Profile Analysis of WISC-III with Gifted Canadian Children

By

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We accept this thesis as conforming to the required standard

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Abstract

This study was an investigation of profile patterns on WISC-III subtest scores of Canadian gifted children. Profiles of students were compared to core profile types identified by Glutting, McDermott, and Konold (1997) and Konold, Glutting, McDermott, Kush, and Watkins (1999). From the literature reviewed, it was felt that conducting a profile analysis based on empirical research would override some of the criticisms inherent in the practice of profile analysis.

The sample consisted of 88 children ages 6 through 13 years. Subjects were included who scored at least 120 on the Wechsler Intelligence Scale for Children (WISC-III). Sixty of the participants were gathered from Choice School; the remaining 28 were from the Psychoeducational Research and Training Centre at the University of British Columbia.

The results of the profile analysis indicated that 34% of the cases were considered to be clinically unique or rare. The profile analysis of the entire sample of Canadian gifted students indicated that a much higher percentage of profiles were considered to be clinically unique or rare when compared to the normative sample. Future research needs to include larger samples of gifted children.
# Table of Contents

<table>
<thead>
<tr>
<th>Chapter One: Overview of Study</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statement of Problem</td>
<td>1</td>
</tr>
<tr>
<td>Context of Problem</td>
<td>4</td>
</tr>
<tr>
<td>Summary of Problem</td>
<td>6</td>
</tr>
<tr>
<td>Justification of Study</td>
<td>6</td>
</tr>
<tr>
<td>Organization of the Study</td>
<td>8</td>
</tr>
<tr>
<td>Definition of Variables</td>
<td>8</td>
</tr>
<tr>
<td>Summary of Chapter One</td>
<td>9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter Two: Review of Literature</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overview of Chapter Two</td>
<td>11</td>
</tr>
<tr>
<td>Utility of IQ Tests and the Resultant Full Scale IQ</td>
<td>11</td>
</tr>
<tr>
<td>Patterns of WISC-R Scores for Gifted Children</td>
<td>18</td>
</tr>
<tr>
<td>WISC-III Studies with Gifted Children</td>
<td>23</td>
</tr>
<tr>
<td>Profile Analysis</td>
<td>29</td>
</tr>
<tr>
<td>Research Directions and Formulation of Research Questions</td>
<td>34</td>
</tr>
<tr>
<td>Chapter Summary</td>
<td>35</td>
</tr>
<tr>
<td>Formal Statement of Research Questions</td>
<td>36</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter Three: Method</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overview of Chapter Three</td>
<td>37</td>
</tr>
<tr>
<td>Population</td>
<td>37</td>
</tr>
<tr>
<td>Sample</td>
<td>38</td>
</tr>
<tr>
<td>Measurement of IQ</td>
<td>39</td>
</tr>
<tr>
<td>Procedure</td>
<td>39</td>
</tr>
<tr>
<td>Summary of Chapter Three</td>
<td>40</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter Four: Results</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overview of Chapter Four</td>
<td>41</td>
</tr>
<tr>
<td>Comparison of Profile Types</td>
<td>42</td>
</tr>
<tr>
<td>Rare Profiles</td>
<td>43</td>
</tr>
<tr>
<td>Common Profiles</td>
<td>46</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter Five: Discussion</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limitations of Study</td>
<td>52</td>
</tr>
<tr>
<td>Interpretation of Results</td>
<td>54</td>
</tr>
<tr>
<td>Suggestions for Future Research</td>
<td>57</td>
</tr>
</tbody>
</table>
## List of Tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1</td>
<td>Descriptive Data for Those Who Matched and Did Not Match a Core Profile</td>
<td>43</td>
</tr>
<tr>
<td>Table 2</td>
<td>WISC-III Subtest Profiles Classified into 9 Core Types and One Unique Group via WISC-III Profile Calculator</td>
<td>46</td>
</tr>
<tr>
<td>Table 3</td>
<td>WISC-III Subtest Profiles Classified into 8 Core Types and One Unique Group via WISC-III Profile Calculator</td>
<td>47</td>
</tr>
</tbody>
</table>
List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1</td>
<td>Mean Subtest Scores for Rare Profiles</td>
<td>44</td>
</tr>
<tr>
<td>Figure 2</td>
<td>Mean Index Scores for Rare Profiles</td>
<td>45</td>
</tr>
<tr>
<td>Figure 3</td>
<td>Mean Subtest Scores for Profile 1</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>(Glutting et al., 1997)</td>
<td></td>
</tr>
<tr>
<td>Figure 4</td>
<td>Mean Subtest Scores for Profile 2</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>(Glutting et al., 1997)</td>
<td></td>
</tr>
<tr>
<td>Figure 5</td>
<td>Mean Subtest Scores for Profile 3</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>(Glutting et al., 1997)</td>
<td></td>
</tr>
<tr>
<td>Figure 6</td>
<td>Mean Subtest Scores for Profile 1</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>(Konold et al., 1999)</td>
<td></td>
</tr>
<tr>
<td>Figure 7</td>
<td>Mean Subtest Scores for Profile 2</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>(Konold et al., 1999)</td>
<td></td>
</tr>
<tr>
<td>Figure 8</td>
<td>Mean Subtest Scores for Profile 3</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>(Glutting et al., 1997)</td>
<td></td>
</tr>
</tbody>
</table>
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Chapter One: Overview of Study

Statement of Problem

In recent years there has been a growing sensitivity towards accurate identification of gifted students. Overlooking gifted and talented students will prevent them from receiving the services that will contribute to their full potential (Artiles & Zamora-Duran, 1997). Furthermore, Rubenzer (1979) hypothesized that early identification of these children can prevent intellectual and emotional regression to the norm. As Renzulli and Reis (1991) point out, there is a need to identify and develop giftedness in a broadly defined population of able youth. One of the most common methods of identifying gifted children is through a standardized intelligence test such as the Wechsler Intelligence Scale for Children- Third Edition (WISC-III).

Since the introduction of the Wechsler scales in 1939, the tests have been used to distinguish between learning disabled, average, and gifted students. There have been numerous revisions to the test since then, and currently practitioners are using the WISC-III, published in 1991, appropriate for children aged 6 through 16 years. Although the WISC-III maintains considerable popularity with practitioners, Osborn (1995) reported that there has been a reluctance to use the measure’s Full Scale Intelligence Quotient (FSIQ) as the primary criterion to identify intellectual giftedness.
The literature suggests problems in identifying gifted students based upon a single assessment, such as the WISC-III. Many authors express concerns with the instability of the subtests in the WISC-III, particularly with the fact that the latest version of the test places a lot of importance on speed (Edelman, 1996; Kaufman, 1992). Due to the importance of speeded responses on the WISC-III, Kaufman (1992) and others (e.g. Fishkin, Kampsnider & Pack, 1996) recommend interpreting profile fluctuations. Brown and Yakimowski (1987) advise using a pattern of subtest scores as a basis for identifying gifted children rather than relying on one single score. Examination of a pattern of subtest scores appears to be important in light of the findings of Fishkin et al. in their 1996 paper; they found gifted students to show greater ranges of subtest variation than average students. However, within the literature on profile analysis, there are numerous criticisms with regard to subtest analysis of the WISC-III. Specifically, many authors express concern with “armchair” profile analysis (Glutting, McDermott, & Konold, 1997; McCoach, Kehle, Bray, & Siegle, 2001), that is, analyzing a student’s profile without a statistically sound method of analysis. In an effort to provide a multivariate methodology for determining whether a child’s WISC-III subtest profile is unusual, Glutting et al. (1997) used cluster analysis to sort 2,200 profiles to determine the most representative profile pattern of the WISC-III standardization sample. Results of their study indicated
nine core profile types and also provided researchers and practitioners two distinct methods for evaluating unusual subtest profiles.

Characteristic patterns of IQ subtest scores were previously documented on the earlier versions of the WISC-III, the Wechsler Intelligence Scale for Children (WISC) and the Wechsler Intelligence Scale for Children-Revised (WISC-R), for children in the superior range (Brown & Yakimowski, 1987; MacMann, Plaskett, Barnett, & Siler, 1991; Mueller, Dash, Matheson, & Short, 1984; Patchett & Stansfield, 1992; Silver & Clampit, 1990; Wilkinson, 1993). Based upon the aforementioned research, Fishkin et al. (1996) investigated patterns of WISC-III IQ subtest scores for gifted children and found that subtest scatter of WISC-III scores occurred with greater frequency in a gifted sample than for participants in the normative sample. Specifically, they found that the gifted sample differed significantly on four subtests: Similarities, Comprehension, Coding, and Symbol Search. These findings were similar to typical subtest scatter patterns of the WISC-R with the exception of Block Design. Block Design was previously seen as a peak subtest for gifted students when assessed with the WISC-R. However, on the WISC-III administration, the gifted students’ performance on the Block Design subtest was a weakness. Authors of this study also found a distinctive pattern of WISC-III subtest scatter that occurred for this sample of gifted children. Fishkin et al. (1996)
recommended investigating the peaks and valleys of subtest scores typical among gifted children as a more accurate method of identifying gifted children.

