A COGNITIVE APPROACH TO WORD-READING FOR
FIRST NATIONS CHILDREN

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in Partial Fulfillment of the Requirements
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in the Department of Educational Psychology and Special Education,
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This study sought to examine the relationship between cognitive processing according to the PASS model, assessed by the Cognitive Assessment System, and to determine the relationship between CAS and reading of a sample of First Nations children.

Forty nine First Nations children participated in this study. The students were in Grades 3 and 4 from a southern Saskatchewan First Nations school. The Cognitive Assessment System (CAS) (Naglieri, & Das, 1997), and the Woodcock-Johnson Third Edition Tests of Achievement (WJ III ACH) (Woodcock, et al., 2001) were employed in order to address the research questions posed. Also included in the study was a teacher rating scale for student reading.

The First Nations sample CAS scores were slightly lower than the standardization sample. There was a significant relationship between the CAS factors and the reading measures. Letter-Word Identification was most highly correlated with Planning and Successive processing. Word-Attack was significantly correlated with Planning, Successive processing, and also Attention. The statistical tests to detect differences between the three teacher rated groups, on the WJ III ACH and CAS factors, were deemed inappropriate because of a very small ‘above average’ group. Therefore, all results involving this sample must be interpreted with caution due to small sample size.

There are many factors that may have accounted for the outcome of the scores in this study; such as the testing situation, the sample size, the uniqueness of the sample, the measures themselves when used with First Nations children. A mixed methods approach
to further research examining reading and cognitive processes in First Nations children may shed even more light on this complex issue.
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The Social Sciences Health Research Council (SSHRC) funded the larger study. The principal investigators were J. P. Das, H. L. Janzen, & D. H. Saklofske. This study provided additional information/data regarding First Nations children’s performance on the CAS and on the reading measures. This data was required for the larger research study which implemented various reading programs to First Nations children. The data collected was used to determine the effectiveness of the reading programs for First Nations children in the larger study. I also wish to give special thanks to the school and the parents who allowed me and my colleagues to conduct the study at their school. I was honored to be invited into this warm and creative atmosphere. I hope the data was of some assistance to the school.

Many thanks go out to my family; a family who knew that they would have to make a transition from life in a small semi-remote community to life in the urban centre. I am also proud of their personal accomplishments for the two years while I was pursuing my studies. To my children, Kelly, Tanya, Blair, and Justine, who realize that education is the key to success, and life itself is a journey. I also want to acknowledge my husband, Darrin, for his love, and continuous support to pursue the goals which I desire to attain.
DEDICATION

This thesis is dedicated to my late parents,

David J. Ninine

and

RoseAnne Hardlotte

You have taught me a lot

and still today,

I continue to learn from you,

and

I will always treasure the precious time we had together!
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CHAPTER 1
INTRODUCTION

First Nations children's literacy has garnered a great deal of attention not only within the realm of First Nations educational settings, but also across advocacy and research frameworks. As with most academic programs there are students who pass and students who fail. First Nations are reported to have performed far below national norms on standardized tests of reading ability (Hayward, Janzen, & Das, 2005; Janzen, 2000; Smith 1992).

This study began with the researcher's experience in working with First Nations children within the context of First Nations educational settings'. Through experience, the writer became well aware of the low achievement scores of students, primarily in the area of language and reading. However, this was not only being experienced within one First Nations educational facility. Through the researcher's various contacts with administrators', teachers', and resource teachers', many First Nations schools were experiencing the same problem; low reading outcomes for their First Nations students. Numerous reading programs and computer assisted language programs had been implemented within the different First Nations educational settings, and the schools reported numerous outcomes, some with success, and others with minimal success.
Many First Nation schools realize the importance of developing programs to help meet the demands of the growing numbers of their children who are not reading at the level of their non-First Nation counterparts (Noll, 1998). Educators who work with First Nations children are aware of current research. It has been consistently shown that once readers fall behind, they rarely catch up to their peers. One of the most renowned studies illustrating this finding is the Connecticut Longitudinal Study completed by Shaywitz, S. E., Shaywitz, B. A., Fletcher, J. M., & Escobar, M. D. (1990). In this study, researchers found that poor readers in grade two, even given remedial instruction, did not increase their reading achievement to standard grade levels. First Nation educational systems implement numerous reading programs to try and increase the reading levels of their students. For example, resource rooms implement various reading programs, schools implement school wide reading labs, and still others purchase expensive language/reading computer based programs (Hayward, Janzen, & Das, 2005; Chiwalose, 2006).

This study was also part of a Social Sciences Health Research Council (SSHRC) funded study. The head researcher's in the larger study were J. P. Das, H. L. Janzen, & D. H. Saklofske. This study provided additional information/data regarding First Nations childrens performance on the CAS and on the reading measures. The data were required for the larger research study which implemented various reading programs to First Nations children. The data collected were used to determine the effectiveness of the reading programs for First Nations children in the larger study.
1.1 Purpose of Study

The purpose of this study was to examine the relationship between cognitive processing, assessed by the Cognitive Assessment System (CAS), and Woodcock-Johnson Third Edition Tests of Achievement (WJ III ACH) reading scores of a sample of First Nations children.

1.2 Research Hypotheses

For the purpose of the current study, the following research hypotheses were investigated.

• There will be a difference between the First Nations sample and the standardization sample on the four CAS factors.

• There will be a difference between the First Nations sample and the standardization sample on the CAS subtests.

• There will be a significant relationship between the CAS subtests/factors and the WJ III ACH reading measures for the First Nations sample.

• There will be a statistically significant difference between WJ III ACH reading scores for the First Nations sample rated by their teacher's as 'above average', 'average', or 'below average' readers.

• There will be a statistically significant difference on the CAS factors between the three teacher rated reading groups.

1.3 Delimitations

This study was confined to forty-nine, grade three and four First Nation students attending one First Nations school. The students spoke English and/or understood Cree.
Implications of student background language knowledge must be taken into consideration in the interpretation of the results in this study. The main researcher, in this study, asked the administrator and teachers how many of students spoke English fluently, and the response was over half of the students spoke English fluently. The next question was how many of them were not able to speak the Cree language but had family member's that spoke Cree at home. The response for the second question was over half of the students lived with family who spoke Cree fluently. A third question was posed, and that was how many of these students were able to understand the Cree language when they were spoken to in Cree. For example, if someone asked them a question in Cree, were they able to understand and provide a response in English, or if they were asked to perform a request, were they able to respond to the request. If the request in Cree was “bring the book”, were students able to bring the book as requested? Therefore, this may have influenced data results.

Second, the data are based on a sample of First Nations children from one Southern Saskatchewan First Nations school. As such, generalizability to other First Nations children is limited because the data collection were confined to only one school. This study requires replication with similar and other groups of First Nations children.

1.4 Significance

This study can make a valuable contribution to the limited body of literature concerning First Nations students and their reading skills. There is ample research to suggest that First Nation students are lagging in their academic subjects, especially in the area of reading. There is a need to examine cognitive patterns of First Nation students and
determine the relationships to reading. This study should be of value to individuals involved with this population and hopefully encourage further research that will benefit all First Nations children.
The following literature review examined five areas of concern to the present study; a) a brief background development in cognitive psychology in relation to intelligence, b) controversy surrounding the issue of Intelligence Quotient, c) background to the Planning Attention Simultaneous Successive (PASS) model, d) reading, First Nations learners' and the PASS model, e) cognition and learning among First Nations populations.

2.1 Developments in Cognitive Psychology in Relation to Intelligence

Paradigm shifts occur in the field of psychology on a regular basis. Education is by no means exempt from paradigm shifts, and from time to time the shifts in thinking in both fields come together. In the field of psychology, many would agree that there has been a shift in popularity from behavioral theory to cognitive theory. Best (1989) defines cognitive psychology as “...all processes by which the sensory input is transformed, reduced, elaborated, stored, recovered, and used.” (p.4). This broad definition implies that virtually any form of mental activity fits within the realm of cognitive psychology. Thus cognitive theory has become influential in many areas of theory and practice. In
particular, cognitive theory has had an impact on the areas of intelligence testing and of reading.

The problem of assessing intelligence is difficult to separate from problems of definition surrounding intelligence as a concept. Intelligence has been defined in many different ways. For example, intelligence has been defined generally as innate potential, observed behaviour, and performance on specific tests of cognitive ability (Sattler, 1990). One of the difficulties with defining intelligence in terms of innate potential is that the latter cannot be measured directly. The most widely used intelligence tests in academic and educational settings are the Wechsler and Binet scales. Both the Wechsler Scale and Lewis Terman's revision of the Binet Scales of Intelligence are based on the assumption that a single score can represent a person's innate intelligence. These scales highly correlate with scholastic achievement (Sattler, 1990; Naglieri & Rojahn, 2004), tend to measure content over process (Royer, Cisero & Carlo, 1993), and may be biased against cultural groups including First Nations (Guilmet, 1983; Noll, 1998).

2.2 The Controversy Surrounding Intelligence Quotient

Lewis Terman coined the popular term Intelligence Quotient (IQ) when he and his colleagues produced the 1916 version of the Binet-Simon Scale (Sattler, 1990). Since that time, the use of a single score of intelligence, or Intelligence Quotient, has been the subject of a great deal of controversy. Debate surrounded the role of IQ in the identification of learning disabilities, and in particular reading disability (see October 1989 issue of the Journal of Learning Disabilities). Several authors have suggested that IQ is irrelevant to the definition of a reading disability (Das et al., 1990; Siegel, 1989a;
Siegel (1989a) has attacked the perceived assumptions that a) IQ tests measure intelligence, b) intelligence and achievement are independent, c) the relationship of IQ scores with reading is linear, and d) reading performance of individuals with reading disabilities will differ as a result of IQ. She argues that IQ scores should be abandoned in the examination of learning disabilities and that the commonly accepted IQ-Achievement discrepancy definition also be abandoned. The IQ-Achievement discrepancy definition states that when a child’s reading ability is significantly below their ability as suggested by IQ, then they are said to be Learning Disabled (LD).

