Screening for Learning Disabilities and Giftedness: The Applicability of the DIAL-R with French-speaking Preschool Quebec Children

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SHORT TITLE:

The Applicability of the DIAL-R Screening Test with Francophone Preschoolers.

ABSTRACT

Cross cultural applicability of the Developmental Indicator for the Assessment of Learning-Revised (DIAL-R), an American screening test, was investigated with 345, 2 to 6 year old Francophone children. Some modifications and elimination of items was necessary to equalize the American and French versions. Data analyses revealed significant differences to the American population, with the present sample scoring higher at most age levels. Analysis of validity and reliability measures indicate that the test meets adequate technical standards for use with this population. Statistically significant and clinically meaningful trends were found between performance and behavioural observations. Results also point to inherent test-bias with regard to language variables. Educational significance of the results were highlighted. Explanation of significant discrepencies between the American and French versions may be based upon cultural and sampling differences. Important issues were raised regarding the implications of the use of the DIAL-R and recommendations were made for future investigations.

RÉSUMÉ

Cette étude a eu pour but d'examiner l'applicabilité inter-culturelle du "DIAL-R", un test de sélection Américain, avec 345 francophones agés de 2 à 6 ans. Quelques modifications et élimination d'items ont été nécessaires pour balancer les versions Françaises et Américaine du test. L'analyse des résultats a révélée des différences significatives entre les deux versions: l'échantillon de population étudié a obtenu des résultats plus élevés, et ce à tout les niveaux d'âge. Une analyse des mesures de validité et de fidélité a indiquée que ce test satisfait les standards techniques adéquats pour cette population. Des tendances significatives, du point de vue statistique et clinique, ont été observées entre la performance et les observations du comportement. Les résultats indiquent aussi le biais inhérent du test à l'égard des variables langagières. L'importance éducationnelle des résultats a été soulignée. Les différences entre les versions Française et Américaine pourrait être expliquées par les techniques d'échantillonnage utilisées et les différences propres aux deux cultures. Certaines questions importantes ont été considérées concernant les implications de l'utilisation du "DIAL-R", et des recommendations ont été faites pour de futures recherches.

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CHAPTER I

INTRODUCTION

This study examines the applicability of an American test, the DIAL-R, Developmental Indicator for the Assessment of Learning-Revised, (Mardell-Czudnowski &Goldenberg, 1983,1984), designed for screening preschool children for potential learning problems or potential giftedness with a Francophone population of Quebec.

To provide an appropriate framework for this investigation and to highlight the assumptions inherent in the development of early screening instruments, theoretical landmarks of Developmental Psychology will be outlined. The importance of early experience to physical and psychological development and its logical extension, early intervention - the ability to effect the course of child development, will be discussed.

The heightened interest of our time in Early Identification, for the purposes of Early Intervention, has led to a common practise of Psychoeducational assessment in a number of countries. The Education for Handicapped Act, P.L. 94-142 passed in 1975 within the United States, embodied an attempt to overcome the neglect that had denied handicapped children the rights to attain their full potential. The rights of these children today have come to rest directly upon these instruments of assessment. Much has come to depend, therefore, on the accuracy with which these tools measure what they set out to measure. The reliability and validity of these psychometric instruments are often questionable even when applied with the population that it was standardized on. However, indiscriminant use of unadapted, unmodified instruments is a common occurrence in Quebec as it is elsewhere. It is therefore necessary to investigate the validity and reliability of psychometric instruments with the population which it is to be used (Triandis & Brislin, 1984).

Early Identification has been specified as a priority of the Quebec Education system as of 1979 (Plan of Action, 1979). The lack of adequate instruments available for this purpose has also been

alluded to in the same report. This present research, in its attempts to investigate the applicability of an instrument with Francophone children, will help to remedy this deficiency.

The DIAL-R is a relatively new instrument, and therefore as a result only a limited number of reviews and studies are based upon it. The DIAL-R was translated, modified and normed on a representative Chinese sample of 322 children in Taiwan (Mardell-Czudnowski, Hwang & Wang, 1984) and normed on an Anglophone sample in Montreal (Derevensky & Mardell-Czudnowski, 1986).

This study: 1) addresses the general issues of cross-cultural validation of screening instruments and the complexities incurred in the process; 2) undertakes the specific task of modifying the DIAL-R, an American screening instrument, to meet the needs of a distinct culture, in particular the needs of Francophone children of Quebec. It is also an indirect aim of this research to add its support to the growing movement in Quebec fighting for the rights of all exceptional children to an appropriate education and to highlight the implications of the indiscriminant use of unmodified potentially biased American testing instruments with Canadian children.

CHAPTER II

REVIEW of the LITERATURE

In order to place this research study in its appropriate context, it will be necessary to approach it from three separate but not unrelated perspectives. The Developmental Indicator for the Assessment of Learning – Revised (DIAL-R)(Mardell-Czudnowski & Goldenberg, 1984), as a psychometric instrument is a product of its age, representing not only advancement and refinement in testing procedures in particular, but more generally it embodies the most fundamental precepts of the field of contemporary developmental psychology. An instrument such as the DIAL-R aquires its credibility by striving to be not only a legitimate expression of current theoretical concerns but also a modest solution to prevelant social issues.

To substantiate the claim that the DIAL-R is an appropriate and timely response to present day concerns and research findings in the field of developmental psychology, it will be necessary to first examine the nature of these contemporary concerns and theoretical positions. Three basic assumptions of all screening tests including the DIAL- R, have their roots in recent research findings. The basic tenets underpinning the raison d'etre of such instruments are:

I. The impact of early experience on development
II. The earlier the intervention, the easier to effect changes in the developmental process
III. Individual differences exist in the very young child

In addition to supporting the thesis that screening tests in general, and the DIAL-R in particular, contribute to the identification and subsequent remediation of developmental problems and its effect on learning, it will be necessary to review various screening tests used in the field with a special focus on the DIAL-R. Finally, in order to introduce the research concerned with the applicability of the DIAL-R with Francophone children in Quebec, it is important to consider the concept and relevance of cross cultural validation of psychometric tests.

The Impact of Early Experience on Development

Research studies investigating the effects of early experience on developmenton can be held directly responsible for the impetus behind the increasing numbers of screening instruments. The questions raised about the effects of early experience on development have been both numerous and various. The questions posed are highly dependent on the state of the field and on individual research bias. As cited by Cairns (1983) the study of the effects of early experience on development has a long history in psychology having been examined by Sherman and Key as early as 1932, by Skeels Updegraff, Wellman, and Williams in 1938, and Wheeler in 1942. Developmental psychology's historical affinity with structural biology and its resulting alliance with the psychometric movement had an important impact on the study of children in the decades from 1920 - 1950. Consequently a maturational bias that as a result dominated the field echoed Gesell's position on the invulnerability of the infant to experiences:

> The inevitableness and surety of maturation are the most impressive characteristics of early development. It is the hereditary ballast which conserves and stabilizes the growth of each individual infant. It is indiginous in its impulsion, but we may well be grateful for the degree of determinism. (Gesell,1928. p.378)

During this period, this perspective generally inhibited the extensive study of environmental or experimental factors as they affected behavior, more specifically, learned changes in behavior (Lipsitt, 1971). Lipsitt drew attention to the important side effect of this bias. The premature acceptance of the limitations of the human organism, in particular as it concerned the infant's capacity for being affected by potential learnig cicumstances, was prevalent (Gesell, 1940; Morgan, Levine & Harmon, 1972).

One of society's concerns about atypical development centered upon the disadvantaged child, who appeared to have been normal as an infant, yet exprienced a large decrease in ability over the course of his development. The decrease was in the early years for the orphanage reared infant, whereas for the disadvantaged child the decline in development as measured by I.Q., has been noted in the first three

grades. (Given that these children were not identified until age 6, it may have occured earlier.) The main contributers to the low level of intellectual functioning in these children were assumed to be inadequate nutrition and poor genes (Lipsitt, 1971).

The appearance of Hunt's (1961) now famous work, "Intelligence and Experience," had a revolutionary effect upon the focus of intervention in particular, and developmental theory in general. According to Hunt, a child's potential, is not fixed at birth but is a product of the interaction between genes and environment, and that declines in development are thought primarily to be attributable to environmental inadequecies and not to the genetic make-up of the individual. The seminal contribution of Arthur Jensen (1969) helped to provide not only the provocative theoretical backdrop for continued debate between the two schools of thought but also gave momentum to an increased number of studies investigating the impact of very early life experience.

Many aspects of infant development have been vigorously investigated in the last two decades. The concept that the earliest years of life are critical not only in the development of the personality but also in the intellectual development of the individual has been generally accepted by the scientific community and the society at large (Gordon, 1971). The concept of the infant as an adaptive organism was rediscovered (Cairns, 1983).

Several studies that led to this change in orientation will be briefly mentioned. Gordon (1975), suggested the environment begins its work at the moment of conception. Evidence from animal research on the impact of environmental experience on the brain was found by Rosenzweig (1984). Animals raised in enriched environments when compared to those raised in isolation were found to have more connections among neurons, heavier brains and thicker cortexes, can restore brain function after injury, learn mazes faster, have better memories and adult relationships, are less agressive, are less withdrawn, sleep more and display better appetites. Further, perceptual systems if not used, fail to function even though they were normal at birth. Parpura (1983), examined the brains of two groups of babies who had died in the first few weeks of life, and he draws a close parallel to the above mentioned animal research. His results suggested that the babies who received intensive care

treatment showed greater development in branch points in 20 neurons, whereas those without the intensive care did not fair as well.

Contemporary studies indicate more rapid development of this generation of children compared to that of earlier generations (Gordon, 1975). The 'secular trend' is a term used to indicate the fact that in recent years there is a curve showing earlier arrival at certain key maturation points. The hypotheses and assumptions offered as causes of this trend are related to changing environmental conditions; (i.e., changing social climate, improved prenatal care, provisions of better child care, pre-school and nursery programs etc.). These findings suggest an interplay of biological, social and psychological factors as determinants of more rapid development. As well as research from developmental psychology, contemporary psycho-biological theory also perceives development as the reciprocal interaction of genes and environment (Sameroff, 1979). When weighted for their implications, all such findings support the mounting evidence that experience assumes great significance in the development of young children. It is becoming clear that if certain early experiences do not occur normally, development just does not take place. Experience is now accredited for its significant role in the early development of children.

Having established the legitimacy of environment in the developmental process, researchers have debated what proportion of the variance can be attributed to environment and what proportion to heredity?

However to some, for example Caspari (1971), the question related to proportions is no longer worthy of inquiry. He states that partitioning of variance into environmental and genetic components is valid only for a particular cultural environment, and considers the nature of the interaction of heredity and environment in the production of optimal intelligence far more important.

Research into the nature of experiences affecting the process of development have helped to further support the above trend in developmental theory. Mother-infant interaction studies have shown:

1) Breast-fed versus bottle fed babies differ in rates of non-nutritive sucking, therefore it may already be too late to assess infants relatively independently of their post-natal experiences (Pilling & Pringle, 1978).

2) The mother-child relationship in the early years develops as an interaction between the contribution of the mother and the contribution of the child (Bell, 1971; Clarke-Stewart, 1973; Lewis & Lee-Painter, 1974; Yarrow, 1973).

3) Maternal responsiveness to the child's signals appears to be established as a crucial influence on the child's development in the first two years, affecting both the quality of attachment to the mother as well as his cognitive development (Shaffer & Emerson, 1964; Yarrow, 1972).

4) Motor coordination of Uganda babies in their first year in life was observed and compared to that of children of the same age in our culture (Geber, 1958). The findings revealed superior coordination, advanced adaptivity to novel situations, social relationships, and language skills of the former babies.

As well Tizard (1972) found that uncontaminated by genetic influences, the verbal environment experienced by children in nurseries affect their language development. Other experiential and environmental influences have also been found to have a major impact and lasting effect on the child's developmental process. These include availability of adult models and exemplars of language, communication, and reasoning (Piaget & Inhalder, 1969; Tizard, 1972).

Although infancy has become the prime focus in recent developmental research, it would be erroneous to conclude that it is exclusively decisive for later development. However, it is important to recognize that the child is much more likely to reach his optimal level if we acknowledge that the foundations of his development are laid through his experiences during infancy (Pilling & Pringle, 1978).

The pressing questions about the effect of early experience on development are <u>not</u> a reformulation of the old nature - nurture conflict, but rather an attempt to make more explicit the causal connections between man's development and the environments with which he interacts. "The world with its multiplicity of environments must now be the behavioral scientist's laboratory" (Bloom, 1964 p.183). As the nature of the interaction, under such intense scrutiny, becomes increasingly more explicit, the contemporary question becomes; How can the environment best serve the child? versus, How can the child accomodate to the environment?

Experience in general and early experience in particular, as an essential component of development, now enjoy full legitimacy generating an important bi-product-the acceptance of the infant as a potential learner (Lipsitt, 1964). Furthermore pertinent evidence for this point of view comes from such eminent and internationally recognized psychologists as Jerome Bruner (1971) and Jean Piaget (1952).

As the status of the infant changes from a passive and simple predetermined biological organism to a being capable of learning, the infant's position in relation to the outside world also changes. According to Gordon's (1975) transactional point of view, the infant is an active and purposful agent who is not only capable of learning, but also impinges upon his environment. The human child is a product of an interactive process between himself, i.e., the structure of the organism, and his world (Mussen, 1963).

Modifying the Course of Development - Intervention, The Earlier the Better

The scientific evidence that has established the child as an active force in his own development, and the quality of his early experiences as a determining factor in this process have all added fuel to the impetus behind the Early Identification movement. Screening tests such as the DIAL-R, the tools of this movement, have been crafted to facilitate the accurate identification of early signs of exceptionality.

The Early Identification movement is based *a priori* upon the concept of Intervention. This field of study bears a strong resemblance to the area of Early Experience given that they are closely related and share characteristic features. Yet, they differ in that the studies of intervention have a slight but significant shift of focus, from observation of the variables that impinge upon unfolding development, to that of the power to alter the course of development predictable under given conditions. In the former, the question under investigation was; Do early experiences affect the course of development and how? whereas in the latter we ask; Given our knowledge of the effects of

early experience, under what conditions may the development be altered? As the relations between the environment and individual development become more clearly defined, it has become difficult for individuals and institutions to merely observe events taking their course. It has become imperative to determine the limits within which a characteristic may be altered or accelerated by educational or other environmental forces. Finding the answers to these concerns can do much to help us attack some practical problems of education and child development.

A basic tenet of psychological theory for over a hundred years has been the notion of development as a continuum, i.e., a process which unfolds as experience and maturation interact (Baldwin, 1930; Binet & Simon, 1908; Gesell, 1928; Preyer, 1888-89).

> *All present growth hinges on past growth. We are led astray by an artificial dualism of heredity and environment, if it blinds us to the fact that growth is a continuous self conditioning process, rather than a drama controlled, ex machina, by two forces* (Gesell, 1928, p.357).

Development as a constant process of transformation, and of reconstruction has firm roots in contemporary psychology (Mardell-Czudnowski & Goldenberg, 1984; Derevensky Mardell-Czudnowski, 1986). Yet erronious assumptions, such as, that development at one age or stage is no more significant than that which takes place at another, were held within this broad theoretical framework (Bloom 1964). Since Gesell's time longitudinal research has made significant contributions to the study of stability and change in development. As a result this has helped to undermine this inherent cultural bias. In the early years, intellectual development, as measured by intelligence tests, was used as the main focus for the examination of the nature of development.

One of the most precise longitudinal studies of a group of children from birth to age 18 was conducted by Nancy Bayley (1949). The study examined the extent to which intelligence test results achieve stability at selected ages and the conditions which promote both stability and change (Bayley, 1949; Bloom 1964; Pilling & Pringle, 1978).

Bloom found a significant positive correlation between chronological age and intelligence in the 2 to 10 age period. The proposed explanation for these results is that the most rapid changes occur in

cognitive development during this period. Given that the correlation pattern nearly equals a straight line, it is thought that the individual develops 50% of his mature intelligence from conception to age 4 (Bloom, 1964).

Although it is still difficult to establish accurate estimates of the amount of change which can take place under various environmental conditions at different ages, some general patterns of change in relation to environment have been determined.

Between 1930-1960 it was observed that young children whose environmental conditions were extremely impoverished, both economically and emotionally, were not only overly represented in special education classes (of those that existed), but were at high risk for school failure. Attempts to reduce the negative effects of these biological and environmental factors were, as a result, undertaken (Kirk, 1958). Kirk's study which compared the development of children in contrasting environments has contributed much to our understanding of these patterns. Children were removed from deprived environments and placed in ones considered enriched. Most of the children in the experimental group showed significant gains in their development whereas the children who remained in the deprived environments showed a decline, or remained stable over time. The classic study which provides the most dramatic evidence of our power to intervene in development, and thereby enhance its course, is well illustrated by the early study of Skeels (1966). Infants with retarded mental development who were moved from disadvantaged orphanages were found twenty years later to be living 'normal' adult lives, whereas those who stayed, had unsuccessful lives as adults. This study suggests that even extremely needy circumstances in infancy may be overcome to a great extent if the child is transferred to more favourable conditions in early childhood. A similar study wherein children were transferred from an unstimulating institution and thrived as a result, was reported by Dennis (1973). Other case histories suggest that children who are severely retarded due to early extreme and prolonged social isolation (from birth to 18 months), may reach normality if they receive skilled and intensive education and sympathetic care from the age of 7 (Clarke & Clarke ,1976; Badger, 1977).

