CHAPTER V

DISCUSSION
DISCUSSION

An attempt was made in this piece of research to study the cognitive profiles of good and poor readers separating the confounding influence of IQ, along the lines of argument suggested by Siegel (1989). The basic framework used was the PASS model. The major focus was to investigate the cognitive characteristics of poor readers coming from high IQ (dyslexics), and low IQ (garden variety) groups (Stanovich, 1988). Past research (Das, Mensink, & Mishra, 1991; Das, Mishra, & Kirby, 1994; Stanovich, 1988) have shown that the high IQ poor readers show a deficit in a limited number of cognitive functions, and the low IQ poor readers, in a wider range of cognitive functions. The specific cognitive deficits among the majority of high IQ poor readers are linked to speech-related processing including phonological coding, speech rate, and successive processing. The findings obtained by Das and his colleagues are limited to the English speaking population. The cross-language and cross-cultural generalizability of the findings obviously need to be ascertained, as deficiency in reading skill related to different languages might entail different sets of cognitive functions. Further to these, the grade level of the subjects under study also provided another dimension in examining the cognitive characteristics of poor readers.

The present research used grade 7 children who were native speakers of the Oriya language. All subjects were individually tested for the four PASS processes, reading competence, and speech-related processing efficiency. The subjects were cross-classified on variables of intelligence and reading comprehension using a double-median split procedure. ANOVA, and regression and factor analyses were used to discover which of the variables were important for reading efficiency.
Major Findings

The preceding chapter was mainly concerned with statistical analyses of data and elaborate presentation of the results. The salient findings are briefly reported below.

1. The accuracy and the speed measures of selective attention were not influenced by variations in reading status, possibly because both good and poor readers came from matched levels of IQ. The IQ level was found to significantly influence subjects’ scores only in the Name Match condition of Selective Attention, which obviously carried more information processing demands.

2. The main effect of reading status was not significant for any of the simultaneous and successive processing measures, possibly because the subjects crossed the elementary stage of reading acquisition and were matched on IQ. The IQ level significantly influenced performance on the simultaneous processing measures, only when the subjects were good readers.

3. All the speech-related processing measures were sensitive to variations in reading efficiency, even if the subjects were matched on their IQ level. The influence of IQ was found to be significant only for phonemic segmentation, which is one of the five measures in the cluster of speech-related processing tasks. Among the poor readers, the low IQ subjects performed at par with the high IQ subjects on all the speech-related measures. The low IQ good readers had an edge over the high IQ poor readers in speech-related measures.

4. The main effects of reading status, IQ, and their interaction were significant for conceptual planning. The simple effect of IQ was significant only for good readers, thus, suggesting that conceptual planning improved as a function of intelligence, only when subjects were good readers.
5. Regression analyses revealed that reading comprehension was best predicted by successive processing, conceptual planning, and phonological coding, while four of the speech-processing measures, and conceptual planning formed the best subset in predicting word decoding efficiency.

6. The results of factor analysis revealed that the two reading measures showed high common factor loadings with measures of phonological coding and articulation. The four PASS processes were also identified.

**Reading in Relation to the PASS Processes**

The only PASS task that differentiated the good from the poor readers was Crack the Code, which is a measure of planning. Attentional processes are crucial to reading, and therefore, are expected to be associated with reading. Though, many researchers have tested the hypothesis that failure to attend selectively is a major cause of reading difficulty, the evidence linking selective attention deficit to reading failure has been inconclusive (Das, Naglieri, & Kirby, 1994). Poor readers do not experience deficits in arousal itself. They, usually, cannot cope up with attending to target, when the rate of presentation is high. A higher "event rate" generates stress, and to counteract its effect, a greater effort is to be invested. If the "event rate" is slow, and the memory is not stressed, selective attention differences should not be observed between the good and the poor readers. Furthermore, reading at different levels of hierarchy, requires the support of different processes. At the initial stage of reading acquisition at a very young age, during the early days in the school, to be able to attend selectively would be closely linked to reading. But at higher levels such as Grade 7, selective attention is less likely to play a significant role. This is what has been observed in the present research, as expected in hypothesis 2.
The two coding processes also did not differentiate between the good and the poor readers. The PASS theorists have studied the involvement of simultaneous and successive processing with reading, but the results have not always been in agreement with one another. While some studies have pointed out a major weakness in successive processing among the reading disabled children, others have shown that weakness in any of the coding processes is of critical importance for reading disability. Some of the more recent experiments implicate mainly a weakness in planning (Naglieri & Das, 1990). The present research on Oriya readers in South-Eastern India records a conceptual planning deficiency among the poor readers.