On attacking the first assumption, that IQ test measure intelligence, Siegel has received some support. For example, Stanovich (1989) agrees that the reason that IQ scores were adopted as the benchmark for the discrepancy definition of learning disabilities is the “mistaken belief” that IQ tests measure intellectual potential. Stanovich also agrees with Siegel that reading disability would be better defined in reference to pseudo word reading or the ability to read nonsense words.

Leong (1989) also agrees that IQ tests do not measure potential but he is careful to point out that examination of the early works on intelligence make no claims that intelligence measures innate potential. Leong (1989) also says that Siegel’s analysis of the subtests of traditional IQ tests like the WISC-R, and her attack on the over-reliance on speed in IQ tests, ignores current evidence. For example, recent research has shown that rapid automatic naming ability is necessary though an insufficient condition for reading (Badian, 1994; Jorm & Share, 1983). Perhaps the main difficulty is one of semantics. As Stanovich (1989) states, “Siegel’s argument about the fairness of IQ tests to children with
LD is intricately bound up with conceptions of intelligence, definitions of LD, and the psychometrics of testing in some very tricky ways.” (1989, p. 490).

Torgesen (1989) also disagrees with Siegel on several fundamental points. First, he points out that there is ample evidence to demonstrate a relationship between phonologically based reading skills and IQ. Second, he takes issue with Siegel’s statement that the existence of samples of children with IQs’ below 80 yet have average reading skills “proves” that low IQ is not causally related to reading problems. Torgesen points out that this simply means that IQ is not a sufficient cause of poor reading and other factors such as teaching, motivation, and home support, among others, may have helped compensate for low IQ. In other words, IQ is only one factor among many other possible causal factors for a reading disability. Naglieri (1989) attempts to bring closure to this issue by advocating in favor of the relevance of cognitive processes for explaining poor reading and the irrelevance of IQ.

Siegel has found general agreement from the field that intelligence and achievement are independent. Many psychologists in the field of assessment recognize that traditional IQ tests are highly correlated with measures of school achievement (Sattler, 2001). Others have agreed with Siegel that reading disability can both affect and be affected by general intelligence, that is they are interdependent (Torgesen, 1989). If this is the case, Das (1991) has argued that IQ test scores, when interpreted as reflecting true intelligence, discriminate against disadvantaged children. Traditional IQ tests, such as the Wechsler Scales, offer a rather narrow definition of intelligence. For example, the Verbal scale of the Wechsler Intelligence test tends to measure such skills as specific
knowledge, vocabulary, expressive language and memory. Siegel points out that reading disabled children have problems with some or all of these skills (1989a).

While the debate goes on, Siegel’s argument against the use of IQ test scores in the definition of reading disability raises important and valid questions for both researchers and practitioners who work with these populations. Further, both she and Stanovich point out that the burden of proof lies with those who hold that the cognitive processes in individuals with LD and low IQ scores are different from individuals with LD and high IQ scores. To date, IQ tests have been relatively ineffective in contributing to our understanding of many discrete cognitive abilities including reading problems (Siegel 1989a; 1989b; 1992).

Since the 1930s the popular Wechsler scales have changed little in terms of which subtests were included and the types of scores that are derived from the test. Even Wechsler himself recognized that intelligence test scores are not identical with what is meant by intelligence. As Sattler (2001) points out, “Tests of intelligence, achievement, ability, or aptitude are, for the most part, measuring similar abilities; the names merely reflect the aspect that has been selected for investigation” (p. 45). Thus, IQ test scores tend to provide description, be content or knowledge based, and are often used to evaluate the effectiveness of instructional goals, rather than helping us explain behaviour.

Assessment is a cognitively-based system, in contrast to the traditional IQ, has the additional goals of evaluating a student’s progress in a developmental model of cognitive skill attainment, assessing cognitive processes, and providing diagnostic information (Royer, Cisero, & Carlo, 1993). That is, the emphasis is on process where students are examined in relation to their own stage of cognitive development in addition to
developmental comparison to peers. The emphasis on assessing cognitive processes, which are considered higher-order and therefore causally linked to micro-skills (such as reading), may allow for greater utility in diagnosing and pinpointing an area, or areas, that could contribute to a particular cognitive deficit (Das et al., 1994). This gives it a considerable advantage over traditional IQ tests in contributing to the understanding of reading and reading problems.

Given the above stated problems with traditional IQ measure and the advantages of a cognitive-based method of assessment, theorists and psychometricians have made efforts to produce a test that is based on a well-researched cognitive theory. One such test is the Das:Naglieri Cognitive Assessment System (CAS, 1997), which is the operationalization of the PASS model of intelligence.

2.3 Background on the PASS Model

The PASS model of intelligence has been researched and developed over time. Construct validity has been demonstrated for planning, successive and simultaneous processes among several unique cultural groups (Naglieri & Rojahn, 2004; Naglieri & Das, 1997). Cultural groups that have been studied include East Indian (Dash, Puhan & Mahapatra, 1985; Mwamwenda, Dash, & Das, 1984), Chinese (Leong, Cheng, & Das, 1985), Australian (Schofield & Ashman, 1986), and Spanish, (Molina, Garrido, & Das, 1997; Perez-Alvarez & Timonedá-Gallart, 2000). These studies and others provide evidence that the tasks used by the CAS function similarly despite wide differences in culture, language, and socio-economic status. There also has been some research with
First Nation populations using the current CAS and earlier versions of the CAS (Hayward et al., 2005; Janzen & Das, 2005; Krywaniuk & Das, 1976).

2.3.1 Historical Foundations of the PASS Model

The PASS model is based on Luria’s (1973) notion of three functional units of the brain (see Das 1999b for a recent review). These units are both physiological and conceptual in nature. That is, Luria proposed that the brain could be divided into three main units included as an attention or arousal unit that roughly corresponded to midbrain centres including the reticular activating system. The second functional unit is responsible for retrieving, storing and processing information roughly corresponds to the parietal and occipital lobes of the brain. The third function unit is responsible for planning, impulse control, regulation of voluntary activity, and linguistic functions such as spontaneous speech. The third unit roughly corresponds to the frontal lobe of the brain. The PASS model was derived from this foundation. Presented below is a more detailed explanation of each of the components of the PASS model. For more thorough description of the theory the reader is referred to Das, et al. (1994).

Planning, as defined in the PASS model, allows a person to “analyze cognitive activity, develop some method to solve a problem, evaluate the effectiveness of a solution, and modify the approach used. These processes are necessary when an efficient and/or systematic approach to solving a problem is required” (p. 428). Thus, planning revolves around problem solving, with efficiency as the central way to measure successful planning. Efficiency generally refers to the ability to perform activities in less time and taking the least number of steps to complete the activity (Royer et al., 1993). In
order for an individual to plan, a person must be able to process information that ultimately requires sufficient attention and arousal devoted to the task. Thus, planning is closely related to arousal and attention, although planning relies on all the components of the PASS model in order to function. Many other terms or concepts have also been postulated to relate to planning. Some of these include, organizing information, goal-directed behavior, control of intentions, developing and shifting sets, maintaining a course of action despite interference, utilizing feedback to facilitate problem solving, producing language with fluency and automaticity, and exploiting the phonemic aspects of words (Das, et al., 1994; Kelly, Best, & Kirk, 1989; p. 277).

The next component of the PASS model involves arousal and attention. Arousal is an integral and necessary part of attention. In fact, for any purposeful and intelligent activity to occur, arousal and attention are requisite. Arousal refers to a person’s state of alertness or wakefulness. It is more of a physiological state as opposed to a cognitive state. For example, arousal is low when someone is drowsy and high after receiving a scare.

Attention, on the other hand, is a more complex voluntary cognitive that is required for any meaningful problem solving. Within the PASS model two broad classes of attention are distinguished, namely selective and sustained attention. Selective attention can be further subdivided into focused or divided selective attention. Focused selective attention refers to how well a subject can focus on relevant stimuli while ignoring irrelevant stimuli. A common example of focused selective attention is when a student can focus on his/her homework when the television and radio are on in the background. For a divided attention task an individual shares attention resources between
two or more sources of information or kinds of mental operations. A good example of a divided attention task is the everyday activity of driving, where a driver must focus simultaneously on the internal environment of the car (e.g., hum of engine, resistance of gas pedal, etc.) and the external environment (e.g., a crossing pedestrian).

In the PASS model, selective attention is further distinguished in terms of whether selective attention occurs at the time information is received and stored in the brain (receptive) or during the responses or expression (expressive). An example of a receptive attention task is a dichotic listening task. This is where two separate pieces of auditory information are presented simultaneously to opposite ears. An example of a dichotic listening task is the Dichotic Digits Test (Musiek, 1983) where an individual hears two digits in each ear simultaneously and is asked to repeat all four digits. An example of expressive attention, on the other hand, is seen in the more widely known Stroop test. The Stroop test presents three color words (red, green and blue) printed in the same three colors of ink. For example, the word “red” may be printed in green ink. The task requires the child to name the color of the ink while inhibiting the automatic response of reading the word. It is this requirement of inhibiting the expression of one piece of information (i.e., the color word), while selecting and expressive another piece of information (i.e., the color of the ink) that make this task both selective and expressive.

