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Reading Difficulties in Children: The Role of Language and Cognitive Processes

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***Abstract*:** *Language and word decoding skill along with cognitive processes underlying reading comprehension difficulties of children were investigated by means of two different studies. In study1, good and poor comprehenders of Grade V of some Odia medium schools of Cuttack, Odisha matched for age and intelligence (measured by RCPM) but differing with respect to their reading comprehension skill were examined for their proficiency in word decoding and PASS (Planning – Attention – Simultaneous – Successive) processes in which the poor comprehenders were deficient. Both the reading skills also showed significant relationship with each of the four PASS processes. In study 2, on the other hand, good and poor comprehenders of Grade IV of some English medium schools of Cuttack, Odisha matched for their age and overall intellectual functioning in terms of PASS processes (measured by CAS) were studied further for their proficiency in word decoding and each of the four PASS processes separately. Poor comprehenders were found deficient not only in word decoding, but also in simultaneous processing while their competence in the remaining three processes was absolutely normal. Both the reading skills also showed significant relationship with the simultaneous process. The results have been discussed in terms of proficiency in the requisite linguistic skills along with competence in the cognitive processes that ensures successful accomplishment of the tasks at hand and suggestions have been made for possible remediation of the problems in that direction.*

Keywords*: Word decoding, Reading comprehension, PASS processes, Language , Mode of instruction* **.**

I. Introduction

Children need mastery over two different but interrelated skills, namely, word reading, i.e., decoding and reading comprehension, i.e., understanding the words in the context in order to attain proficiency in reading. In fact, the ability to read words in isolation is necessary, but reader's ultimate goal is to comprehend what they read. Many poor or disabled readers experience difficulty in both, while some are found to have problems only in comprehension and thus, are referred to as poor comprehenders. Such difficulties of children have been studied on the basis of several studies carried out within the framework of PASS model of intelligence in the last two decades (Das, Naglieri, & Kirby, 1994; Das, Parrila & Papadopoulos, 2000; Dash & Dash, 1999; Mahapatra & Dash, 1999).

PASS (Planning-Attention-Simultaneous-Successive) theory proposes that cognition is organized in three systems, namely, planning, attention, and coding. The planning system is an executive control system responsible for controlling and organizing behavior, selecting or constructing strategies, and monitoring performance, whereas, the attention system is responsible for maintaining the arousal levels and alertness and ensures focus on appropriate stimuli. The coding or the information processing system, on the other hand, employs simultaneous and successive processes to encode, transform and retain information. In simultaneous processing the between items and their integration into interrelated larger units of information is the focus, while in successive processing information is coded in a manner so that the only links between the items are sequential in nature. The PASS processes are carried out in different blocks of the brain involving the lower as well as the higher brain centres.

Earlier studies in the field carried out in Western culture as well as in Indian set up reveal that PASS processes are essentially involved in reading and determine one's proficiency in the two skills of reading (Das, Naglieri & Kirby, 1994; Das, Parrila & Papadopoulos, 2000; Dash & Dash, 1999; Kirby et al., 1996; Mahapatra, 1989, 1990; Mahapatra & Dash, 1999; Senapati, Pattanaik & Dash, 2012).

The recent studies in reading literature, however, focus on reading comprehension difficulties of children, particularly, the heterogeneity of such children with respect to language and cognitive skills (Cain & Oakhill, 2006; Kendeou, Broek, white & Lynch, 2009; Nation, Clarke & Snowing, 2002). Thus, while some children exhibit weakness in oral language and decoding skills, some are found to have a general cognitive impairment, and still some others, a weakness in verbal domain only. However all these studies have been carried out in western culture. Moreover the contribution of PASS processes to the variations in comprehension skill among children is yet to be studied. In the present investigation, therefore an attempt has been made in this direction by means of two different studies as described below.

Study 1

Objective: The objective of Sudy1 was to examine the difference between good and poor comprehenders with respect to their competence in word decoding and PASS processes and the relationship of these processes with the two skills of reading. These participants were to be studied for their reading skills in their first language (mother tongue) i.e., Odia which was also the mode of instruction at the schools from where they were selected. It was expected that good comprehenders would be superior to the poor comprehenders with respect to the PASS processes and all the processes would show significant relationship with the two skills of reading. But whether the two groups would differ with respect to their word decoding skill was to be seen.