These and other studies have repeatedly substantiated Bloom's hypothesis (1964) that the effect of extreme environments appear to be greatest in the early (and more rapid) periods of intellectual development and to a lesser amount in the later periods of development.

In 1987 the evidence continues to suggest that marked changes in the environment in the early years does produce greater changes in development. The hypothesis that human development could be altered to greatest advantage in the early years launched an increasing number of investigations in the past two decades. Most recently, Guralnick and Bricker's (1986), investigations found that the intellectual decline of Down's syndrome children may be prevented by altering both environmental and experiential conditions in the early years.

Numerous results based on longitudinal evaluations of early childhood educational programs for children living in poverty are now available. In 1977, at a meeting of the American Association for the Advancement of Science, Bernard Brown noted that of the 96 studies that were concerned with early intervention all demonstrated positive developmental effects of early intervention (Brown 1978). This was prior to the publication of the Consortium's (1983) findings. The Consortium, directed by Richard Darlington, studied the long term effects of early intervention on later academic and social competence, and found that high quality infant and preschool services improve the ability of low income children to meet the minimal requirements of further schooling (Consortium, 1983). One of the Consortium's studies, the Perry Preschool Project, not only found that quality programs for preschool children help in overcoming some of the harmfull effects of poverty, but that early childhood education has a lasting impact on adult life (Schweinhart & Weikart, 1985).

Society's concern for children who are handicapped and/or for those who are potentially gifted has always been closely linked to society's concern for poor children. Kirk's and Hunt's work and much of the evidence cited above, influenced the establishment of early childhood programs. A variety of programs for hadicapped children and their families have been established and have grown considerably in the past few years. There are home based programs, center based programs, and combination of both approaches. Early Intervention practices have become wide spread and strategies employed vary depending on both location and purpose (Abidin, 1980; Bronfenbrenner, 1974;

Garber & Heber, 1975; Tjossem, 1976;). The outcomes of many of these interventions have been demonstrated to improve the lives of vulnerable, at-risk and handicapped children and their families (Anastasiow, 1986).

Individual Differences in the Very Young

Not only has the notion of the Environment as an alterable variable in the service of the child gained credibility, but the concept of 'individual differences' has become a fundamental assumption of contemporary thought.

Before 1900 researchers and writers assumed a single standard for child development. Children were assumed to develop at a standardized rate. Scientists were studying 'The Standard Child' and had rigid expectations of 'Childhood' (Sommerville, 1982). Although in 1883 Sir Francis Galton used sensory discrimination tests to assess differences in basic abilities, it was not until 1905 when Binet and Simon created the classic measure of intelligence did emphasis shift from to the stressing of a multiplicity of abilities. Binet was among the first psychologists to be curious about the assessment of differences among persons and their explanation. Binet's working assumption, that the study of normal processes was the key to the understanding of special talents or deficits, remains to this day one of the important guiding principles in Developmental Psychology.

"Individual patterns are the rule" (Bayley 1956, p. 45). Individual patterns of development have been supported from a variety of perspectives. Richmond and Lustman (1955) in their research with infants have shown that neonates at the University of Illinois Hospital exhibit qualitative and quantitative individual differences in automatic functions. Biochemical individuality is recognised even in the embryo and clearly in the newborn. At the time of birth each child is already a unique entity (Cairns, 1983).

In summary, the first variable which distinguishes one child from another is his biological difference, and for each child that represents a unique pattern. The second variable is the effect of that particular child's environment, physical or social, upon a multitude of inherited qualities, among

which one must include his inherent sensitivity to environmental demands. The third variable affecting individual characteristics is timing, the developmental point at which such environmental demands have maximum impact, i.e., optimal periods of development. As a result of the interaction of the numerous variables that impinge upon development, there emerge no 'standard children' but rather children who are unique individuals.

Unique from conception and in a constant state of transformation enhanced by the earliest of experiences, the child has become an invaluable source of information, shedding light on the complex nature of human development.

The Early Identification Movement --- An Outgrowth of a New Perspective

The Exceptional Child with Learning Problems

Within this broad range of normality there also exist specific individual aberrations and significant deviations from the 'norm'. Whatever the cause, whether biological, physical, or environmental, a significant proportion of our children (10% - 12%) (Lerner, Mardell-Czudnowski & Goldenberg, 1981), very early in life, appear to be developmentally delayed, emotionally unstable, physically incapacitated or learning disabled.

The early identification of children with learning problems has received wide support from medical, psychological and educational professions as well as from parents. Among handicapped children those with learning problems, often called learning disabled, seem to be the most numerous. They are youngsters of normal intelligence without apparent physical, sensory handicaps who find it difficult to learn in school. In school they often lag behind their peers and they achieve less than might be expected of them on the basis of their performance in other areas. Even among specialists there is no consensus on the definition of learning disabilities due to the fact that there is little known about the causes of various learning disorders. In spite of the absence of an agreed upon etiology, researchers and educators have become less concerned with the origins, and more concerned that this

atypcial condition will develop if certain characteristic signs are not identified and ameliorated early enough.

The passage in 1975, PL 94-142 (USOE, 1977), became the most comprehensive, far-reaching federal mandate for special services for children between the ages of 3 to 21 in the United States. This was certainly a major landmark for special education (Eaves, 1984-85; Mardell-Czudnowski & Goldenberg, 1984; Pilling & Pringle, 1978). PL 94-142 specifically outlines a comprehensive system of special education practises. A minimum standard for the education of handicapped children was insured by the passing of this law by Congress. The mandate for free appropriate education covers the 3-5 age range except where it is "inconsistent with State law or practice, or the order of any court" (PL 94-142, 1975, Section 612 (2) (B))(USOE, 1977). Although Public Law 94-142 does not include the birth-to-3 year population there is however, as of 1978 the Developmental Disibilities Act (PL 95-602,1978), which covers children from birth onward. PL 94-142 gave additional impetus to the Early Identification movement. Another significant feature and contribution of PL 94-142 is the formulation of an excellent working definition of learning disabilities devised by the National Advisory Committee on Handicapped Children (Owen, Fromen, & Moscow, 1981). When legislation mandated that all young handicapped children must have an opportunity to benefit from a program that meets their needs, new identification procedures became imperative. P.L. 94-142 represented a major step forward ensuring the development of comprehensive assessment methods to serve the needs of exceptional children.

Assessment has played a major role in the history of learning disabilities. Historically the field can be divided into four periods: 1) the foundation phase, 1800 -1930; 2) the transition phase, 1930 - 1960; 3) the integration phase, 1960 -1975 (Bos, Weller & Vaughn, 1984-85) and 4) the contemporary phase, 1975 to the present (Lerner, 1985).

The Contemporary Phase of Assessment.

Many tests have been developed from the early 1900s to the present to measure the cognitive and perceptual abilities of infants and young children. Major changes in the assessment became evident

during the contemporary phase. The need to measure the outcomes of compensatory programs and increased federal legislation in the recent past had a substantial impact on the advancement of early assessment efforts. They also directed attention to the need for adequate preschool instruments. Since global measures were believed to be inprecise and inappropriate for young children (Keogh & Sheehan, 1981; Stott & Ball,1965; Strain, 1984), there has been considerable development of new measures in the last decade (Salvia & Ysseldyke, 1985). Contemporary developmental theories (Guilford, 1967, Piaget, 1967) have broadened the scope of assessment by emphasising qualitative, multifaceted and experiential dimensions to the assessment of a child's level of functioning. One of the first tests to appear during this 'Contemporary Period' was the Caldwell Preschool Inventory Revised Edition (Caldwell, 1970(a)). It is designed to assess the various skills deemed necessary for the school achievment of children 3 to 6 years of age, thus forming the basis for curricular objective in several areas (Paget, 1984-85). Additional tests were devised to measure outcomes in the various domains of affective, intellectual and psychomotor functioning. The practice of assessing infants and pre-school children in an attempt to expose those likely to be "at risk" of experiencing school problems at a later time, is referred to as the practice of Early Identification.

The process of Early Identification as a preventive strategy for working with children with learning disabilities has led to widespread implementation of a variety of screening methods or systems. In 1973 in Illinois, as a result of an agreement signed to provide appropriate intervention programs for all eligible 3 to 5 year olds, the CIP, a Comprehensive Identification Process for *locating, screening,* and *evaluating* young handicapped children (Zehrbach, 1975-76), came into being (Cross & Goin, 1977). Thorough identification processes, such as the CIP facilitates the identification of specific types of children who differ in many ways, physically, intellectually as well as socially from the population identified through more traditional methods such as agency referral. Not only does such an identification process make it feassible to economically and efficiently screen large numbers of children but more significantly it allows for the identification of mild and developmentally different children who are usually ignored by the traditional methods (Zehrbach, 1975).

Once the children have been located a sorting-out process referred to as a"Screening"process is launched. Too frequenly, screening - a quick tentative check - is confused with diagnosis, the thorough, complex examination. A screening test in the area of potential handicaps sorts out children who may need special attention (about 10% to 12% of the population) (Lerner et al., 1981); (15% to 20%)(Rutter Tizard & Whitmore, 1970). Screening should be viewed as a continous process, beginning at birth and repeated periodically throughout life. Screening includes any or all of the following activities: selecting conditions to be screened; selecting tests; training staff; screening children; and reporting results (Lerner et al.,1981).

The practise of Early Identification through screening techniques has several advantages. First, as has been shown by the results of early experience and early intervention research, the behavior of young children is more susceptible to change than that of older children. Therefore, the likelihood of early intervention efforts being effective is greatly enhanced by early identification. Also, by identifying children who might experience later problems the advocates of early intervention hope to establish preventive programs during optimal developmental periods.

The Exceptional Gifted Child

The prime motivating factor at the heart of the Early Idetification movement is the desire to maximize the potential in all exceptional children. Although children with disabilities have been the ones most frequently singled out as most likley to benefit from early intervention techniques, another group of children, equally exceptional, and whose potentials deserve nurturing, are also demanding their equal rights for special services. These are our *gifted* and *talented* children.

The early years of education is critical for gifted children, since during this time children are defining patterns and attitudes that may last a lifetime and may affect later school performance (Roeper, 1977). A long standing assumption has been that talent is virtually indestructable (Johnson, 1983). Gallagher (1979), however warns that giftedness can be destroyed if we fail to create enriched environments and provide appropriate opportunities for gifted children. Many children with gifted potential may have lost it before entering first grade (Johnson, 1983).

The question whether to place gifted children in seperate ability groups has been debated for years. A variety of answers have emerged. Supported by the notion that the gifted child will generally seek out and learn in any environment the regular classroom has been proposed as one solution for success. But as Lerner, et al., (1981) point out, it is important to consider that this assumption as potentially biased in favour of the middle class child. In contrast, the less motivated child with fewer supports may never have the chance to reach his potential given one's lack of awareness about his inherent talents.

> *No one knows to what levels of attainment a child would have risen when no attempt to assist the child was ever made. The undiscovered will remain unknown* (Lerner et al., 1981, p. 54).

Therefore, in many respects debates raging over "types" of placement is somewhat premature for most of our children. Prior to deciding where to place our children we must first demand that they be given the chance to be "discovered" as early as possible. Research suggests that there may be thousands of young children enrolled in early child programs who need more than a basic preschool experience (Johnson, 1983). Bechtel (1980), calculated that over 3 per cent of the enrolled preschool and kindergarten population should be eligible for differentiated educational programs if they had the opportunity of early identification.

Research, for more than a half a century has stressed the necessity of early intervention in order to tap the potential and to foster the exceptional abilities of the gifted child (Gallagher, & Ramsbotham, 1977). Early identification is the prerequisite for early intervention (Bechtel, 1980; Martinson, 1975). The methods of identification of gifted children are not unlike those employed to identify the disabled. They include parent nominations, teacher observations, and formal testing (Kitano, 1982). Formal testing usually consists of an initial screening process, followed by the individual testing of students who scored well on the screening instrument. Individual testing has shown to identify gifted children more accurately than group testing (Johnson, 1983). Some of the instruments that utilize individual testing to identify giftedness are; the Cognitive Skills Assessment Battery (Boehm & Slater, 1974), Comprehensive Identification Process (CIP) (Zehrbach, 1975-76), Cooperative

Preschool Inventory (CPI) (Caldwell, 1970(b)), and the DIAL-R (Mardell-Czudnowski & Goldenberg, 1983(a)).

Screening Tests: With Emphasis on the DIAL-R

An upsurge of interest in tests for infants, toddlers and preschool children has been witnessed. One contributing factor has been the widespread development of preschool programs of compensatory education for culturally disadvantaged children. As a response to the needs of these programs, new instruments were developed and considerable research has been conducted on innovative approaches to assessment. An especially well constructed test for the earliest age levels, and a model for future screening tests, is the Bayley Scales of Infant Development (BSID)(Bayley, 1969). Bayley observed that these scales like all infant tests should be used principally to assess current developmental status rather than to predict subsequent ability levels. For a history of infant intelligence tests and a discussion of their uses and limitations see Lewis (1976).

A variety of screening tests for the identification of learning disabilities or potentials in preschool children have also, as has already been mentioned, been produced in the last decade. They should be administered by examiners with special but limited training to a large number of children over a short period of time at a modest cost. The interpretation of these tests also may require little time. Given that they do not provide specific enough information which will pinpoint atypical development or deficiencies, they are not definitive tools for intervention, placement or treatment (Lerner et al.,1981; Barnes, 1982). Their value lies in identifying those in need of full assessment or diagnostic evaluation (Anastasiow, 1986; Bos et al.,1984-85;). Generally, screening is unnecessary for severe handicaps. These children are often identified during the locating period and they would proceed directly to the diagnostic process.

Given there are an ever increasing number of preschool assessment tests available, caution must be exercised in their selection (Mercer, Algozzine & Trifiletti, 1979; Lidsay & Wedell, 1982; Paget, 1984-85). Through 1981 only 5 out of 40 tests met the American Psychological Association (APA) standards for acceptability for educational and psychological tests (Berman, 1977).

There are numerous screening tests which concentrate on one particular developmental domain. The Developmental Test of Visual Motor Integration (VMI)(Berry & Buktenica, 1967) and the Bender-Gestalt with Koppitz Scoring (Bender, 1964) are used for the assessment of perceptual motor skills. There exist only a few screening tests for the domain of cognition. The Boehm Test of Basic Concepts (Boehm, 1969), which assesses the child's understanding of space, time, and quantity is one of the most widely used group tests for assessing cognitive skills and is most useful in kindergarten and first grade screening (Lerner et al., 1981). For the screening of speech and language development there exist several useful tests, among them the Arizona Articulation Proficiency Scale (Fudala,1970), the Peabody Picture Vocabulary Test-Revised (Dunn,1980), and the Templin-Darley screening Test of Articulation (Templin &Darley,1969). Given that there is no quick or simple way of evaluating socio-emotional growth, the use of observational strategies in naturalistic settings are recommended. (Lerner et al.,1981). As opposed to tests that have as their focus a particular domain of development, the more recent trend has been toward the development of more comprehensive screening, a screening which taps a variety of domains of development at a given time.

There are *criterion-referenced* comprehensive screening tests, which measure performance relative to precise developmentally-based objectives. Scores are interpreted in terms of a specific standard of performance. A specific content domain is used by such tests as their interpretive frame of reference. These tests, are most useful when applied to specific curriculum planning and ongoing evaluation of achievement rather than as screening instruments for identifying total handicapped populations (Lerner et al.;1981). Good examples of criterion-referenced screening tests are, the Learning Accomplishment Profile (LAP) (Sanford, 1974), and the Carolina Development Profile (Lillie & Harbin, 1976).

In contrast the Denver Developmental Screening Test (DDST), (Frankenburg, Dodds & Fandal, 1968-70), Developmental Indicator for the Assessment of Learning-Revised (DIAL-R), (Mardell & Goldenberg, 1975(a), 1983(a)), are all *norm-referenced* screening instruments. Children tested are compared with others on whom the test was standardized. Therefore, the interpretive frame of

reference for such tests is a specific population. The Denver Developmental Screening Test, although considered as a practical, efficient, and dependable test, is recommended for use with many provisos and within strict limits (Moriarty, 1972). It is recommended as best serving the intermediate range of children (3 mo.- 4yrs.). In spite of its seeming reliability, and validity, due to its limited sample selection from a circumscribed geographic region (Werner,1972), there is reason to doubt that the test's norms are reliable with children from lower socioeconomic groups or from minority groups. It also yields limited information for clinical interpretations and educational programming.

A detailed analysis can be found in Lindsay (1979) and Salvia and Yesseldyke (1985) of many of the sreening tests on the educational market. Unfortunately, many tests which have already been in use for 10 years are still reported without standard measures, such as reliability or predictive validity coefficients (Lindsay & Wedell, 1982). Where evidence is available, it is not always encouraging.