Sustained attention, on the other hand, refers to the maintaining of attention to a single source of information for an unbroken period of time. Another synonymous term for sustained attention in the literature is vigilance. Air traffic control operators, who are required to monitor radar screen for extended periods of time, require good vigilance skills.
The next components of the PASS model, namely successive and simultaneous processing, are responsible for retrieving, storing, and processing information. Successive processing in the PASS model has been defined as “…the integration of stimuli into some specific series where the elements form a chain-like progression” (Naglieri, Das, & Jarman, 1990; p. 427). Simultaneous processing on the other hand, is defined by the same authors as “…the integration of stimuli into groups, often through the recognition that a number of stimuli share a common characteristic, and therefore these aspects require that the stimuli be related to one another” (p. 427). The key difference between these two processes is that in simultaneous processing, elements can be interrelated in several ways while in successive processing they are only linearly related. An example of successive processing might be when a novice reader encounters a novel word and tries to read it phonetically, one letter at a time from left to right. On the other hand, an example of a simultaneous process includes the ability to read a novel word by utilizing context cues within a passage or recognizing the word or parts of the word from memory.

The next question is how do each of these four components operate during any cognitive activity? Das et al. (1994) state that the PASS components all work dynamically and interactively. The components are dynamic in that they rely on and respond to the knowledge, and experience of the individual. Thus knowledge acts as a moderator for processing. The PASS model is illustrated in Figure 1.1. This Figure illustrates the interaction of the different elements of the model. This shows how the elements are all related and yet maintain their independence from one another. As Das, et al. state, “effective processing is accomplished through the interaction of knowledge with
planning, attention, simultaneous, and successive processing as demanded by the particular task” (p. 19).

The input and output parts of the model indicate that information can arrive through any sensory modality, but they enter either serially (i.e., over time) or synchronously (i.e., concurrently). For example, auditory information is often presented serially while visual information is frequently presented concurrently. Regardless of the method of presentation, the type of processing, (i.e., successive or simultaneous) is dictated by the requirements of the task and not by the way it is presented.

The final feature of note within Figure 1.1 is the arrows that connect the functional units. These arrows show the strength of relationship as indicated by the size of the arrow. Thus, the planning and the arousal/attention components purport to have a stronger relationship with each other than they do with either mode of processing (i.e., successive or simultaneous).
2.4 Reading, Reading Problems, and the PASS Model

The focus now turns to reading, and an exploration of the associated cognitive abilities. The ability to use the language system appropriately is fundamental in developing fluent reading skills. Reading effectively assists children in learning new ways of acquiring specific content within the educational setting. Effective learners appropriately engage in school routines, whereas children who experience language-processing difficulties in learning to read, spell and write do not experience the same. Specific breakdowns in the language processing may account for some of the difficulties experienced by children with reading disabilities, since learning to read requires more advanced knowledge of oral language skills. Due to the interrelated nature of language, processing problems may give rise to subsequent difficulties in other academic areas.
because learning to efficiently decode print is a prerequisite for accessing higher levels of knowledge (Adams, 1990). Understanding the reading process enables educators to detect error patterns that may suggest deficits in students' language processing. Beginning readers benefit from understanding the mechanisms of spoken language and its relation to reading and writing skills (Torgesen, 2002).

Mainstream society would agree that being able to read the dominant language of the country in which you live is valuable, regardless of your cultural background. While there may be cultural differences on the value of attaining an education in general, it would be hard to argue against the value of learning to read the dominant language in North America and the world today. Both individual word reading and reading comprehension are highly correlated with school learning and achievement in a majority of subjects (Daneman, 1996; Torgesen, 2002). Reading is the medium through which people acquire knowledge and skills in school and it opens new doors of opportunity and help people gain access to knowledge necessary for success in North American culture.

It could be argued that English reading skills are of equal importance for First Nation children as for non-First Nation children. First Nation children come from a heritage that has its own language. On-going efforts are being made to preserve and foster this First Nation heritage in the home and the school. Yet the reality is that many First Nation communities have adopted English as a primary language. The school systems on reserves generally implement the provincial curriculum. And depending on the demographics of the First Nations communities, the language of commerce in the First Nation community is predominantly becoming English, and most First Nations are exposed to English-speaking media influences. With such dominance in the English
language and living in the broader context of North American society, the importance of strong English reading skills is underscored.

2.4.1 Reading Problems

Reading disability is the most common disability found in school-aged children, and reading problems appear to be of equal or greater prevalence in First Nation samples (Janzen & Das, 2005; Smith, 1992). The current use of assessment instruments to define, diagnose, and characterize reading problems has been problematic. Many authors continue to argue about the validity of current assessment methods, and of the definition of reading disability. Children are most commonly identified as having a reading disability when their reading levels are significantly lower than would be predicted by their scores on intelligence tests, such as provided by the Wechsler and Stanford-Binet scales. This definition of a reading disability is commonly referred to as a discrepancy definition. Many researchers have now shown evidence that this discrepancy definition of reading disability is unfounded and that a global intelligence score may be irrelevant to the definition of reading disabilities (Das, Mensink, & Mishra, 1990; Siegel 1989a; 1989b; 1992; Stanovich, 1989). One may ask what utility traditional intelligence measures, such as the Wechsler and Stanford-Binet scales, have in identifying, describing or predicting reading disability. At the present time it appears that tests such as these may be limited in this regard.

Perhaps an alternative First Nation conceptualization of intelligence, such as the PASS model, would have greater utility in describing reading ability and identifying and predicting reading problems. This is because the tests used to operationalize the PASS
model may be more sensitive to exploring cognitive abilities regardless of culture. As Das et al. (1994, p. 23) have stated, “...tasks used to operationalize simultaneous, successive, and planning processes have functioned similarly despite wide differences in culture, language, and socioeconomic status.”

The PASS model appears to be sensitive to, but not biased against, variations in culture, language and socio-economic status (Das et al., 1994). Therefore, the tests that reflect the PASS model may help avoid inappropriate stereotyping of culturally distinct groups such as First Nations. This is especially the case if PASS tests are used to help diagnose and identify learning problems. In other words, the emphasis on process over content in the operationalization of the PASS might make this a more culturally fair measure of cognitive ability for First Nations populations.

In the mainstream culture, it has been shown that all of the components of the PASS model are related to various aspects of reading (Das et al., 1994). Recent research on the relationship between the PASS model and reading among First Nations in Canada has received some exploration (Hayward, et al., 2005; Janzen, 2000; Janzen & Das, 2005). In addition, research has shown there are deficits in reading among First Nations (Janzen, 2000; Janzen & Das, 2005).

2.4.2 The PASS Model and Reading

All of the components of the PASS model have been studied in relation to reading and reading problems. While initial studies tended to focus more exclusively on successive and simultaneous processing, later studies also included planning and
attention. Each of these processes will be examined as they relate to reading and reading problems.

2.4.2.1 Successive Processing

Problems in individual word reading are most often associated with poor performance in successive processing especially in early Grades (Carlson & Das, 1992; Das, Mishra, & Kirby, 1994; Das, Nanda, & Dash, 1996; Das & Sui, 1989; Kirby, Booth, & Das, 1996; Kirby & Das, 1990; Kirby & Robinson, 1987; Kraft, 1993; Parilla & Kirby, 1998; Snart, Das & Mensink, 1988). This has also been shown to hold true for First Nations samples (Janzen, 2000; Janzen & Das, 2005). Conversely, reading comprehension tends to be significantly related with simultaneous tasks after Grade 3 or 4 (Das, et al., 1994; Mahapatra, 1990; Parilla & Kirby, 1998). Planning is thought to be a significant process that underlies reading achievements in general while attention is clearly required for any cognitive task but does not seem to be specifically related to reading disability (Das 1993a; 1993b). These statements provide the current basic findings regarding PASS and reading ability.

There are reliable differences in the performance on Successive Processing tasks between reading disabled and non-reading disabled groups (Das, Mishra, & Kirby, 1994; Kirby, et al., 1996; Perez-Alvarez & Timoneda-Gallart, 2000). For all of these studies, this finding held true regardless of the subjects’ non-verbal IQ as measured by the WISC-R or Matrix Analogies Test. Kirby et al. (1996, p. 454) state that, “Successive processing emerges in this and previous studies as an important factor in the development of skilled
reading. It is possible that successive processing is either a prerequisite for phonological coding or a critical component in its application to reading”.

Tasks used to measure successive processing have commonly contained an articulation component. Successive processing tasks with an articulation component include Naming Time and Speech Rate. Naming Time involves naming common objects. Speech Rate requires the subject to rapidly repeat three phonetically dissimilar but common words 10 times in succession (e.g., man-cow-key). These tasks have been utilized in several studies and have shown to reliably predict aspects of phonological coding and word decoding skills (Das & Mishra, 1991; Das, Mok, & Mishra, 1994). In Das and Mishra’s 1991 study, they found that Naming Time best predicted individual word reading skills followed by Speech Rate. They also utilized a working memory task in their study that did not add to predictability. They concluded that a latent variable involving two elements (i.e., phonological activation and articulation) would lead to poor memory span as well as poor reading. These findings were replicated by Das, Mok & Mishra (1994) with a sample of 8 and 10 year old poor and average readers. Das et al. also found that Naming Time and Speech Rate were dependable measure of phonological coding skills and were actually better predictors of word decoding than tasks of phonemic segmentation and word recall.

2.4.2.2 Simultaneous Processing

In several studies, simultaneous processing has shown significant relationships with both individual word reading skills and reading comprehension (Das, Cummins, Kirby, & Jarman, 1979; Das et al., 1996; Leong, et at. 1985; Mahapatra, 1990; Parilla &
Kirby, 1998). As was the case for successive tasks, there are reliable differences between children with reading problems and chronological age control groups (Kirby, et al., 1996; Mahapatra, 1990; Parilla & Papadopoulos, 1996). Kirby et al. (1996) also found that two groups of children with reading disabilities, one group with high IQ and the other with low IQ, had significant differences on simultaneous processing measures. However, they state that this finding may be spurious as the groups were pre-selected to differ based on their non-verbal IQ as measured by the Matrix Analogies Test (Naglieri, 1985). The Matrix Analogies Test was also one of the simultaneous processing measures used in the study.

