

MO-Cup

THE RELATIONSHIP OF PERSONALITY PATTERN DIFFERENTIATION
AND CONSISTENCY TO ACADEMIC ACHIEVEMENT
IN A UNIVERSITY COUNSELLING POPULATION

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Thesis presented to the School of
Graduate Studies at the University
of Ottawa as partial fulfillment of
the requirements for the degree of
Master of Arts

Ottawa, Canada, 1980



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ACKNOWLEDGEMENTS

This thesis was prepared under the direction of Dr. Daniel C. Lee, Director of the University of Ottawa Counselling Service, and Dr. William F. Barry, Professor of Psychology at the University of Ottawa. The author wishes to express his sincerest gratitude to Dr. Lee and Dr. Barry for their help and support throughout the many phases of this research project.

Special notes of thanks are extended to Mr. Raymond Duschene, Counsellor and former Interim Director of the University of Ottawa Counselling Service, for authorizing the use of Counselling Service data; Mr. Jean Boyer, Assistant Vice-Rector, University of Ottawa, for permission to assess and use information of the Registrar's Office; and to Mrs. Ann Hurd and Miss Jane Boyle for their computer advice.

I would finally like to express my gratefulness to my family and friends for their love and support throughout this endeavor.

CURRICULUM STUDIORUM

Daniel G. Kehoe was born in Buckingham, Quebec, on May 10, 1956. He was raised and received his basic school training in Gatineau, Quebec, and Ottawa, Ontario, thereafter earning the Bachelor of Arts (Honors) degree in psychology from the University of Ottawa in 1977.

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ABSTRACT

This study was designed to assess Holland's theoretical constructs of consistency and differentiation as measures of academic achievement (GPA). Holland postulates that levels of consistency and degrees of differentiation, as derived from the General Occupational Themes of the Strong-Campbell Interest Inventory (SCII, Campbell, 1974), may be used to assess a person's educational achievement. In addition, Holland (1973) maintains that high levels of consistency and differentiation are related to high levels of academic achievement; that the prediction of academic achievement may be improved by combining measures of these two constructs; and finally, that differentiation is a better predictor of academic achievement than consistency.

A series of correlational and multiple regression analyses were employed to test the above hypotheses. The main independent variables were differentiation (Holland's range score measure) and consistency (Holland's hexagonal model definition). The control variables were faculty, age, sex and academic aptitude. Academic aptitude was assessed by the Otis Self-Administering Test of Mental Ability, Higher Examination, Form A (Otis, 1956) for the anglophone counselee students and by the Examen Otis-Ottawa d'Habilité Mental, Examen Supérieure, Formule A (Shevenell, 1948) for the francophone counselee students. The criterion measure,

academic achievement, was assessed by the grade point average (GPA) score.

Subjects were 176 anglophone and 142 francophone undergraduate students who visited the University of Ottawa Counselling Services between May 1, 1975 and May 1, 1979.

Correlational and multiple regression analyses indicated that differentiation and consistency, either taken singularly or in combined form, are not related to academic achievement for both anglophone and francophone students. Furthermore, differentiation was not found to be significantly better than consistency as a predictor of academic achievement. Finally, faculty, age, sex and academic aptitude were found to be significantly related to and predictive of academic achievement (GPA) for anglophone students but not for francophone students.

It was suggested that weaknesses in Holland's theory, particularly in respect to his operational definitions of differentiation and consistency, may account for the non-significant findings. Furthermore, it was proposed that counsellors exercise extreme caution when employing these two constructs as diagnostic aids with counselees experiencing educational planning difficulties and that they proceed cautiously when using faculty, age, sex and academic aptitude, as measured by the Otis-Ottawa, as factors influencing academic achievement with francophone student counselees. Finally, it was suggested that future studies

devise more comprehensive measures of differentiation and consistency and attempt to determine more precisely the separate components of these constructs by means of factor analysis.