The good and the poor readers did not differ on measures of attention, coding, and perceptual and mnestic planning, as expected in hypothesis 2. But conceptual planning was sensitive to variations in reading comprehension. The regression analyses also revealed conceptual planning to be one of the best predictors of reading comprehension as well as word decoding. Past research on western subjects have shown a planning deficit in reading disabled children (Das & Snart, 1982; Kirby & Robinson, 1987), even when they had comparable scores with their average peers on attention, simultaneous, and successive measures. A skilled reader keeps the purpose of reading in view, develops his own plans and strategies of mastering the content, and becomes adept in deliberate application of that knowledge in remarkably flexible ways. The more efficient and parsimonious is the plan, the effective is the outcome. Though, group-comparison analyses did not underscore the importance of successive processing in reading, the regression analyses did. Serial Recall, which is a marker successive processing measure was judged as one of the better predictors of reading comprehension. Since successive processing is linked to phonological coding, which correlates highly with reading efficiency, several studies have also noted the intimate connection between
successive processing and reading (Bisanz, Das, & Mancini, 1984; Das, Mishra, & Kirby, 1994). The implication is that reading efficiency can be improved through training on planning and successive processing.

While reading competence was related to conceptual planning, and to some extent with successive processing, the IQ-effect was observed for the Name Match Selective Attention, Figure Memory, Matching Numbers, and Crack the Code, as postulated in hypothesis 1. As predicted in hypothesis 3, the high IQ poor readers had an edge over the low IQ good readers in most of the PASS measures (except conceptual planning), though the differences were not statistically reliable.

Reading in Relation to Speech-related Processing

As postulated in hypothesis 2, the main effect of reading status was significant for each of the speech-related processing measures. The IQ-effect was noticed only in phonemic segmentation. Thus, phonological coding and articulation speed were very sensitive to variations in reading competence. Phonemic segmentation was one of the best predictors of reading comprehension, while almost all the speech-related measures formed the best set of predictors for reading decoding. Both decoding and comprehension shared high common factor loadings with measures of phonological coding and articulation. All these findings reveal intimate relationship of reading proficiency with speech-related processing, as mentioned in hypotheses 2, 4, 5, and 6.

The findings are consistent with the hypothesis that phonological coding and articulation rate lie at the core of deficits experienced by the reading disabled children, irrespective of their IQ (Das, Mensink, & Mishra, 1991; Das, Mishra, & Kirby, 1994; Siegel, 1989; Stanovich, 1988; Torgesen, 1989). Reading disabled children with low IQ are deficient compared to dyslexics in many other cognitive
processes as well. In other words, the speech processes, more than IQ, differentiate the poor from the good readers.

Stanovich (1988) maintains that the high IQ poor readers are distinguished by a processing deficit localized in the phonological core. Both phonological coding and articulation are involved in successive processing. But successive processing, in addition, requires short-term memory, which also is involved in reading. Hence, in the present research, successive processing also emerged as one of the best predictors of reading efficiency. The findings favour Siegel's contention that IQ is irrelevant to the definition of reading disability.

**Cognitive Profiles of the Subgroups**

Subjects were categorized on the basis of reading efficiency and intelligence. Although, it is difficult on the basis of the findings of this research, to assert that the cognitive profiles of the four groups of school children are distinctively different, some distinctions can be seen and predictions can be made regarding their academic performance.

The high-IQ good readers were the 'high achievers', whose attention, coding, planning, phonological coding, and articulation efficiency were superior to the rest of their classmates. Their scholastic achievement is likely to be superior to the rest in the school. The low-IQ good readers are likely to perform well in language-related subjects, but their performance would possibly be constrained, when the conceptual demands of the task are heavy, such as in arithmetic, and science. Because of their weakness in basic cognitive processes, their school performance would not be very satisfactory. They can be labeled as 'underachievers'.
Among the poor readers, the high IQ subjects, in spite of their more-than-average cognitive processing efficiency, are likely to encounter difficulties in comprehending written text, because of poor articulation and phonological coding. They would be less likely to translate their conceptual understanding of school-related subjects into a very successful scholastic performance in school examinations. More possibly, they would be diagnosed as 'dyslexics'. The low-IQ poor readers exhibited poor performance in all the processing measures. Following the line of argument of Stanovich (1988), they would be called the 'garden-variety' of poor readers having pervasive deficits in a wider range of cognitive functions. Their school performance would be extremely poor.