More Words of Caution

While the goal of Early Identification and Intervention is generally positively viewed, a number of investigators have pointed out the dangers of making predictions (Keogh & Becker, 1973; Lichenstein, 1982; Mercer et al., 1979; Sapir & Wilson, 1978; Wilson & Reichmuth, 1985), including problems related to predictive accuracy, and the relevance of screening information for appropriate intervention.

Predictive accuracy is one of the main concerns of most reviewers. One of the problems raised by Lindsay (1979) is the method of reporting predictive validity, with the use of correlation coefficients. He points out that while significant relationships may be revealed, this is less important than correct classification of children. He argues that statistical significance is not a sufficient criterion, and that ultimately what is required is psychological and educational significance. Highly significant correlations may be found when the sample size is sufficiently large but the amount of variance accounted for may be very small. Wilson et al., (1985), attempting to answer the question, When is predictive accuracy sufficient? arrive at the conclusion that while base rate, selection ratio and test validity are all important consideration, they are nevertheless insufficient. Rather, they conclude the

sorting process has to be viewed in the context of intervention decisions. They also agree with Ebel (1979), who suggested that our continuing focus on the problem of predictive validity is like raising a storm in the dust and then complaining we cannot see. The accuracy of prediction is considered of little value and ineffecient unless the predictions lead to better educational opportunity for the students about whom they are made (Wilson et al., 1985).

Concerning predictive validity, Keogh and Becker (1973), bring our attention to an important methodological paradox inherent in the early identification process. If both identification and diagnosis were insightful and resulted in successful remediation, the preschool high-risk child would receive the kind of intervention that would result in successful school performance. In essence, he would no longer be designated as high-risk, but would be instead a normal achiever. Therefore, as a result, the identifying instrument's predictive validity would be low. Success with the child would negate accuracy of prediction. Thus, examination of the long-term predictive validity of an instrument may be limited by ethical considerations.

Yet another matter of concern relates to the effects of identification. Applicable to the early identification issue is Rosenthal and Jacobson's (1968) notion of the "self-fulfilling prophecy." The act of predicting learning problems may have a built in expectancy phenomenon (Keogh & Becker, 1973). Given that the expectancy involved in prediction may be harmful, the ethical issues relating to programs of Early Identification are worthy of consideration.

Mercer et al., (1979) voiced their concerns regarding the harmful effects of misdiagnosis. They suggest continuous and frequent monitoring of each child's progress and nonstatic placement decisions, as proceedures that would minimize these effects. They also point to parental involvement as a method by which identification and intervention can be enhanced.

While it is obvious that early identification can be extremely positive, there have been objections raised about the practice of early screening of large child populations (Sapir & Wilson, 1978). This fear relates more specifically to the resolution of the problem as opposed to the delineation of it. The combined lack of trained personnel and funds to serve handicapped and gifted children who are

identified are highlighted as inherent pitfalls of this enthusiastic movement. Sapir and Wilson (1978) caution us to attend to the dangers of over-concern, too much legislation and incorrect emphasis.

Changes in emphasis of techniques have been cited as facilitators of effective early identification by Keogh and Becker (1973). They recommend specification of expected outcomes as a first step in an early identification process. It has been argued that prediction made to outcomes which are close in time based on evaluative measures which demonstrate abilities required in the educational program, increases the validity of early identification. A shift of focus from future orientation to one that is more concerned with success in the present and in the immediate future is suggested. Recognition of compensatory abilities of the child as opposed to exclusive focus on his deficits is cited by Keogh and Becker (1973) as another important step in developing effective early identification. Any dynamic process, such as Early Identification, requires the presence of those who monitor both theory and practice, as well as those who, in the light of these evaluations, set out to refine, modify and create new tools to meet the stringent ethical and practical demands of the field.

The DIAL-R

One of the pre-kindergarten screening instruments currently in use that shows promise as an effective tool in the identification of learning disabilities and potential is the Developmental Indicator for the Assessment of Learning - Revised (DIAL-R) (Obrzut, Bolocofski, Heath & Jones, 1981; Mardell-Czudnowski & Goldberg, 1984). In the early 1970s, the DIAL preschool test, (Mardell & Goldenberg, 1972(a); 1975(a)), was designed and developed in Illinois to meet the special education mandates. In 1976, continued research was recommended to broaden population sampling beyond Illinois and to extend the testing age span (Mardell-Czudnowski & Goldenberg, 1984). It was important to improve and update content, materials and procedures where it was warrented. However, the best elements of the DIAL, such as its validity and reliability features, as well as its

sensitivity to cultural differences were retained. The DIAL-R is neither an intelligence test nor a diagnostic test. Innate abilities and brain dysfunction are not identified by this tool. It is

> *merely a definitive first step in identifying young children at either end of the continuum of readiness skills who may be in need of additional services* (Mardell-Czudnowski & Goldenberg, 1984 p. 7).

Given that the DIAL-R is a relatively new instrument there are only a select few comprehensive reviews available. Yet these reviews have praised many of this instrument's unique features. Grill (1978), draws attention to several notable strengths of the DIAL. He considers the criteria used in the selection of items and the references to support the inclusion of each one to be impressive. The latent-trait method, a Rasch-Wright procedure (Wright & Stone, 1979) was used to analyse the data on the 2,447 children. This procedure determined whether each item in the battery "fit the model" and calibrated items indipendent of a particular norming sample. In addition descriptive statistics were used to determine means and standard deviations.

Eight well known consultants in child development reviewed the construction of the test and found its content validity exemplary (McCarthy, 1978), supporting the notion that the items selected are representative of the motor, concept and language tasks typically applied to preschool children. The standardization of the DIAL, in 1975, on a sample size of 4,356 children and subsequently the DIAL-R in 1984 on 2,447 children, as well as its five variables used for stratification (for eg., sex, ethnicity, geographic region, size of community, and socioeconomic status), stand in its favour. The test's shortcoming, in relation to its limited geographic representation (Grill, (1978), was heeded by the authors and was incorporated in the revised version. The test was removed from the confines of Illinois and the 1984 sample for the DIAL-Revised version is representative of 4 major geographic regions of the United States, (Northeast, North Central, South, and West) (Mardell-Czudnowski & Goldenberg, 1984).

In 1976 the Milwaukee Public School Diagnostic Services were designated by state law to carry out a comprehensive screening procedure for children at the pre-kindergarten level. The aim of this project was to identify problems that could interfere with the child's potential for adapting to the social and academic demands of the school environment. Three screening instruments were chosen for

intercomparison. The DIAL-R was one of the screening instruments chosen. They were selected according to specific criteria such as, relative completeness, ease of administration and scoring, and their facility for yielding comparative scores and student profiles. Each child was administered all three of the instruments under consideration. To establish predictive validity the evaluations of a multi-disciplinarian team, (MDT), consisting of psychologists, social workers, speech pathologists, and diagnostic educators, were compared against the results obtained on the test. The results reflected a high degree of correlation between overall screening strategy and the MDT's findings ($r = .90$). The intercomparisons of specific screening subtests in a multiple regression analysis indicated the combination of the DIAL, the parent questionaire, and the auditory evaluation to hold the best predictive capability. It was therefore concluded that by utilizing only these elements, relatively little predictive value is lost, allowing for a short, inexpensive and yet reliable procedure. While all the tests correlated with the MDT, the DIAL was found to be superior (Matusiak, 1976).

Most recently the adequacy of the DIAL-R was evaluated in relation to the criteria set forth in the American Psychological Association's Standard for Educational and Psychological Tests (1974). On the whole, it was found to fullfill the standards' requirements admirably (Linder, 1986). Recommendations for improvement were suggested regarding inter-rater reliability and tester qualifications. Concern was also raised about the inclusion of handicapped children in the norming sample given that this is thought to result in the under-identification of potential problem children and the overi-dentification of those potentially gifted.

There are many additional attractive features left unhighlighted by the reviewers. The comprehensive nature of the DIAL-R, in that it assesses the potential of children in a variety of developmental areas as opposed to concentrating on one specific area, is much to its credit. It, in this way, is a valid expresson of the complex and interactive nature of development. The test's format is also praiseworthy given that it reflects an information processing model designed to tap both receptive and expressive performance of the various behaviors. The DIAL-R items were analysed both for their degree of validity and for their ability to assess input and output which is necessary for the

identification of both strong and weak modalities across the three domains (Mardell-Czudnowski & Goldenberg, 1984).

Several steps were also taken to minimize the effects of cultural and environmental differences in order to promote non-biased assessment. For this reason oral directions are kept to a minimum and testers visually demonstrate what is expected from the child on several items. The normative sample not only includes representative proportions of minorities based on the 1980 Census (Mardell-Czudnowski & Goldenberg, 1984), but also is equally representative of the sexes. The incorporation of ecological validity into the design of the DIAL-R enhances its value as an instrument (Derevensky & Mardell-Czudnowski, 1986). The testing site attepts to simulate a day-care atmosphere wherein exist both the typically occuring distractions and the familiarity of a learning environment thus being condusive to optimal performance. Most tests are either administered individually or in groups. The DIAL-R is unique, in that, although the children are tested individually, they are joined by other children who are tested concurrently. It has been demonstrated that children's performance, when tested in isolated conditions, often varies significantly from that of their performance under group conditions, with significant improvement in the latter (Garber & Slater, 1983). Given that the test's method of administration requires that each child be tested by three testers its ecological validity is further strengthened. This unique feature helps to yield important data on the child's ability to adapt, protects the child's interest against tester-bias, and allows the child the opportunity to regain his self confidence from one tester to the next. The child's perfomance therefore, on the DIAL-R is a more valid representation of the actual potential of that child, as it would be manifested in a learning environment such as a school.

In the development of the scoring system considerable effort was expended. Three systems were considered, the Raw Score system, the Score Sheet system and the Weighted system. The Dial-R authors decided to incorporate the benefits of the weighted system, while at the same time maintaining the simplicity of the unweighted approach. In this way each response of the child is treated as a separate item, "rather than the somewhat arbitrary groupings found on the score sheet" (Hall, Mardell, Wick & Goldenberg, 1976 p. 28).

Two types of screening procedures answer the question, "What are we screening for?", the *grading system* and the *differential sorting system* (Hall et al., 1976). The *grading system* requires the same question to be repeated over the course of many attemps; "Does the child have a learning disability"? and finer instruments are needed at each stage of screening. In contrast, the *differential sorting* system asks a series of different questions in a systematic way, each designed to detect a different quality or characteristic.

The screening of children with learning disabilities could incorporate a combination of both the gradual grading and the differential sorting systems. The DIAL-R attempts this method (Hall et al., 1976). The sampling of various types of behaviour is a type of differential sorting, whereas the use of cut-off points is a type of grading. That each type is available in the DIAL-R is one of the favorable characteristics of this instrument in that a variety of question, both of a general and specific nature are addressed, and answers to them provided by this tool.

Unique to the DIAL-R is the movable dial format. The presentation of a single stimulus is facilitated by this feature and in this way the distraction factor often found in testing young children is reduced (Mardell-Czudnowski & Goldenberg 1984). The materials are all attractive, as well as durable. The manual is well organised, legible, and contains well written instructions for administration and scoring (McCarthy, 1978).

A question that arises frequently in the area of screening is whether prediction or early detection is desired. The choice will determine what type of measure we use, when we will apply our test and what we expect to do with the results. The DIAL-R utilizes both of these approaches in its operation (Hall et al. 1976). Perhaps this feature is the main appeal of the DIAL-R, that it is a valid instrument for both prediction and for early detection (Ary, 1972; Mardell-Czudnowski & Goldenberg 1984; Matusiak, 1976).

Cross-Cultural Validation: A Rational

Psychoeducational assessment of preschool children has become a priority for a number of countries since both school success and equal access to education for children from all socio-economic backgrounds has become a priority (Tarnopol & Tarnopol, 1981).

A test's accuracy with which it measures the theoretical variable that it intends to measure is indicated by its construct validity (Cosby, 1977). Construct validity according to Messick (1980), is the most important type of validity for an instrument. The theoretical construct behind the DIAL-R stipulates that with age children develop and perfect new skills in different areas of functioning (Mardell-Czudnowski & Goldenberg, 1983(b)). Therefore, when adapting a test for a different culture than that for which it was designed, this essential quality, the test's theoretical construct, needs to be reassessed (Mardell-Czudnowski & Goldenberg, 1984).

It is also necessary to investigate if the norms of the test in question are valid for this new population. It has become common practise that many unmodified tests are being used in different parts of the world, including Quebec, without their validity or reliability being empirically verified for that population. In these instances certain cultural references may invalidate the results, resulting in a culturally biased test (Garber & Slater, 1983; Triandis & Brislin, 1984). When there are systematic errors in the predictive validity or construct validity of a test's scores that are associated with the individual's group membership, a test is said to be biased (Gould, 1981). All of the items must measure the same trait or ability for all groups, and it must be equally reliable for all groups for a test to be unbiased (Mardell-Czudnowski & Goldenberg, 1984). Finally, both within intragroup and intergroup comparisons, the relationship between observed score and ability must be the same for all groups. It is therefore imperative to assess the validity and reliability of psychometric instruments with the population for which it is to be used (Triandis & Brislin, 1984).

Developmental theory related to cultural variations, and test construction theory were studied at the same time, as the applicability of the DIAL-R was investigated with three populations other than that for which it was developed.

The DIAL-R has been adapted to serve as a technically adequate screening test for the people of Taiwan (Mardell-Czudnowski, Hwang & Wang, 1984). Not only has the cross-cultural adaptation of this test served to strengthen the validity of the DIAL-R but also it has helped to highlight some significant cultural differences and similarities between North American culture and that of the Chinese people of Taiwan. In this way it has helped to further understanding and respect of other cultures.

The need for early identification was clearly recognized by the Quebec Ministry of Education in 1978. The lack of adequate instruments for this purpose, that is standardized, reliable and valid measures for the children living in Quebec was again alluded to in a subsequent report (Quebec MInistry of Education, 1979). It was in response to this apparent deficiency that the authors of the DIAL-R addressed themselves in 1983-86.

The DIAL-R's applicability as a screening tool with English children in a Canadian population had been investigated (Derevensky & Mardell-Czudnowski, 1986), and in spite of its limited sample the data do suggest that it may become a useful clinical tool for Montreal children with specific modifications. The results of the Anglophone children of Montreal were significantly higher than the American normed population using the DIAL-R (Derevensky & Mardell-Czudnowski, 1986). Whereas the Motor area scores were similar to those of the U.S. norms, performance on the Language and Concept subtests were significantly higher for the Canadian population. The authors suggest that these quantitative differences may be explained in terms of sampling techniques used Only children who have had some form of educational experience were recruited. Therefore some form of instuctional strategies were available to these children in these various programs. The quality of the setting, i.e., its familiarity, wherein the children were tested may also have contributed to these discrepencies in scores (Derevensky & Mardell-Czudnowski, 1986). These factors were hypothesized to be the most likely determinants of the higher scores, as opposed to their being a function of superior aptitude compared to that of the American population.

A pilot study was also carried out in Quebec City in order to verify the validity and the reliability of the translation and modification of the DIAL-R for French speaking population using 30 children

between the ages of 2 and 6 years. Given the limited nature of pilot study, the results were encouraging nonetheless in that the data supported the presence of construct validity, Motor (r=.95); Concept (r=.86); Language (r=.85); Total (r=.93)); and test-retest reliability, Motor (r=.95); Concept (r=.96); Language (r=.96); total (r=.98)), for the DIAL-R French version (Mardell-Czudnowski, Dionne-Simard & Oellet-Maynard, 1985). The authors recommended further modification of the DIAL-R and subsequent norming of the instrument on a French-Canadian sample before the consequences of using potentially invalid tests become too much of a burden on these and other young Canadians.

The DIAL-R, as a new instrument has sucessfully responded to many contemporary concerns in its development. It is an instrument that deserves attention and continued investigation of its attributes with a variety of cultures. Such endeavors will not only help to enhance the quality of the instrument, but also provide a much needed means by which we may maximize the potential of "undiscovered" children.

CHAPTER III

RATIONALE

The enthusiasm generated about the potential to intervene and therefore to effect and influence the path of children's development gave rise to an influential movement commited to the Early Identification of individual deficits as well as giftedness in young children. The development of scientifically objective instruments were commissioned to meet the needs of this movement committed to prevention, i.e., prevention of wasted human potential.

The DIAL-R is one of the many screening instruments available within the existing market of tests. It is a tool that due to its many strenghths has since its recent inception (Mardell-Czudnowski, & Goldenberg, 1983), attracted the attention of those dedicated to the prevention and remediation of learning disabilities as well as to the harnessing of special gifts in children.

The motivation underlying the investigation of the applicability of the DIAL-R with a Francophone population is threefold. The general principles of Early Identification and Intervention directly correspond to one of the author's priorities. Central to these general priorities is the committment to the rights of Quebec children to an education appropropriate to their needs. Canada as a nation, and specifically Quebec as a province, have not yet followed the exemplary lead of the U.S. to protect the rights of all children by mandating the provisions necessary for an education appropriate to their individual needs. It is because of this lack of legal committment on the part of Quebec to the province's children that this author considers the raising of the important issues of Early Identification and Intervention necessary.