II.1 Method

II.1.1 Sample: The sample consisted of 50 good and 50 poor comprehenders of Grade-5 selected from a population of approximately 340 children of the same grade covering four Odia medium schools in the City of Cuttack, Odisha. The mean grade level attained in terms of reading comprehension was 5.9 (about 1 grade above their actual grade) for the good comprehenders and 2.9 (about 2 grades below their actual grade) for the poor comprehenders whereas all were normal with respect to their general intelligence, i.e. within 40th to 60th percentile of the intelligence score distribution as indexed by their performance on RCPM. The children had also no report of any serious medical or psychiatric problem. The subjects were selected from both the sex groups with a mean age of 10 years in each group and were from middle class families.

II.1.2 Tests: The good and the poor comprehenders were selected on the basis of their intelligence and reading competence as measured by Raven's Coloured Progressive Matrices and Graded Reading Comprehension Test respectively. Then each subject received the Oral Reading Test (Dash, 1982) and a series of cognitive tests designed to measure the word decoding skill and planning, attention, simultaneous and successive (PASS) processes respectively. All the tests of PASS processes except Serial Recall and Planned composition were selected from the test battery known as Cognitive Assessment System (Naglieri and Das, 1987, 1988). The tests, their characteristics and scoring procedures are described below.

Raven's Coloured Progressive Matrices. This is a widely used culturally reduced test of intelligence for children aged 5 to 11 years. Consisting of 36 matrices or designs, each having a part which has been removed, the test requires the subject to choose the missing part from six possible alternatives. The 36 matrices are grouped into three series and each series is comprised of 12 matrices of increasing difficulty. Each correct identification carries a score of '1'. Hence, the maximum possible score for the test is 36.

Graded Reading Comprehension Test. Developed by Mohanty and Sahoo (1985), this test is used for children of Grades 1 through 7. This test consists of some passages written in Odia which the subject is given to read and subsequently to answer some questions based on them. A score of '1' is given for each correct answer with the maximum score for the test being 86. The obtained score is then converted to a grade score. The test is discontinued following subject's failure to answer any of the questions of a passage. Oral Reading Test. This test which is an Odia adaptation of Schonell's Word Reading Test and was used by Dash (1982) consists of one hundred Odia words. The words are of varying complexity and difficulty which the subject is required to read aloud. A score of '1' is given for each correct pronunciation with the maximum score for the test being 100. The test is discontinued with 10 consecutive errors, i.e., the incorrect pronunciations. Matching Numbers. This a non-verbal test of planning. The test consists of numbers of increasing length arranged in rows in its three parts. Each row in each part consists of six numbers, two of which are identical which the subject is to find and underline within a time limit of 2 minutes per part. Each correctly identified pair of numbers carries a score of '1' with the maximum possible score for the test being 24.

Planned Composition. This is a verbal marker test of planning which requires the subject to write a story after seeing a picture card which is chosen to be the Card No.2 of the Thematic Apperception Test (TAT). The story written by the subject is rated by the investigator for expression, organisation, and individuality. The maximum score for each aspect is 7. Hence, the maximum possible score for the test is 21.

Receptive Selective Attention. In this test of attention, picture pairs are shown to the subject under two different conditions, namely, physical match and name match. The subject's task is to identify the pairs that look same in physical match condition (e.g. 2 roses, 2 dogs, etc.) and those which belong to same class in name match condition (e.g. 2 flowers, 2 animals etc.). Each correct identification carries a score of '1'. The maximum possible score in each condition of this test is 20.

Auditory Selective Attention. There are two conditions in this test of attention. In condition I the subject listens to some 'colour' and 'fruit' words in both male and female voices and tap hand on the table by hearing the man saying the 'fruit' words. In condition II, on the other hands, the subject listens to some 'animal' and 'flower' words in both male and female voices and tap hand on the table by hearing the man saying the 'animal' words and the woman, the 'flower' words. The score is calculated by deducting one third of the incorrect responses from the total number of correct responses given by the subject in each condition.