**Educational Implications**

The findings carry theoretical as well as some applied implications. At the theoretical plane, the findings provide a cross-cultural data in support of speech-related deficiencies among poor Oriya readers, irrespective of IQ, as has been observed in earlier research on western population. The findings are consistent with the expectation that reading disabled children do not constitute a homogeneous group; rather within the reading disabled population there are different subgroups marked by distinctive mental characteristics. Furthermore, the PASS theory provides a meaningful framework to study the cognitive characteristics associated with different forms of reading disability.

At the applied level, the findings can be used for making an early diagnosis of reading disability. Once the early reading skills are acquired, the diagnosis of further possible difficulties in reading would obviously require the use of some reading tasks, in addition to phonological coding, articulation, successive processing, and conceptual planning. But if one wished to assess the likelihood of future reading problems in children who have not yet started formal reading, the
tasks that can be pressed into service would be Speech Rate, and Serial Recall of Words, and if possible phonological coding. Once the basic reading skills are developed, obviously other factors and variables would come into consideration. For example, if the child faces reading difficulties because of poor instruction, lack of motivation, or other social and emotional problems, the diagnosis would not simply depend on the use of the tasks suggested here.

The results also provide a dimension for imparting effective remedial training to children facing difficulties in learning to read. Obviously, training in phonological coding would constitute a standard part of the remedial training. In addition, training to improve articulation rate and successive processing would also be required. Within the PASS framework, Das and his colleagues have shown the effectiveness of training in successive processing for improving reading skills. At still advanced stages, training on other PASS processes like conceptual planning would assume increasing significance. Thus, in addition to cognitive processes, training on speech-related processing constitutes an essential feature of any remedial program for reading.

It should be mentioned here that training in phonological coding and articulation are much easier compared to training on fundamental cognitive processes. Teachers can operate remedial techniques in respect of these speech processes in their classroom situation quite effectively. For administering this, the teachers need not be subjected to very elaborate training sessions. This needs to be tried, and if the method turns out to be effective, the practical implications would be many.

**Future Projections**

The results and implications of the study are limited by selection of the subjects and tasks. The subjects were classified using a double-median split
procedure. Possibly, because of this, the expectations regarding a distinctive difference between high-IQ poor readers and low-IQ good readers were not confirmed. With large number of subjects, the groups can be selected from the top and the bottom quartiles of distributions on variables of intelligence and reading proficiency. The subjects were from Grade 7 of rural Oriya-medium schools. It is suspected that the quality of instruction and the motivational level of the subjects might not have been satisfactory. As a result, some of the students might have been classified as poor readers in spite of their inherent reading proficiency. Thus, the cognitive profiles were not very distinctive for different subgroups. The school characteristics and the non-cognitive attributes of students deserve special consideration, while examining the cognitive patterns of different subgroups.

Current research on dynamic assessment (DA) procedures has documented the beneficial effect of such assessment procedures in optimizing cognitive performance compared to the level of performance elicited by standard psychometric and experimental methods. The use of DA in assessing the competence of good and poor readers in various PASS processes would provide a challenging line for future enquiry, not only at the stage of classifying subjects, but also at the time of designing remedial programmes suitable to the needs of different subgroups.

The data on children’s academic performance in their respective schools could have been obtained. Since twelve schools were involved, it was not possible to obtain a uniform measure of the scholastic competence of children in school-related subjects. Further studies may try to obtain a uniform measure of children’s school-related achievement so that predictions based on the cognitive profiles of different subgroups can be verified.
The cognitive profiles of children at different hierarchical levels of reading are likely to be different. Future research should investigate cognitive and speech-related processing in children at different developmental levels of reading cross-sectionally, but more preferably by following a longitudinal plan. In fact, most of the methodological weaknesses can be corrected by a longitudinal study aimed at discovering the progressive stages of reading decoding and comprehension and examining which processes best distinguish the poor from the good readers at each successive stage. A longitudinal study would help us identify deficiencies, if any, at an earlier stage as possible indicators of a child’s reading failure in later grades.

The purpose of early diagnosis would be best served, if a remedial programme can be set up to correct for deficiencies encountered by poor readers. Future research may take this as a challenge, and design appropriate remedial packages for dealing with cognitive and speech-related processing difficulties encountered by children facing problems in learning to read. One may seriously consider the possibility of constructing a battery of tasks in Oriya language for an early diagnosis of reading difficulties among primary-level children, and designing a remedial package to alleviate the deficiencies in cognitive and speech-related processing. Teachers in schools can use the battery and the package in their classrooms or special sessions to identify reading difficulties in children at an earlier stage and to remedy deficiencies among children likely to be diagnosed as reading disabled in later grades.