INTRODUCTION

The search for effective predictors of academic achievement has been a priority issue for a host of researchers and administrators across numerous institutions for many years. This search has been intensified by the recent growth in the student population and the consequent heightening in the competition for admission to various faculties, especially at the better universities and colleges.

Although the number of variables studied in relation to academic achievement has been extensive, there has been a noticeable lack of effort devoted to the establishment of a theoretical base for much of this research. Some recent efforts have attempted to bridge this gap.

One of the more promising theoretical frameworks that has been recently studied in relation to academic achievement is Holland's (1973) theory of careers. Holland (1973) has developed a comprehensive theory of educational/vocational behavior with far-reaching implications. His theory is based largely upon the assertions that all persons, environments, and their interactions may be assessed by categorizing them in terms of one or a combination of six operationally defined types. These are realistic, investigative, artistic, social, enterprising, and conventional. Holland (1973) theorized that these type patterns may be analyzed by their varying

degrees of differentiation and consistency. Furthermore, Holland (1973) theorized that these constructs could be employed to predict a number of educational/vocational outcomes, among these being academic achievement. This dissertation deals specifically with academic achievement and the constructs of differentiation and consistency.

Consistency and differentiation are measures of the compatibility and intensity of a person's personality pattern, respectively. Thus, a person classified as consistent would be one who's highest test scores occur on personality types that are related, indicating an integration of interests, competencies, traits, values, and perceptions. A person classified as differentiated would display clearly defined high and low test scores in terms of the various personality types, indicating a crystallization of interests, competencies, traits, values and perceptions.

Theory-based assumptions maintain that high levels of consistency and differentiation are related to high levels of academic achievement; that the prediction of academic achievement can be improved by combining measures of these two constructs; and finally, that differentiation is a better predictor of academic achievement than consistency. The primary objective of this dissertation is to test each one of these assumptions using a sample of university counselling students.

Literature relevant to the investigation is presented in

Chapter I. Chapter I also contains a brief summary of the basic principles and theoretical constructs of Holland's (1973) theory of careers, a presentation of the statement of the problem, the theoretical rationale for the study, reasons for conducting the study, as well as a statement of the hypotheses. Chapter II describes the research design, the setting, the subjects, the instruments employed, and the methods of data analysis. Chapter III presents the results, while the fourth chapter includes a summary of the results, a discussion of the results, the theoretical and practical implications of the results, limitations and sources of error, suggestions for further research, and a summary of the findings.

CHAPTER I
REVIEW OF THE LITERATURE

This review of the literature contains six sections. It begins in section one by examining the basic principles and theoretical constructs of Holland's (1973) vocational theory, as well as a few studies lending support to this theory. Section two presents a number of studies that investigate the relationship between various cognitive factors and academic achievement; while section three examines studies that focus on the relationship between various non-cognitive factors and academic achievement. Section four deals with literature that investigates the relationship between interests and academic achievement; while section five presents a complete review of the literature relating Holland's theoretical constructs of differentiation and consistency to academic achievement. Section six concludes the review with a presentation of the statement of the problem, the theoretical rationale for this study, reasons for conducting the study, as well as a statement of the hypotheses.

1. Holland's Theory

John Holland's (1973) theory of vocational behavior is the result of approximately 25 years of comprehensive formulations, research, and revisions. The first published

formulation of his theory was a journal article (Holland, 1959). It consisted of an a priori classification of occupations in terms of the personality and intelligence of people in each occupation. This initial formulation led to some empirical research which culminated in the revision and expansion of his initial statements (Holland, 1966b). Here he proposed an empirically based classification of occupations and college majors. The latest statement of the theory is very systematically and skillfully illustrated in his book Making Vocational Choices: A Theory of Careers (Holland, 1973).

Holland's (1973) latest theoretical formulation is structured around four major assumptions, three secondary assumptions, and four background principles. The first major assumption proposes that:

1. In our culture, most persons can be categorized as one of six types: realistic, investigative, artistic, social, enterprising, or conventional (p. 2). (Refer to Appendix 1 for a complete description of each type.)