Figure Memory. This marker test of simultaneous processing consists of simple geometric patterns. The subject's task is to remember each pattern within a period of 5 seconds and subsequently locate and outline the same as embedded within a more complex pattern. A score of '1' is given for each perfect outline, with the maximum score for the test being 20. The test is discontinued after 4 consecutive failures.

TokensTest. This is a marker test of simultaneous processing in which the subject is required to produce some patterns using the concept of 'shape and colour' in various combinations as per some statements presented verbally to him or her. Each correct response carries a score of '1' with the maximum score for the test being 20. The test is discontinued after failure on 4 consecutive items.

Serial Recall. This marker test of successive processing was used by Dash (1982). The test consists of 12 sets of words, four from each of four-word, five-word and six-word series. After one presentation of each series, the subject is asked to recall it in correct serial order. The total number of words recalled in correct serial order constitutes the score of the subject on the test. The maximum possible score for this test is 60.

Speech Rate . This too is a marker test of successive processing, which requires the subject to take note of a 2 digital number triad and repeat it 10 times continuously from memory as fast as possible taking care not to commit any mistake. The articulation time, i.e., the time taken by the Subject to repeat the triad 10 times and errors committed are recorded from which the mean articulation time for correct repetitions is calculated and used as the score of the subject on the test.

II.1.3 Procedure: The tests were administered in Odia, the mother tongue of the subjects following establishment of adequate rapport with them and exposure to a few practice items. The children were tested individually in their respective schools, but in separate rooms free from any kind of disturbances. The tests were administered as per the instructions given in the test manuals but in three different sessions. Thus, the tests of intelligence and reading were administered in the first and the second sessions respectively which were 1day apart. The rest of the tests were administered in the third session. The order of the tests in these sessions was same as described in this section and was also balanced within the sessions. The subjects enjoyed performing on the tests.

III.1 Results

Keeping in view the objectives, the data were analyzed by means of't' test and correlation analysis. The results have been presented in separate tables.

Results of ' t' test: The subjects were given the Oral Reading Test and Graded Reading Comprehension Test following their performance on RCPM. The means, standard deviations and't' values in respect of these tests are presented in Table1.1.

Table 1.1 Means, Standard Deviations and t Values Showing Group Differences on Measures of Intelligence and Reading (N = 50 in each group)

Measure		Good Comprehenders	Poor Comprehenders	t
RCPM	Mean	25.34	24.98	1.15
	SD	1.51	1.62	
Graded reading	Mean	70.00	32.52	20.18**
Comprehension	SD	4.56	12.32	
Oral Reading	Mean	69.34	55.90	4.75**
	SD	11.74	16.20	

**p < .01

It may be seen from Table 1.1 that the groups of good and poor comprehenders who were matched for their intelligence, differed significantly from each other with respect to their skill of word reading. In other words, poor comprehenders were also deficient in word decoding; a base level skill of reading that indicates the reader's facility in lexical access. The correlation coefficient between word decoding and reading comprehension was found to be 0.51 which was found to be significant ($p < .01$) indicating the relationship between the two skills of reading. The good and the poor comprehenders were then tested for their competence in planning, attention, simultaneous and successive processes. The means, the standard deviations and't' values for these tests are presented in Table 1.2.

Table 1.2 Means, Standard Deviations and t Values Showing Group Differences on Measures of Attention, Simultaneous Processing, Successive Processing, and Planning (N = 50 in each group)

Measure		Good Comprehenders	Poor Comprehenders	t
Receptive Selective Attention				
Physical Match	Mean	19.58	19.08	1.77
	SD	1.06	1.70	
Name Match	Mean	16.50	14.28	3.25**
	SD	3.11	3.69	
Auditory Selective Attention				
Condition I	Mean	56.80	52.85	1.47
	SD	11.37	15.23	
Condition II	Mean	40.35	34.11	2.39*
	SD	11.14	14.68	
Simultaneous				
Figure Memory	Mean	9.92	9.22	1.86
	SD	1.75	2.00	
Tokens	Mean	8.70	5.14	4.98**
	SD	3.65	3.49	
Successive				
Serial Recall	Mean	45.18	35.90	4.89**
	SD	7.31	11.25	
Speech Rate	Mean	0.72	1.10	2.02*
	SD	0.40	1.26	
Planning				
Matching Numbers	Mean	21.74	20.22	2.71**
	SD	2.25	3.27	
Planned	Mean	12.26	7.26	7.43**
Composition	SD	3.76	2.92	

*P < .05, ** p< .01

It may be seen from Table 1.2 that good comprehenders were superior to poor comprehenders with respect to the two tests of planning measuring strategic search and organization of information, one of the two tasks of each of receptive (name match task) and auditory measure (condition II task) of attention both of which involve focus on semantic processing of information, one of the simultaneous measures (Tokens) that involves understanding of logico-grammatical relationship among information and both the successive tests that involve sequential processing and memorization of information.