Canadian children have shown performance different from that of American children on all measures of cognitive ability, in particular the WISC-III. The Canadian study of the WISC-III (Mark, Beal, & Dumont, 1998) showed that the American WISC-III norms did not provide a good psychometric fit for Canadian children. Canadian children scored consistently and significantly higher on all three IQ scores (Verbal, Performance, and Full Scale), on all four index scores (Verbal Comprehension, Perceptual Organization, Processing Speed, & Freedom from Distractibility), and on all subtests, except for Arithmetic and Information (Mark et. al.). Since Canadian children differed significantly on their performance on the WISC-III, it can be expected that their profile patterns may be different from those of American gifted children.

Context of Problem

The following analysis of the problem context involves a general discussion of the utility of Full Scale IQ scores, the characteristic patterns of WISC-R test scores for gifted children, and studies of gifted children with the WISC-III as well as a discussion of profile analysis.
Although the Wechsler scale was the most popular method of identifying gifted children in multiple surveys of school psychologists (Alvino, McDonnel, & Richert, 1981; Klausmeier, Mishra, & Maker, 1987; Wilson & Reschly, 1996), there continues to be much controversy surrounding the use of a single score to identify gifted children. Full Scale IQs (FSIQ) from such assessments fail to account for subtest scores that may reflect unique cognitive strengths or peaks. It is, therefore, necessary to determine whether the most widely used measure of cognitive ability, the WISC-III, adequately identifies students with high ability.

Studies comparing the WISC-R and WISC-III with samples of gifted children have concluded that the scores on the WISC-III were significantly lower than the corresponding WISC-R IQs and subtest scaled scores (Bryant, 1992). These findings have been consistently replicated (Edelman, 1996; Sevier, Bain, & Hildman, 1994). In the current study, a comprehensive review of recent literature is provided to develop a better understanding of subtest scatter found in the WISC-R and WISC-III. Only a few studies investigated patterns of WISC-III IQ subtest scatter scores for gifted children. No studies could be located which investigated subtest profile patterns for a sample of Canadian gifted children. Providing a characteristic pattern of subtest profiles for a sample of Canadian gifted children could be beneficial for evaluation and placement in gifted programs throughout the country.
Summary of Problem

This study extends the research of Fishkin et al. (1996) by investigating profile patterns of WISC-III IQ subtest scores for gifted children with a Canadian sample. Because WISC-R subtest scatter occurred frequently among students of high ability and WISC-III subtest scatter occurred in a similar pattern in Fishkin et al.’s 1996 study, there is a need to determine if similar subtest variability is evident for the WISC-III with a Canadian sample. With this in mind, the purpose of this study will be to determine if gifted students will display similar patterns of performance on the WISC-III when compared to scores obtained by participants in the normative sample. This study will examine profile patterns of WISC-III subtest scores for a sample of Canadian gifted children to determine whether such profiles significantly differ from the nine core profiles described in Glutting et al., 1997). Profile patterns will also be examined for possible similarity to profiles that had been previously reported for children of superior intellect on the WISC and WISC-R.

Justification of Study

The way in which practitioners interpret gifted children’s IQ profiles has tremendous impact on the educational experiences of children. It is essential to determine a valid and accurate method of interpreting measures of cognitive ability, particularly the WISC-III. A review of the literature suggests that there are very clear dangers in not identifying
gifted and talented students. Children not identified as early as the third grade may demonstrate adaptive behavior which conforms to the expectations of the education systems that do not value diverse thought or advanced intellectual development; in a sense they 'regress to the mean' (Clark, 1988; Shaklee, 1992). Early and accurate identification of gifted students is therefore crucial to their intellectual and emotional development.

Numerous studies have documented characteristic patterns of IQ subtests on the WISC-R (Brown & Yakimowski, 1987; Hollinger & Kosek, 1986; Patchett & Stansfield, 1992; Wilkinson, 1993). Most recently Fishkin et al. (1996) found evidence of subtest scatter on the WISC-III occurring with greater frequency in a gifted sample than for participants in the normative sample. The results of Fishkin et al.'s research have tremendous implications for current practices of identifying gifted children. Presently, the Full Scale IQ is thought to be a reliable and valid measure for identifying gifted children. Other studies suggest reporting subtest profiles which identify strengths and weaknesses of the student rather than a single score (Brown & Yakimowski, 1987; Kaufman, 1992).

Historically, profile analysis has been the subject of much criticism. However, by using a method of profile analysis that is statistically sound, it will be possible to evaluate subtest profiles empirically. An investigation of profile patterns of the WISC-III with a sample of Canadian gifted children will serve academics, professionals, and educators in
providing another piece of the research puzzle that surrounds accurate identification of

gifted students.

Organization of Study

Chapter One provided an overview of the rationale for the study and general description
of the research problem. In Chapter Two, the literature relevant to the study is critically
reviewed and specific research questions stated. Chapter Three describes the research
methodology, specifically the participants, measures, procedures and design. In Chapter
Four, the results of the data analyses are outlined. Chapter Five discusses the results of
the study, and draws conclusions and implications for future research

Definition of Variables

Giftedness. Gifted students are a unique and special population in our society and
their intellectual needs deserve particular attention. According to the British Columbia
Ministry of Education (1995), “A student is considered gifted when she/he possesses
demonstrated or potential abilities that give evidence of exceptionally high capability
with respect to intellect, creativity, or the skills associated with specific disciplines”
(p.17).
The term gifted is used to describe children with exceptionally high IQs, those who have creative talents, and those who are high on both dimensions. It is estimated that this definition applies to approximately 3 to 5 percent of the population (Sattler, 1992). For the purposes of this study, the concept of giftedness was restricted to the cognitive domain. As the study investigated the WISC-III as a measure of cognitive ability, limiting the conception of giftedness was appropriate.

For this study, children will be identified as intellectually gifted if they receive a Full Scale IQ of 120 or higher on the WISC-III. Although obtaining a score of 125 or higher, or scoring in the top 5% of the population, has been commonly accepted as an indication of intellectual giftedness (Davis & Rimm, 1989), a cutoff of 120 was used in the present study to include students who would be considered highly able.

*Summary of Chapter One*

Investigating profile patterns of WISC-III IQ subtest scores for gifted children is justified on the basis of the following recognized needs:

- to discover whether distinctive profile patterns appear on WISC-III for gifted Canadian children
- to investigate if profile patterns found with a sample of Canadian gifted children match one of the nine core profiles found by Glutting et al. (1997).
Literature relevant to the investigation of these needs is reviewed in the following chapter.
Chapter Two: Review of Literature

Overview of Chapter Two

In this chapter relevant literature is critically reviewed to provide a framework in which to discuss the identified research needs. The literature is addressed under the following general headings:

- Utility of IQ tests and the resultant Full Scale IQ
- Patterns of WISC-R test scores for gifted children
- WISC-III Studies with Gifted Children
- The pros and cons of profile analysis
- Chapter summary
- Formal statement of research questions

Utility of IQ Tests and the Resultant Full Scale IQ

Throughout the following discussion, the utility of Full Scale IQs in reference to gifted children will be analyzed. Examination and interpretation of the research may produce a clearer picture of the purpose of using Full Scale IQs when describing gifted children. An understanding of the strengths and weaknesses of reporting Full Scale IQs will provide the context in which to examine WISC-III profiles of gifted students.
In almost every program for gifted children there is a fixed number of openings and limited resources. The identification criteria are general conditions regarding eligibility for consideration or nomination. They function as a means of controlling the number of nominees or applications within a reasonable range (Feldhusen & Jarwan, 1993). There are a number of programs for gifted children in the Lower Mainland of Vancouver, including private establishments such as Madrona Elementary School, Choice School for Gifted Children, and various challenge programs and congregated classes within the public school setting. All of the above mentioned programs conduct a multiple-criteria approach for identification and placement of gifted children, including standardized testing, parent and teacher nomination, student portfolios, and academic motivation of the student.

Regardless of the program, and whether or not multiple criteria are used in the identification process, IQ tests continue to be at the cornerstone of the nomination process. Despite criticisms about biases and limitations of intelligence tests (Borland, 1986; Snyderman & Rothman, 1988), they remain among the most useful (Borland, 1986) and most accurate method of identifying gifted children (Sattler, 1992), and the strongest measures of intellectual ability (Gallagher, 1975; Snyderman & Rothman, 1988); however, there is still controversy surrounding the use of IQ tests as well as their role in identifying gifted children.
The history of the IQ debate goes back to the early 1900s when Walter Lippmann and Lewis Terman engaged in a war of words in which they debated the merits, uses, and potential abuses of IQ tests (Borland, 1986). Even though Lippmann argued that IQ tests were invalid and dangerous, he still thought that there was a future for mental testing and suggested that practitioners be made aware of the limitations of IQ testing and be careful to augment their use with other instruments and methods (Borland, 1986). Almost eighty years later, the suggestions that Lippmann made still guide the use and practice of IQ testing and are echoed in the studies and recommendations of modern day researchers.