A study by Parrila and Papodopoulos (1996) showed that a group of Grade 1 children displaying early reading difficulties (based on Word Attack and Word Identification) consisted of two subgroups. One subgroup consisted of participants who were performing at a significantly higher level than the other subgroup on most cognitive tasks, “particularly in those measuring simultaneous processing.” (p. 2). Relative to chronological control group, the first subgroup was significantly different on only a planning task and two successive tasks. In contrast, the second subgroup differed from the control group on all but one cognitive processing tasks (i.e., Planned Search).

Kirby (1988) offers a conceptualization of how successive and simultaneous processing occur in reading. In Kirby’s model, successive and simultaneous processing, as they relate to reading, are arranged in eight distinct hierarchical levels of increasing complexity. These eight levels include features, letters, sound or syllable units, words, phrases, ideas and themes. At each level, items of information are recognized
(simultaneous processing) and ordered (sequential processing) so that the next higher-level unit can be recognized (simultaneous).

2.4.2.3 Planning and Attention

Regarding Planning and Attention, Das, Mishra, and Kirby (1994) found that both receptive and expressive Attention tasks, in combination with Successive tasks discriminated between the Planning or Simultaneous processing tasks and reading. Conversely, Little, Das, Carlson and Yachimowicz (1993) found that two factors including a Planning/Attention and Successive processing factor, explained 65% of the variance in word reading skills (i.e., individual word reading and word attack). The Planning/Attention factor consisted of several tasks including Planned Connections, Expressing Attention and Receptive Attention. The Successive Processing factor consisted of Word and Sentence Repetition, Speech Rate, and Sequence Repetition. Both of these studies confirm the importance of expressive and receptive attention skills in relation to reading achievement. In fact, Little et al. (1993) suggest that the Planning/Attention factor was a better predictor of Word Skills than the successive processing factor. It is possible that differences between these studies in terms of samples, methods of analyses, and tasks used may account for variable findings. Conversely, the fact that the tasks used for the Planning/Attention factor were all timed may have contributed to this.

Das et al. (1990) found that the Stroop Color-Word Test essentially has three components. First a subject has to rapidly name colors, and then rapidly name color-words (i.e., red, blue, green, and yellow). In the final condition, subjects are presented
with color words written in different colors of ink. The task in the final condition is to name the color of ink and suppress the reading of the words. Das (1993b) replicated this finding when he found that several selective attention measures with an articulation component helped distinguish between disabled Grade 5 readers, average Grade 5 readers and average Grade 3 readers. In the 1993 study, Das used Posner and Boies' (1971) physical and name matching tasks as well as the Stroop Color-Word Test. Specifically, he found that disabled readers were poorer at the name matching and color-word naming but were average in terms of color naming and physical matching.

2.4.2.4 Summary

Studies have consistently shown a strong relationship between Successive Processing skills and individual word reading. Simultaneous processing tasks have most consistently shown relationships with reading comprehension tasks especially for children beyond Grade 3 and 4. A factor consisting of Planning and Attention has a significant relationship with individual word reading and word attack, and with school-based achievement in general. However, Planning and Attention tasks have not consistently shown a significant relationship with reading. One exception to this were expressive attention tasks, which by virtue of their articulation component, have consistently shown a significant relationship with phonological tasks involved in reading.

2.5 First Nations Populations on Cognition and Learning

Reading problems go beyond the boundaries of culture. However, one must carefully examine the degree to which culture affects reading skills. From several studies,
we already know that one’s cultural schema can affect the metacognitive strategies used for reading (Pritchard, 1990; Vellutino, Scanlon, & Lyon, 2000). The effect of culture on reading ability is unique for Canadian First Nations. Coming from a history of literacy and education different from European Canadians, as well as encountering economic and cultural discrimination and disruption, it is not very surprising that many First Nation children have difficulty reading the English language (Lesaux & Siegel, 2003).

Historically, schools have served to promote mainstream cultural values and expectations, and have disregarded the experiences, languages, and cultural understandings of First Nations, and other underrepresented groups. Early education systems that were established suppressed First Nation languages in favour of the Western-European language (Lazarus, 1991; McCarty, 1994), and “to ‘civilize’ and assimilate the Indians into the mainstream of the dominant culture” (Reyhner, 1992, p. 35). Although these policies are no longer carried out through abusive practices, their underlying Eurocentric orientation continues to be reflected in the education of First Nation students, who thus experience a sense of cultural incongruence (Deyhle, 1995; Lipka & Ilutsik, 1995). First Nation students cultural and linguistic differences frequently are perceived as deficiencies by mainstream society, a finding illustrated in Philips’s (1983) studies on the Warm Springs Indian Reservation, for example. Philips found that cultural differences in the structures for verbal participation resulted in miscommunication between First Nations children and non-First Nations teachers.

Similarly, McCarty and Schaffer (1992) contended that, rather than recognizing First Nation students’ background knowledge and dual-language capabilities, schools frequently respond to cultural and linguistic differences by prescribing low-level
remediation. They argued the importance of understanding and building on students’ oral and written language competence and of providing meaningful literacy experiences that involve parents, and reflect community knowledge.

To understand more about reading among First Nations, what is needed is some way to conceptualize and assess their cognitive skills with minimal interference from the cultural biases inherent in many IQ assessment tools. The CAS, which is based on the PASS model, appears to suit this purpose. However, before we can begin to examine First Nation cognitive patterns as they relate to reading, it would seem useful to review the relevant literature on First Nation learning styles and reading.

2.5.1 First Nations Learning Styles

Considerable research has been done on First Nations learning styles, as the assumption has been that First Nations learn in a qualitatively different manner than non-First Nations, and Caucasians in particular (Kleinfeld & Nelson, 1991; Larose, 1991; McCarty, Wallace, Lynch & Benally, 1991). Learning style has been defined in several different ways. For the purposes of this thesis, the definition as presented by More (1989, p. 17) is used, where learning style refers to: “The characteristic or usual strategies of acquiring knowledge, skills and understanding by the individual.” In other words, learning style is roughly equivalent to the preferred mode of information processing.

The most common assumptions about First Nations learning style is that First Nations tend to be relatively stronger in terms of visual or observational modes of learning (Larose, 1991; More, 1989; Sawyer, 1991; Swisher & Deyhle, 1989), that most First Nation cultures emphasize a non-competitive or collaborative learning environment.
(Swisher & Deyhle, 1989), and that competence should precede performance (Sawyer, 1991; Swisher & Deyhle 1989).

In terms of the successive and simultaneous processing, Walker, Dodd and Bigelow (1989) showed that a majority of capable First Nation adolescents (from Northern Cheyenne and Crow Nations) preferred a learning style that involves organizing verbal information simultaneously. A simultaneous processing learning style was evidenced by higher scores on a learning preference scale in favor of a "Patterned Symbols" approach to learning. The Swisher & Deyhle (1989) state that, these learners draw personal symbolic relationships between what they know and the new information" (p. 64).

It has also been found that First Nation students perform relatively better on tasks that involve a simultaneous mode of processing (Krywaniuk & Das, 1976). There has also been a consistent finding that First Nations have a relative cognitive strength for visual and spatial skills as opposed to verbal skills (Kleinfeld & Nelson, 1991). The following questions remain: Do Cree children favour one form of information processing over another? Do First Nations children have a cognitive "style" or preferred mode of operation, especially when it comes to reading? The cognitive patterns for First Nations populations has generally been shown to be weaker for successive processing (Janzen, 2000; Janzen & Das, 2005). Does this hold true for this sample of Plains Cree children?

2.6 Summary

This chapter reviewed the literature on five areas which concern the present study; a) background development in cognitive psychology in relation to intelligence, b) debate
on Intelligence Quotient, c) background to the PASS model, d) reading, First Nations learners’ and the PASS model, e) the relationship between cognition and reading ability among First Nation populations. These areas were presented in support of the research hypotheses. These hypotheses aimed to describe a sample of First Nations children in terms of their cognitive processes according to the PASS model and to determine the relationship between CAS and reading.
CHAPTER 3
METHODOLOGY

This chapter contains description of the methodology employed in this study. The current study is a quantitative investigation which examines the relationship between cognitive processing, and reading scores of a sample of First Nations children.

3.1 Method and Design

The procedures including methodology and data analyses that were used in this study were driven by the research questions. This study intends to examine the relationship between cognitive processes as measured by the CAS, the WJ III ACH reading scores and teacher ratings of a sample of First Nations children.

3.2 The Setting

The sample of children who participated in this study were chosen from a First Nation reserve site in southern Saskatchewan, Canada. The school attended by these children consisted entirely of children from the reserve and is operated by the local First Nations band. The elementary school provided education to children from Kindergarten through Grades 1 – 4. Aspects of the Plains Cree culture were explicitly taught in school. This included Cree language instruction, which began in Grade 1 and continued through high school.
The reserve consisted of approximately 1,200 people. The reserve took pride in its culture, and this was resonated in the community. As the researchers drove into the community, they were made aware that they had reached their destination by a welcoming greeting written on a sign “Tawow”; meaning ‘welcome’ in English. As the researchers drove further into the community, the houses were located further apart, and the main buildings were artistically painted. Signs, both in English and Plains Cree dialect, were posted in front identifying the buildings. Nearing the school, the elementary and high school again artistically designed. The architectural structure of the high school was intricately designed, and aspects of the Plains Cree culture stood out. Upon entering the elementary school, the researchers were warmly greeted by the secretary. The Plains Cree identity was again resonated with the language dialect written on an encased glass and on the door’s indicating the use of each room and/or office, a foyer glass display of miniature Pow-Wow Dancers and a teepee in the background’. Pictures of their Elders’ hung on the hallway walls.