Results of correlational analysis

The relationship of word decoding and reading comprehension with the four PASS processes was also studied by means of corelational analysis the results of which are presented in Table 1.3.

Table 1.3 Correlation Coefficients for Measures of Reading and Cognitive Processes for Good and Poor Comprehenders (N=100)

Measure	Sel. Attn. (Rec:PM)	Sel. Attn. (Rec:NM)	Aud. Sel. Attn. (C1)	Aud. Sel. Attn. (C2)	Fig. Mem.	Tok. Test	Ser. Rec.	Nam. Time	Mat. Num.	Plan. Comp.
Oral Reading	.16	-.15	.22*	.32**	.11	.45**	.45**	-.42**	.23*	.55**
Graded Reading Comprehension	.04	-.27**	.19	.28**	.19	.55**	.47**	-.29**	.17	.65**

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

It may be seen from Table 1.3 that Oral Reading which measures word decoding correlated significantly with both Matching Numbers and Planned Composition, while, reading comprehension correlated significantly with Planned Composition. Similarly, Oral Reading was found to be correlated significantly with both the tasks of auditory measure of attention, whereas, reading comprehension correlated significantly with the name match task of the receptive measure and condition II task of the auditory measure of attention. Both the skills of reading also showed significant relationship with Tokens Test, the simultaneous measure and both the successive measures. Thus, all the PASS processes were found to be involved in reading but word decoding seems to involve deployment of strategies involving sequential as well as relational organization of information, whereas, reading comprehension seems to involve deployment of strategies involving logical-conceptual organization and integration of information in order to attain mastery in that skill.

IV.1 Discussion

The purpose of the present study was to examine the difference between good and poor comprehenders with respect to their word decoding skill and competence in the planning, attention, simultaneous and successive processes and the relationship of these processes with the two skills of reading. The participants were studied for their reading skills in Odia language.

Good comprehenders were found proficient in word decoding and also the processes of planning, attention, simultaneous and successive coding as revealed by the general trend of the results. The results made it clear that proficiency in reading comprehension needs adequate word reading skill and both the skills require not only selection of relevant information but also adoption of an efficient mode of information coding keeping in view the purpose of reading. The hypothesis framed in this connection, thus, is supported. Clearly then, the inability to utilize the appropriate strategies for information coding through requisite skills of attention gets combined with an inadequate knowledge of vocabulary, syntactic and semantic rules to give rise to reading difficulties among poor comprehenders even when the mode of instruction at school is in their first language, i.e., the mother tongue to which they are expected to have adequate exposure.

Study 2

Objective: The objective of study 2 was to examine the difference between good and poor comprehenders in word decoding and each of the four PASS processes, i.e., planning, attention, simultaneous and successive coding while their overall intellectual functioning in terms of these processes was normal. These participants were to be studied for their reading skills in their second language i.e., English which is also the mode of instruction in the schools from where they were selected. It was expected that good and poor comprehenders would show varying levels of competence in these processes. Whether they would differ with respect to their word decoding skill was to be seen.

II.2 Method

II.2.1 Sample: The study involved a sample of 30 children, 15 good and 15 poor comprehenders selected from two English medium schools of the City of Cuttack, Odisha. All children were reading in Grade IV, but when tested, good comprehenders on average were found to be slightly above their own grade (mean Grade Equivalent Score 4.1) whereas, poor comprehenders on average were 1.8 grades below their actual grade (mean Grade Equivalent Score 2.2) in reading comprehension. The children in both the groups were 'average' with respect to their overall intellectual functioning in terms of PASS processes as indicated by their Full Scale Score on Cognitive Assessment System which was within the range of 90-109. All the children came from the same age bracket (8-10 years), same socio-economic background (higher than average) and from both the sex groups.