A type is a theoretical category or model against which the real person can be measured. Each type is the product of a characteristic interaction among various personal, cultural, and environmental forces (i.e., culture, social class, parents, peers). From these varied experiences, the person first learns a preference for some kinds of activities

and aversions to others. Later, these preferences evolve into well-defined interests which produce self-satisfaction and thus develop into more specialized competencies. The person's increased differentiation of interests is also accompanied by an integration and crystallization of his values. These interests, competencies and values create a particular personal disposition that leads the person to think, perceive, and act in special ways.

By comparing a person's attributes with those representative of each type in the model, one can determine which type he resembles most. The resulting model becomes his personality type. By examining the person's total resemblance to each of the six types in descending order, one forms a pattern of similarity and dissimilarity. The pattern is called the person's personality pattern. This six-category scheme avoids many of the problems inherent in categorizing a person as a single type by allowing the possibility of 720 different personality patterns.

The second assumption is that:

2. There are six kinds of environments: realistic, investigative, artistic, social, enterprising and conventional (p. 3).

Just as real people can be assessed by comparison to personality types, real environments can be assessed by comparison to environmental models. An environmental model

is defined as the situation or atmosphere created by the people who dominate a given environment. For example, social environments are dominated by social types. Because different people have different interests, competencies, and dispositions they tend to surround themselves with people and objects that are congruent with their interests, competencies and views on life. Thus, wherever people congregate, they create an environment that reflects the types they are, and it becomes possible to characterize the environment by assessing its population.

The third assumption holds that:

3. People search for environments that will let them exercise their skills and abilities, express their attitudes and values, and take on agreeable problems and roles (p. 4).

Conventional types seek conventional environments, social types seek social environments and so on. The person's search for an environment is carried on in numerous ways, at different levels of consciousness, and often stretches over long periods of time.

And finally, the last assumption states that:

4. A person's behavior is determined by an interaction between his personality and the characteristics of his environment (p. 4).

The knowledge of a person's personality pattern and the pattern of his environment can be used to forecast some of the behavioral outcomes of such a pairing. Such outcomes include: vocational/educational choice, vocational/educational achievement, vocational/educational success, personal competence, and various social behaviors.

In summary, both persons and environments can be characterized by their resemblance to six personality types and six environmental models respectively. The pairing of persons and environments leads to various educational, social and vocational behavioral outcomes that can be predicted from knowledge of the personality types and environmental models.

These four major assumptions are supplemented by several secondary assumptions that attempt to surmount many of the difficulties encountered by past researchers studying the relationship between peoples measured interests and eventual behavior.

The first secondary assumption is Consistency. Consistency is a measure of the degree of psychological relatedness of pairs of types and is determined by the nature of high and/or low scores of a particular profile. For example, a person whose two highest scores on the General Occupational Themes are social and artistic or vice versa would be classified as highly consistent. Some pairs of types are more closely related than others (i.e., social-artistic, realistic-investigative, investigative-artistic). For a more comprehensive understanding of the levels of

consistency the reader is referred to Table 1 of Appendix 1.

The related pairs of types are hypothesized to be more predictive of various behaviors than pairs of types that are less related (i.e., social-realistic, conventional-artistic). A consistent personality pattern, for the individual, represents an integration of psychologically related and similar competencies, interests, traits, values, and perceptions. Because these similar competencies, interests, traits, values, and perceptions are integrated, the person has a more restricted repertoire of possible behaviors. Thus his behaviors in general are presumably more predictable and more resistant to change. Similarly, for the environment, a more consistent pattern represents an integration of similar demands and rewards for those within the environment. On the other hand, inconsistent persons are less predictable because they combine more diverse interests, competencies, values and perceptions, resulting in a more diverse repertoire of possible behaviors. An inconsistent environment is less influential upon those within it because it provides a wider range of demands and rewards.