3.3 The Sample

The sample included all 49 students (23 boys and 26 girls) enrolled in Grades 3 and 4, who had received systematic reading instruction. The children ranged in age from 7 years 10 months to 10 years 9 months (Mean Age = 9 years 0 months).

3.4 Procedure

By way of a formal letter, the local First Nation Board of Education for the selected site was informed of the purpose of the study and the nature of student
participation required. The elected Board of Education comprised of eight members, and they represented the education decisions for its membership. The Board of Education members were provided with an opportunity to ask questions about the study. At the request of the Board of Education, the procedure for student participation was handled by the school administration. A letter explaining the details of the study were sent home with the Grade 3 and 4 students; a consent and assent form were attached to the letter. At the time, parents and/or guardians choosing to allow their children to participate in the study were required to read and sign the forms. All 49 students returned their forms to the school. Parents and/or guardians, and the school were also provided with a copy of the consent and assent form for their records.

3.4.1 Procedure for Data Collection

The psychometric measures were administered individually within the school in five testing sessions; February 15, 16, 24, 2005 and March 3, 10, 2005. All of the children were assessed using selected subtests from the Das-Naglieri Cognitive Assessment System (Das-Naglieri, 1997) and the Woodcock-Johnson Third Edition Tests of Achievement (Woodcock, McGrew, & Mather, 2001). The CAS was designed by Das and Naglieri (1997) to assess cognitive functioning according to the PASS model as described previously. The reading portion of the assessment consisted of selected subtests from the Woodcock-Johnson Third Edition Tests of Achievement (WJ III ACH, 2001). The WJ III ACH was designed by Woodcock, McGrew, & Mather, (2001) to assess student achievement.
Each testing session took approximately one hour, and was conducted in quiet areas within the school setting during school hours. The testing areas were selected so that there were minimal distractions. For example, the Guidance Office, Library, and an empty computer laboratory were made available as testing areas. Testing was completed either by the researcher of this thesis or by one of three graduate students from the University of Saskatchewan. All examiners had completed a course in individual psychological assessment and were given specific training in the administration of the CAS and the WJ III ACH. Every examiner had the opportunity for a practice administration of the CAS and the WJ III ACH prior to administering it to the First Nations students in this research.

The CAS was administered strictly according to instructions within the administration manual. For every child the subtests were administered in the following order: Matching Numbers, Planned Codes, Expressive Attention, Number Detection, Nonverbal Matrices, Verbal-Spatial Relations, Word Series, and Sentence Repetition. The WJ III ACH was usually administered with Letter-Word Identification first and then the Word Attack subtest.

3.5 Measurement Instruments

3.5.1 Cognitive Measure According to the PASS Theory

For the purpose of this study, the Basic Battery was administered, which included eight subtests. The CAS subtests included two Planning tasks (Matching Numbers and Planned Codes), two Attention tasks (Expressive Attention and Number Detection), two Simultaneous tasks (Nonverbal Matrices and Verbal-Spatial Relations) and two
Successive tasks (Word Series and Sentence Repetition). The Standard Battery which is the full version of the CAS includes 3 planning, 3 attention, 3 simultaneous, and 4 successive tasks. The CAS is a highly reliable test with Cronbach alpha values ranging from a low of .84 to a high of .90 for the various subtests of the CAS (Das, Mishra, & Kirby, 1994). The reliability for the total scale is .87. As well, the manual provides support for the criterion and construct validity of this test.

The CAS subtests are each briefly described here.

1. **Matching Numbers** – This task is four pages. Each item is composed of eight rows of numbers, with six numbers per row. Two of the six numbers in each row are the same. The length of numbers differs on the various rows. Numbers increase in digit length from one digit on the first row of Item 1 to seven digits on the eighth row of Item 4. There are four rows for each digit length. Children are asked to underline the two numbers in each row that are the same.

2. **Planned Codes** – Planned Codes contains two items, each with its own set of codes and particular arrangements of rows and columns. A legend at the top of each page shows a correspondence of letters to specific codes (e.g., A, B, C, D, to OX, XX, O0, XO, respectively). Just below the legend are seven rows and eight columns of letters without the codes. Children are asked to fill in the corresponding codes in empty boxes beneath each of the letters. Each item is administered and scored separately. The items differ in the correspondence of letters to codes and the position of the letters on the page.

3. **Expressive Attention** – This task is very similar to the Stroop task (Stroop, 1935). There are two versions of this subtest, one for younger children and the other for
older students (the latter was administered for this study). For younger children, this task involves identifying whether an animal is big or small. For example, if a child saw a picture of a whale they would say “large” and if they saw a mouse they would say “small”. First, various types of animals were presented in one size of the page. Then the size on the page was alternated between large and small irrespective of how large the animal is in reality. For example, the child might see a small-sized picture of a whale, but still need to say “large”. This second task served as an interference task. For older children, Expressive Attention included a task where children read the words, red, green, yellow, and blue on the three separate pages. Children were required to read the words as fast as possible. On a second card was a palette of colors red, green, yellow, and blue. The child’s task for this card was to name the colors as rapidly as possible. On the last card the words red, green, yellow, and blue were presented in various colors of ink. This interference task required the child to rapidly name the color of ink that word was printed in. Both of these tasks are considered to be primarily measures of attention.

4. **Number Detection** – Children are presented a page of numbers and are required to find a particular stimulus on a page containing many distracters. Children, 8 through 17 years of age are asked to underline typeface. In the next item children are asked to underline the numbers 1, 2, and 3 that now appear in regular typeface, and 4, 5, and 6 when they appear in an outlined typeface. There are 18 rows of 10 numbers with 45 targets in each of the first two items, and 15 rows of 12 numbers in the third and fourth items with a total of 45 targets in each item.
5. **Nonverbal Matrices** – This is a 33-item multiple choice subtest. Each item utilizes shapes and geometric elements that are interrelated through spatial or logical organization. Children are required to decode the relationships among the parts of the item and respond by choosing the best of six options.

6. **Verbal-Spatial Relations** – This is composed of 27 items that require the comprehension of logical and grammatical descriptions of spatial relationships. Children are presented with items that depict six drawings and a printed question at the bottom of each page. The items involve both objects and shapes that are arranged in a specific spatial configuration.

7. **Word Series** – This task required subjects to repeat a series of single syllable words, ranging in length from two to nine words. Essentially this task is similar in nature to the more common Digit Span test only using words and without the backwards component. The linearity of this task qualifies it as a measure of successive processing.

8. **Sentence Repetition** – This task required the child to repeat a sentence composed of color words (e.g., The blue is yellowing). Colored words are utilized so sentences contain little meaning and reduces the influence of simultaneous processing. The subject is required to repeat each sentence exactly as it is presented.

3.5.2 Rationale for the choice of the CAS Subtests

For the purpose of this study, the Basic Battery was administered to obtain the four cognitive processing scales of Planning, Attention, Simultaneous and Successive
processing of the First Nations sample. The PASS model clearly suggests that the four major components are related (i.e., correlated). Thus it was deemed important to examine the full model in relation to the reading scores of this sample of First Nations children.

The particular subtests were chosen to match past research (Carlson & Das, 1992). These subtests have been shown to have a significant relationship with reading in other populations. As well, the choice to include only two subtests in each of the four major components was based simply on pragmatics. The students were required to undergo a considerable amount of individual testing and every effort was made to limit the amount of missed classroom time; and to ensure the student’s attention was focused on the test during the testing session.

The Successive tasks chosen for this study, i.e., Word Series and Sentence Repetition, have shown a strong relationship with reading in other research contexts. Word Series, which is essentially a verbal version of the more common Digit Span subtest from the Wechsler Intelligence Scales, could be considered a verbal memory task. Wagner et al. (1993) have suggested that a combination of reliable measures of word span and/or articulation rate may provide a good index of phonological coding processes in young children.

The constructs of Planning and Attention, while clearly important to reading, have consistently shown a weaker relationship than successive and simultaneous tasks. However, both constructs are clearly related to reading competency. For example, children with attentional problems will likely experience greater difficulty staying on task and this will impact reading at all levels and stages of acquisition.
3.5.3 Reading Measures

For the purpose of this study selected subtests of the Woodcock-Johnson Third Edition Tests of Achievement (WJ III ACH, 2001) was administered. The WJ III ACH subtests included Letter-Word Identification and Word Attack. The WJ III ACH was designed by Woodcock, McGrew, & Mather, (2001) to assess five clusters of student achievement. The full version of the WJ III ACH includes 22 tests organized into a standard and an extended battery measuring five curricular areas – reading, mathematics, written language, oral language, and academic knowledge. The psychometric properties of the WJ III ACH include Cronbach alpha values ranging from a low of .83 to a high of .97 for the various subtests of the WJ III ACH (Woodcock, McGrew, & Mather, 2001).

The two reading subtests are described here:

1. **Letter-Word Identification** - Reading decoding skills, the ability to name uppercase and lowercase letters, and the ability to identify words are measured by this subtest. The subtest requires the subject to point, or orally name visually presented letters and words. The initial test items require the subject to identify letters that are presented in large print. Then the presented items progress where the subject is required to pronounce words correctly. The items become increasingly difficult as they appear less and less frequently in English.

2. **Word Attack** – The ability to apply phonic and structural analysis skills in pronouncing phonically and orthographically regular nonsense and nonwords are measured in this subtest. The initial items require the subject to produce the sounds for single letters. The remaining items require the subject to read aloud letter combinations that are phonically consistent, or regular, patterns in English.
orthography but are nonwords or low-frequency words. The items become increasingly difficult as the complexity of the nonsense words increase.