The issues are not raised exclusively within a theoretical framework. They are brought into focus by the consideration of an instrument that may be employed with Quebec children in the future. The evaluation of the validity and reliability of the DIAL-R is investigated with a Francophone population, i.e., a culture different from the one used for its standardization. Cross-cultural validation of tests

help to serve a variety of purposes. Test construction theory as well as developmental theory related to cultural variations can be confirmed and/or modified as a result. As well, the validity of an instrument that has successfully undergone the rigours of scientific evaluation with different cultures is greatly enhanced.

However, this study not only attempts to acredit an instrument for its own sake but to provide the children of Quebec with an instrument that may more accurately assess their academic potential.

This study aspires not only to fill the gap in culturally appropriate testing materials for Francophone children, but to bring attention to this important oversight on the part of our Canadian education system.

Thus the DIAL-R will be investigated for its applicability as a screening instrument in Quebec with Francophone children attending French day-cares.

CHAPTER IV

METHODOLOGY

Subjects

The standardization of the DIAL-R was based on a sample of 345 Fancophone children age between 2;0 - 6;2. Francophone children were enlisted from French day-care centers located in different geographic regions in Montreal. No children were excluded from the sample because of known handicapping conditions. The variables used as a basis for stratification were age, sex, language and geographic region. These four variables are described below.

Chronological Age

Seventeen 3-month age groups were defined:

Age Groupings	Ages	N
1	2 ;0 - 2;2	14
2.	2 ;3 - 2;5	16
3.	2 ;6 - 2;8	16
4.	2 ;9 - 2;11	24
5.	3 ;0 - 3;2	18
6.	3 ;3 - 3;5	23
7.	3 ;6 - 3;8	19
8.	3 ;9 - 3;11	23
9.	4 ;0 - 4;2	27
10.	4 ;3 - 4;5	26
11.	4 ;6 - 4;8	22
12.	4 ;9 - 4;11	20
13.	5 ;0 - 5;2	21
14.	5 ;3 - 5;5	20
15.	5 ;6 - 5;8	24
16.	5 ;9 - 5;11	14
17.	6 ;0 - 6;2	18

Sex

The design called for an approximate equal number of males and females (175 girls, 170 boys).

Language

The native language of the children was an important consideration. French was the only language spoken by 280 or 81% of the children, and 65 or 19% of the sample were children from different language backgrounds.

Geographic Region

The sample included children from all four geographic regions of Montreal. An attempt was made to screen a representative sample from each region, however due to the participatory limitations of time, manpower and finances, testing occured in those regions where permission was granted. A total of 17 day-cares in Montreal participated in this study.

The Instrument - DIAL-R

The test under study, the DIAL-R, is a screening test for children between the ages of 2 and 6 years. The test's objective is the identification of those children with potential problems or potential giftedness. The DIAL-R was standardized using a stratified national random sample of over 2,400 American children. The authors report both satisfactory reliability and validity (.98 with age); test-retest reliability (.87); internal consistency (.96); and concurrent validity with the Stanford Binet (.40) (Mardell-Czudnewski & Goldenberg, 1984).

The DIAL-R consists of 3 subtests: Motor, Concepts, and Language. Each area contains 8 different items. Raw Scores were first obtained for each area and then were converted into their Scaled Score equivalent, which when tallied yield the Total Score for each child. This is used to identify potentially gifted children who are +1,5 s.d. from the mean of their own age group, or high-risk children who score -1.5 s.d. from the mean, and normal children, those who score within these two ranges. In addition to the total score, an individual review of each DIAL-R area and the pattern

of Scaled Scores can assist the DIAL-R coordinator and the parents in determining specific learning strengths and weaknesses for each child. The functional level of each child can be ascertained with the use of the following grid:

TABLE 1

Interpretation of Scaled Scores for Functional Level

Scaled Scores	Functional Level
0	below 2 years old
1	2 to 3 years old
2	3 to 4 years old
3	4 to 5 years old
4	5 to 6 years old

Drawing a functional profile line can also assist the team, parent and teacher in recommending follow up activities for each child. Appendix A displays both a complete DIAL-R scoresheet (U.S.version) and the French version, (without Scaled Scores). The Scaled Scores are not provided given that the French version of the test was produced with the aim of developing Scaled Scores specific to this population.

Behavioural observations are also noted, and are an important part of the screening process. At the end of each subtest there is a list of 8 items representing possible deviant behaviours during testing. An examiner not only tests each child's skill level within a certain domain but at the same time is alert to inappropriate behavioural responses. The appropriate observation number (1-8), that is the description that corresponds to the child's repetoire, is circled at the end of testing, . Given that there is a significant relationship between DIAL-R total scores and the number of observations noted (MardellCzudnowski & Goldenberg, 1983(b)), additional valuable information is generated about the child's socio-affective development.

In order to develope this comprehensive screening test stringent criteria of acceptibility had to be met. They included:

1. Technical adequacy for screening purposes
2. Four year age range (2 years-6 years)
3. Individual administration
4. Short administration time (20-30 min.)
5. Multidimensional content
6. Objective scoring procedure
7. Process and product orientation
8. Sensitivity to cultural differences
9. Tasks of interest to young children

(Mardell-Czudnowski, 1984.)

Another important and unique feature is that the DIAL-R incorporates ecological validity into its design. Not only does the testing site simulate a typical learning environment but each child is tested by three different examiners, minimizing tester-bias effects. Within this environment the child not only experiences typical distractions but is comforted by the familiarity of the situation. These characteristic features of the DIAL-R help to yield results which are representative of the true potential of a child, as it would typically be expressed in his usual environment. In addition, given that the testers in general who administer the test require only limited training, and that the interpretation of test results requires minimal time, it can be administered to large numbers of young children in a relatively short period.

Modification of the Instrument

For the pilot study conducted in Quebec City (Mardell-Czudnowski, Simard & Ouellet-Mayrand, 1985), specific changes were made to the DIAL-R in order to render it appropriate for a French-speaking population (see Appendix A). The DIAL-R manual was translated by a team of bilingual professionals, following the back to back translation method (Mardell-Czudnowski et al., 1985). The Articulation subtest items were also modified by language specialists in order to represent, as did the original, the developmental progression of learning the pronounciation of different consonnants in French. Certain English word were deleted (D), and replaced (R), by what was percieved to be the

more appropriate French equivalent. In addition, the Remembering subtest items were also altered to maintain functional equivalence with the original English sentences.

The following table demonstrates the type of alterations that were made. (Where no translation appears in brackets, the meaning corresponds to the original English version). See Table 2 for these revisions.

TABLE 2

REVISION TABLES

ARTICULATION SUBTEST

	ENGLISH VERSION	FRENCH VERSION (Translation)	
1.	pin (D)	pomme (R)	(apple)
2.	bed	lit	
3.	cup (D)	ski (R)	(ski)
4.	towel	serviette	
5.	hand	main	
6.	rabbit (D)	banane (R)	(banana)
7.	chair	chaise	
8.	knife (D)	verre (R)	(chair)
9.	leg	jambe	
10.	fish (D)	fromage (R)	(cheese)
11.	truck (D)	beigne (R)	(doughnut)
12.	dress	robe	
13.	sandwich (D)	cloche (R)	(bell)
14.	thumb (D)	fleure (R)	(flower)
15.	mouth/teeth (D)	brosse (R)	(brush)
16.	------	cadeau (R)	(gift)
17.	------	gateau (R)	(cake)
18.	------	feu (R)	(fire)

REMEMBERING SUBTEST

ENGLISH VERSION	FRENCH VERSION
1. clapping	frappe
2. numbers: 5-3; 7-1-4; 6-8-2-9;	***
3. sentences:	
a) Hi there;	Bonjour;
b) Hi there, have a nice day.	Bonjour, bonne journee;
c) It is fun to play outside if the sun shines	J'aime jouer dehors quand il fait soleil
d) ----------	Je bois du lait tout les jours.

The results of the pilot study revealed certain deficiencies in the analysis of the translation. The results of this study suggested that the modification of the Articulation and Remembering subtests and/or the translation may have altered the level of difficulty of the items, as shown by the lack of discrimination between the older groups in these areas, i.e., a tendency toward a plateau (Mardell-Czudnowski et al., 1985). An analysis of different items of that pilot study also supported this finding. Words such as "rempli" (full) and "rapid" (fast) in the Identifying Concepts subtest, and the word "poitrine" (chest) in the Body Parts subtest, appear to be much more difficult than their original English counterparts. Nevertheless, the major changes made in the Articulation and Remembering subtests seem to be adequate (Mardell -Czudnowski et al., 1985) given that special attention was paid to the functional equivalence in choosing the French nomenclature.

The Materials

The materials in the DIAL-R kit are very attractive and durable (McCarthy, 1972). The movable plastic dial format is a unique feature which significantly helps to reduce distraction, given that only a single stimuli is presented at a time. Included in the testing kit are colourful wooden blocks, a bean

bag, and dials with well illustrated stimulating pictures, and a large easy to manipulate lead pencil for writing and drawing.

Procedure

Training

University undergraduate students, two men and nine women, interested in the field of Developmental Psychology volunteered to work as DIAL-R examiners. They proved to be highly motivated and reliable. Over a period of three weeks students underwent extensive training in the administration and scoring of the test. These training sessions consisted of:

1. Viewing of the video tape (part of the DIAL-R training package), followed by questions and discussions.
2. Selection and thorough study of specific subtests of interest (motor, concept, or language).
3. Two role playing sessions for each examiners in a simulated testing environment.
4. Practice testing session with 4 child volunteers for each examiners.

The examiners were trained until they were proficient in their task.

Selection of Testing Sites and Children for the Sample

The selection of sites was highly dependent opon the initial enthusiasm and the level of resposibility that the directrice of each day-care was willing to undertake, as well as the responsiveness of the parents surveyed. Random selection of sights was rendered impossible as a result of financial and time constraints. Of those centers contacted by the coordinator, approximately 25% did not wish to participate due to a variety of considerations such as; bias against testing, too demanding on the already overworked and underpaid staff, unwillingness to upset daily routine of the children and staff, lack of adequate space, etc. Cultural influences were considered as a factor in these decisions, but according to this author there appeared to be no systematic pattern that emerged in relation to their readiness to participate. Once the centers indicated interest and willingness to participate, they were mailed parental permission forms, which included information about the DIAL-

and the proposed research. At the end of a week, they were recontacted to ascertain the level of response. On the average, there was a 30% or less return of the forms granting permission. As a result, the day-care children included in the sample were not randomly selected, but are drawn from institutions that permitted us to carry out the testing, and more specifically they are children whose parents gave permission for testing. Nevertheless, given the limitations of the selection process, the sample, according to this author represents a normal cross section of the population.

The number of children tested in different day-care centers varied from 6 to 40 children. The day care centers that yielded the most participants were those in which the directrice informed the parents by posting notices around the day-care and requesting of those opposed to their child being tested to come forward.

The final sample of 350 children were obtained from 18 different day-care facilities which were representative of different socio-economic levels of Montreal. The majority of the day-cares were located in regions designated as low to middle income level. Of those children attending the majority of these day-cares 50% received financial aid (Rosemarie Thonney, March, 24, 1987, statistician of the L'Office du Garde de L'Enfance).

Testing

All testing for this present study took place between September, 1985 and May 1986. All the children were administered all items in the normative battery. The French version of the Instruction Manual was employed to guide the examiners in their task. This manual can be referred to in Appendix C. Each testing session required the presence of 3 examiners and the DIAL-R co-ordinator. Over a period of 9 months a system of rotation allowed for an equitable distribution of work among the 12 testers, each responsible for a particular subtest. Three children were tested simultaniously within an environment familiar to the child. The testing material was arranged in three different areas within the same room. These rooms were unthreatening to the children, given that many of their usual daily activities took place within them. The children's peers could often be heard, if not seen nearby playing, talking or looking on, while awaiting their own turn. When children

exhibited some hesitation or resistance, one of the day-care staff would accompany the child through as many subtests as was required. All examiners administered each and every item within their own respective subtests. At the completion of each subtest the children were thanked and directed toward the next available tester. In the event that all other examiners were still testing, the child awaited his turn at the play table.. Testing time was concluded in a single session which lasted approximately 20-25 minutes per child.

Scoring

Prior to actual testing, personal identifying information about each child; name, sex, date of testing, birthdate and chronological age, was recorded by the DIAL-R co-ordinator. Other significant data mentioned by the directrice or by the teachers at the day-care was also noted on the score sheet. Care was taken with the calculations of the chronological age in order to ensure the correct placement of the child into his respective age division.

The raw scores were derived according to the comprehensive instructions available in the test's manual. Raw scores were tallied, and cross checked by the DIAL-R co-ordinator and one of the testers at the completion of testing. The maximum value of each item is 2, and the minimum is 0. The test's format allows for a choice of two modes of responding, verbal or motor. A verbal response earns a score of 2 whereas the motor responses given in lieu of verbal ones, earn a score of 1. In cases where the child required modelling of the required response, a score of 1 is earned.

Behavioural Observations

A list of eight possible behavioural observations from the test's manual are included at the end of each DIAL-R subtest. The examiners, during the presentation of their subtest, were required to attend to behaviours that corresponded to this list, and at the end of their testing, to circle inappropriate behaviours that was exhibited by the child during testing. These notations provide the screening team with important observations of individual differences in social interactions.

In this way an additional component is offered toward the total profile for screening predictions.

BEHAVIOUR OBSERVATION LIST

1. Unable to separate from adult
2. Cries/whines
3. Unwilling to answer questions
4. Perseverative; repeats what (s)he says or does
5. Distractible; does not pay attention
6. Hyperactive; restless; fidgety; antsy
7. Resistive; unwilling to try task
8. Distruptive; interupts testing procedure

Order of Testing

The DIAL-R specifies no sequence of administration of subtests. During testing each child completes each subtest, the order of the 3 subtests (Motor, Concept, Language) being randomized. It is recommended that the very young, shy child not be tested in the Language area first, thereby allowing for time to adjust to the novel situation. Each tester noted down the order of subtests.

CHAPTER V

RESULTS

The data matrix contained the following information on each of the 345 children: subject number, age in months, sex, native language, scores on each of the 24 DIAL-R items (M1 to M8, C1 to C8, L1 to L8), number of behavioural observations in each of the 3 subtests (maximum = 24), as well as the order in which the child was tested in each area (1st, 2nd or 3rd).

A variety of procedures were carried out in the following order: Prior to any analysis all Raw Scores were converted to Scaled Scores and ages in months were converted into 17 different age groups, with a three months interval in each one. Extensive descriptive statistical analysis was carried out on the above data. The following measures were investigated; construct validity, internal consistency (reliability) and inter-subtest correlations.

The intention of this analysis was to develop Scaled Scores unique to the population of French speaking Quebec children using the latent-trait method employed in the development of the U.S. norm (Mardell-Czudnowski & Goldenberg, 1983). However, the use of this method, also often referred to as the Rasch-Wright procedures (Wright & Stone, 1979), was advised against by Professor Wright, Chicago University (personal communication, January, 1987). A variety of reservations about these procedures, including their technical complexity, problematic accessibility as well as the lack of trained statisticians in Montreal, expert with these specific procedures, contributed to Professor Wright's advice against their use for this study. Rather, he suggested that the already existing Scaled Scores, derived in 1983 for the norming of the DIAL-R in the U.S., would be most appropriate and should be used. All Raw Score results, that is, scores for each of the 24 items, (8 items in each of the three subtests), for every Francophone subject was converted to these previously established Scaled Score equivalents. (See Appendix B. for examples of these Scaled Scores in the U.S. version of the DIAL-R).

The Development of Cut-off Points

The DIAL-R norms, as defined by the DIAL-R original standardization study, used DIAL-R total score means for each age group as central points. For each age group, cut-off points (for the determining of high risk or potentially gifted) were established by measuring + 1.5 standard deviation from the mean of the total score (sum of subjects). According to these cut-off points, the DIAL-R test classifies a child as "OK", that is, within the normal range if the child scored within these limits, (between -1.5 s.d. and +1.5 s.d.). A child scoring below the cut-off point (-1.5 s.d. from the mean) is classified as a "potential problem", requiring further assessment for learning disabilities. A score that is +1.5 standard deviation above the mean is considered "potentially gifted."

A comparison of the means of the U.S. sample to the Montreal Francophone sample was made. Francophone children were found to score substantially higher that the U.S. population for most of the age groups. If one were to use the U.S. norms as a reference, only 2% of the Francophone children scored in the "potential problem" range and as much as 41.7% of the sample scored in the "potentially gifted range.

Adjustment of the French Version of the DIAL-R

Given the strong discrepency between the U.S. norms, the Anglophone norms and those of the Francophone population, (See Table 3, 4, 5, 6, 7, and 8 for these results), an attempt was made to make the two tests as equivalent as possible.