II.2.2 Tests: The tests used in the present study were Woodcock's Reading Mastery Tests - Revised (1987) and Das-Naglieri Cognitive Assessment System (1997b). These were used to assess the subjects' strengths and weaknesses in the skills of reading and the PASS processes respectively. The tests and their scoring procedures are described below.

II.2.2.1 Reading Tests**:** Word Identification. This test which measures the word reading skill was taken from Woodcock Reading Mastery Tests-Revised (1987). The test requires the subject to identify the words and read them aloud. A natural reading of the word within five seconds is considered to be the correct response and yields a score of '1'. The task is discontinued after six consecutive errors i.e., mispronunciation of words.

Passage Comprehension**.** This test which measures reading comprehension skill was taken from Woodcock Reading Mastery Tests-Revised (1987). The test consists of 68 short passages arranged in the order of increasing difficulty. The subject is required to read silently each passage and identify a key word missing from it which is represented by a blank line. The subject's total score is the number of correctly filled blanks. The test is discontinued after six consecutive errors.

II.2.2.2 Cognitive Assessment System: The subject's strength in PASS processes was assessed using the Basic Battery of Das - Naglieri Cognitive Assessment System (CAS; Naglieri & Das, 1997b) designed for use with children and adolescents ages 5 through 17 years. The total score on the test is called the Full Scale Score.The Basic Battery of CAS consists of eight subtests, two from each of the four PASS processes. A brief description of each subtest along with its scoring procedure is presented below.

Planning Scale

Matching Numbers. In this test the subject is presented with three pages each containing eight rows of numbers with six numbers per row and is required to find and underline the numbers that are identical. The score on the test is calculated by combining both time taken and number correct in each page.

Planned Code .This subtest consists of two pages. In each page there is a distinct set of codes arranged in seven rows and eight columns with a legend at the top of the page which indicates how letters relate to simple codes. The subject's task is to fill in the correct code beneath each corresponding letter in any manner he/she chooses that is by adopting some strategy for the same within the time limit of 60 seconds. The score is calculated by combining both the time and number correct in each page.

Attention Scale

Expressive Attention. This subtest is similar to Stroop Test and consists of 3 pages. On the first page, the subject read some colour words (i.e., Blue, Yellow, Green, Red) and on the second page, he/she names these colours printed on it. On the third page, the colour words are printed in a different ink colour than the colour the words name (e.g., the word Blue may appear in Green ink). and the subject is to name the colour of the ink while not saying the colour word. The score on this subtest is calculated using time and number correct.

Number Detection . This subtest consists of two pages on which target numbers are printed along with distracters. The subject's task is to find and underline the target stimuli from among the distracters. The subtest score is a ratio of accuracy (total number of correct minus the number of false detections) to total time taken to complete all the items.

Simultaneous Scale

Nonverbal Matrices**.** This subtest consists of 33 items of varying types of shapes and geometric designs that are interrelated through spatial or logical organisation with one section missing. The subject is required to choose the missing section from an array of five possible choices in order to complete the subtest. The score is the number of correct responses on this subtest. The subtest is discontinued after four consecutive errors.

Verbal Spatial Relations**.** This subtest is composed of 27 items that require the comprehension of logical and grammatical descriptions of spatial relationships. The subject is presented with items each with six drawings and a printed question at the bottom of each page. The examiner reads the question aloud and the subject selects the option that matches the verbal description. The subtest is discontinued with four consecutive errors and score is the total number correct.

Successive Scale

Word Series. This is essentially a test of memory for word order. The Examiner reads the subject a series of single - syllable, high frequency words at the rate of one word per second and asks him/her to repeat them exactly in the same order. The subtest consists of 27 items (word series) that vary in length from two to nine words. The subtest is discontinued after four consecutive errors. The score is the total number of items repeated correctly.

Sentence Repetition**.** This is also a test of memory for words (colour words) arranged within a syntactic form. The subject is read aloud the sentences and is asked to repeat each sentence exactly as presented. The subtest is discontinued after 4 consecutive errors. The score is the total number of sentences repeated correctly.