The second assumption employs the concept Differentiation. Differentiation as a measure, is the magnitude of the difference between the highest and lowest score on the six personality types. For example, on the SCII a differentiation score would be the difference between the highest and lowest scores on the General Occupational Themes. Thus a

differentiated profile has high peaks and low valleys, while an undifferentiated profile remains relatively flat. For the individual, differentiation refers to interests, competencies, values, perceptions, and traits that are crystallized and well-defined. Because of this the differentiated person's behaviors are more predictable. The interaction of a differentiated person and a differentiated environment is very predictable because this person is assumed to be interacting in an environment that is well-defined and has a focused influence.

The third concept is called Congruence. Congruence refers to the degree of compatibility of an individual's personality type with the type of environment that he functions in. The greatest amount of congruence exists when the personality type matches the environmental type (i.e., a social person in a social environment). The most extreme degree of incongruence exists when the personality type is opposite that of the environment (i.e., a social person in a realistic environment).

To summarize, consistency is a measure of the relatedness of the personality pattern; differentiation refers to the intensity of the personality pattern; while congruency is a measure of the consistency or harmony between environments and types within that environment. Because these concepts are directly related to the major assumptions underlining Holland's (1973) theory, they appear, at least

theoretically, to possess tremendous potential for explaining and clarifying the individual's vocational-social-educational behavior.

In the development of the personality types, environmental models, and secondary constructs a number of crucial background principles emerged.

The first principle states that:

1. The choice of a vocation is an expression of personality (p. 6).

Holland's theory is mainly an elaboration of this key idea which initially grew as a reaction against the very limited conception of the meaning of vocational interests that existed for many years in the vocational literature. Prior to the development of Holland's (1966, 1973) theory, scores on vocational interest inventories and statements of vocational choice were generally interpreted as measuring interests, vocational choices, or vocational preferences, implying that vocational interests were independent of personality (Holland, 1973). However, the results of some studies indicated that vocational interests were at least moderately correlated with academic achievement (Campbell, 1940; Segal, 1934), academic ability (Kerr and Willis, 1966), originality scales (Holland, 1963), parental attitudes (Medvene, 1969), impulsivity (Kipnis, Lane, and Berger, 1969) and other psychological and social variables. Thus if

vocational interests are assumed to be expressions of personality, then they represent the expression of personality in work, school, subjects, recreational activities and preferences.

2. Interest inventories are personality inventories (p. 7).

This follows from the first principle and was the basis for Forer's (1948) attempts to assess personality from interests and activities. More recently the Vocational Preference Inventory (VPI, Holland, 1965) and the Self Directed Search (SDS, Holland, 1970) use this principle. Research has tended to show that interpreting vocational interest tests as personality inventories is useful (Baird, 1970; Campbell, 1971).

3. Vocational stereotypes have reliable and important psychological and sociological meaning (p. 8).

It is assumed that persons are judged by their vocations just as they are judged by their friends, dress, behaviors, etc. Thus common vocational stereotypes such as: salesmen are persuasive, plumbers are handy, accountants precise and so on, exist. Research has found that vocational stereotypes exist at all age levels and that they remain fairly consistent throughout the persons lifespan (Marks and Webb, 1969). This is an important assumption for if perceptions of

occupations had no validity, then interest inventories would have little if any validity.

4. The members of a vocation have similar personalities and similar histories of personal development (p. 9).

If personality is influential in the selection of a given vocation, it stands to reason that specific vocations attract people with similar personalities. Several studies support this assumption (Owens, 1960; Nachmann, 1960; and Chaney and Owens, 1964).

5. Because people in a vocational group have similar personalities, they will respond to many situations and problems in similar ways, and they will create characteristic interpersonal environments (p. 9).

Although this principle is difficult to test directly, Astin and Holland (1961) found that the percentage of students in each of six curricular groups, realistic, investigative, social, enterprising, artistic, and conventional, at a given college becomes the profile of that college. Similar results were reported more recently (Richard, Seligman, and Jones, 1970).

6. Vocational satisfaction, stability, and achievement depend upon the congruence between one's personality and the environment (composed largely of other people) in which one works (p. 9).