Insert Tables 3, 4, 5, 6, 7, and 8 about here

Apart from ambiguous and/or inappropriate words in the Concept and Language Areas, the French version's Articulation item, (#1), in the Langauage subtest contained an additional 3 items, that is, 18 instead of the 15 found in the U.S. version. The Memory section, i.e., item #3, contained 4 as opposed to 3 Phrases in the U.S. version. This therefore allowed for higher results among the Francophones, given that their chances to succeed was increased. In order to ascertain which words in the Articulation section to eliminate, assessment of these words was carried out for all 345 subjects

TABLE 3

MEANS AND STANDARD DEVIATIONS OF MOTOR AREA SCORES

		Montreal Francophone Present Study			U.S. Sample			English Montreal Sample		
	Age Group	N	Mean	S.D	N	Mean	S.D	N	Mean	S.D
1.	2.0 to 2.2	14	2.64	2.56	96	3.9	3.8	4	3.50	2.18
2.	2.3 to 2.5	16	3.81	3.06	121	5.3	3.3	9	4.67	1.70
3.	2.6 to 2.8	16	5.75	3.19	108	6.7	3.3	12	6.33	1.70
4.	2.9 to 2.11	24	8.38	3.89	150	8.3	3.7	17	7.71	3.04
5.	3.0 to 3.2	18	10.17	3.00	142	9.8	4.1	13	10.69	3.41
6.	3.3 to 3.5	23	12.52	4.85	139	11.6	4.1	16	11.94	3.86
7.	3.6 to 3.8	19	15.00	4.55	146	13.4	4.1	23	14.70	4.05
8.	3.9 to 3.11	23	16.74	3.70	163	15.2	4.1	23	17.96	3.96
9.	4.0 to 4.2	27	20.63	5.59	167	16.4	3.8	19	15.63	3.83
10.	4.3 to 4.5	26	21.15	5.40	203	17.5	3.9	27	20.56	3.76
11.	4.6 to 4.8	22	23.82	4.66	202	19.0	4.0	20	22.80	4.02
12.	4.9 to 4.11	20	25.85	3.25	187	20.1	3.6	19	22.47	4.99
13.	5.0 to 5.2	21	25.05	4.39	214	20.8	4.1	16	24.31	4.09
14.	5.3 to 5.5	20	26.00	4.80	122	22.4	3.0	14	26.14	3.50
15.	5.6 to 5.8	24	28.08	2.55	150	23.1	3.2	10	27.70	3.03
16.	5.9 to 5.11	14	29.64	1.27	135	23.7	3.4	20	27.25	3.16
17.	6.0 to 6.2	18	29.67	.91	–	n.a.	n.a.	19	26.68	4.57

TABLE 4

MEANS AND STANDARD DEVIATIONS OF CONCEPT AREA SCORES

	Montreal Francophone Present Study			U.S. Sample			English Montreal Sample		
Age Group	N	Mean	S.D	N	Mean	S.D	N	Mean	S.D
1. 2.0 to 2.2	14	6.29	2.46	96	3.7	4.3	4	7.75	2.28
2. 2.3 to 2.5	16	7.06	4.07	121	5.8	4.5	9	6.22	2.82
3. 2.6 to 2.8	16	8.81	3.89	108	6.3	4.4	12	11.17	5.86
4. 2.9 to 2.11	24	8.92	3.68	150	8.9	5.0	17	12.12	2.85
5. 3.0 to 3.2	18	11.44	3.68	142	9.5	5.4	13	16.23	6.67
6. 3.3 to 3.5	23	15.57	4.54	139	11.2	5.3	16	17.75	4.52
7. 3.6 to 3.8	19	16.37	3.82	146	13.1	5.5	23	16.91	4.03
8. 3.9 to 3.11	23	17.39	4.49	163	15.0	5.6	23	23.43	4.35
9. 4.0 to 4.2	27	19.56	5.09	167	16.7	5.6	19	22.68	3.48
10. 4.3 to 4.5	26	21.31	3.60	203	17.7	5.6	27	27.11	2.90
11. 4.6 to 4.8	22	22.86	4.49	202	18.7	5.5	20	27.55	2.27
12. 4.9 to 4.11	20	24.05	4.31	187	20.0	5.0	19	25.63	2.89
13. 5.0 to 5.2	21	24.52	4.09	214	21.2	4.8	16	28.25	1.98
14. 5.3 to 5.5	20	25.20	3.85	122	22.5	3.6	14	28.50	1.95
15. 5.6 to 5.8	24	25.92	3.51	150	24.0	3.2	10	28.70	1.42
16. 5.9 to 5.11	14	27.57	3.06	135	23.9	4.0	20	27.05	4.08
17. 6.0 to 6.2	18	28.89	1.28	–	n.a	n.a	19	27.42	2.76

TABLE 5

MEANS AND STANDARD DEVIATIONS OF LANGUAGE AREA SCORES

	Montreal Francophone Present Study			U.S. Sample			English Montreal Sample		
Age Group	N	Mean	S.D	N	Mean	S.D	N	Mean	S.D
1. 2.0 to 2.2	14	5.43	3.10	96	6.2	5.6	4	7.25	5.31
2. 2.3 to 2.5	16	7.94	4.85	121	8.3	5.7	9	10.33	5.27
3. 2.6 to 2.8	16	8.81	5.25	108	10.3	5.7	12	13.50	6.32
4. 2.9 to 2.11	24	12.13	6.10	150	12.4	5.5	17	16.29	4.27
5. 3.0 to 3.2	18	15.06	5.84	142	12.8	6.1	13	16.08	6.04
6. 3.3 to 3.5	23	18.78	6.18	139	15.5	5.6	16	20.56	5.26
7. 3.6 to 3.8	19	20.74	5.26	146	17.4	5.2	23	20.30	4.06
8. 3.9 to 3.11	23	21.78	5.55	163	18.7	4.7	23	24.26	3.00
9. 4.0 to 4.2	27	23.38	4.75	167	19.3	5.0	19	23.05	3.53
10. 4.3 to 4.5	26	24.85	6.27	203	20.7	4.0	27	25.11	3.15
11. 4.6 to 4.8	22	26.91	3.11	202	21.6	4.1	20	26.85	3.05
12. 4.9 to 4.11	20	26.50	5.88	187	22.2	3.7	19	25.53	3.76
13. 5.0 to 5.2	21	27.29	4.54	214	23.2	3.8	16	27.19	4.59
14. 5.3 to 5.5	20	27.75	2.79	122	23.4	3.8	14	27.86	2.07
15. 5.6 to 5.8	24	29.04	2.72	150	23.9	3.2	10	27.80	2.56
16. 5.9 to 5.11	14	29.07	1.77	135	24.4	3.5	20	26.30	3.77
17. 6.0 to 6.2	18	30.00	1.66	--	n.a	n.a	19	26.16	4.99

TABLE 6

MEANS AND STANDARD DEVIATIONS BASED ON TOTAL SCORES OF THE UNADJUSTED DATA FOR EACH AGE GROUP

	Montreal Francophone Present Study			U.S. Sample			English Montreal Sample		
Age Group	N	Mean	S.D	N	Mean	S.D	N	Mean	S.D
1. 2.0 to 2.2	14	14.36	6.56	96	13.9	12.6	4	18.50	7.43
2. 2.3 to 2.5	16	18.81	9.10	121	19.4	11.7	9	21.22	8.00
3. 2.6 to 2.8	16	23.50	10.87	108	23.3	11.9	12	30.92	11.70
4. 2.9 to 2.11	24	29.42	12.08	150	29.6	11.9	17	36.18	7.04
5. 3.0 to 3.2	18	36.67	10.09	142	32.3	13.3	13	43.00	13.78
6. 3.3 to 3.5	23	46.87	13.36	139	38.3	12.6	16	50.25	11.30
7. 3.6 to 3.8	19	52.11	11.44	146	43.9	12.5	23	51.91	9.22
8. 3.9 to 3.11	23	55.91	10.22	163	48.9	11.9	23	65.65	8.50
9. 4.0 to 4.2	27	63.56	12.08	167	52.4	11.5	19	61.37	8.41
0. 4.3 to 4.5	26	67.31	11.51	203	55.9	11.2	27	72.78	7.12
1. 4.6 to 4.8	22	73.59	10.04	202	59.2	10.6	20	77.20	6.11
2. 4.9 to 4.11	20	76.40	10.57	187	62.3	10.0	19	73.63	8.14
3. 5.0 to 5.2	21	76.86	10.47	214	65.2	10.0	16	79.75	8.12
4. 5.3 to 5.5	20	78.95	10.26	122	68.4	7.6	14	82.50	5.72
5. 5.6 to 5.8	24	83.04	7.41	150	71.0	7.7	10	84.20	4.35
6. 5.9 to 5.11	14	86.29	4.58	135	72.1	8.8	20	80.60	9.35
7. 6.0 to 6.2	18	88.56	2.57	--	n.a.	n.a.	19	80.26	10.08

TABLE 7

ADJUSTED MEANS AND STANDARD DEVIATIONS OF LANGUAGE AREA SCORES

	Montreal Francophone Present Study			U.S. Sample			English Montreal Sample		
Age Group	N	Mean	S.D	N	Mean	S.D	N	Mean	S.D
1. 2.0 to 2.2	14	5.29	3.10	96	6.2	5.6	4	7.25	5.31
2. 2.3 to 2.5	16	7.69	4.85	121	8.3	5.7	9	10.33	5.27
3. 2.6 to 2.8	16	8.69	5.25	108	10.3	5.7	12	13.50	6.32
4. 2.9 to 2.11	24	11.50	6.10	150	12.4	5.5	17	16.29	4.27
5. 3.0 to 3.2	18	14.28	5.84	142	12.8	6.1	13	16.08	6.04
6. 3.3 to 3.5	23	17.87	6.18	139	15.5	5.6	16	20.56	5.26
7. 3.6 to 3.8	19	19.42	5.26	146	17.4	5.2	23	20.30	4.06
8. 3.9 to 3.11	23	20.74	5.55	163	18.7	4.7	23	24.26	3.00
9. 4.0 to 4.2	27	22.22	4.75	167	19.3	5.0	19	23.05	3.53
10. 4.3 to 4.5	26	23.77	6.27	203	20.7	4.0	27	25.11	3.15
11. 4.6 to 4.8	22	25.68	3.11	202	21.6	4.1	20	26.85	3.05
12. 4.9 to 4.11	20	25.20	5.88	187	22.2	3.7	19	25.53	3.76
13. 5.0 to 5.2	21	26.14	4.54	214	23.2	3.8	16	27.19	4.59
14. 5.3 to 5.5	20	26.70	2.79	122	23.4	3.8	14	27.86	2.07
15. 5.6 to 5.8	24	27.75	2.72	150	23.9	3.2	10	27.80	2.56
16. 5.9 to 5.11	14	28.07	1.77	135	24.4	3.5	20	26.30	3.77
17. 6.0 to 6.2	18	29.66	1.66	--	n.a	n.a	19	26.16	4.99

TABLE 8

MEANS AND STANDARD DEVIATIONS BASED ON TOTAL SCORES OF THE ADJUSTED DATA FOR EACH AGE GROUP

	Montreal Francophone Present Study			U.S. Sample			English Montreal Sample		
Age Group	N	Mean	S.D	N	Mean	S.D	N	Mean	S.D
1. 2.0 to 2.2	14	14.21	6.40	96	13.9	12.6	4	18.50	7.43
2. 2.3 to 2.5	16	18.56	8.97	121	19.4	11.7	9	21.22	8.00
3. 2.6 to 2.8	16	23.25	10.66	108	23.3	11.9	12	30.92	11.70
4. 2.9 to 2.11	24	28.79	11.70	150	29.6	11.9	17	36.18	7.04
5. 3.0 to 3.2	18	35.89	9.86	142	32.3	13.3	13	43.00	13.78
6. 3.3 to 3.5	23	45.96	12.94	139	38.3	12.6	16	50.25	11.30
7. 3.6 to 3.8	19	50.79	11.56	146	43.9	12.5	23	51.91	9.22
8. 3.9 to 3.11	23	54.87	10.07	163	48.9	11.9	23	65.65	8.50
9. 4.0 to 4.2	27	62.41	11.92	167	52.4	11.5	19	61.37	8.41
10. 4.3 to 4.5	26	66.23	11.45	203	55.9	11.2	27	72.78	7.12
11. 4.6 to 4.8	22	72.36	10.49	202	59.2	10.6	20	77.20	6.11
12. 4.9 to 4.11	20	75.10	10.42	187	62.3	10.0	19	73.63	8.14
13. 5.0 to 5.2	21	75.71	10.54	214	65.2	10.0	16	79.75	8.12
14. 5.3 to 5.5	20	77.90	10.10	122	68.4	7.6	14	82.50	5.72
15. 5.6 to 5.8	24	81.75	7.59	150	71.0	7.7	10	84.20	4.35
16. 5.9 to 5.11	14	85.29	4.76	135	72.1	8.8	20	80.60	9.35
17. 6.0 to 6.2	18	87.61	2.50	--	n.a.	n.a.	19	80.26	10.08

to determine which words among the 18 were most inappropriate. Three words were found to be ambiguous: "jambe" (leg), "beigne" (doughnut) and "cloche" (bell). The first two corresponding pictures (images of a *leg* and a *doughnut*, respectively), to be identified presented a problem of ambiguity, that is, several consistently incorrect responses were offered by the children, eg., "pied" (foot), and "biscuit" (cookie), thereby necessitating prompting. The third picture (an image of a *bell)* could not be identified since it appears to have been outside the range of the childrens' vocabulary. The children did not attempt to name this image, but often asked for the image to be identified for them. As a result of this item analyses these three words were eliminated.

In the Memory section the extra 'phrase' ("Je bois du lait tous les jour") which did not appear in the English version was eliminated. The Language subtest was then re-scored using these criteria for revision. As a result of these adjustments the Language subtest means were lowered (See Tables 5 and 6 for these results).

Although this discrepency between the French and U.S. version of the test was corrected, the overall results of the Francophone population remained consistently higher than the U. S. norms with 2.3% scoring within the "potential problem" range and 38.3% in the "potentially gifted" range. See Table 9 for these results.

See Table 9 about here

Establishment of Francophone Norms- the Development of New Cut-Off Points

The DIAL-R norms and cut-off points as previously discussed were established by measuring +1.5 s.d. each age group mean. These arbitrary cut-off points were selected to identify 6.68% of the children at each end of the continuum ("potential problem" and "potentially gifted"). Given that children from the present sample scored significantly higher than the U.S. normative sample, (with 2% being at high risk, and 38% "potentially gifted") the DIAL-R U.S. norms could no longer be employed to identify the 6.68% of the population who may be "potential problem" or "potentially

TABLE 9

FRANCOPHONE CHILDREN SCREENED USING U.S. AND ANGLO-CANADIAN CUT OFF POINTS WITH ADJUSTED DATA

		U.S.				Anglophone			
		Potential Problem (1)		Potentially Gifted (3)		Potential Problem (1)		Potentially Gifted (3)	
Age Group	N	N	%	N	%	N	%	N	%
1. 2.0 to 2.2	14	0	0	0	0	3	21	0	0
2. 2.3 to 2.5	16	1	6	0	0	3	19	1	6
3. 2.6 to 2.8	16	1	6	0	0	3	19	0	0
4. 2.9 to 2.11	24	1	4	3	13	10	42	1	4
5. 3.0 to 3.2	18	0	0	1	6	4	22	0	0
6. 3.3 to 3.5	23	0	0	4	17	5	22	1	4
7. 3.6 to 3.8	19	1	5	3	16	2	11	1	5
8. 3.9 to 3.11	23	0	0	4	17	6	26	0	0
9. 4.0 to 4.2	27	1	4	9	33	6	22	1	4
10. 4.3 to 4.5	26	1	3	13	50	7	27	0	0
11. 4.6 to 4.8	22	0	0	13	59	9	41	2	9
12. 4.9 to 4.11	20	0	0	11	55	5	25	0	0
13. 5.0 to 5.2	21	1	5	12	57	5	24	0	0
14. 5.3 to 5.5	20	1	5	13	65	5	25	0	0
15. 5.6 to 5.8	24	0	0	16	67	5	21	0	0
16. 5.9 to 5.11	14	0	7	12	80	2	14	0	0
17. 6.0 to 6.2	18	0	0	18	100	0	0	0	0
TOTALS	345	8	2.3	132	38.3	80	23.2	7	2.0

gifted". Using the original DIAL-R cut-off points, one would fail to identify an important proportion of children. Similarly, one would overclassify the number of children who may be "potentially gifted" using the U.S. norms. Therefore, using the U.S. norms for this population renders the results meanigless. Table 9 shows the percentage of children in the present sample classified as "potential problem" or "potentially gifted" when the U.S. DIAL- R norms are implemented. These results made it necessary to establish new Francophone cut-off points according to the same criteria as in the original standardization study, that is, by measuring +1.5 s.d. the total mean score for each age group. These new cut-off points, which are considerably higher than the U.S. population, can be seen in Table 10. Within each age group approximately 89% of the children will fall between these two numbers. At the higher age levels (5;5 - 6,2), the lack of differentiation between the cut-off points for the 'potentially gifted' is due to a plateau effect in the scores. This trend is similar to that found in both the original American study (Mardell & Goldenberg, 1984),and in the Anglophone study (Derevensky & Mardell-Czudnowski, 1986). See Table 10 for these results.