Many researchers caution applications of arbitrary “cutoff scores” (Harrington, 1987; Klausmeier et al., 1987; National Association for Education of Young Children, 1988). In particular, Harrington (1987) suggests that there is no statistically significant difference between scores of 126 and 130, if one considers standard error of measurement. Borland (1986) also recommends not relying on IQ tests alone. Rather, he argued, they should be used as one source of information for making placement decisions rather than as a criterion cutoff. He expanded this statement by recommending the use of IQ tests for inclusion not exclusion, a method of identification practiced at Hollingworth Preschool for intellectually precocious three and four year olds. The preschool is operated by the Center of the Study of Education of the Gifted at Columbia University in
New York, and uses IQ tests in their selection process in the following manner. For children who score well on the test (three standard deviations above the mean), the results are taken at face value; however for children who do not score within this range, the score on the IQ test is ignored. Selection of students who fall into the latter category depends more on observations of children as they work in small groups. Simply stated, IQ tests are used only when they advance the child’s cause, not when they fail to do so.

In addition to the many researchers who are opposed to cutoff scores being used as criteria for identification and placement decisions of gifted children, the National Association for the Education of Young Children (NAEYC) has a policy on use of test scores. In 1988, the NAEYC released a position statement on standardized testing of young children. Throughout the statement, it was recommended that decisions that have a major impact on children, such as placement in special classes, should be based on multiple sources of information and should never be based on a single test score. Furthermore, it is reinforced that standardized tests are only one of multiple sources of assessment information that should be used when decisions are made about what is best for young children.

Another area of concern regarding IQ tests is the use of the tests with students who are culturally and linguistically diverse (CLD). There is a fair amount of research that has
been directed towards gifted and talented students of different cultures. Harrington (1987) cautioned that IQ tests may be culturally biased against minority groups and pointed out that IQ tests have been banned in portions of California “when their primary function is to identify a black child for placement in a class for mentally retarded children” (p. 114). Artiles and Zamora-Duran (1997) suggested an over reliance on standardized testing of gifted and talented CLD students. In their 1997 book, they pointed out that overlooking CLD gifted students is as harmful as overlooking learning disabled CLD students; in both cases, incorrect identification prevents the groups from receiving the services that will contribute to the development of their potential. In the same book, Rueda (1997) criticized traditional standardized assessments because they do not take cultural knowledge and background into consideration. Instead of a standardized assessment for CLD students, he “proposes the use of performance assessment approaches” (Rueda, p. 4) in an effort to address the above-mentioned limitations.

In a discussion of the limitations of IQ tests, Borland (1986) stated that IQ tests are not valid tests of intelligence but devices for generating numbers that are useful in assessing academic aptitude within a given culture, namely the North American Caucasian culture. Furthermore, IQ tests produce different results for different (i.e., cultural) groups. As well, minority children constitute a smaller percentage in gifted programs than they do in the school district as a whole (Borland, 1986). Taken from the National Report on
Identification: Assessments and Recommendations for Comprehensive Identification of Gifted and Talented Youth (Richert, Alvino, & McDonnel, 1982), one of the principles of identification was that of equity. In 1982, 30-70% of minority groups were underrepresented (Richert, 1985), a statistic that is still valid today. In general, IQ tests are very sensitive to racial, ethnic, linguistic, and socioeconomic differences and these differences may not be adequately reflected in a Full Scale Score. The underrepresentation of minority students in programs for the gifted has been well documented (Maker, 1996; Sarouphim, 1999; Valencia & Suzuki, 2001).

Another criticism of IQ tests is that they are often used for purposes for which they were not designed. It was found that identification instruments such as IQ tests are being used to identify categories of giftedness for which they were not designed such as creativity and leadership (Richert, 1985). In a national survey of identification practices in the field of gifted and talented education, Alvino, McDonnel, and Richert (1981) found that practitioners are using IQ and achievement tests to identify nonintellectual, nonacademic talents such as creativity and leadership ability.

IQ tests tend to measure one facet of intellectual giftedness; often creative or imaginative responses are not credited and points are awarded for convergent rather than divergent answers (Harrington, 1987). Controversy quite often surrounds the use of IQ tests
because they are not used for the purpose for which they were created, to predict academic achievement. IQ tests can yield a wealth of valuable information about a gifted child; the criticisms are often based on unrealistic expectations that tests can accomplish what they were never intended to do. IQ tests do not predict occupational success or personal life satisfaction, nor can they measure creativity or social giftedness and they definitely cannot be used in isolation (Robinson & Chamrad, 1986).

IQ tests and the resulting Full Scale IQ that is reported are controversial topics. Much of the controversy has stemmed from the misuse and abuse that has occurred throughout history. Students have been incorrectly classified on the basis of one test score. IQ tests are not culturally sensitive and do not take into account different backgrounds and cultural knowledge. However, throughout North America, the WISC-III continues to be the most extensively used ability measure across all three categories of gifted, learning disabled, and gifted/learning disabled (Feldhusen & Jarwan, 1993; Klausmeier et al., 1987; Reynolds & Kaufman, 1990). Many researchers have suggested that “indicators of giftedness which may be brought out by theses scales should be automatic “flags” to do further assessment whether or not the overall IQ meets a cut-off” (Klausmeier et al., p.137). Multiple criteria assessments are recommended (Borland, 1986; NAEYC, 1988; Richert, 1985) as well as reporting subtest scatter (Brown & Yakimowski, 1987; Hollinger & Kosek, 1986), a method that will discussed in a later section.
Patterns of WISC-R Scores for Gifted Children

The following discussion provides a comprehensive review of recent literature to develop a better understanding of subtest scatter found in the WISC-R with gifted children. Despite the fact that the WISC-R was designed as a measure of general intelligence (Wechsler, 1974), researchers have spent much time and energy searching for subtest performance profiles characteristic of specific clinical populations. Studies have looked at profiles in children who are mentally challenged (Kaufman & van Hagen, 1977; Naglieri, 1980), learning disabled (Anderson, Kaufman & Kaufman, 1976), emotionally disturbed (Hamm & Evans, 1978), and intellectually gifted (Karnes & Brown, 1980; Schiff, Kaufman & Kaufman, 1981). As a result, certain patterns have emerged that are typical of gifted children’s performance on the WISC-R.

Since WISC-R subtest performance patterns are strongly related to intellectual levels (Mueller et al., 1984), practitioners can expect to gain more information that may be useful to program planning and instructional strategies when analyses are conducted that include profile patterns. In their examination of WISC-R profiles of a sample of intellectually gifted students, Hollinger and Kosek (1986) found a significant variation in WISC-R scaled and subtest scores that was comparable to the WISC-R standardization sample. The frequency of significant differences in performance across subtests (for 22
out of 26 subjects in their study) suggests that careful examination and interpretation of the individual WISC-R profile is warranted. Hollinger and Kosek (1986) found over 35% of their sample obtained significantly discrepant Verbal/Performance (VP) IQs, a percentage that is comparable to the discrepancy reported by Kaufman for the original WISC-R standardization sample. Results of this study have tremendous implications for practitioners. Interpretation of WISC-R profiles could lead directly to suggestions for instructional strategies and further assessment.

In their examination of the hypothesis that children identified as gifted may have different patterns of scores on the WISC-R than children not identified as gifted, Brown and Yakimowski (1987) investigated the possibility that gifted children process information in a qualitatively different manner from average children. If gifted children do process information differently than average children, then patterns of subtest scores on the WISC-R may be more important in identifying gifted children than the commonly used Full Scale IQ. The study included three subsamples from a total of 599 WISC-R protocols. The gifted group consisted of children who were already in gifted programs and had been identified as “gifted” by their school system; the high-IQ group was created by including any child with a Full Scale IQ greater than 119, whether or not they had been identified as “gifted” by their school system; the average group consisted of children who had a Full Scale IQ score between 85 and 115. Results of the study
suggested students in the gifted group cognitively process information on the WISC-R in a different manner than average students. Specifically, Brown and Yakimowski found higher verbal than performance IQs for both the identified gifted and the high IQ groups; the average group did not demonstrate such pronounced verbal performance (VP) IQ differences. Also, in order to account for the variance among children in the gifted group, a four-factor solution (Perceptual Organization, Verbal Comprehension, Acquisition of Knowledge, Spatial Memory) was necessary, opposed to the usual two-factor structure (Verbal Ability and Perceptual Organization) used when accounting for variance of average students. Suggestions for using patterns of subtest scores as a basis to identify giftedness were made due to the finding that the gifted group may have different skills and/or strategies, which resulted in significantly different patterns of subtest scores.

Wilkinson (1993) also found variability within profile patterns when WISC-R profiles were analyzed. Four hundred fifty-six Grade 3 students with Full Scale IQs of 120 and above were examined; bright children performed significantly better than average children on reasoning tasks such as Similarities, Vocabulary, Comprehension, and Block Design. It was also found that the bright children performed lower than average on subtests involving bonus points for speed. Gender differences were noted as well. More boys than girls obtained higher scores overall and boys demonstrated greater variability.
in their profiles. These results suggest that variability within the profile is more of a norm than an anomaly, a finding that is particularly relevant when interpreting low scores on subtests.