II.2.3 Procedure

The subjects were tested in their respective schools with the permission of the Principals and cooperation of the teachers of the concerned schools. Establishing adequate rapport with each subject the work was carried out in a separate room in both the schools taking maximum care to keep the subjects away from the external disturbances during administration of the tests. The tests were administered to each subject in two different sessions. The cognitive tests were administered in the first session. Those who scored within the normal, i.e., the 'average' range (90-109) got selected for administration of reading tests in the second session. These sessions were one day apart. The tests were administered following the rules given in the test manuals and the subjects enjoyed the tasks at hand.

III.2 Results

Taking into account the objective of this study the data were analysed with the help of 't' test and correlation analysis. The results have been presented in separate tables in this section.

Performance on measures of reading

The subjects were selected on the basis of their reading comprehension skill and thereafter were given the Word Identification Test to assess their decoding skill. The means, standard deviations and't' values in respect of these tests have been presented in Table 2.1.

Table 2.1 Means, Standard Deviations and t Values Showing Group Differenceson Measures of Reading (N = 50 in each group)

Measure		Good Comprehenders	Poor Comprehenders	t
Passage Comprehension	Mean	37.73	21.40	7.39**
	SD	1.16	8.47	
Word Identification	Mean	74.60	57.80	4.19**
	SD	7.29	13.69	

**p<.01

It may be seen from Table 2.1 that the poor comprehenders differed significantly from their good counterparts in word decoding also which is the minimum requisite skill to learn to read. The correlation coefficient between word decoding and reading comprehension for these subjects was found to be .81 which was also significant (p<.01).

Performance on cognitive measures

The good and the poor comprehenders were matched for their Full Scale score on Cognitive Assessment System which was 103.6 and 97 for the two groups respectively, and were within the normal range (90-109). Thus both the groups were normal (average) with respect to their overall cognitive functioning in terms of PASS processes. The individual processing scores then were taken into consideration to see the difference between the two groups on each process as each contributes in its own way to the two skills of reading. These results have been presented in Table 2.2.

Table 2 .2 Means, Standard Deviations and t Values Showing Group Differences on Cognitive Measures (N = 15 in each group)

Measure		Good Comprehenders	Poor Comprehenders	t
Planning Scale	Mean	102.00	99.00	0.93
	SD	7.91	9.66	
Attention Scale	Mean	98.20	95.40	0.86
	SD	8.98	8.84	
Simultaneous Scale	Mean	98.40	89.60	3.39**
	SD	5.87	8.16	
Successive Scale	Mean	109.60	105.46	0.84
	SD	11.22	15.30	

**p<.01

It may be seen from Table 2.2 that out of the four processes, poor comprehenders differed significantly from good comprehenders in only one process, i.e. simultaneous coding. In other words, good and poor comprehenders were found to have equal level of competence in planning, attention, and successive coding processes along with their overall intellectual functioning, but not in simultaneous processing.

The relationship of the two skills of reading with each of the four PASS processes was then analysed by means of correlational analysis the results of which have been presented in Table 2.3.

Table 2.3 Correlation Coefficients for measures of Reading and Cognitive Processes. (N=15 in each Group)

Measure	Planning	Attention	Simultaneous	Successive
Word Identification	0.21	0.24	0.56**	0.01
Passage Comprehension	0.14	0.23	0.70**	0.02

**p< .01

It may be seen from Table 2.3 that both word decoding and reading comprehension as measured by the two tests of reading correlated significantly with simultaneous processing. Clearly, weakness in simultaneous processing appears to be responsible for the reading difficulties of children in this study.

IV.2 Discussion

Good and poor comprehenders being selected on the basis of their reading comprehension skill and overall intellectual functioning in terms of PASS processes were further examined for their proficiency in word decoding and in each of the four PASS processes separately. The participants were studied for their proficiency in reading in English language. Good comprehenders were found to be markedly superior to their poor counterparts in word decoding and simultaneous processing. The two skills of reading also correlated significantly with simultaneous processing. The hypothesis framed in this connection, thus, is partially supported.