Insert Table 10 about here

It was also interesting to compare the performance of Francophone children to those of the Anglophone population (Derevensky & Mardell-Czudnowski, 1986). Using the Anglophone norms, it was found that 23% of the present sample were in the "potential problem" range and 2% were found to be in the "potentially gifted" range. Therefore, using these norms with the present sample would significantly overclassify the "potentially learning disabled" and underestimate the "potentially gifted." These results are the reverse of those found using the U.S. norms (Table 9).

Construct Validity

Consistent developmental trends had to be demonstrated within the specified behaviours in order to be included among the final 24 items in the course of the original U.S. standardization process.

Insert Table 11 about here

TABLE 10

SUGGESTED CUT-OFF POINTS FOR FRANCOPHONE POPULATION COMPARED WITH ORIGINAL AMERICAN CUT-OFF POINTS

Age Group	U.S. cut-off points		Francophone cut-off points	
	Potential Problem (1)	Potentially Gifted (3)	Potential Problem (1)	Potentially Gifted (3)
1. 2.0 to 2.2	0	30	4	24
2. 2.3 to 2.5	2	40	5	32
3. 2.6 to 2.8	4	44	7	39
4. 2.9 to 2.11	10	47	11	46
5. 3.0 to 3.2	15	50	21	51
6. 3.3 to 3.5	18	57	27	65
7. 3.6 to 3.8	26	62	33	68
8. 3.9 to 3.11	32	65	40	70
9. 4.0 to 4.2	34	67	45	80
10. 4.3 to 4.5	37	70	50	83
11. 4.6 to 4.8	41	73	57	88
12. 4.9 to 4.11	47	75	59	90
13. 5.0 to 5.2	51	77	60	92
14. 5.3 to 5.5	53	78	63	93
15. 5.6 to 5.8	55	80	70	93
16. 5.9 to 5.11	57	81	79	93
17. 6.0 to 6.2	58	82	83	93

TABLE 11

MEANS AND STANDARD DEVIATIONS FOR TOTAL SCORES OF MOTOR, CONCEPT, AND LANGUAGE AREAS FOR FRANCOPHONE SAMPLE

			Motor Area Scores		Concept Area Scores		Language Area Scores		Total	
	Age Group	N	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D
1.	2.0 to 2.2	14	2.64	2.56	6.29	2.46	5.29	3.10	14.21	6.40
2.	2.3 to 2.5	16	3.81	3.06	7.06	4.07	7.69	4.85	18.56	8.97
3.	2.6 to 2.8	16	5.75	3.19	8.81	3.89	8.69	5.25	23.25	10.66
4.	2.9 to 2.11	24	8.38	3.89	8.92	3.68	11.50	6.10	28.79	11.70
5.	3.0 to 3.2	18	10.17	3.00	11.44	3.68	14.28	5.84	35.89	9.86
6.	3.3 to 3.5	23	12.52	4.85	15.57	4.54	17.87	6.18	45.96	12.94
7.	3.6 to 3.8	19	15.00	4.55	16.37	3.82	19.42	5.26	50.79	11.56
8.	3.9 to 3.11	23	16.74	3.70	17.39	4.49	20.74	5.55	54.87	10.07
9.	4.0 to 4.2	27	20.63	5.59	19.56	5.09	22.22	4.75	62.41	11.92
10.	4.3 to 4.5	26	21.15	5.40	21.31	3.60	23.77	6.27	66.23	11.45
11.	4.6 to 4.8	22	23.82	4.66	22.86	4.49	25.68	3.11	72.36	10.49
12.	4.9 to 4.11	20	25.85	3.25	24.05	4.31	25.20	5.88	75.10	10.42
13.	5.0 to 5.2	21	25.05	4.39	24.52	4.09	26.14	4.54	75.71	10.54
14.	5.3 to 5.5	20	26.00	4.80	25.20	3.85	26.70	2.79	77.90	10.10
15.	5.6 to 5.8	24	28.08	2.55	25.92	3.51	27.75	2.72	81.75	7.59
16.	5.9 to 5.11	14	29.64	1.27	27.57	3.06	28.07	1.77	85.29	4.76
17.	6.0 to 6.2	18	29.67	.91	28.89	1.28	29.66	1.66	87.61	2.50

In Table 11, the means and standard deviations of the scaled scores are presented for Motor, Concepts and Language areas and for Total scores respectively for all 17 age groups. (These results are analysed on the basis of the adjusted scores for the Francophone sample).

When the mean scaled scores are plotted, as shown in Figure.1, existence of a strong developmental trend in all three areas, as well as for the total score, (see Figure. 2), are very evident. These results clearly suggest that the DIAL-R has high construct validity when it is used with French children in Montreal. The aggregation correlation of DIAL-R Total score and age yielded a correlation of .89 ($P < .001$); for Motor scores and age, .89, ($P < .001$); for Concept scores and age, .86, ($P < .001$); and for Language scores and age, .80, ($P < .001$).

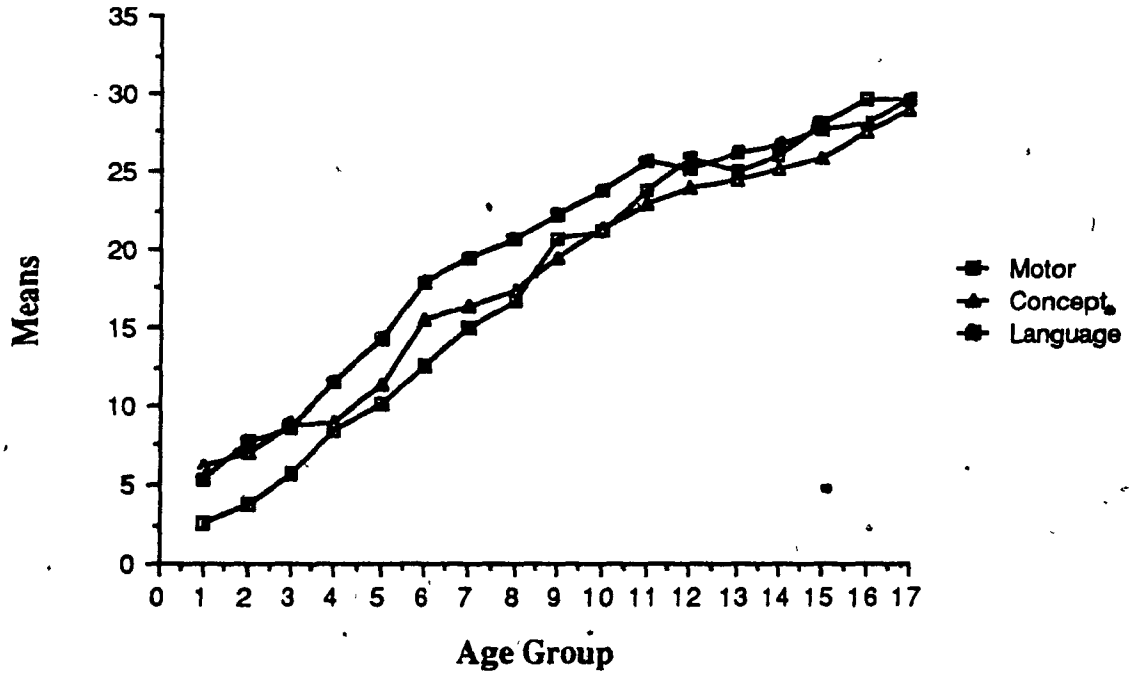

Figure 1: Means of three subtests for Francophone sample by age.

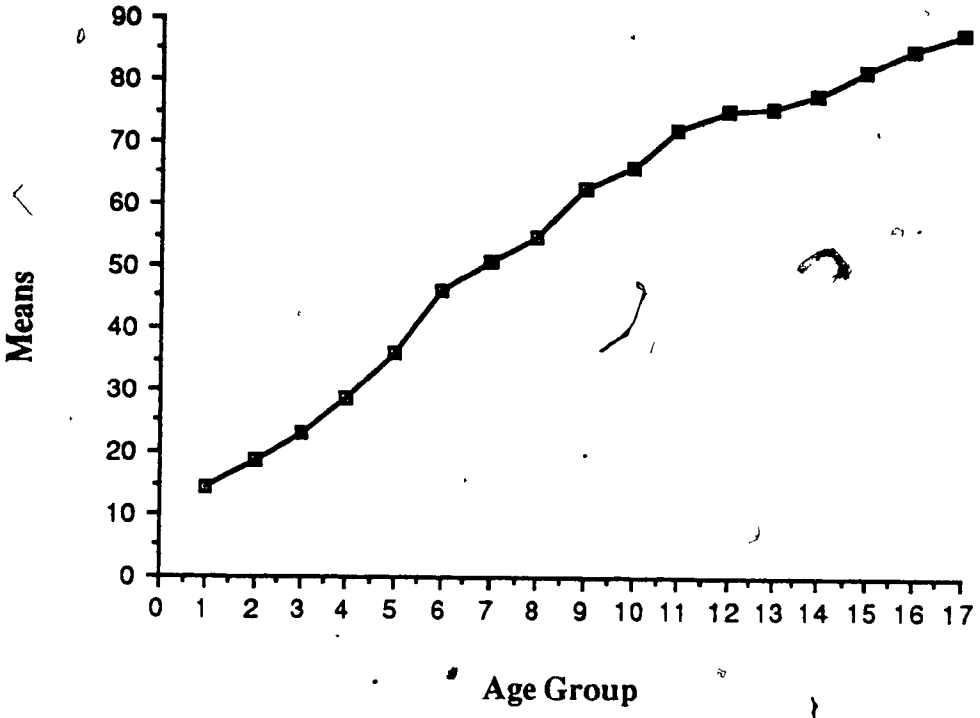

Figure 2: Means for total score for Francophone sample by age.

Figures 3 through 6 display graphically the performance results of the three different samples, (i.e., American, Anglophone Canadian and Francophone Canadian, for all three subtests (Fig. 3, 4, 5), and for the total scores (Fig. 6).

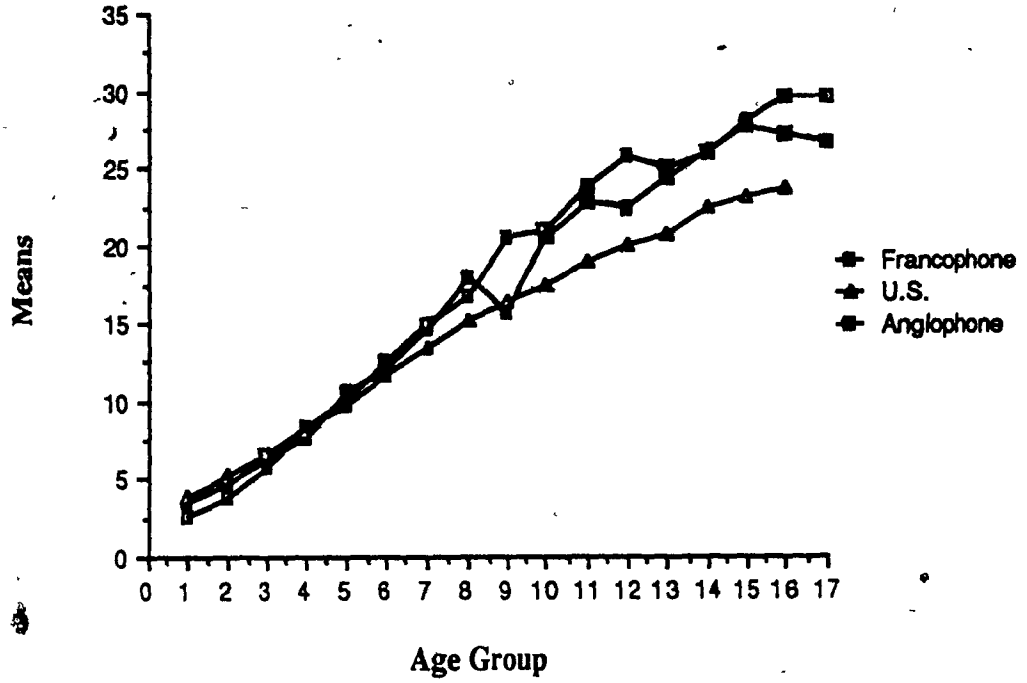

Figure 3: Means for motor subtest for Francophone, U.S., and Anglophone by age.

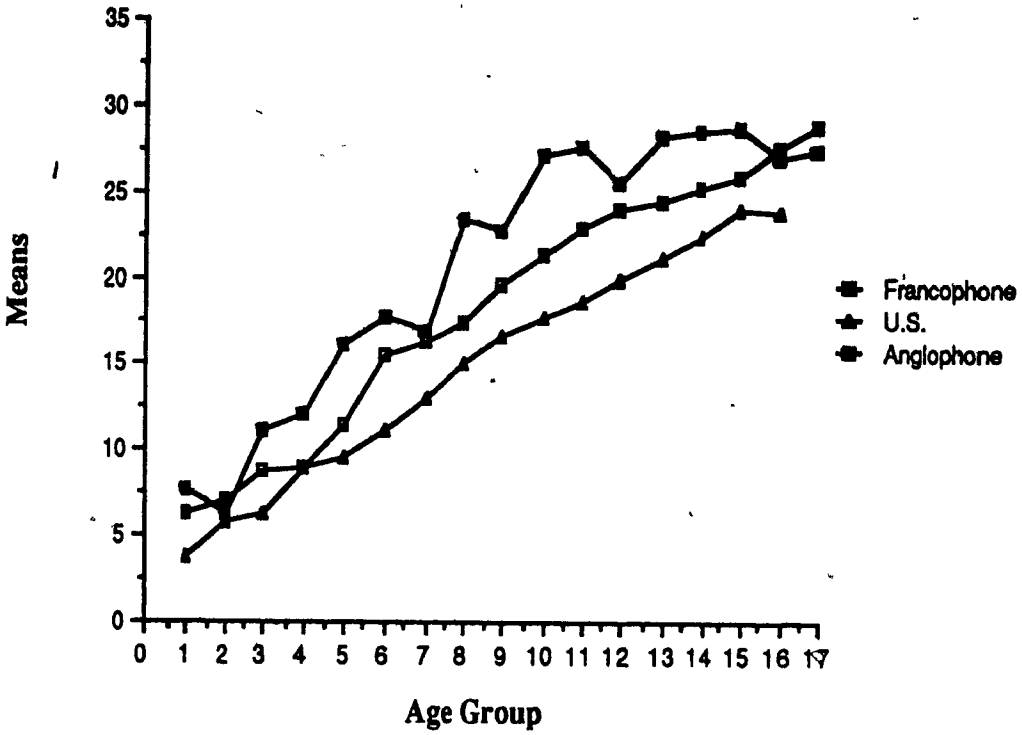

Figure 4: Means for concept subtest for Francophone, U.S., and Anglophone samples by age

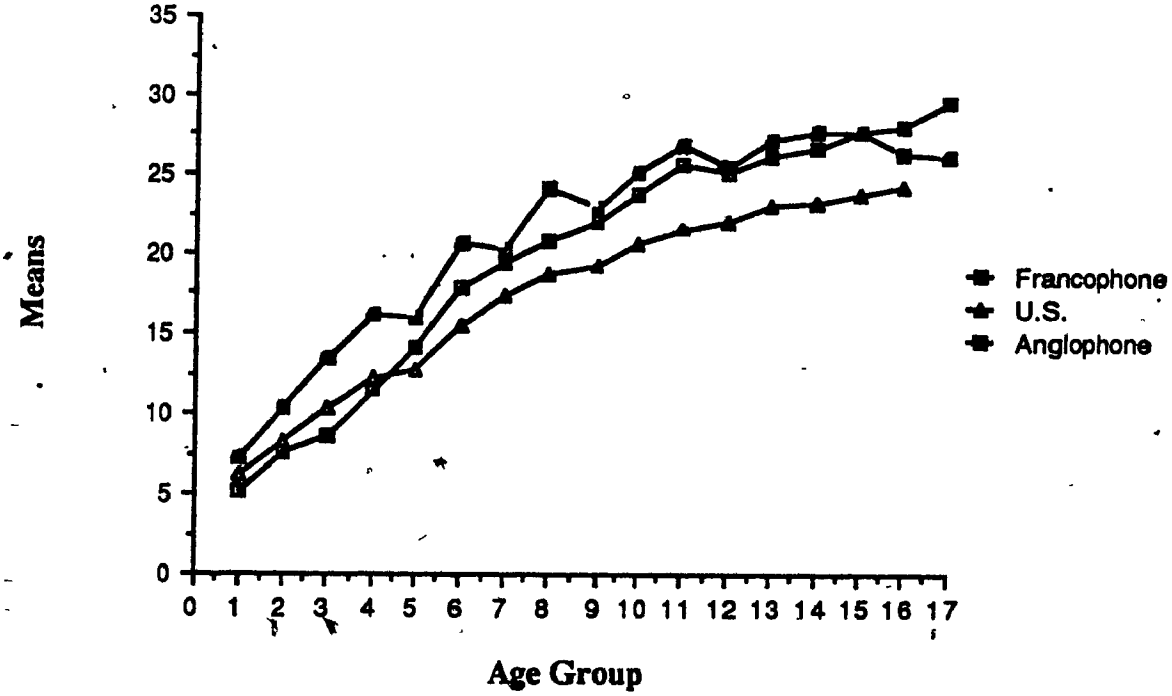

Figure 5: Means for language subtest for Francophone, U.S., and Anglophone samples by age.