Unlike Silver and Clampit (1990) who found that gifted children had VP discrepancies greater than what was suggested in the WISC-R Manual, Patchett and Stansfield (1992) did not find a significant difference on VP discrepancies between average and superior groups of children aged 9 years. However, the results of their examination of subtest scatter on WISC-R profiles of 290 children who were candidates for a gifted program in a mixed urban/rural public school district in northern Ontario, suggest that the WISC-R subtest scatter as measured by scaled score range increases as IQ increases into the superior range. Specifically, as the child’s IQ score increased, so did their level of subtest scatter. Patchett and Stansfield concluded that one can expect higher than average subtest scatter from a greater proportion of children with superior ability than from children with average or high average ability. Kline, Snyder, Guilmette, and Castellanos (1993) also found brighter children to have more variable profiles in their calculation of profile variability indexes (PVI).

As many researchers have found significant VP discrepancies when analyzing WISC-R profiles (Mueller et al., 1984; Silver & Clampit, 1990; Wilkinson, 1993), Silver and
Clampit cautioned against using the tables provided in the WISC-R manual for determining the frequency of occurrence of VP discrepancies in profiles of gifted children. They suggested that using the tables will distort the interpreter’s view of the child because more gifted children than average have discrepancies between verbal and performance IQs. Although the tables provided in the manual are accurate for average children, they greatly overestimate the rarity of VP discrepancies in gifted children. A distorted view may lead to incorrect classification of children as learning disabled or different from the norm. To prevent this from occurring, Silver and Clampit constructed a specialized table for determining the frequency of occurrence of VP discrepancies in profiles of high IQ children in an effort to lend greater accuracy to the interpretation of WISC-R profiles of gifted children. The table reflects the prevalence of larger VP discrepancies and has been confirmed through empirical observations of the WISC-R standardization sample. For example, if a child has a VP discrepancy of 14 points, with the higher level of the quotient being 140, it is expected that 50% of children with a similar profile will have a discrepancy of this magnitude.

Subtest scatter on the WISC-R has been investigated by many researchers who have found a greater frequency of scatter and more variability in profiles of gifted children, when compared to those of average children (Brown & Yakimowski, 1987; Kline et al., 1993; Patchett & Stansfield, 1992; Silver & Clampit, 1990; Wilkinson, 1993). Therefore,
it is quite likely that similar profiles would be observed for profiles of gifted children with the WISC-III. The following section investigates this possibility as well as other studies that have been conducted with gifted children and the WISC-III.

**WISC-III Studies with Gifted Children**

The third edition of the Wechsler Scales was introduced in 1991 and boasted improvements in the standardization sample, gender revisions, more attractive pictures as well as a new, optional subtest, Symbol Search. Typically, testees tend to score about 3-5 points lower on renormed tests than the original version; the WISC-R was 2-9 points lower than the WISC (Swerdlik, 1977). Since the main purpose of the WISC-III was to update the norms (Sattler, 1992), many researchers were interested to explore the new norms and their subsequent effects on gifted children.

An entire cohort of grade 3 students in a Canadian urban school board was screened between 1991 and 1994 in an effort to identify gifted students (Beal, 1995). It was found that the WISC-III FSIQ identified gifted grade 3 students in proportion to the district percentile cutoff, which was set at the 98th percentile. The study found that the WISC-III more accurately measured children's current functioning as IQ norms have drifted upward since the WISC-R was normed (Beal). Beal also found that gifted children who obtained a Full Scale IQ of 130 or higher had a lower occurrence of VP discrepancies
than the WISC-III as reported in the manual (Wechsler, 1991). The reduced occurrence of large VP discrepancies on the WISC-III for grade 3 gifted students may be related to an infrequent occurrence of atypical scaled score ranges beyond the normal range than was found on the WISC-R. These results are contrary to those of Patchett and Stansfield (1992) who found that a substantial proportion of gifted students with WISC-R FSIQs of 130 or higher showed scaled score ranges exceeding normal ranges on the WISC-R. Both studies by Beal and Mark et al. (1998) indicate a difference between Canadian and American children on the WISC-III and suggest a need for further study of profile patterns with a population of Canadian gifted children. Fewer Canadian students referred for gifted screening showed VP discrepancies when compared to the WISC-III standardization sample (Beal) and other differences in subtest scatter may be evident within the Canadian population of gifted students.

In his review of the WISC-III, Edelman (1996) found that there was an overall drop of 5.3 points on the Full Scale IQ; a 2.4 point drop in VIQ and a 7.4 drop in Performance IQ. The drop in Performance IQ was explained by increased importance of speed and time bonuses in reaching certain scaled scores. For example, a sixteen-year-old who completed every item on the Picture Arrangement subtest of the WISC-R correctly, but without a time bonus, could reach a scaled score of 9, within the average range. The same performance on the WISC-III will give a scaled score of 6, below average. The
speed differential between the WISC-R and WISC-III is most significant on the Picture Arrangement subtest. It is believed that the effect of the need for speeded performances is likely to be the greatest on those populations who are least likely to perform quickly (i.e., exceptional children). Edelman concluded his review of the WISC-III by warning that a reduction in scores from the WISC-R to the WISC-III could have a significant and negative effect on the placement and re-evaluation of exceptional children in school systems that have rote reliance on ability-achievement test score discrepancies.

Other researchers in the field (Fishkin & Kampsnider, 1996; Kaufman, 1992) have been concerned with the importance of speed on the WISC-III. When Kaufman evaluated the WISC-III and WPPSI-R for use with gifted children, he was most critical of the emphasis placed on speed of responding. Kaufman's review is unique because he had the opportunity to speak with David Wechsler about his hopes for future editions of the Wechsler scales. According to Kaufman, Wechsler himself wanted the Picture Arrangement subtest to focus more on problem solving ability than speed which is why the number of bonus points per item was reduced from three to two when the WISC became the WISC-R (Kaufman). On the WISC-R, a child could earn 51 possible bonus points for speed; on the WISC-III, the number of bonus points increased to 83. Of the total points a subject can earn on the four WISC-III subtests that allot bonus points (Arithmetic, Picture Arrangement, Block Design, Object Assembly), 60% come from
solving problems correctly, 40% from bonus points. The ratio has increased from the WISC-R.

Despite the increase in rewards for speed, research has shown that smarter children have quicker response times than less bright children, so the importance of speed on the WISC-III should not hamper gifted children (Benbow & Minor, 1990; Jensen, Cohn, & Cohn, 1989; Kranzler, Whang, & Jensen, 1994). However, the underlying point is that there is great variability in ability levels of individuals who solve problems at different rates of speed; the variability may be due to non-intellectual factors such as poor motor coordination or cognitive style (slow and thoughtful). More importantly, it is a well known fact that gifted students do not excel in motor speed (Kaufman, 1992); this point is well reflected in the Coding subtest, a measure of pure psychomotor speed, which is often a valley in a gifted child’s profile. Also, Processing Speed, the new factor of the WISC-III, composed of Symbol Search and Coding, is reported in the manual to be lower for gifted students, compared to the other factors - Verbal Comprehension, Perceptual Organization, and Freedom from Distractibility (Wechsler, 1991). All of the 38 gifted children from the normative sample, previously identified as gifted by independent evaluations, performed poorly on the Processing Speed factor and showed great variability in their performance (Wechsler, 1991). “Foolish” is the word Kaufman (p.137) uses to describe anyone who responds to a problem in five or fewer seconds. The
WISC-III allots three bonus points for solving a Block Design item in 1-5 seconds as does the Picture Arrangement subtest. Kaufman recommends studying subtest profiles of potentially gifted students to determine whether the subject was penalized for slow responding. Also, the subjects' performance on highly speeded tasks should be compared with their performance on tasks without bonus points.

In addition to exploring the WISC-III and the apparent emphasis on speed, many researchers have been interested in the subtest scatter of the WISC-III with respect to gifted children. Fishkin et al. (1996) investigated patterns of WISC-III IQ subtest scores for gifted students and found that subtest scatter occurred with greater frequency in a gifted sample than that reported for the normative sample. The amount of subtest scatter and its pattern on the WISC-III was similar to typical patterns of strengths and weaknesses for gifted children on the WISC-R with the exception of the Block Design subtest. Previously noted as a strength for gifted children, Block Design was found to be a weakness.

In another study of subtest scatter, Schinka, Vanderploeg, and Curtis (1997) analyzed the standardization sample of the WISC-III to determine the frequency of occurrence for relative intersubtest scatter ranges (defined as the difference between highest and lowest subtest scaled scores). This approach provides the greatest precision in scatter analysis to
help clinicians determine whether the amount of scatter obtained in WISC-III profiles is rare enough to be considered abnormal (Schinka et al., 1997). Results of the Schinka et al. study confirm the findings of Wechsler (1991) concerning the relationship of IQ to scatter in the WISC-III. Both studies conducted analyses to establish whether scatter varied with age or IQ level and revealed no significant findings. However, neither of these studies looked specifically at gifted children who have a history of greater subtest scatter than average children on all Wechsler scales.