Decoding and word recognition which involves reactivation of phonological, syntactic and semantic representations of the written language in long term memory is a basic prerequisite of reading. But what is also important is the ability to perceive the relationship among the bits of information obtained from separate words and then from separate sentences to understand and comprehend the text. A cyclical use of both successive and simultaneous processing along with attention and planning, thus, prevails in the entire process of reading as is seen in the previous study of the present investigation. But contrary to the findings of that study, the present study revealed poor comprehenders' competence in planning, attention and successive processing, while their simultaneous processing was markedly deficient. Simultaneous processing demands understanding of logico-grammatical and conceptual relationship among bits of information and integration of these information into a larger structure of information in order to get an overall impression of the text. Clearly then, simultaneous processing plays an important role in comprehending the text. In fact, planning and attention can have their influence only when the requisite coding skills are well developed and some earlier studies have revealed that simultaneous processing plays a very significant role in reading at higher level, whereas, successive processing is more important for beginning readers (Das, Naglieri & Kirby, 1994; Das, Parrila & Papadopoulos, 2000)

V. General Discussion

Reading and understanding print is an activity which requires the appropriate interweaving of top-down, conceptually driven processes and of bottom-up, text-driven processes (Rumelhart, 1977). Skilled readers, therefore, keeping in view the purpose of reading develop their own plans or strategies of mastering the content of the text and become adept in deliberate application of that knowledge in remarkably flexible ways. The more effective and parsimonious the plan is, the better is the outcome. But when readers' all resources are devoted towards the acquisition of base level lexical skills like decoding the word and articulating the same while reading, the higher level language skills like vocabulary knowledge, inference making, integrating information, semantic and syntactic processing of information, cannot be developed which are all required to comprehend the text i.e., to construct a meaning based representation of the text in which simultaneous processing plays a crucial role. Deficit in this process, thus, automatically makes the strategy to be adopted inefficient and creates deficit in the required skills of reading. The language in which children learn to read, of course, is important because they must be able to understand as what information is being communicated to them. But in study1 of the present investigation, the children were found to have weakness in all the four PASS processes and consequently in both word decoding and reading comprehension even when their general intelligence level was quite normal and the mode of instruction at school was Odia, their first language (mother tongue) that ensures the knowledge of the code and the ability to predict what will come next while going through the text. In study-II, on the other hand, the poor readers were deficient in both the skills of reading while their overall intellectual functioning in terms of PASS cognitive processes along with the competence in three of these processes was absolutely normal. However, the mode of instruction for them at school was English, their second language. Reading comprehension, in general, demands efficient word decoding and semantic processing of information along with vocabulary knowledge, syntactic awareness and the metacognitive strategies like planning, comprehension monitoring, inference making, activating and integrating relevant background information and combining information in working memory to form mental representations of the texts (Nation, 2005; Nation & Snowling 1998; Perfetti, Landi, & Oakhill, 2005). Requisite cognitive processes, therefore, must develop adequately along with a lot of exposure to and practice with the language which is used for reading. This exposure provides a knowledge base upon which the cognitive processes operate. In fact, in the second study, lack of adequate exposure and experience with the language i.e., English which was the participants' second language seems to be the reason behind their poor reading skills along with the deficit in the underlying cognitive process in the poor readers. Yet, the study may be said to have the limitation of small sample size which can be taken care of in a future study in order to to see the changes, if any, in the cognitive profiles along with the reading proficiency of the children using English as the language of reading.

The PASS processes, however, are mutable. Keeping this in view a remedial training programme, PREP (PASS Reading Enhancement Programme) which is based on PASS theory of intelligence has been developed (Das, 1999) and used successfully in improving the reading skills of children including the children of India (Das, Georgiou & Janzen, 2008; Das, Mishra & Pool, 1995; Naglieri & Rojahn, 2004; Mahapatra, Das,

Stack-Cutler & Parrila, 2010). Through PREP the readers who are the native speakers of English language and those who use English as their second language (ESL children) acquire appropriate cognitive strategies as well as the language analysis skills needed to improve the reading skills. But what is needed is a parallel remedial programme in Odia to cater the needs of the children in Odisha who perform poorly because of their reading difficulties.

VI. Conclusion

Poor academic performance may be the outcome of poor reading skills in children that may result because of deficits in the cognitive processes or lack of command over the language in which they read or because of both. Acquisition of reading skills, therefore, is a dire necessity for children if success depends upon their way through school. Remediation of reading problems, then, is imperative if children do not profit from normal class room instruction in spite of their average or even above average level of intelligence.

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