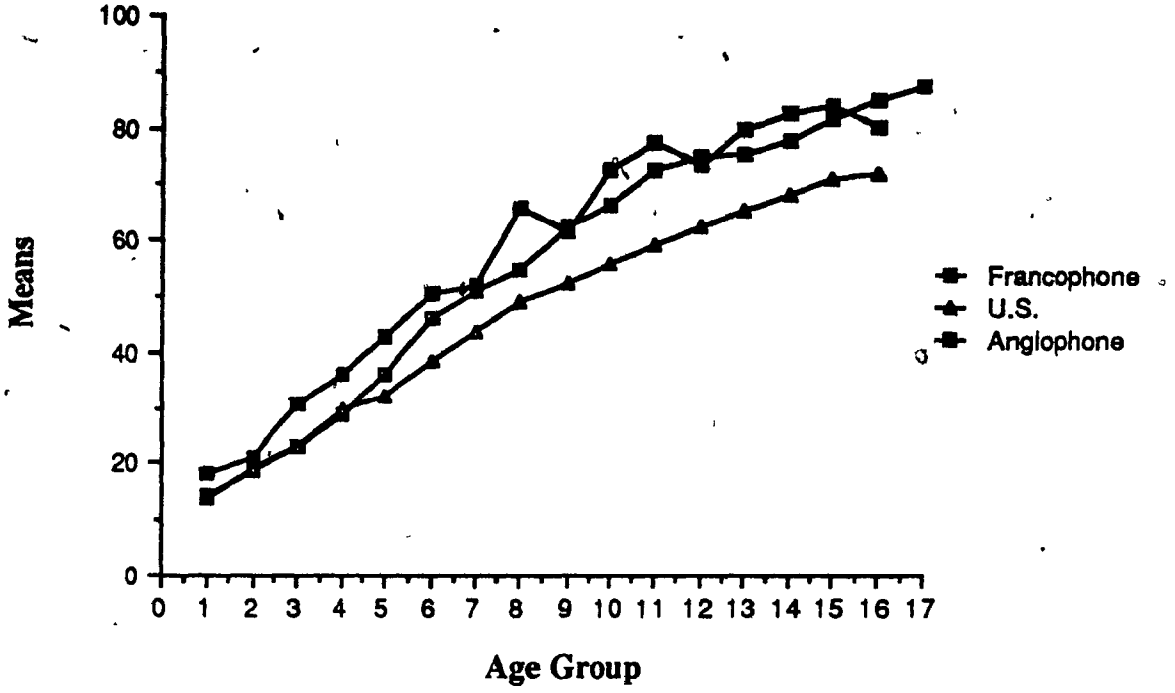

Figure 6: Means for total scores for Francophone, U.S, and Anglophone samples by age

Total scores within each of the 17 age groups were correlated with age and as expected no statistical significance was found. However these results are interesting to examine nevertheless. Due to the fact that a range of 3 months may be too small to generate significant developmental trends, these results were not surprising. However, when the age groups were regrouped into 6 month intervals the analysis yielded different yet inconsistent results. Age groups 1(2.0-2.5), 3(3.0-3.5), and 5(4.0-4.5) showed a significant relationship between age and Total score at a .02, .001, and a .03 level respectively, whereas the other age groups failed to reach statistical significance. When the Total scores are broken down into their subtest components yet another pattern emerges. In age group 1, (2.0-2.5), Language subtest scores are significantly related to age at a .01 level. A significant relationship only exists in the Motor area in age group 2, (2.6-2.11). All three subtest

scores are significantly related to age in group 3, (3.0-3.5) ($P < .007, .0001, .005$) respectively. For these results see Table 12.

Insert Table 12 about here

Internal Consistency

In order to estimate internal consistency of the DIAL-R subtests it was necessary to regroup the 17 age groups into 9 groups. In this way not only the age intervals within each group increased from 3 months to 6 months, but also the number of subjects within each group. This adjustment made the reliability analysis more meaningful.

Cronbach Alpha was used to estimate the internal consistency of each subtest and the total score on the DIAL-R. This coefficient measures the degree of homogeneity of the items in each component and in the total test. The overall coefficient for the DIAL-R is .96. The internal consistency reliability coefficient for each subtest and total scores of the DIAL-R by 6 month intervals are found in Table 13. When the 17 age groups were regrouped for the purposes of this analysis, the 9th group, (6 .0-6.2) remained unchanged. The reliability results should be ignored for the 9th age group. As a result of its unchanged small age interval (3 months), few subjects (n =18), and the very small amount of variance demonsrated in the performance of this age group, the reliability measure is unrepresentative of the overall pattern.

Insert Table 13 about here

Inter-Area Correlation

Another way of examining the relationship between the three subtests is by analysing their inter-correlations. The correlation between Motor and Concepts was found to be .86, between Motor and Language .83, and between Concepts and Language .86. It is therefore apparent that there is a close interrelationship between the three subareas. These correlations closely approximate those found by

TABLE 12

CORRELATION OF THE 3 DIAL-R AREA SCORES AND TOTAL SCORES FOR EACH OF THE 9 AGE GROUPS

Age group (regrouped)		N	Motor		Concept		Language		Total	
			r	p	r	p	r	p	r	p
1	2.0 - 2.5	30	.28	.07	.16	.2	.39	.02 *	.37	.02 *
2	2.6 - 2.11	40	.29	.04 *	-.05	.4	.18	.13	.17	.14
3	3.0 - 3.5	41	.38	.007 *	.49	.0001 *	.39	.005 *	.51	.000 *
4	3.6 - 3.11	42	.32	.02 *	.08	.31	.03	.42	.17	.14
5	4.0 - 4.5	53	.13	.19	.28	.02 *	.19	.08	.26	.03 *
6	4.6 - 4.11	42	.28	.03 *	.16	.14	.01	.47	.19	.12
7	5.0 - 5.5	41	.15	.17	.18	.12	.02	.44	.15	.18
8	5.6 - 5.11	38	.29	.03 *	.14	.20	.00	.49	.16	.16
9	6.0 - 6.2	18	.30	.11	.05	.42	-.06	.39	.09	.36
TOTALS		345	.89	.001 *	.86	.001 *	.80	.001 *	.89	.001 *

(* statistically significant)

TABLE 13

INTERNAL CONSISTENCY (ALPHA) OF DIAL-R AREAS AND TOTAL SCORES BY AGE

Age group (regrouped)		N	Motor Alpha	Concept Alpha	Language Alpha	Total Alpha
1	2.0 - 2.5	30	.69	.54	.79	.80
2	2.6 - 2.11	40	.66	.67	.86	.88
3	3.0 - 3.5	41	.63	.66	.84	.86
4	3.6 - 3.11	42	.50	.50	.79	.79
5	4.0 - 4.5	53	.71	.61	.80	.82
6	4.6 - 4.11	42	.60	.67	.77	.82
7	5.0 - 5.5	41	.69	.61	.70	.84
8	5.6 - 5.11	38	.51	.60	.52	.78
9	6.0 - 6.2	18	.01	-.85	.16	.03
TOTAL		345	.92	.89	.92	.96

Mardell-Czudnowski and Goldenberg (1983), as well as those found by Derevensky and Mardell-Czudnowski in 1986. See Table 14 for these results.

Insert Table 14 about here

Sex Differences

Of the children in the "potential problem" range (n=26 or 7.5%), 61% were found to be male. A chi-square was obtained which was statistically significant ($P < .001$). Furthermore, whereas only 5.7% of the total female population scored in "potential problem"range in contrast 9.5% of the total male population, almost double that of the female population, scored in the "potential problem" range. The profile seems to substantiate the general trend of girls exceling over boys (Maccoby & Nagy, 1974). Of those boys found in the lower ranges, 62% were found in the 10-17 age ranges, whereas among the girls found in the "problem" range 60% were found in the lower age ranges, (1-9). For the U.S. sample gender was not a significant variable in performance. See Table 15, 16 and 17 for these results.

Insert Table 15, 16 and 17 about here

There were no significant discrepencies found in the upper scoring ranges between the sexes. Of those who scored in the "potentially gifted" range (n = 11 or 3%), 55% were girls and 45% were boys. Of the total female population 3.5% scored in the upper ranges compared to the 2.9% of the total male population.

French as a Second Language

The total Francophone sample consisting of 345 children was composed of those whose mother tongue was French (280), and of those whose native language was other than French (65) but who were attending French day-care. The testing was carried out in French speakin day-care centers. The

TABLE 14

INTER-AREA CORRELATION COEFFICIENTS BETWEEN DIAL-R SUBTESTS

FRANCOPHONES

	Motor	Concepts	Language
Motor	1.00		
Concepts	.89	1.00	
Language	.83	.86	1.00

U.S.

	Motor	Concepts	Language
Motor	1.00		
Concepts	.85	1.00	
Language	.77	.79	1.00

ANGLOPHONES

	Motor	Concepts	Language
Motor	1.00		
Concepts	.79	1.00	
Language	.75	.79	1.00

TABLE 15

DISTRIBUTION OF POTENTIALLY LEARNING DISABLED (1), NORMAL (2), AND POTENTIALLY GIFTED (3) BY SEX

	Females (N=175)			Males (N=170)		
	1	2	3	1	2	3
N	10	159	6	16	149	5
%	5.7	90.8	3.5	9.5	87.6	2.9

TABLE 16

SEX DISTRIBUTION OF POTENTIALLY LEARNING DISABLED (1), BY AGE GROUPS

Age Group	Females		Males		TOTAL
	N	(1)	N	(1)	
1. 2.0 to 2.2	6	0	8	1	14
2. 2.3 to 2.5	6	0	10	1	16
3. 2.6 to 2.8	11	1	5	0	16
4. 2.9 to 2.11	7	0	17	1	24
5. 3.0 to 3.2	7	1	11	0	18
6. 3.3 to 3.5	15	2	8	0	23
7. 3.6 to 3.8	9	1	10	1	19
8. 3.9 to 3.11	9	0	14	1	23
9. 4.0 to 4.2	14	1	13	1	27
10. 4.3 to 4.5	12	0	14	2	26
11. 4.6 to 4.8	13	0	9	2	22
12. 4.9 to 4.11	10	0	10	2	20
13. 5.0 to 5.2	11	1	10	1	21
14. 5.3 to 5.5	13	1	7	0	20
15. 5.6 to 5.8	13	0	11	3	24
16. 5.9 to 5.11	7	2	7	0	14
17. 6.0 to 6.2	12	0	6	0	18
TOTAL	**175**	**10**	**170**	**16**	**345**

TABLE 17

SEX DISTRIBUTION OF POTENTIALLY LEARNING DISABLED (1), NORMALCY (2), AND POTENTIALLY GIFTED (3) BY AGE GROUPS

	Learning Disabilities		Normalcy		Giftedness	
Age Group	Females	Males	Females	Males	Females	Males
1. 2.0 to 2.2	0	1	5	7	1	0
2. 2.3 to 2.5	0	1	6	8	0	1
3. 2.6 to 2.8	1	0	9	5	1	0
4. 2.9 to 2.11	0	1	6	14	1	2
5. 3.0 to 3.2	1	0	6	10	0	1
6. 3.3 to 3.5	2	0	12	8	1	0
7. 3.6 to 3.8	1	1	8	9	0	0
8. 3.9 to 3.11	0	1	8	12	1	1
9. 4.0 to 4.2	1	1	12	12	1	0
10. 4.3 to 4.5	0	2	12	12	0	0
11. 4.6 to 4.8	0	2	13	7	0	0
12. 4.9 to 4.11	0	2	10	8	0	0
13. 5.0 to 5.2	1	1	10	9	0	0
14. 5.3 to 5.5	1	0	12	7	0	0
15. 5.6 to 5.8	0	3	13	8	0	0
16. 5.9 to 5.11	2	0	5	7	0	0
17. 6.0 to 6.2	0	0	12	6	0	0
TOTAL	10	16	159	149	6	5

Results show that a substantial proportion, 34%, of those who scored in the "potential problem" range, spoke French as a second language. Only 6% of the total native French-speaking sample scored in the "potential problem" range, whereas 14% of all those for whom French is a second langauge scored in the lower ranges. A chi-square analysis was carried out of the two variables, that is, language and total scores. A chi-square of 4.5 ($df = 1$) was obtained, which is statistically significant ($P < .05$). It was also found that 8 out of the 9 subjects who scored in the lower ranges, whose language was other than French, were found in the upper age ranges, with 6 of the subjects in the 12th to 16th age range. Had these children been found in the lower age ranges, wherein competency in language is not as developed for all children, the significance of a second language variable may have been confounded by developmental factors. However, according to these results, the significance of the second language variable is better supported. All those who scored in the potentially gifted range ($n = 11$) were native French speaking children. See Table 18 for these results.

Insert Table 18 about here

Observational Differences

Integral to the screening procedure was the notation of behavioral patterns which are thought to interfere with school success. A list of 8 inappropriate behaviors appears at the end of each subtest. In the course of testing the examiners are required not only to attend to the responses of the children to the test items, but also to closely observe whether the child is behaving in a socially acceptable manner, using the list of behaviors as a criteria.

In the Francophone population, as in the American samples, there is a significant negative correlation between the number of observations noted on a particular child and his DIAL-R total score ($r = -.22$, $P < .0001$). Thus, as the DIAL-R total scores decrease, the number of inappropriate behaviors, such as, distractibility, hyperactivity, resistance etc. increases. Of those children who scored in the "potential problem" range, 50% have 2 or more (with a maximum of 10) observations,

TABLE 18

DISTRIBUTION OF POTENTIALLY LEARNING DISABLED (1), NORMAL (2), AND POTENTIALLY GIFTED (3) BY LANGUAGE SPOKEN AT HOME

	French as First Language (N=280)			French as Second Language (N=65)		
	1	2	3	1	2	3
N	17	252	11	9	56	0
%	6	90	3.9	14	86	0

and 23% have 5 or more observations. This can be compared to the 21% who scored in the normal range with 2 or more observations and of whom only 7% were noted to have 5 or more observations, with a maximum of 7.

The negative correlation between the number of observations and the child's overall results, i.e., a high incidence of observations and low scores, was most evident in the Language subtest ($r = -.24$, $P < .001$) for all age groups. Of those whose overall results fell within the range of "potential problem", 61% had 1 or more observations during the course of testing in the Language subtest. This compares to 31% in the Concept and 42% in the Motor Areas respectively. The correlation between Observation and total score, was also statistically significant ($P < .0001$) in the Motor subtest and the Concept area ($P < .02$).

Using +1.5 standard deviations from the mean of total observations, it is possible and desirable to derive observation cut-off points for 4 age groups. See Table 19 for these results.

Insert Table 19 about here

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order/observations.

It was of interest to determine whether a relationship between the order of presentation and the number of behavioral observations is a significant one. The analysis revealed no such significant relationship existing between the number of observations in a particular subtest and the order in which the subtest was administered (Motor: $r = -.01$; Concept: $r = -.02$; Language: $r = .05$).

order/performance.

Since it was found that there was a significant relationship between the number of observations and low scoring subjects, it was of interest to investigate the relationship between that of order and of performance. This yielded no further indication that the order in which the test was administered had a significant bearing on performance (Motor: $r = .01$; Concept: $r = .03$; Language: $r = .01$).

TABLE 19

OBSERVATION CUT-OFF POINTS

Number of Behaviors Circled in all 3 Areas		
Chronological Age	Francophone	American
2.0 - 2.11	9 or more	8 or more
3.0 - 3.11	6 or more	5 or more
4.0 - 4.11	3 or more	2 or more
5.0 - older	1 or more	1 or more

CHAPTER VI

DISCUSSION

This study considered the applicability of the DIAL-R screening instrument for a Quebec based Francophone population. The focus of the discussion section will be threefold; 1) The results of the data analyses will be considered in depth for their wider implications regarding the applicability of the DIAL-R with this particular Francophone population; 2) The limitations and strengths of this study will be considered within the context of instrument modification practices in Quebec; and 3) The merits of the DIAL-R will be discussed with regard to its Educational significance in general and its value to the educational needs of Francophone children in Quebec in particular.

Applicability of the DIAL-R to the Francophone children of Quebec

Validity and Reliability

Construct validity of an instrument is deemed to be the most important type of validity (Messick, 1980) in that it reflects the test's accuracy with which it measures the theoretical construct that it intends to measure. Anastasi (1982), considers the criteria of differentiation of the results with age to be the most important contributing factor to an instrument's construct validity. The results suggest that the Francophone version of the DIAL-R as adapted for this study was shown to have good construct validity. The overall developmental trend in all three areas, Motor, Concept and Language, as well as for the total score, was found to be strong and statistically significant.