In a recent study of subtest scatter, Fishkin and Kampsnider (1996) administered the WISC-III to 141 rural West Virginia children in order to determine whether subtest scatter patterns of superior ability children on the WISC-III differ from scatter patterns of children of lesser ability. They were also interested in assessing the importance of processing speed as a cognitive ability. They found no differences between verbal and performance IQ scales and a relative lack of scatter among subtests for gifted (FSIQ=124-131) and superior IQ range groups (FSIQ=132-148). However, the bright group (FSIQ=115-123) displayed variability previously observed for superior IQ children on the WISC-R (Silver & Clampit, 1990). Also noted was that the subtests most influenced by speed were comparatively the lowest and that processing speed had a greater effect for children in the bright IQ range than those in the superior or gifted range. Perhaps these “bright” students may in fact be gifted and better served in a challenge
program, had it not been for their poorer performance on the speeded subtests. Fishkin and Kampsnider concluded in reporting that the WISC-III does not measure perceptual organizational skills of potentially gifted children but in fact measures the speed with which those children organize perceptual materials.

Based on the aforementioned research, it is clear that gifted students display unique subtest patterns on the WISC-III. These patterns range from VP discrepancies (Beal, 1995) to low performance on speeded tasks (Kaufman, 1992) and low perceptual organization skills (Fishkin & Kampsnider, 1996). Although all of the studies previously conducted on patterns of gifted students' scores on the WISC-III provide important information to practitioners, none provide a method of analysis to determine if a given profile can be considered unique. The following section discusses such a method.

Profile Analysis

Profile analysis refers to the practice of interpreting differences among subtests as evidence of differential and distinct patterns of cognitive functioning. It can provide greater insight into the nature and complexity of human ability; clinicians can gain greater diagnostic precision by evaluating multiple abilities (Glutting et al., 1997). Compared to subtest scatter analysis, profile analysis has been used to discover distinct patterns among many diverse populations including gifted students (Rizza, McIntosh, &
McCunn, 2001) and learning disabled students (Yuan, 2000), as well as individuals who demonstrated various forms of psychopathology (Ridenour, Miller, Kenneth, & Raymond, 1997).

One of the most common uses of profile analysis is in its application to find core types or profiles within a distinct population. Holcomb, Hardesty, Adams, and Ponder (1987) applied multivariate profile analysis to WISC-R scores of a heterogeneous group of children who had previously been identified as Learning Disabled. They found six types, two of which were already identified in the literature. Holcomb et al. (1987) used the profiles to suggest unique remedial interventions.

Despite the apparent popularity of profile analysis, there are numerous criticisms. One of the most salient criticisms is that when conducting profile analysis, practitioners do not have a normative typology of core profiles that exist in a normal population. McDermott, Fantuzzo, and Glutting (1990) list numerous criticisms of subtest analysis including the fact that the profile believed to be unique is often commonplace within the population. Specifically, they report that the “claims for discovery of unique Wechsler profiles are never made against a viable null hypothesis” (McDermott et al., p.296). In an effort to provide accurate knowledge of the types and prevalence of subtest profiles that exist in the population of normal individuals, normative typologies of core profiles have recently
been established and validated using standardization samples for the WISC-R (McDermott, Glutting, Jones, Watkins, & Kush, 1989), WAIS-R (McDermott, Glutting, Jones, & Noonan, 1989), and the Wechsler Preschool and Primary Scale of Intelligence (Glutting & McDermott, 1990).

Watkins and Kush (1994) compared seven core profile types of the WISC-R to 1222 Special Education students in an attempt to provide an empirical counter-argument to conducting profile analysis of Wechsler subtests. More than 96% of the Special Education cases were found to be similar to one of the core types identified in the standardization sample (McDermott et al., 1989). The authors found that only 3.6% of the cases were unique and used this finding to recommend against conducting profile analysis. Based on these results, school psychologists can expect that clinically unique profiles are quite rare in both normal and special education populations. Furthermore, school psychologists can expect to encounter an unusual WISC-R profile in only 4% of the Special Education population (Watkins & Kush). However, it is important to note that the authors of the study caution that the current results cannot be uncritically applied to the WISC-III.

Glutting, McDermott, and Paul (1994) used profile analysis to identify the most representative ability and achievement profiles for the linking sample of the WISC-III.
and Wechsler Individual Achievement Test (WIAT). They found six core profiles that provide contrasts for testing multivariate IQ-achievement discrepancies. As well, Glutting et al. (1994) provide two methods for determining multivariate IQ-achievement discrepancies as well as determining whether a given profile is uncommon. The first method is mathematically precise and appropriate for research purposes whereas the second method, based on generalized distance theory, (Osgood & Suci, 1952) is more convenient and better suited for practitioners.

In 1997, Glutting, McDermott, and Konold investigated whether the pattern of score peaks and valleys across component subtests from the WISC-III are indicative of unique cognitive abilities. As well, they provide a multivariate methodology for determining whether a child’s WISC-III subtest profile is commonplace or unusual. During the first step of their investigation, they used cluster analysis to sort 2,200 profiles to determine the most representative profile pattern of the WISC-III standardization population. Glutting et al. (1997) found nine core profile types. The primary distinction among the types was general ability level or “g.”

The multivariate methodology provided by Glutting et al. (1997) allows practitioners to test the validity of WISC-III subtests thought to be clinically relevant or unusual. Glutting et al. (1997) provide two methods to determine whether a profile is uncommon.
The first method is mathematically more accurate, but more complex and uses the \( rp(k) \) statistic to determine similarity to core profile types. When using this method of profile analysis, likelihood of core type membership is determined by the \( rp(k) \) group similarity coefficient for correlated variables (Tatsuoka & Lohnes, 1988) where a separate \( rp(k) \) value reflects the level and shape similarity of the hypothetically unique profile to each core type.

The second method is more practical and is based on generalized distance theory (Osgood & Suci, 1952). Although the second method is described as being more suitable to practitioners, it is still a statistically rigorous method (Glutting et al., 1997). With this method, the subtest profile of an individual is compared to only those core profile types within the individual’s general ability range. The differences in scaled score points between corresponding subtests of each profile are calculated and squared. If the sum of squared differences between the individual’s profile and any core profile in the individual’s ability range is >80, the individual’s profile may be interpreted as uncommon in the general population. Although the authors do not necessarily support subtest analysis, the above-mentioned methodologies provide an empirical basis for interpreting hypotheses generated from subtest scores rather than an over-reliance on observed profile variability.
Another method of conducting profile analysis, suited to practitioners, has recently been developed by Watkins (1999). The WISC-III Profile Calculator is a computer program that compares the obtained WISC-III scores of an individual child to the core profiles of the WISC-III normative sample, using the generalized distance measure. If 10 mandatory subtest scores are provided, the program applies the 10 subtest normative taxonomy developed by Konold et al. (1999). When all 12 subtest scores are provided, the program applies the 12 subtest normative taxonomy developed by Glutting et al. (1997). The comparison of an individual case to the normative taxonomy of the most common subtest profiles allows an empirical test to determine the uniqueness or clinical importance of that individual profile. Uniqueness is only plausible when it is demonstrated that a child’s pattern of subtest scores is atypical when compared to the most common (or core) patterns found in the population (See Appendix A for a description of core profiles).

Research Directions and Formulation of Research Questions

Exploring the profile patterns of Canadian gifted children may provide some insight into the differences between the performance of Canadian and American gifted children on the WISC-III. As well, providing more current research on the performance of Canadian gifted children on the WISC-III will assist practitioners in their interpretation of these students’ scores. There appears to be a research need as no studies have focused on
profile analysis of Canadian gifted children. The following general research questions emerged from the review of the literature:

- Will a sample of Canadian gifted children match the nine profile types identified by Glutting et al. (1997)? If so, what profiles will the sample most resemble?
- Will some of the Canadian gifted children’s profiles be considered unique when compared to the profile types identified by Glutting et al. (1997)? If so, what are the characteristics of the individuals whose profiles are considered to be unique?

A formal statement of the research questions will appear after the summary of the chapter.

Summary of Chapter Two

In Chapter Two, the literature relating to characteristic patterns of WISC-R and WISC-III test scores for gifted subjects was reviewed. A discussion of the utility of IQ tests and scores was included in order to provide a framework for understanding the strengths and weaknesses of reporting Full Scale IQs as well as to provide a context in which to examine WISC-III profiles of gifted students. WISC-III studies with gifted children were also reviewed as well as a general discussion of profile analysis. From this discussion it was deduced that there is a need for further research in this area. Particularly apparent is the need to explore characteristic patterns of WISC-III profiles with gifted Canadian
children. Several research questions emerged from this review of the literature and are summarized below.