3.5.4 Rationale for the choice of the WJ III ACH Subtests

For the purpose of this study, the two subtests from the WJ III ACH were administered to obtain data from the First Nations sample for their basic reading ability. Reading is a complex skill and ranges from simple letter recognition to the understanding of complex prose. These particular subtests have been shown to have significant relationship with reading in other populations, and further chosen to match past research with First Nations samples (Janzen, 2000; Janzen & Das, 2005). Therefore, Letter-Word Identification and Word Attack provide an aggregate measure of sight vocabulary, phonics, and structural analysis. The Letter-Word Identification measured lower-level ability to recognize isolated letters and words.

3.5.5 Teacher Rating Scale

The purpose of the informal teacher rating scale was to obtain data from the classroom teachers on their students’ reading ability. The teacher ratings were based on their best professional knowledge of the reading skills of their students that came from daily interactions with the students in the classroom. There were four teachers who provided the ratings of students. The teacher’s teaching experience ranged from twenty years to four years.

At the request of the school, the teacher rating scale was limited to a simple categorical description. The school did not want the teachers’ to fill out extensive forms
for the rating scales, and thus add extra work load for them. Therefore, it was left to the classroom teachers to decide if they wanted to rate their students as 'above average', 'average', or 'below average' readers by providing an oral response to the writer of this thesis.

3.6 Data Analysis

Data gathered in this study was analyzed using the Statistical Package for the Social Scientist (SPSS) Version 11.5. Both descriptive and inferential statistical procedures were used. Descriptive statistics, including the means and standard deviations were used to facilitate additional statistical interpretation. Descriptive data regarding the teacher rating scales were also reported. Pearson Product Moment correlation coefficients were calculated to identify any statistically significant relationships between the various cognitive tasks on the CAS subtests and reading ability within the current study. Independent samples t-test were employed in order to determine if observed differences reached statistical significance.
CHAPTER 4
RESULTS

The purpose of this chapter is to present the results of the data analyses conducted to examine the relationship between cognitive processing and reading scores of a sample of First Nations children. This chapter includes the results of the findings and the results with regard to each hypotheses. The data analyses are summarized in table format. This is followed by the research results and a brief discussion by each hypotheses.

4.1 Research Hypotheses

All data analysis included within this study was intended to investigate the following research hypotheses.

- There will be a difference between the First Nations sample and the standardization sample on the four CAS factors as reported in the manual.
- There will be a difference between the First Nations sample and the standardization sample on the CAS subtests.
- There will be a significant relationship between the CAS factors and the WJ III ACH reading measures for the First Nations sample.
- There will be a statistically significant difference between WJ III ACH reading scores for the First Nations sample rated by their teacher’s as ‘above average’, ‘average’, or ‘below average’ readers.
• There will be a statistically significant difference on the four CAS factors between the three teacher rated reading groups.

4.2 Sample Descriptive Statistics

There were forty nine students (23 boys and 26 girls) enrolled in Grades 3 and 4 at the selected southern Saskatchewan First Nations school, in January 2005, who participated in this study. The children in this study ranged in age from 7 years 10 months to 10 years 9 months. The average age of the children was 9 years 0 months. All the CAS and WJ III ACH reading measures for the 49 children were available for analysis. However, there were only 31 teacher ratings available for analysis. The teachers' stated that they did not want to rate the 18 students' because they felt it would be unfair to the students; due to the fact that some of the students' were new to the school, and two of the teachers' were new to the school and thus felt their professional judgment would not be accurate.

4.3 Data Analysis

All data analysis was completed using SPSS, the Statistical Package for the Social Sciences (version 11.5). In order to address the research questions posed within the current study, data analysis required that both descriptive and inferential statistical procedures be used.
4.3.1 Hypotheses 1

There will be a difference between the First Nations sample and the standardized sample on the four CAS factors as reported in the manual.

Table 4.1 First Nation Sample on CAS Factors Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
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<th>Mean</th>
<th>SD</th>
<th>MIN</th>
<th>MAX</th>
<th>t</th>
<th>p</th>
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</thead>
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<td>12.6</td>
<td>74</td>
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<td>11.6</td>
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<td>.077</td>
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</tr>
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<td>89.80</td>
<td>12.7</td>
<td>55</td>
<td>117</td>
<td>-5.608</td>
<td>.000(^1)</td>
</tr>
<tr>
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<td>91.49</td>
<td>12.1</td>
<td>63</td>
<td>115</td>
<td>-4.941</td>
<td>.000(^1)</td>
</tr>
</tbody>
</table>

St. Sample \(\bar{X} = 100\) \(\text{SD} = 15\)

\(^1\)Bonferroni Corrections \(.05/4 = .0125\)

It appears that the First Nation sample, on the four CAS factors, had lower scores compared to the standardization sample \((M = 100; \text{SD} = 15)\). A Bonferroni correction was applied to determine the t value used for significance \(.0125\). While Planning and Attention were relatively close, scores on Simultaneous, Successive and the Total CAS score were approximately two thirds standard deviations below the mean of 100. Therefore, it can be seen that there were two significant differences between groups on Simultaneous and Successive factors on the First Nations sample at the .01 level. The Planning factor was also noted to be significantly different at the .03 level.
Descriptive statistics indicated differences between the First Nations sample, and the standardized sample on the four CAS factors. Therefore, there were differences between the First Nations sample and the standardization sample on two of the four factors was significantly different.

4.3.2 Hypotheses 2

There will be a difference between the First Nations sample and the standardization sample on the CAS subtests.

Table 4.2 Descriptive Statistics on CAS Subtests (N=49)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>SD</th>
<th>MIN</th>
<th>MAX</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matching Numbers</td>
<td>9.24</td>
<td>2.50</td>
<td>4</td>
<td>14</td>
<td>-2.118</td>
<td>.039</td>
</tr>
<tr>
<td>Planned Codes</td>
<td>9.59</td>
<td>2.03</td>
<td>5</td>
<td>13</td>
<td>-1.407</td>
<td>.166</td>
</tr>
<tr>
<td>Expressive Attention</td>
<td>9.02</td>
<td>2.25</td>
<td>4</td>
<td>14</td>
<td>-3.048</td>
<td>.0041</td>
</tr>
<tr>
<td>Number Detection</td>
<td>10.27</td>
<td>2.39</td>
<td>4</td>
<td>16</td>
<td>.778</td>
<td>.440</td>
</tr>
<tr>
<td>Nonverbal Matrices</td>
<td>8.47</td>
<td>2.70</td>
<td>2</td>
<td>14</td>
<td>-3.978</td>
<td>.0001</td>
</tr>
<tr>
<td>Verbal-Spatial Relations</td>
<td>9.24</td>
<td>2.45</td>
<td>3</td>
<td>15</td>
<td>-2.154</td>
<td>.036</td>
</tr>
<tr>
<td>Word Series</td>
<td>8.80</td>
<td>2.76</td>
<td>2</td>
<td>17</td>
<td>-3.053</td>
<td>.0041</td>
</tr>
<tr>
<td>Sentence Repetition</td>
<td>7.53</td>
<td>2.27</td>
<td>3</td>
<td>12</td>
<td>-7.602</td>
<td>.0001</td>
</tr>
</tbody>
</table>

St. Sample X = 10        SD = 3

1Bonferroni Corrections .05/8 = .006

Scores of First Nations children on each of 8 CAS subtests were compared to the standardization mean of 10 (SD = 3). A Bonferroni correction was applied to reduce the
possibility of over estimating statistical significance due to the use of multiple T-tests. The more stringent alpha was set at .006. The one sample t-test for the CAS variables results are presented in Table 4.2 Significant differences between the CAS subtest scores of the First Nations children relative to the subtest mean of 10 (SD = 3) were found on half of the CAS subtests of the First Nations sample. The First Nations student sample scored lower than the standardized sample, on all but one subtest (Number Detection), of the various CAS subtests. Therefore, there was a difference between the First Nations sample and the standardized sample.

Pearson product-moment correlation was used to explore the relationships between the eight CAS cognitive subtests among the First Nations children. The results of this analysis are presented in Table 4.3.

Table 4.3 Correlations between CAS Subtests (N=49)

<table>
<thead>
<tr>
<th>Subtests</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Matching Numbers</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Planned Codes</td>
<td>.608**</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Expressive Attention</td>
<td>.381**</td>
<td>.289*</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Number Detection</td>
<td>.220</td>
<td>.384**</td>
<td>.247</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Nonverbal Matrices</td>
<td>.249</td>
<td>.116</td>
<td>.081</td>
<td>.071</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Verbal-Spatial Relations</td>
<td>.204</td>
<td>.121</td>
<td>.241</td>
<td>.263</td>
<td>.206</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Word Series</td>
<td>.267</td>
<td>.334*</td>
<td>-.083</td>
<td>.261</td>
<td>.198</td>
<td>.180</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>8. Sentence Repetition</td>
<td>.234</td>
<td>.237</td>
<td>.128</td>
<td>.327*</td>
<td>.091</td>
<td>.152</td>
<td>.585**</td>
<td>1.00</td>
</tr>
</tbody>
</table>

*p<.05; ** p<.01, two-tailed
Table 4.3 shows the correlations between the 8 subtests of the CAS. It was expected that the two subtests drawn from each factor would correlate more highly with each other than with the subtest comprising other factors. Planned Code and Matching Numbers reflecting Planning on the one hand, and Word Series and Sentence Repetition tapping on ‘Sequential Processing’ correlated most highly. This pattern was not found for the two Simultaneous processing and Attention tasks. This may suggest that the PASS factor structure is less clear in this sample or even with First Nations children in general.