Just as we are more comfortable among friends whose interests and values are similar to our own, so we are more likely to perform well at a vocation that is congruent with our interests. The Strong Campbell Interest Inventory (SCII, Campbell, 1974) as well as other interest inventories are based on this assumption.

The reader is referred to Chapter 5 of Holland's book Making Vocational Choices (Holland, 1973) for a more detailed review of the many studies that have examined the usefulness of the theory and its classification scheme.

This section of the review of the literature has presented an outline of the major concepts, assumptions, and principles underlining Holland's (1973) theory of vocational behavior. The next section deals with a number of studies that investigated the relationship between various cognitive factors and academic achievement.

2. Cognitive Factors and Academic Achievement

A number of investigators of college academic achievement prediction have used scores on standardized measures of scholastic aptitude as predictors of freshman grade point average. This would include standardized intelligence tests as well as instruments developed specifically to measure scholastic aptitude (i.e., the Otis Self-Administering Test of Mental Ability, Higher

Examination, Form A (Otis, 1956).

Such measures are assumed to be more cognitively oriented as predictors of academic achievement than other measures, including previous school year grades. This is due in part to the fact that the latter cannot be assumed to be entirely free of personality and social influences.

According to Cronbach (1949) and Lavin (1965), correlations between aptitude tests and college academic achievement, as measured by the grade point average score, cluster around .50 and range between .30 and .70. The variation in the reported results is presumed to be largely due to the use of different types of ability measures.

The literature devoted to relating measures of academic aptitude to achievement in college populations is voluminous. A few of these will be reviewed in this section.

Schmitz (1937) sought to determine the relationship between several variables and college academic achievement using freshmen students. The predictors included scores from the American Council on Educational Psychological Examination (ACE, Thurstone & Thurstone, 1924), the Army Alpha Intelligence Test (Yoakum & Yerkes, 1920), a spelling test, and high school grades. The criterion was success in college as measured by a scholastic quotient. The correlations between the various predictors and the criterion ranged between .419 and .644 and were all significant at the .01 level of significance. The highest correlation was between

the college scholastic quotient and the high school scholastic quotient.

Vaillancourt (1955) sought to determine the relationship between scholastic aptitude and academic achievement using scores from the Otis Self-Administering Test of Mental Ability, Higher Examination, Form A (Otis, 1956) and the Examen Otis-Ottawa D'Habilité Mental, Examen Supérieur, Formule A (Shevenell, 1948) as predictors and final grades as the criterion. Using a sample of 309 freshmen students from the University of Ottawa and treating the Otis and the Otis-Ottawa as equivalent instruments, he found a low but significant correlation of .36 between scholastic aptitude and grades.

Klugh and Bierly (1959) used the Cooperative School and College Ability Tests (SCAT, Educational Testing Service, 1955) as the main predictor of first semester GPA for entering college freshman students over a two-year period. High school averages were also used with SCAT scores in multiple correlations to predict first semester GPA's. The correlations between SCAT scores and college GPA's ranged between .51 to .67. When high school GPA was added to the regression equation, the multiple correlation rose to .66 for males and .78 for females.

Adkins (1963) sought to determine the best predictors of college achievement from a set of eleven predictors which included: high school grade point average; the Otis Self-

Administering Test of Mental Ability, Higher Examination, Form A (Otis, 1956); subtests from the American College Test (ACT, American College Testing Program, 1959); size of student's high school; size of student's home community; father's primary occupation; father's educational level; and number of siblings. The criterion was college success as determined by the GPA score. Using a multiple regression analysis, the author arrived at a number of regression equations using various combinations of predictors. The multiple correlations ranged from .477 to .775. The multiple correlation between high school grade point average, size of home community, Otis IQ score and GPA was .719. The author concluded that the high school GPA was highly predictive of college GPA, and that the other variables, including the Otis IQ score, served somewhat to improve the prediction of college success.