Formal Statement of Research Questions

The research questions that will be addressed in the current study are:

- How will the profiles of Canadian gifted children compare to those profiles identified by Glutting et al. (1997) or Konold et al. (1999)? What percentage of the sample will fit into one of the nine core profiles previously identified by Glutting et al. (1997) or one of the eight core profiles identified by Konold et al. (1999)? What percentage of the sample will be considered clinically unique or rare?

- Of those profiles considered to be clinically rare, what are the demographics (sex, race) of those individuals whose profiles do not fit into the core types? What core type do their profiles most resemble?

- Of those profiles considered to be common (fits into one of the nine core types), what is the profile that is the most common? What are the implications for interpretation of WISC-III subtest scores?

In Chapter 3, a description of the methods used to investigate the research questions is provided.
Chapter Three: Method

Overview of Chapter Three

The research methodology of the study is described in the following three-part discussion. Part one includes details about the population and sample. Part two discusses the quantitative measures and the testing procedures. In part three, the design of the study is explained.

Part One

Population. In order to obtain a final sample of approximately 100 participants, the sample for this study was gathered from two unique settings. The first target population was gifted students attending various public schools in the Lower Mainland of British Columbia, including Vancouver. The accessible population was children who were voluntarily brought to the Clinic on Ability and Development in the Psychoeducational Research and Training Centre (PRTC) at the University of British Columbia, Vancouver, British Columbia for intellectual, academic achievement, and social developmental assessment. At the Clinic on Ability and Development, data continued to be collected over a period of several years. Data for this study were drawn from the larger Clinic project which was longitudinally designed to examine the
intellectual and social development of gifted children. Testing was conducted at the
PRTC by graduate students in School Psychology who were trained in Level C testing.

The second target population was gifted students attending Choice School for Gifted
Children, a private institution located in Richmond, British Columbia. Choice is a multi-
aged non-graded school that requires psychoeducational testing as part of the application
process. Consent forms (see Appendix B) were distributed, by classroom teachers, to
every student in the school. Upon receipt of the consent forms, students were assigned an
identification number; no other identifying information was collected. Data collection
took place at Choice School and each participant's subtest scores, sex, and age were
recorded directly into a computer file.

Sample. The total sample size in this study was 88. Sixty of the participants were
gathered from Choice School; the remaining 28 were from the PRTC. The students
ranged in age from 6 years to 13 years, 10 months with a mean age of 8 years, 4 months.
The sample included 41 females and 47 males who all spoke English fluently. With
regards to ethnicity, 58% of the participants were Caucasian, 29.5% of the participants
were Asian, and 12.5% of the participants were from other minority groups. The students
were attending schools in private, public and parochial settings. The socio-economic
level of the sample was middle-to-upper class.
Part Two

*Measurement of IQ.* Each participant’s intellectual ability was measured by the Wechsler Intelligence Scale for Children-Third Edition (WISC-III). The WISC-III is a recently revised test of general cognitive ability. It consists of ten mandatory and three optional subtests, each classified into a verbal or performance scale. The child’s performance on these measures is summarized in three composite scores, Verbal, Performance, and Full Scale intelligence quotients (IQ). To be included in the current sample, the children had to obtain a full scale score of 120 or more.

Part Three

*Procedure.* As part of the larger project explained above as well as the application process for Choice School, the gifted subjects were administered the WISC-III. Sixty-nine subjects were administered twelve subtests, including Symbol Search and Digit Span, while the remaining 19 subjects were administered the ten mandatory subtests. Using the nine core profile types identified by Glutting et al. (1997), a profile analysis was conducted using the WISC-III Profile Calculator, a computer program developed by Watkins (1999). This program is available for public use and can be downloaded from the internet. The program is easy to use and requires the user to enter the subtests scores of the WISC-III. Using the generalized distance measure, the WISC-
Ill Profile Calculator compares the obtained WISC-III scores of an individual child to the core profiles of the WISC-III normative sample. If only the 10 mandatory subtest scores are provided, the program applies the 10 subtest normative taxonomy developed by Konold et al. (1999). If all 12 subtest scores are provided, the program applies the 12 subtest normative taxonomy developed by Glutting et al. (1997).

*Summary of Chapter Three*

This chapter described the study's methodology, including the sample, measurement instruments, design, and analyses. In Chapter Four the results of the statistical analyses are presented.
Chapter Four: Results

Overview of Chapter Four

This chapter has been subdivided into three sections. In order to facilitate connection between the research questions and the results, each question has been reiterated followed by the statistical analyses for that particular question. Since not all profiles included the twelve subtests of the WISC-III, those profiles with the ten mandatory subtests of the WISC-III were compared to the eight core profile types found by Konold et al. (1999). The profiles with the ten mandatory subtests as well as the two optional subtests of the WISC-III were compared to the nine core profile types found by Glutting et al. (1997). Results of the study will be discussed in relation to rare and common profiles as well as profiles that were compared to either the eight or nine core profile types.

The first section describes how the profiles of Canadian gifted children compared to the core profile types identified by either Glutting et al. (1997) or Konold et al. (1999). The second section addresses the research question concerning the profile types that are considered to be clinically rare and do not fit into a core profile type. The participants' personal characteristics are described as well as the profile type that most resembles the profile considered to be rare. The final section of the results describes the profiles that are considered to be common and fit into a core profile type.
How will the profiles of Canadian gifted children compare to those profiles identified by Glutting et al. (1997) or Konold et al. (1999)? What percentage of the sample will fit into one of the core profiles previously identified by Glutting et al. (1997) or Konold et al. (1999)? What percentage of the sample will be considered clinically unique or rare?

Overall, the proportion of children classified into one of the nine or eight core profile types as identified by Glutting et al. (1997) and Konold et al. (1999), respectively, was significantly lower than expected (66%). Of the 88 profiles, 34% (N=30) were considered to be clinically unique or rare. The profiles were considered to be rare if the generalized distance measure, $D^2$, was greater than 120, when all twelve subtest scores were provided. If only ten subtest scores were provided, the profiles were considered to be rare if $D^2$ was greater than 98.

Based on the generalized distance measure, $D^2$, 58 of the profiles were considered to be common and fit into one of the core profile types. Forty-four of the profiles considered to be common were compared to the nine core profile types (Glutting et al., 1997) while the remaining 14 were compared to the eight core profile types (Konold et al., 1999). The distribution of cases across sex and race was relatively even and reflected the
distribution of the entire sample. Table 1 presents the descriptive data for those who matched and did not match a core profile.

Table 1
*Descriptive Data for Those Who Matched and Did Not Match a Core Profile*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Match a Profile</th>
<th>No Match</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>58</td>
<td>30</td>
</tr>
<tr>
<td>% Male</td>
<td>48.3</td>
<td>63.3</td>
</tr>
<tr>
<td>% Female</td>
<td>51.7</td>
<td>36.7</td>
</tr>
<tr>
<td>% Caucasian</td>
<td>60.3</td>
<td>56.7</td>
</tr>
<tr>
<td>% Asian</td>
<td>29.3</td>
<td>26.7</td>
</tr>
<tr>
<td>% Other</td>
<td>10.4</td>
<td>16.6</td>
</tr>
<tr>
<td>Mean Age (in months)</td>
<td>100.19</td>
<td>99</td>
</tr>
<tr>
<td>Full Scale IQ</td>
<td>128.66</td>
<td>132.37</td>
</tr>
<tr>
<td>Verbal IQ</td>
<td>126.81</td>
<td>136.6</td>
</tr>
<tr>
<td>Performance IQ</td>
<td>125.52</td>
<td>121.97</td>
</tr>
<tr>
<td>Verbal Comprehension IQ</td>
<td>126.34</td>
<td>136.23</td>
</tr>
<tr>
<td>Perceptual Organization IQ</td>
<td>124.93</td>
<td>122</td>
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<tr>
<td>Freedom from Distractibility IQ</td>
<td>120.42</td>
<td>128.26</td>
</tr>
<tr>
<td>Processing Speed IQ</td>
<td>115.27</td>
<td>114.28</td>
</tr>
</tbody>
</table>

Of those profiles considered to be clinically rare, what are the personal characteristics of those individuals whose profiles do not fit into the core types? What core type do their profiles most resemble?

Profile analysis results from the sample of Canadian gifted students indicate that 34% (N= 30) of the cases were unusual when contrasted to the core types found in the normative population. Analysis of the demographic characteristics of the 30 atypical
students found that they were 19 males and 16 Caucasians. The distribution of cases across age was relatively even and reflected the distribution of the entire sample. Figure 1 indicates the mean subtest profile of the 30 atypical students and figure 2 indicates the mean index scores of the 30 atypical students.

Figure 1. Mean subtest scores for rare profiles. PC= Picture Completion; IN=Information; CD=Coding; SM=Similarities; PA=Picture Arrangement; BD=Block Design; AR=Arithmetic; VO=Vocabulary; OA=Object Assembly; CM=Comprehension; DS=Digit Span.
Of the 30 atypical profiles, 25 of the cases were compared to the core profile types identified by Glutting et al. (1997). Although all of the 25 cases were considered to be clinically unique or rare, the profile most of the rare cases most resembled was the High Ability with Low Processing Speed profile (N=19). Four of the cases most resembled the Above Average Ability with V>P and Low Processing Speed profile while the remaining two cases most resembled the Average Ability profile. Five of the profiles that were considered to be clinically unique or rare were compared to the eight core profile types identified by Konold et al. (1999). Although considered rare, all five of the profiles most resembled the High ability profile.
Of those profiles considered to be common (fits into one of the nine or eight core types), what is the profile that is the most common? What are the personal characteristics of those subjects whose profiles were considered to be common?