4.3.3 Hypotheses 3

There will be significant relationships between the CAS factors and the WJ III ACH reading measures for the First Nations sample.

Pearson product-moment correlations were used to explore the relationships between the four cognitive factors of the CAS, and word reading ability as measured by the Woodcock Johnson Third Edition Achievement Test among the First Nations children; specifically Letter-Word Identification and Word Attack subtests. The results of this analysis are presented in Table 4.4.
Table 4.4 Correlations Between CAS and Reading Scores (N=49)

<table>
<thead>
<tr>
<th>Subtests</th>
<th>Letter-Word Identification</th>
<th>Word Attack</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>0.556*</td>
<td>0.546**</td>
</tr>
<tr>
<td>Attention</td>
<td>0.275</td>
<td>0.304*</td>
</tr>
<tr>
<td>Simultaneous</td>
<td>0.208</td>
<td>0.246</td>
</tr>
<tr>
<td>Successive</td>
<td>0.548**</td>
<td>0.556*</td>
</tr>
<tr>
<td>Full Scale</td>
<td>0.564**</td>
<td>0.584**</td>
</tr>
</tbody>
</table>

*p<.05; **p<.01, two-tailed

There were several important findings of relevance to this study. First, the CAS Simultaneous Processing factor did not correlate significantly with the reading measures.

In contrast, both the Planning and Successive Processing were significantly correlated with both reading measures. The Attention tasks correlated significantly only with Word Attack subtest at the .05 level.

4.3.4 Hypotheses 4

There will be a statistically significant difference between WJ III ACH reading scores for the First Nations sample rated by their teachers' as 'above average', 'average', or 'below average' readers.
Classifying the 31 students, as ‘above average’, ‘average’, and ‘below average’ in general reading skills as rated by teachers, produced 3 groups but with very small numbers particularly in the ‘above average’ group. Therefore statistical tests (e.g., t-tests) to detect differences between groups were not deemed appropriate in comparison with the ‘above average’ reading group.

Of interest is that the ‘average’ and ‘above average’ reading group showed very little difference in their scores and, the ‘above average’ group did not obtain scores that exceeded the average scaled score for either subtest. While there was variability within the groups (note standard deviation), these observations do suggest that reading scores in general were not high for this sample of children. The only statistical comparison was made between the ‘below average’ and ‘average’ rated groups. Here the ‘average’ group score was significantly higher on Letter-Word Identification in comparison to the ‘below
average' group. However, both groups showed somewhat below average scores in this reading measure.

4.3.5 Hypotheses 5

There will be statistically significant difference on the CAS factors between the three teacher rated reading groups.

Table 4.6 Compares the Three Teacher Rated Reading Groups on the Two CAS Processing Factors

| Teacher Ratings | Planning | | | Attention | | |
|------------------|----------|---------------|----------|---------------|---------------|
|                  | X  | SD | t       | p   | X  | SD | t       | p   |
| Below Average¹   | 92.94 | 13.28 | -1.739 | .094 | 95.89 | 11.13 | -1.637 | .118 |
| vs Average²      | 99.70 | 7.27 |         |     | 103.00 | 10.95 |         |     |
| Average²         | 99.70 | 7.27 |         |     | 103.00 | 10.95 |         |     |
| vs Above Average³| 108.50 | 20.51 | 87.50 | 4.95 |     |     |         |     |
| Below Average¹   | 92.94 | 13.28 | 95.89 | 11.13 |     |     |         |     |
| vs Above Average³| 108.50 | 20.51 | 87.50 | 4.95 |     |     |         |     |

¹ N = 18
² N = 11
³ N = 2

As before, the teachers classified 31 students, as 'above average', 'average', and 'below average' in reading. This produced 3 groups but only 2 students were classified as 'above average'. Therefore, statistical tests to detect differences between the 'above average' reading group with the other two groupings was not deemed appropriate because of the very small 'above average' group.
Table 4.6 reveal that the 'above average' group on the Planning factor obtained scores that exceeded the average scaled score. The only statistical comparison was made between the 'below average' and 'average' rated groups. However, there was no statistically significant difference found between the 'below average' and 'average' rated groups on the Planning and Attention factors.

Table 4.7 Compares the Three Teacher Rated Reading Groups on the Two CAS Processing Factors

<table>
<thead>
<tr>
<th>Teacher Ratings</th>
<th>Simultaneous</th>
<th>Successive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>X</td>
<td>SD</td>
</tr>
<tr>
<td>Below Average¹</td>
<td>92.39</td>
<td>13.96</td>
</tr>
<tr>
<td>vs Average²</td>
<td>96.18</td>
<td>7.95</td>
</tr>
<tr>
<td>Average² vs</td>
<td>96.18</td>
<td>7.95</td>
</tr>
<tr>
<td>Above Average³</td>
<td>91.00</td>
<td>21.21</td>
</tr>
<tr>
<td>Below Average¹</td>
<td>92.39</td>
<td>13.96</td>
</tr>
<tr>
<td>vs Above Average³</td>
<td>91.00</td>
<td>21.21</td>
</tr>
</tbody>
</table>

¹N = 18
²N = 11
³N = 2

Table 4.7 data reveal that all 3 rated groups showed scores lower than expected on the Simultaneous and Successive processing, relative to each rating by teachers. As well, the score patterns were not as expected with the 'above average' reading group earning the lowest Simultaneous Processing scores and the highest Successive Processing Scores. This may certainly be due to the fact that only two students were rated as 'above
average' readers. The only significance that comparing 'below average' and 'average' readers showed no statistically significant difference on the Simultaneous and Successive Processing scales.

Finally, the three groups were compared on the total (composite) CAS score. Small sample sizes precluded all but two statistical comparisons.

Table 4.8 *Three Teacher Rated Reading Groups on the CAS Composite Factor*

<table>
<thead>
<tr>
<th>Teacher Ratings</th>
<th>X</th>
<th>SD</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below Average¹</td>
<td>89.00</td>
<td>12.14</td>
<td>-2.356</td>
<td>.027*</td>
</tr>
<tr>
<td>vs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average²</td>
<td>96.45</td>
<td>4.48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average²</td>
<td>96.45</td>
<td>4.48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>vs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Above Average³</td>
<td>96.00</td>
<td>15.56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below Average¹</td>
<td>89.00</td>
<td>12.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>vs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Above Average³</td>
<td>96.00</td>
<td>15.56</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹N = 18
²N = 11
³N = 2

There was significant differences (p=.027) between the 'below average' and 'average' reading groups on the CAS composite score. Again the total CAS scores for the three groups did not show the values expected for low, medium and high groupings. Group scores fell below the standard score mean of 100. However, all results involving this sample must be interpreted with caution due to small sample size, especially in the 'above average' reading group.
4.4 Summary

The purpose of this study was to examine a sample of First Nations children in terms of their cognitive processes according to the PASS model and to determine the relationship between CAS and reading. In order to determine if associations between the elements of the current study did exist, descriptive statistics and inferential analysis procedures were conducted.

Descriptive statistics, including the means, standard deviations, and range of obtained scores for each of the scales used in the current study were calculated and used to facilitate either statistical or sample observational interpretation. Descriptive data regarding the teacher rating scales were also reported.

Descriptive statistics indicated differences between the First Nations student sample, and the standardized sample on two of the four CAS factors. There were two significant differences on the Simultaneous and Successive processing factors. The Planning factor was also significant at the .03 level. Therefore as hypothesized, the First Nations sample was significantly different on half of the CAS factors from the standardization sample.

The one sample t-Test for the CAS subtests showed that the First Nations student sample scored significantly lower than the standardization sample on Expressive Attention, Nonverbal Matrices, Word Series and Sentence Repetition subtests. The Pearson product-moment correlation coefficients were calculated to explore the relationships between the various CAS subtests among the First Nations sample. Planned Codes and Matching Numbers did reflect the Planning process. The Word Series and Sentence Repetition subtests also appeared to tap to Successive processing. However, the
subtests representing the Attention and Simultaneous processes did not correlate highly with each other. This latter finding may suggest that these PASS subtests are not tapping a single construct for this sample of children; alternatively the small sample size may have contributed to this unexpected finding.

The Pearson product-moment correlation coefficients were calculated to explore the relationships between the four CAS factors and two reading subtests. There were several significant findings. First, the CAS Simultaneous factor did not correlate significantly with the reading measures. In contrast, there were two CAS factors that correlated significantly; the Planning and Successive tasks with both reading measures. However, the Attention factor correlated significantly with the Word Attack subtest.

Descriptive statistics comparing student reading performance on the WJ III ACH were used to for the three teachers rated groups. Only 31 of the students were rated by teachers which produced three groups; 'above average', 'average' and 'below average' readers. However, the 'above average' group only had two students and thus statistical tests could not be carried out for some comparisons and even where t tests were calculated, the results are tentative. The 'below average' readers tended to score lower on both WJ III reading tests.

Descriptive statistics were also used to compare student performance according to the three teacher rated reading groups for the four CAS factors. As reported previously, this same group of 31 students only had two students classified in the 'above average' group and their scores on the four CAS factors appeared inconsistent with expected scores. Therefore, it was determined that the statistical tests to detect differences were deemed inappropriate for comparisons of the 'above average' rated group with the
'average' and 'below average' groups. Again the 'below average' group tended to have lower CAS factor scores compared to 'average readers'.
CHAPTER 5
DISCUSSION

This chapter includes an overview of the current study and a discussion of the findings in relation to the research questions considered. In addition, recommendations for further research directions are made and conclusions are reported.

