tutors who showed the only significant gains. Inherent within the classroom organisation of peer tutoring dyads, there is often an embedded message about the status of students. Tutors are perceived as higher status than tutees [28]. Enhanced satisfaction with learning and achievement were reported in a sample of 104 twelve-year-old students in a reciprocal peer tutoring study. However, these gains were only evident when students were acting in the role of tutor [29]. This is why reciprocal tutoring has often been reported to be beneficial to use in schools [30]. It may also be a more plausible reason as to why gains mainly accrued for the tutor in the peer learning process.

It was noted that overall effect sizes on NGRT scores were modest (overall ES +0.13). This ES is lower than when the same technique was implemented in elementary/primary schools where reported ES was +0.2. However, the intervention reported here ran for only 12 weeks and this may not have been long enough for gains to maximise. In contrast, the Fife Peer Learning study ran over a period of 104 weeks [3]. In addition, there was some concern over the low number of errors being made during the cooperative interactions between students. In comparison, when implemented with Year 6 and Year 4 students in elementary/primary schools in the Fife Peer Learning study, mistake rates that were linked to optimal reading attainment gains were one mistake about every two minutes (a mistake rate of 0.5 mistakes per minute) [25]. However, the mistake rate in this study was approximately one every three minutes (a mistake rate of 0.32 mistakes per minute). The explanation for this may be that reading development for students in the sample had reached a stage where the range of new word attack skills, e.g., use of phonics to approach new or unknown words, was quite comprehensive. They were therefore able to pronounce words that were used in their selected reading efficiently. The widespread use of phonics teaching in England has resulted in a school-aged population who can read sentences they may not necessarily have full understanding of. This has been termed 'barking at print' [31]. Therefore, even when students did not know what a word meant, they would be able to say it without error. Alternatively, the interest level of students may not be matched by the reading level of books, as publishers and authors make books with readability age targets that are wide enough to appeal to a mass audience and are generally reported to be at a level akin to that of Year 4 and Year 6 students [32]. This level of readability would indicate a potential use of reading ages in books of about 144 months, where in fact the mean comprehension reading age determined by the NGRT test of the sample in this study was 149 months. This means that the book readability age ranges were likely to be below the reading comprehension age of the majority of the students. With this being the case, the error correction component of paired reading is only likely to be beneficial in similar secondary/high school settings for those of low literacy attainment. A larger randomised controlled trial reported that it was only low reading comprehension-attaining tutors in secondary/high school settings in the north east of England that benefited from use of paired reading techniques similar in nature to the use of paired reading reported in this study [20]. This may add weight to this argument. Other ways to optimise the use of paired reading may include ensuring that both tutees and tutors ask questions. This should enhance cognitive load on the tutees, bringing it closer to that demanded of the tutors. It may also create more opportunities for promotive positive interaction. This has been reported to be a fundamental requirement of successful cooperative learning techniques according to Social Interdependence Theory [9,10]. Finally, there may be a need to pay attention to the use of praise. Given the way that self-concept in an academic subject area has been repeatedly shown to predict better future school attainment [33], it would make sense for tutees to be the recipients of praise that may raise their self-concept levels of themselves as a reader.

What were the sociological factors at play that may explain these results? According to Bourdieu [34–36], education achievements are not mainly determined by mental abilities, but habitus that develops within a specific social space through gradually assimilating the structural features of the context in which the actor is situated. Because the volume of cultural capital directly affects such structural features, when its strength increases, the actor is likely to develop an academic habitus and vice versa. Because habitus functions as a certain form of disposition, directing the actors how to perceive, judge and react towards the outside information, it becomes the core framework regulating people's minds and behaviours.

It has been well documented that linguistic abilities come to regulate cognitive development [8,37]. Code theory proposed by Basil Bernstein [38] looked at the range and type of language structures employed by families and within schools. Bernstein classified codes as being elaborated when language and discourse were rich, and children grew up being

able to articulate themselves effectively. This theory provides a convincing insight into the linkage between cognitive development and linguistic abilities. This language-rich culture thus facilitates the children's development of an elaborated code that helps them undertake logical reasoning and decode the theoretical, and often abstract, concepts embedded within texts that they are exposed to in school. This is particularly important when undertaking reading comprehension work, when students must move from the text to abstract conceptualisation of meaning. Those students with poor reading comprehension may well lack the development of this required 'scholastic' code. In this manner, texts can be conceptualised as vertical discourse, and characterised as theoretical, systematic and logical [39]. Students growing up in linguistic or literacy poverty, where their language may not be stimulated to the same extent as children from more literate backgrounds and homes, may be afforded fewer opportunities to expand their ability to express abstract terms in verbal discourse, developing the required lexicon and comprehension to fully articulate with school-based texts [39]. As a result, they tend to develop a restricted code (the features of which have been reported to be short, unorganised and unsystematic discourse). Because a restricted code differs greatly from the written language often found in books, it can then be difficult for students with less well-developed language skills to understand the abstract meanings of texts and make the jump from text to abstract imagination of meaning [40]. In order to improve their outcomes when learning, weak social relation such as that which occurs during groupwork/cooperative learning (weak framing) can help to transform vertical discourse (strong classification) into understandable information [41].

Findings from this study suggest that peer tutoring/cooperative learning, along with extended periods of academic learning comprising language rich experiences, are two core elements in developing the linguistic structures and competency to become a successful comprehender of written text. The language immersion of the paired reading processes, by which high quality discourse about text in a suitably structured environment is shared, provides a good context and medium in which to develop linguistic and literacy skills for students who have been unable to develop these skills previously.

#### *Limitations*

This study had a number of limitations. The sample size was low and drawn from a limited number of school settings. There is a need to undertake a study with a wider number of schools, classes, teachers and students. Classes were assigned to condition at the class level, so interpretation of individual analysis is problematic. There is now a need to undertake a cluster randomised controlled trial of paired reading that takes account of potential clustering effects in design and analysis. There is also a need to explore for which students gains accrue. This study appears to indicate that gains are most likely to accrue for those acting in the role of tutors. There is also a need to explore where gains accrue in terms of reading comprehension ability, to determine whether paired reading in secondary/high school should be a general or targeted intervention.

#### **5. Conclusions**

In conclusion, the observed effects of paired reading in primary school settings do not transfer for all pupils in a secondary school implementation. Gains are greatest for those acting in the role of tutor. This may be due to reading ages of texts not being high enough to provide challenge and extend the lexicon of tutees. Reading comprehension ages are likely to be lower than the chronological age of secondary school students, but higher than the readability of available texts at an appropriate interest level for students. There was some evidence for this in the fact that mistakes made were at a lower rate than those reported for a sample using the same technique in primary school [25] However, further work is required to explore these patterns in more detail, and determine whether they can be generalised to a larger population of students.

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**Data Availability Statement:** The anonymised data set is publicly available from the ‘Activities’ section of Allen Thurston’s homepage at Queen’s University Belfast at <https://pure.qub.ac.uk/en/persons/allen-thurston/activities/> or by emailing Allen (details above).

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