Sixty-six per cent of the total sample had profiles that fit into one of the nine or eight core types identified by Glutting et al. (1997) and Konold et al. (1999), respectively. Table 2 presents the frequency of occurrence of each profile type classified into the nine core types as identified by Glutting et al. (1997).

Table 2
WISC-III Subtest Profiles Classified into 9 Core Types and One Unique Group via WISC-III Profile Calculator

<table>
<thead>
<tr>
<th>Type</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>High ability and depressed processing speed</td>
<td>52.17</td>
</tr>
<tr>
<td>Above average ability; VIQ&gt;PIQ and depressed speed</td>
<td>8.70</td>
</tr>
<tr>
<td>Above average ability; PIQ&gt;VIQ and elevated speed</td>
<td>2.90</td>
</tr>
<tr>
<td>Unique</td>
<td>36.23</td>
</tr>
</tbody>
</table>

Table 3 presents the frequency of occurrence of each profile type of the common profiles classified into the eight core types identified by Konold et al. (1999).
Table 3
WISC-III Subtest Profiles Classified into 8 Core Types and One Unique Group via WISC-III Profile Calculator

<table>
<thead>
<tr>
<th>Type</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>High ability</td>
<td>57.90</td>
</tr>
<tr>
<td>Above average ability</td>
<td>5.26</td>
</tr>
<tr>
<td>Above average ability with VIQ&gt;PIQ</td>
<td>10.52</td>
</tr>
<tr>
<td>Unique</td>
<td>26.32</td>
</tr>
</tbody>
</table>

Figures 3, 4, and 5 present a comparison of the subtest means between the current sample and the scores provided by Glutting et al. (1997) for the most common three profiles.

Figure 3. Mean subtest scores for Profile 1: High ability with depressed processing speed (Glutting et al., 1997). PC= Picture Completion; IN=Information; CD=Coding; SM=Similarities; PA=Picture Arrangement; BD=Block Design; AR=Arithmetic; VO=Vocabulary; OA=Object Assembly; CM=Comprehension; SS=Symbol Search; DS=Digit Span.
Figure 4. Mean subtest scores for profile 2: Above average ability, VIQ>PIQ (Glutting et al., 1997). PC= Picture Completion; IN=Information; CD=Coding; SM=Similarities; PA=Picture Arrangement; BD=Block Design; AR=Arithmetic; VO=Vocabulary; OA=Object Assembly; CM=Comprehension; SS=Symbol Search; DS=Digit Span.

Figure 5. Mean subtest scores for profile 3: PIQ>VIQ, elevated processing speed (Glutting et al., 1997). PC= Picture Completion; IN=Information; CD=Coding; SM=Similarities; PA=Picture Arrangement; BD=Block Design; AR=Arithmetic; VO=Vocabulary; OA=Object Assembly; CM=Comprehension; SS=Symbol Search; DS=Digit Span.
Figures 6, 7, and 8 present a comparison of the subtest means between the current sample and the scores provided by Konold et al. (1999) for the most common three profiles.

Figure 6. Mean subtest scores for profile 1: High ability (Konold et al., 1999). PC= Picture Completion; IN=Information; CD=Coding; SM=Similarities; PA=Picture Arrangement; BD=Block Design; AR=Arithmetic; VO=Vocabulary; OA=Object Assembly; CM=Comprehension.
Figure 7. Mean subtest scores for profile 2: Above average ability (Konold et al., 1999). PC= Picture Completion; IN=Information; CD=Coding; SM=Similarities; PA=Picture Arrangement; BD=Block Design; AR=Arithmetic; VO=Vocabulary; OA=Object Assembly; CM=Comprehension.

Figure 8. Mean subtest scores for profile 3: Above average ability and VIQ>PIQ (Konold et al., 1999). PC= Picture Completion; IN=Information; CD=Coding; SM=Similarities; PA=Picture Arrangement; BD=Block Design; AR=Arithmetic; VO=Vocabulary; OA=Object Assembly; CM=Comprehension.
In Chapter Five the results of the study will be discussed and interpreted in light of the research questions. Limitations of the current study, recommendations for further research, and implications for practice are also included in the following chapter.
Chapter Five: Discussion

In Chapter Five, the limitations of the study are described; the results are interpreted; and implications of the current research for education and suggestions for future research are discussed.

*Limitations of the Study*

One of the major limitations facing the current study relates to the sample. As a portion of the sample of children was self-selected for the study, certain biases are possible. Since the children were voluntarily brought to the Psychoeducational Research and Training Centre, this introduces a bias due to volunteerism. Another concern is the small size of the sample. Previous studies conducting profile analysis of a select population have had sample sizes of 1200 (Watkin & Kush, 1994) and 200 (Ward, Ward, Glutting, & Hatt, 1999). However, there have been studies conducted using sample sizes of 100 (Rizza et al., 2001) as well as a study that used one subject’s profile to conduct a profile analysis (Reynolds & Clark, 1986).

Due to its partial volunteer nature and size, the sample of children participating in the current study may not be representative of the population of gifted children. This means that generalizations to the population of gifted children need to be made cautiously.
However, analysis of the results derived from this particular sample will provide a solid framework for hypothesizing certain trends within the Canadian gifted population. A description of the hypotheses and suggestions for future research are included throughout the discussion.

Another limitation of this study concerns the actual practice of profile analysis. There are many studies citing the limitation of profile analysis (Glutting et al., 1997; McDermott et al., 1990). One study conducted by Watkins and Kush (1994) concluded that "no way" be the response to profile analysis. However, the majority of the studies that recommend against conducting profile analysis do so based on the "armchair" profile analysis that has been conducted in the past. Criticisms of profile analysis included the lack of empirical research and no core profile types with which to compare individual profiles.

Mark et al. (1999) found that American WISC-III norms did not provide a good psychometric fit for Canadian children. When collecting data for the current study, it was not indicated on all of the WISC-III protocols whether Canadian or American norms had been used. To maintain a purely Canadian sample and allow for generalizations to the population of Canadian gifted children, all protocols should be scored using Canadian norms.
**Interpretation of the Results**

The profile analysis of the entire sample of Canadian gifted students indicated that a much higher percentage of profiles were considered to be clinically unique or rare when compared to the normative sample. These results suggest that when subjected to profile analysis, gifted student performance on the WISC-III is more likely to be considered rare and is less likely to fit into a core profile type. When compared to results of other studies that subjected various populations to profile analysis, it is apparent that gifted students’ profiles are more unique than those of average students. The profile analysis conducted by Watkins and Kush (1994) with a sample of 1,200 special education students found only 3.6% of the sample to be considered unique. Based on their results, the authors recommended that profile analysis was not beneficial or advantageous.

Results of the current study are similar to those found by Ward et al. (1999) who found 30% of the LD sample to have profiles considered to be clinically unique. It is important for educators and practitioners to be aware of the likelihood of gifted students having profiles that would be considered rare if subjected to a profile analysis. The large percentage of profiles considered to be unique supports the practice of profile analysis with gifted students, a recommendation previously made by Kaufman (1992).
Previous research has identified characteristic patterns of IQ subtests on the WISC and WISC-R for children in the superior range (Brown & Yakimowski, 1987; MacMann et al., 1991; Mueller et al., 1984; Patchett & Stansfield, 1992; Silver & Clampit, 1990; Wilkinson, 1993). Fishkin et al., (1996) found that subtest scatter of WISC-III scores occurred with greater frequency in a gifted sample than for scores obtained by participants in the normative sample. They found the gifted sample differed significantly on four subtests; Similarities and Comprehension scores were found to deviate above the sample mean while scores on the Coding and Symbol Search subtests were significantly below the sample mean. They also found that Block Design, previously a peak subtest for gifted students on the WISC-R was a weakness on the WISC-III. Interestingly, the mean subtest scores for the rare profiles in this study indicate Block Design as a strength along with Information, Similarities, Arithmetic, and Vocabulary. Weaknesses include Coding and Picture Arrangement.

Although the purpose of the current study was to investigate rare profiles, a discussion of the profiles considered to be common is useful in an effort to understand typical and expected performance of Canadian gifted children on the WISC-III. Sixty-six per cent (N=58) of the profiles were considered to be common; 44 were compared to nine core profile types (Glutting et al., 1997) and the remaining 14 were analyzed against eight core profile types (Konold et al., 1999). Thirty-six of the 44 profiles compared to the nine
profile types (Glutting et al., 1997) fit into the High ability with depressed processing speed profile. This finding supports earlier research that gifted students perform poorly on speeded tests (Kaufman, 1992) and also indicates a need to analyze subtest scores to determine if speeded subtests were responsible for adversely affecting the Full Scale IQ. There were no differences found between sex, race or age within this profile.