It is also important to observe the relationship between age and total score from one age group to the next. In spite of the small age differences, 3 to 6 months, there are significant performance differences between groups. This trend strongly substantiates the theoretical position that not only is development a constant process of transformation but that, in the early years from 2 through 6, there are distinct and rapid developmental changes occurring within the child.

The only exception to this consistent developmental trend among the age groups was observed in the Language subtest. Here, there appears to be a tendency toward a plateau among the 5 oldest groups. This can be more readily seen in Fig. 1 which displays the mean standard scores of the three DIAL-R areas of the 17 age groups. These results are in accord with those found by Mardell-Czudnowski et al. (1985), in the pilot study of the French version. As in the earlier study, it can be speculated that this tendency toward a plateau may be explained by the alterations made in the Articulation and Remembering subtests and/or that the translation may have altered the level of difficulty of the items. It may also be plausible that at these age levels, from 5 to 6 years, the development of language skills reach a certain plateau rendering it difficult to measure and discriminate the subtle and perhaps imperceptible differences. This tendency toward decreased variability in scores for the older age group may more likely be related to the lack of power of the items to discriminate at these levels, i.e., the test may not be sensitive enough. From the age of 5 years, 5 months, items M4 (touching fingers), M5 (cutting), and M8 (writing name of the Motor area, C3 (counting by rote) of the Concepts area and L3 (memory) of the Language area indicate no variance, with all subjects receiving a ceiling score. In order to render the DIAL-R more sensitive, i.e., more descriminating of skill development at the higher age levels, replacement or modification of the items mentioned above is required. This plateau was not only evident in the French pilot-study (Mardell-Czudnowski et al., 1985), but also in the original standardization sample (Mardell-Czudnowski, 1983(b)), as well as in the study of Anglophone children in Montreal (Derevensky & Mardell-Czudnowski, 1986) (Figure 5 displays this trend).

If we regroup the ages into 6 month as opposed to 3 month intervals, and closely examine the correlation of age with performance intra age groups (Table 2), the relationship is no longer a linear one. Given that within 6 month intervals one would expect uneven but continuous development the results are consistent with this assumption.

A closer analysis of the results reveals several important trends. Whereas within the Motor subtest levels of statistical significance in relation to age and performance are reached in 6 out of 9 age groups, only 2 groups in Concepts and 3 in Language reach statistical significance. It is interesting to

speculate that within the Motor area of development significantly more developmental changes occur within short intervals of time than within the areas of conceptual and language development. It is also note worthy that only within one age range, 3.0 - 3.5, does performance significantly correlate with age in all three developpmental areas, whereas in the other age groups the pattern is somewhat inconsistent. These irregular patterns of development yield important evidence and strong support for individual differences (inter individual as well as intra individual differences), as well as for the existence of a broad range of "normality."

The high intercorrelation between subtests not only helps to support the test's claim of good construct validity but also substantiates that the general and overall pattern of physical and psychological development is consistent over a variety of domains.

Quantitative Differences Between American and French Versions

The adjustments made to equalize the Francophone version of the DIAL-R with that of the U.S. version, such as, eliminating extra and inappropriate items, did not substantially alter the results of the Francophone sample which continued to remaine significantly higher than that of the U.S. population. Using the U.S. norms, only 2% of the Francophone population would be identified as "potentially learning disabled" and as much as 42% as "potentially gifted". These quantitative differences may be a reflection of similar factors that may have also influenced the results obtained by the Anglophone population in comparison to those of the U.S. sample (Derevensky & Mardell-Czudnowski, 1986).

The sampling techniques employed in the present study may have been a significant determinant of these higher results. Whereas the U.S. data were derived on a regional basis and the preschool children were recruited from a variety of sources, (eg., private homes,pediatric practices, nurseries), the present sample consisted of children presently enrolled in day care centers in the Montreal area. These day-care centers may have provided a range of enriching educational experiences which resulted in a significant increase in these children's performance over that of the U.S. sample.

It is therefore quite plausible that the higher scores may be more reflective of direct instructional strategies employed in the preschools than of a superior aptitude to the U.S. population. It is at this point interesting to speculate about the higher results obtained by the Montreal Anglophone as compared to the Francophone sample. Given that the Anglophone sample consisted of children mainly from middle class homes as opposed to the Francophones who were primarily representative of working class homes, it is therefore conceivable that the discrepency in their results may be due to socio-economic differences. This notion is in keeping with the finding of Mardell-Czudnowski and Goldenberg (1983(b)) who found that inner-city populations scored below the middle class average.

Another factor which may account for higher scores of the Francophone groups of children compared to those of the U.S. sample is their degree of acculturation. Anastasi (1982) has noted that differences between cultures at different ages may be reflective of different degrees of acculturation. The pluralistic society within Montreal and the emphasis on multilingualism and multiculturalism may have influenced performance scores. While this is speculative at best, additional research from more uniformly unilingual communities within Canada may provide useful information.

The testing setting may also have affected the performance scores of the children in this sample. The settings in which the testing took place in the U.S. is not specified in the DIAL-R manual, however the impression given in the training video is that the children were usually brought to an unfamiliar place for testing. In the present study, testing was done in the familiar setting of the child's own day care centre. This may have served to minimize the child's level of anxiety and subsequently allowed him to perform better. As well, the context of an environment such as a day care, which is geared toward learning and achievement, as well as competition of peers, may have generated its own built-in expectations on the child's performance level. The child in such a setting may be more motivated to perform at his optimal level.

Finally, the DIAL-R testers in the present study were undergraduate students from Departments of Education and Psychology. They volunteered to participate in the project in return for partial credit in a required university course. As such, they were highly motivated and very interested in the

techniques and principles of testing. Their enthusiasm and conscientious approach may have had some impact upon the testing situation.

Sex Differences

The clinical relevance of a statistically significant difference found between boys and girls on the total scores where girls excelled over boys ($p < .001$), appears somewhat questionable. These results are not in accordance with those obtained by Mardell-Czudnowski and Goldenberg (1972(b)), 1984) nor with Derevensky and Mardell-Czudnowski (1986), where no significant differences between the sexes were noted. Nevertheless, the significant results obtained in this study cannot be ignored and should serve as a guidepost for further research on the DIAL-R. The results may suggest a possible need in the future for the development of separate and discrete cut-off points unique for males and females.

French as a Second Language

A second language factor as a significant determinant of low achievement is strongly suggested by the results. Those children whose native language was other than French were over-represented in the category of learning disabilities and under-represented in the gifted range. This confirms much of the research in recent years which indicate that there is frequent overidentification of children of various ethnic origins as learning disabled (Bos, Weller, Vaughn 1984-85; Eaves, 1984-85), when they are more often underachievers due to a second language deficit.

The concern about over-identification of minority group children also awakened interest in equity issues in assessing gifted minority students (Gregory, 1984-85). These students are often overlooked or underidentified by insufficiently normed tests for these subpopulations. It is plausible that such is the case in this instance. Of the 11 children scoring in the "potentially gifted" range, none were representative of the French as a second language group.

These results suggest that the DIAL-R requires further refinement and evaluation in order to render it appropriate for use with linguistically different and culturally diverse children of Quebec. Quebec

has in excess of one million residents for whom French is not the mother tongue and the various linguistic and cultural groups are insecure in their minority status. It is not surprising that the agenda of Quebec education gives prominance to issues of language and culture. In 1977, the Quebec Legistlature passed Bill 101 which remains the legal structure for language policy. It restricts English education to those whose parents are native English Quebecers and directs all others, new immigrants regardless of language or origins into the French system. Groups of non-French speaking pupils coming to the French school system for the first time pose an important challenge to the education system of Quebec. The Ministry of Education has been taking steps to meet this challenge of pluralism by establishing special classes and groups for non-French speaking pupils. Education consultants are being called upon to evaluate and assess many of these children to determine appropriate placement for them. Quality instruments that are unbiased and have been modified for use with these cultures are rare. Therefore the DIAL-R which is promising in many of its qualities, requires further refinement in order to meet the needs of Quebec's pluralistic society.

These results, which point to test-bias regarding linguistically different subjects, also helps to underline the importance of taking comprehensive background information on each child prior to testing. Comprehensive data on the language background of the children may aid in averting the misclassification of many of them. Factors such as second language cannot be ignored given that they yield invaluable information in the eventual diagnosis and treatment of the child.

Interpreting Behavioural Observations

The data analysis revealed a significant negative relationship between DIAL-R total scores and the number of negative behavioural observations i.e., a high incidence of observations and low scores. Proportionately, twice as many 'potential problem' children were noted to have 2 or more inappropriate behaviours compared to those scoring in the normal range. A maximum of 10 behaviours were noted for individual children in the lower score ranges, whereas only 7 were noted for an individual among those scoring in the normal range. In addition it was noted that as children mature there are fewer observations. It is therefore essential to note the observation totals as an

important component of the child's overall profile. This faciliates the use of the number of observations to be employed in addition to DIAL-R total core cut-offs in evaluating the child's overall results (Table 19 for these observation cut-off points). Thus, if a child scores "OK" or even above his/her cut-off on the DIAL-R total score, the child may still require referral for further assessment in the social/affective area. Based on the total number of circles on the score sheet, this area can offer additional input for future interpersonal relations in school. These findings are in keeping with Mardell-Czudnowski and Goldenberg (1984).

Order of Testing

The order in which the child was administered each of the 3 subtests was noted. Although the relationship between order of testing and overall results was not statistically significant nor between order of testing and behaviour observations, it is nevertheless important to consider a clinical observation. Children in the younger age groups who showed initial reluctance and /or a tendency for shyness were much more motivated by the activities in the Motor area than in the Language tasks. It is therefore advisable to direct these younger children first to the Motor subtest in order to allow them the appropriate opportunity to relax and therefore to participate more willingly and to get a more accurate behavioural sample.

Qualitative Differences

The present results support the findings of the pilot study carried out in Quebec (Mardell-Czudnowski et al., 1985) with the French version of the DIAL-R. Also, in this present study the global analysis of the translation of the different items in the DIAL-R reveals similar as well as new deficiencies. For example consistently incorrect responses to words such as "poitrine" (chest), "hanche" (hip) "taille" (waist), "rempli" (full) and "rapide" (fast) in the Concepts subtest, indicate differences in language as opposed to deficiencies in conceptual knowledge. Although these words correspond directly to their English counterparts, they appear to present a different level of

comprehension difficulty than that of the originals. Therefore, it is recommended that they be replaced, if possible, by words respecting a more appropriate developmental level of difficulty.

Unlike the findings in the pilot study, the Articulating, Remembering and Naming Names sections in the Language subtest include several problems. In the Articulation section the words "jambe" (leg); "beigne" (doughnut); and "cloche" (bell) presented significant difficulty for the children. The problem was not that the pictures were ambiguous, but rather, that the words were not readily accessed by the children, or words other than the ones required were elicited, thus requiring prompting and thereby depriving them of a maximum score. In the Naming Objects section the word "pendule" (grandfather-clock) (the required response), requires replacement given that it was never the word associated with the given image. The suggested replacement, which would more appropriately match the image, would be "cadrain" (alarm clock). In the Naming Verb section "transporter" (transport) (the required response), for the image of an airplane is also inappropriate. The suggested replacement should be "vol" (fly) the response most often given by the children.

Cases of image ambiguity also occured frequently. In the Articulation subtest this is of utmost importance given that a child loses a point if the correct word must be modelled for him. The picture for "verre" (glass), "main" (hand), and "gateau" (cake) elicited consistently incorrect responses such as "poubelle" (garbage can), "gant" (glove), and "fromage" (cheese) respectively. In this instance the images must be refined in order to eliminate ambiguity. Finally, for the Naming Objects and Naming Verbs there are additions to the list of acceptable responses. These are found in Appendix A.

Since the number of items in the French version exceeded those in the English, it was necessary to remove certain items for the purposes of equalizing the two versions. The three inappropriate words in the Articulation section mentioned above, "jambe," "beigne," and "cloche," were therefore eliminated thereby balancing the number of items in both versions. In the Remembering subtest of the Phrase section, "Je bois du lait tout les jours" (I drink milk every day) was also eliminated as an extra item.

This analysis of the translation and the content of the DIAL-R may permit us to draw some implications for the use of present and future translated American psychometric tests. It is the claim

of this study, as it was for the 1985 pilot study that the back-to-back translation method is insufficient by itself. The conservation not only of functional equivalence, choice of items and level of difficulty but also order and means of presentation is essential. It is therefore recommended that the content of this revised instrument be reevaluated in each new setting in order to decrease, if not altogether eliminate, the cultural references which may invalidate the results. These results highlight the important implications for all the translated, but non-modified tests currently used for pre-schoolers in Canada.

Limitations and Strengths of this Study

That the present research sample is representative of the defined population, i.e., Francophone children in day care centers in Quebec, can only be tentatively claimed. Efforts to obtain a representative cross section of the population with which the test was to be validated were obstructed by a variety of uncontrollable realities. Many of these concerns were addressed in the Methodology section. Although systematic random selection of subjects was made impossible and such characteristics as geographic distribution, socioeconomic level, and breakdown of ethnic composition were not accounted for in any rigorous manner, nevertheless, according to this author, the L'Office du Garde de L'Enfance, (R. Thonney, personal communication, March 20, 1986), and personal communication with various directors of the sampled day cares (September, 1985 to May, 1986), the present sample closely approximates a normal cross section of the population. Every geographic region of Montreal was representated by the participating day cares. The breakdown of socioeconomic levels also approximate the proportions of the population as a whole (R. Thonney, personal communication, March, 20, 1986), given that their distribution is related to the geographic regions represented in the study and the number of subjects tested therein. The 19% of the sample which represented those children from different ethnic origins also closely approximates the ethnic composition of the Montreal population (22%). The limited size of each of the 17 age groups, 20 subjects on average, was just large enough to generate a valid developmental profile across each age range. However, the overall size of the sample, 345 subjects, is deemed large enough to provide

stable values (Mardell-Czudnowski et al., 1985). The sample also had an approximately equal distribution of males and females (males = 170, females = 174).

The limitations of this design cannot and should not be ignored. However, in the light of the fact that the validation of psychometric instruments with cultures other than that used for their standardization is rarely undertaken, the results warrent close analysis. A deliberate emphasis is being placed here on the necessity and importance of cross cultural validation of standardized tests. The intention is to underline the inadequacies and constraints which result from attitudes and policies current in the adaptation of testing materials. Changes of policy require increased funding which occurs only through public pressure. However, without such changes children may continue to be misclassified.

Quebec, in spite of a deep committment to its distinct historical heritage and national identity, continues to assess and classify its future generations, those invested with the responsibility of carrying on Quebec's unique legacy, on the basis of unmodified American standardized instruments. This does not merely represent a theoretical contradiction but a profoundly practical injustice.

In spite of this study's inherent limitations, it may nevertheless make an important contribution to the children of Quebec. By underlining the necessity of cross-cultural validation of assessment tools, this study attempts to set an example for future action. It also aims to provide guidelines for the modification of a fair tool that may be used to determine the realization of children's potential.

The Need to Consider Both Statistical and Educational Significance

The continuing search for ideal instruments and their necessity (both political and educational) has led to their prolifferation in the educational market. There are no perfect instruments for documenting change in all populations of young children; however, while researchers proceed with the development of more instruments, practitioners would be better advised to select from currently available measures. The DIAL-R, a developmental screening tool is one such instrument. This instrument is rare in that it fulfills the criteria of detecting both quantitative and qualitative nuances of development in children. The DIAL-R not only demonstrates statistically significant reliability and

validity but can also claim educational significance in that it may be effective in enhancing prescriptive teaching techniques.

The discriminating power of the individual items, other than those at the highest age levels which were extrapolated, is impressive. The difficulty of test items was scaled with the use of mathematically sophisticated procedures Rasch Wright method, generally characterized as "latent trait models" (Wright & Stone, 1979). The concept of latent traits is employed in deriving an index of item difficulty. The basic measure is the probability that a person of specified ability succeeds on an item of specified difficulty. Essentially latent trait models are used to establish a uniform "sample-free" scale of measurement, which is applicable to individuals and groups of widely varying ability levels.

The DIAL-R as a normed referenced instrument helps in judging the performance of a child not only regarding large complex domains of development but is also highly tuned to detect fine grained developmental changes. For educational purposes it is important not only to have access to data revealing inter group comparisons, that is, how a child performs in relation to his peers, but also intra-individual differences, that is, a profile of the child's own strengths and weaknesses in relation to himself. The DIAL-R provides a method by which a functional profile for each child can be drawn with the use of the scaled scores. This profile is most helpful in assisting the teacher and parent to focus on specific weaknesses, thereby aiding in the planning of follow-up activities for each child. It also open to detection of abberant response patterns which, when considering only global scores, would be imperceptible.

The DIAL-R also lends itself well to error analysis. This is of great educational advantage in that it allows for detection of child-specific deviation, thereby contributing important data for the development of educational intervention. In order to facilitate scoring and interpretation of results, the developers of the DIAL-R have added an attractive component to an already comprehensive package. A computer program which generates, on the basis of individual scores, a developmental profile on each child, including specific recommendations for intervention procedures for both parents and teachers, is now available (Prof. J. Derevensky, personal communication, March, 31,1987).