5.1 Summary of the Study

To recall, the purpose of this study was to examine the relationship between cognitive processing assessed by the Cognitive Assessment System, and the reading scores of a sample of First Nations children. In this study, all children (N = 49) in Grades 3 and 4 were assessed at the school with selected subtests from the Cognitive Assessment System and the Woodcock-Johnson Third Edition Tests of Achievement. The tests were administered individually within the school setting. Each testing session took approximately one hour, and was conducted in a quiet area during school hours. Each child was administered the CAS subtests in the following order: Matching Numbers, Planned Codes, Expressive Attention, Number Detection, Nonverbal Matrices, Verbal-Spatial Relations, Word Series, and Sentence Repetition. The WJ III ACH subtests were administered beginning with Letter-Word Identification, and ending with Word Attack.
5.2 Discussion

The initial presentation of the research findings is focused on the three research hypothesis that investigated the cognitive (PASS) processes and reading abilities of a sample of First Nations children. This section is followed by an examination of these measures in relation to teacher rating on their students' reading ability.

5.2.1 CAS Cognitive Processes and Reading

Results from this study demonstrated that scores of the First Nations sample were different from the standardization sample on the CAS factors and subtests. The descriptive statistics for the four CAS factors between the First Nations sample and the standardization sample indicated two significant differences on the Simultaneous and Successive factors, although the Planning factor was also found to be significant at the .03 level. Bonferroni corrections were calculated because of the likelihood that multiple errors might result in an overestimation of significant differences. Therefore, Bonferroni corrections were applied to reduce the possibility by imposing a more stringent alpha level of .0125. In simply observing the scores of First Nations children to the standardization sample from the CAS Manual, the standardization sample had higher scores. The data from the First Nations sample showed that the weakest scores occurred on the Successive factor suggesting that this First Nations sample had a weaker ability to integrate stimuli into specific serial order.

Descriptive statistics on the CAS subtests indicated there were significant differences between the CAS subtests scores of the First Nations sample relative to the subtest mean of 10(SD=3) were found on over half of the CAS subtests. The First Nation
student sample scored lower than the standardized sample, on all but one subtest (Number Detection). Pearson product-moment correlations were calculated to explore the relationships between the CAS subtests among the First Nations sample. It was expected that the two subtests drawn from each factor would correlate more highly with each other than with the subtest comparing the other factors. Planned Codes and Matching Numbers drawn from the Planning factor did correlate significantly with each other. Also, Word Series and Sentence Repetition drawn from the Successive factor correlated significantly highly with each other. However, the other subtests representing the Attention and Simultaneous factors did not correlate with each other. Therefore, these data suggest that these latter two PASS factor scores may be less clear for this sample.

The third research hypotheses investigated the relationship between the four CAS factors and the reading scores of the First Nations sample. The Pearson product-moment correlations indicated a significant correlation of the Planning and Successive factors with the Letter-Word Identification and Word Attack reading measures. The Attention factor correlated significantly only with the Word Attack subtest at the .05 level. However, the Simultaneous processing factor did not correlate significantly with the reading measures.

There was a 'twist' in the study with the results indicating that the measures were not working as the researcher had thought they would. For example, as noted in the correlational analysis, the simultaneous and attention subtests did not appear to be assessing the same construct. The researcher is not sure if this has to do with the model, the test itself, or the small size. However, it should also be recognized that the tests were not standardized and normed on First Nations children.
5.2.2 Teacher Ratings

The next section discusses the three teacher rated reading groups. This section focuses on research hypotheses four and five.

There were 31 students rated on their general reading skills by their teachers as ‘above average’, ‘average’ and ‘below average’ but upon analyzing the data for the teacher rating scales there were only two students rated as ‘above average’. Therefore, it was determined that the use of statistical tests to detect differences between the groups on their WJ III ACH reading tests were not inappropriate for comparisons with the ‘above average’ rated group. The only statistical comparison was made between the ‘below average’ and ‘average’ rated groups. The ‘average’ group scored significantly higher on Letter-Word Identification in comparison to the ‘below average’ group. The teacher rated groups did not obtain WJ III ACH reading scores that exceeded the average scaled score for either subtests.

Turning to the CAS scores for the three teacher rated groups, Table 4.6 revealed that the ‘above average’ group obtained Planning factor scores that exceeded the average scaled score. However, no statistical comparisons could be made for this group with a sample size of only 2. There were no statistically significant difference between the ‘below average’ and ‘average’ rated groups on the Planning or Attention factors. Table 4.7 revealed that all three rated group scores were lower than expected on Simultaneous and Successive processing, relative to each rating by teachers. There were significant differences (p=.027) on the CAS composite scores between ‘below average’ and ‘average’ rated readers. Again, the total CAS scores for the three rated groups did not show the values expected for low, medium, and high groups. The group scores fell below
the standard score mean of 100. However, all results involving this sample must be interpreted with caution due to small sample size.

5.3 Limitations

The children who participated in this study were grade three and four First Nations students, screened with the Cognitive Assessment System and Woodcock Johnson Third Edition Tests of Achievement, who spoke English as their first language. The conclusions drawn from the findings in this study were limited by the following factors:

1. The students' mental and physical states during testing may have been affected by fatigue, nervousness, anxiety, illnesses which may have resulted in the assessment process.

2. Due to unknown or undiagnosed learning, reading and physical disabilities, the students’ performances may have impeded on the assessment results in the testing situation.

3. The English dominant and bilingual Cree/English classifications of students by classroom teachers, and the Cree Language Instructor may not have been accurate because of the lack of family background knowledge of each child.

4. Due to lack of background information on each student, the sample is not representative of the general population of First Nations children because of the diversity of various First Nation groups. First Nations are a diverse group because they speak various dialects, have different cultural traditions, and their demographics also enables them to have unique experiences.
5. Due to the small sample size, generalizations of findings to the total population of First Nation students must remain tentative.

5.4 Implications for Practice and Further Research

5.4.1 Implications for Practice

The researcher must be aware of conducting research which is culturally sensitive before it can also be deemed meaningful in its findings. For example, it is important for researchers to learn about the culture and traditions within local First Nation communities because these can provide researchers’ with a valuable insight, and an understanding about the population they are studying.

5.4.2 Further Research

These recommendations stem from the findings in this study.

1. In terms of future research, it would be important to replicate this study with another sample of First Nations children from a different First Nation Group. The present study utilized a group predominantly from a Plains Cree First Nation, and conclusions likely have utility to this sample and other children with a similar language and cultural background. However, First Nations people are a heterogeneous group with unique languages and cultural values. Therefore, these results cannot be generalized to all First Nations groups. Replication of these results with other unique First Nations would add further validity to these conclusions.

2. In addition, it would be useful to perform a similar study to the present study using the entire CAS battery of tests. It may be more useful to include an individual
test of reading skills, such as the Woodcock Reading Mastery Test. At least it would be important to include some measures that includes nonsense word reading, individual word reading and a comprehension component. Including such measures would also permit more direct comparison to other available research in this area.

3. It would be useful to perform studies on reading disabilities among First Nation students. Although little is known about reading disabilities among First Nations population, much is known about the general characteristics of reading disabilities.

4. Also, it would be useful to study this diverse group in the context of the various reading programs currently available, and which of these reading programs would be a viable option to increase reading levels. While most academic programs recognize reading disabled students among their failures and seek to offer assistive services to support them, First Nations education systems have not had much success in providing these types of services for their First Nation students. Numerous factors contribute to this, not the least of which is how to provide adequate reading programs for First Nation students so that their reading levels increase and are comparable to non-First Nation learners.

5.5 Conclusion

This study examined a sample of First Nations children to determine the relationship between cognitive processing and their reading. While almost all CAS scores were below the standardization mean, the First Nations sample was found to have weaker successive processing ability. The results from this study add to the weight of evidence which has found a significant and unique contribution of successive processing to reading
problems within First Nations. This finding is consistent with recent literature (Janzen, 2000; Janzen & Das, 2005). The finding that this sample of First Nations children generally earned lower CAS scores was also consistent with the literature on the cognitive performance found for other First Nations and Aboriginal samples (Leveque, 1993; Larose, 1991; More, 1989; Sawyer, 1991; Swisher & Deyhle, 1989; Walker, Dodd, & Gielow, 1989; Wauters, Bruce, Black, & Hocker, 1989). These studies and others provide evidence that the tasks used by the CAS function similarly despite wide differences in culture, language, and socio-economic status (Dash, Puhan & Mahapatra, 1985; Leong, Cheng, & Das, 1985; Molina, Garrido, & Das, 1997; Mwanwenda, Dash, & Das, 1984; Perez-Alvarez & Timoneda-Gallart, 2000; Schofield & Ashman, 1986).

Also, some literature (Das, 2002; Kirby, 1992; Naglieri, & Rojahn, 2004) does suggest that the CAS is a culturally sensitive assessment. However, this researcher is careful to note that caution must be interpreted when interpreting the results. The CAS was not standardized and normed on First Nation populations, therefore the students’ background knowledge, and dual language capabilities were not accounted for. The researcher realizes the students cultural and linguistic differences might have accounted for the scores on the CAS and WJ III ACH reading scores.

There are many factors that may have accounted for the outcome of the scores. For example, the testing situation, the sample size, the uniqueness of the sample, circumstances unforeseen by the researcher and so forth. The reader must be careful when exploring the data because these results are preliminary and tentative. It is important to note that there were no great differences in the scores as it was not possible to test for significant differences in relation to all research questions.
There are two significant factors that need to be considered for the success of this diverse group. The first is affluence and the second being education. First Nations need education so that they can be successful in mainstream society. They need education in order to get jobs. Children who are not able to read are not able to be successful in school or remain in school. This is one of the reasons why tests are conducted; not to impose an etic and an emic of reading disadvantaged population. Also what will determine the success of First Nations people and not be marginalized. For example, who fills the prison populations? The power of education is not to eliminate but to enable and to empower this diverse group.
References