Fourteen of the 44 common profiles had scores for only the ten mandatory subtests of the WISC-III and were therefore compared against the eight profile types identified by Konold et al. (1999). Eleven of the 14 profiles fit into the High Ability profile type. Considering the sample of the study, this finding is not unexpected. One profile fit into the Above average ability profile while the remaining two fit into the Above average ability, V>P profile. Although the core profile types identified by Konold et al. (1999) are useful when conducting a profile analysis for students administered the bare essentials of the WISC-III, the profile types identified by Glutting et al. (1997) provide much more meaningful information.

Previous studies of profile analysis have been criticized for conducting profile analysis without the support of multivariate methodology. The current study attempt to avoid these problems by conducting a method of profile analysis supported by empirical research. Thirty-four percent of the sample were found to have profiles that could not be
classified into one of the core types identified by either Glutting et al. (1997) or Konold et al. (1999). Practitioners and researchers need to be aware of the high probability that a given gifted student’s profile could be considered clinically unique or rare and should be interpreted accordingly.

Of the profiles that were considered to be common, a large majority was classified into the High ability with depressed processing speed profile. This finding supports previous research that gifted students do not perform as well on speeded subtests as they do on subtests that are not timed such as Similarites or Comprehension. Based on these results, it would be advisable for practitioners to investigate the student’s performance on speeded subtest scores of the WISC-III.

Suggestions for Future Research

The first suggestions for future research are derived from the limitations outlined at the beginning of Chapter Five. In order to confirm the results obtained, additional studies need to include larger samples of gifted children. Replicating the study using a random sample of gifted children would address the volunteer bias. Conducting the study with these modifications to the sample would allow for more valid generalizations to the population of gifted children.
Future research needs also to address investigations of gifted profile types for the WISC-III due to the large proportion of rare profiles found within the sample of Canadian gifted children. Based on the results that 34% of the total sample had profiles considered to be clinically unique or rare, more research is needed within this area. It would be worthwhile to conduct a cluster analysis with a large sample of gifted students to determine if unique profiles exist within the population. Similar to the study conducted by Ward et al. (1999), investigating exceptional gifted profile types for the WISC-III would be beneficial to practitioners, researchers, and educators of gifted children.

Incorporating achievement data would also be useful, much like the study by Ward et al. (1999) in which the authors conducted a hierarchical cluster analysis with data from the WISC-III as well as the Wechsler Individual Achievement Test (WIAT).

Summary of Chapter Five

Chapter Five described the limitations facing the current study. The results of the analyses were interpreted and implications for school psychologists discussed. As well, suggestions for future research were made.
References


Appendix A

Core Profile Types Identified by Glutting et al. (1997)

1. **High ability and depressed processing speed** (prevalence = 9.4%; FSIQ $M = 125.6$, $SD = 6.0$). The occurrence of unusual FSIQ>PIQ discrepancies is nearly four times greater than that found in the general population ($M = 9.2$ points in favor of the FSIQ). More than 60% of the children are females and comparatively more Caucasians are present (88.1% vs. 70.1% in the child population based on 1988 U.S. census data).

2. **Above-average ability; VIQ>PIQ and depressed processing speed** (prevalence = 13.3%; FSIQ $M = 114.1$, $SD = 4.8$). The frequency of unusual VIQ>PIQ discrepancies in profile 2 is double the national propensity ($M$ difference = 6.2 points in favor of the VIQ). There are slightly more females and more Caucasians than anticipated.

3. **Above average ability; PIQ>VIQ and elevated processing speed** (prevalence = 14.4%; FSIQ $M = 108.6$, $SD = 5.3$). The incidence of unusual PIQ>VIQ discrepancies exceed the national trend by more than two and one-half times ($M$ difference = 7.0 points in favor of the PIQ). Slightly more PSI>FSIQ differences are
apparent than expected (M difference = 9.2 points in favor of the PSI). Males are predominant (65.5%). Slightly more Caucasians are present than expected.

4. *Average ability* (prevalence = 13.2%; FSIQ M = 101.6; SD = 4.4). Profile type 4 and profile type 6 are the only clustered defined solely by the g level. Neither type shows unusual variation in the rate of children’s VIQ/PIQ, FSIQ/FDI, or FSIQ/PSI discrepancies. Slightly more Caucasians are present in profile type 4 than expected.

5. *Average ability and elevated freedom from distractibility* (prevalence = 9.5%; FSIQ M = 99.2; SD = 5.1). No unusual differences are apparent for children’s gender, age, or race.

6. *Slightly below average ability* (prevalence = 9.9%; FSIQ M = 92.4, SD = 5.5). Profile type 6 is defined solely in terms of g level. No unusual variation is evident in the rate of children’s VIQ/PIQ, FSIQ/FDI, or FSIQ/PSI discrepancies. This type shows a higher prevalence of females. Caucasians and African Americans are represented proportionately.

7. *Slightly below average ability; PIQ>VIQ and elevated processing speed* (prevalence = 12.1%; FSIQ M = 91.3, SD = 5.0). The occurrence of PIQ>VIQ discrepancies is
more than three times that for the aggregate population ($M$ difference = 9.6 points in favor of the VIQ). Differential expectations are present for gender, with females (67.0%) more prominent than males. Caucasians are slightly underrepresented.

8. **Below average ability and VIQ>PIQ** (prevalence = 9.7%; FSIQ $M = 86.0, SD = 4.7$). More than two and one-half times the predicted number of children show VIQ>PIQ discrepancies ($M$ difference = 10.2 points in favor of the VIQ). Distributions for gender are equitable.

9. **Low ability; elevated freedom from distractibility and elevated processing speed** (prevalence = 8.0%; FSIQ $M = 73.6, SD = 6.4$). Profile type 9 is the only one to display atypical score variation from both the PSI and FDI.

**Core Profile Types Identified by Konold et al. (1999)**

1. **High ability** (prevalence = 9.1%; FSIQ $M = 126.2, SD = 5.5$). More Caucasians are present than would normally be projected on the basis of race distributions in the population

2. **Above average ability** (prevalence = 14.9%; FSIQ $M = 113.9, SD = 4.4$). More than 65% of the children are girls and a greater percentage of Caucasians is present.
3. *Above average ability and VIQ>PIQ* (prevalence = 10.1%; FSIQ $M = 108.5$, $SD = 5.2$). The occurrence of unusual VIQ>PIQ discrepancies is higher and unusual PIQ>VIQ is less than that found in the general child population ($M$ discrepancies = 8.5 points in favor of the VIQ).

4. *Average ability and PIQ>VIQ* (prevalence = 13.4%; FSIQ $M = 102.6$, $SD = 5.2$).

Profile type 4 shows the greatest disproportion in the number of atypical VIQ/PIQ differences.

5. *Average ability and VIQ>PIQ* (prevalence = 17.2%; FSIQ $M = 99.1$, $SD = 4.3$). The occurrence of unusual VIQ>PIQ discrepancies is higher and unusual VIQ>PIQ discrepancies is lower than expected ($M$ difference = 6.2 points in favor of the VIQ).

There are more girls (59.8%) and slightly more Caucasians than expected.

6. *Below average ability and PIQ>VIQ* (prevalence = 12.9%; FSIQ $M = 89.3$, $SD = 4.7$). Slightly fewer Caucasians are included in this type.

7. *Below average ability* (prevalence = 14.0%; FSIQ $M = 87.6$, $SD = 4.8$). More boys (57.3%) than girls associated with this type.
8. *Low ability* (prevalence = 8.4%; FSIQ $M = 73.1$, $SD = 6.2$). Less than half the expected number of Caucasians are present.
Purpose:

The purpose of this study is to investigate the Wechsler Intelligence Scale for Children (WISC-III), a popular instrument used to measure children's cognitive ability. In particular, we are looking for patterns that may be unique to gifted children when compared with students of average ability. Since research in this area is limited, your child’s participation in this study will help us better understand interpretation and application of gifted children’s WISC-III scores. We also hope that the results of this study will help practitioners determine a valid and accurate method of interpreting measures of cognitive ability, particularly the WISC-III.

Study Procedures:

Students who participate in this study, will not have any face-to-face contact with the investigators. Instead, permission is being requested to access test data located within the student’s permanent record files. Specifically, the results of the WISC-III, administered previously to each student as part of the school admission process, will be recorded anonymously and used as data for this investigation.

Confidentiality:

Participation in this study is entirely voluntary and withdrawal from the research study or refusal to participate will not jeopardize you or your child in any way. All information collected will be strictly confidential and will not be available to students, teachers, parents or any other school personnel. No names will be recorded; instead numerical codes will be assigned to each student. No individuals other than the investigators of this study will have access to the information collected from the students. All collected data will be kept in a secure computer file.

Please sign the attached form indicating whether you do or do not give permission for confidential access to your child’s test data and return it to the school. Thank you very much for your time and consideration of this request.