Boyce and Paxson (1965) administered a series of ability and achievement tests in order to determine the main predictors of college GPA for a sample of freshmen at Troy State College in Alabama. Several random samples of 100 subjects in the general education program served as subjects. First quarter GPA scores served as the criterion. Results indicated that the American College Test (ACT, American College Testing Program, 1959) subtests and composite score were the best predictors of first quarter GPA. The correlation of ACT scores with individual course grades

ranged from .46 for Natural Science to .64 for English. The ACT composite score correlated .57 with academic achievement. Further results also indicated that the College Entrance Examination Board Scholastic Aptitude Test (SAT, Educational Testing Service, 1926) and the School and College Ability Test (SCAT, Educational Testing Service, 1955) also correlated significantly and positively with freshman GPA.

Ramsay (1975), using a sample of first year French-speaking female students from the University of Ottawa, examined the relationship between Otis-Ottawa IQ scores and academic achievement as measured by the GPA score. He found a significant correlation of .54 between Otis-Ottawa scores and GPA at the end of the first year for students in the Science faculty. However, the correlation for the total sample was .20.

Larson and Scontrino (1976) examined the validity of high school grade average (GPA) and verbal and mathematical portions of the College Entrance Examination Board Scholastic Aptitude Test (SAT, Educational Testing Service, 1926) as predictors of college grade point average over an eight year period. Using a multiple regression analysis involving all three of the predictors, they found consistently high correlations between these variables and 4-year college GPA. The correlations between high school GPA and college GPA ranged from .51 to .76 for females and .56 to .73 for males. For the total sample of 1,457 students the correlations

ranged from .58 to .72. The correlations between the verbal composite score of the SAT (SAT-V) and college GPA ranged from .41 to .73 for males; .29 to .66 for females; and .40 to .58 for the total sample. The correlations between the mathematics composite score of the SAT (SAT-M) and college GPA ranged from .35 to .70 for males; .22 to .63 for females; and .22 to .53 for the total sample. The investigators further found that including SAT-V and SAT-M scores in the prediction equations increased predictability slightly for males, but provided no increase in predictability for females when the prediction equations were cross-validated.

In summary, the preceding research findings suggest that the best predictions are obtained from multiple correlations in which a battery of cognitive variables is employed to predict GPA; that in general the single best predictor of college GPA is high school GPA; and that in general the correlations between ability and academic achievement tend to be higher for females than for males.

3. Non-Cognitive Factors and Academic Achievement

Although measures of ability, aptitude and prior achievement have been found to be most closely related to college grades, they account for less than half the variance in academic achievement. A number of studies have been conducted to identify other factors that might also be

related to college achievement. Such factors include personality characteristics and sociological determinants. Because of the voluminous amount of literature in this area as well as the eclectic emphasis in the literature on the type of characteristics, determinants and variables studied, this section will review only a few of the more representative investigations. Many of these studies used an analysis of variance approach for statistical purposes. For example, students at different levels of achievement were compared on non-intellective traits, and students with different non-intellective characteristics were compared on academic achievement. Other studies utilized simple correlation and regression techniques.

A study that examined personality factors of students with low academic potential was conducted at the University of Utah by Merrill and Murphy (1959). These investigators sought to determine if the Edwards Personal Preference Schedule (EPPS, Edwards, 1954) would discriminate between college students with low predicted academic achievement who were over-achievers (N=49) and a group of similar students (N=52) who were performing as predicted (low achievers). Seven variables demonstrated statistically significant differences between the two groups. The over-achieving group was more dominant, less autonomous, more deferrant, less exhibitionist, less affiliative, less concerned about change and more enduring ($p < .05$) than the group which was

achieving as expected. These student groups compared with the liberal arts normative group were less achievement-oriented, more deferring, more affiliative, more exhibitionist, less dominant, less intrceptive, more changeful, more abaseful, more enduring, less heterosexual and less aggressive.

Lunneborg and Lunneborg (1967) examined personality patterns in relation to achievement at the University of Washington. The predictors were: Achievement, Exhibition, Intraception, Abasement, and Aggression scales on the Edwards Personal Preference Schedule (EPPS, Edwards, 1954). The students in this study were 59 females and 62 males in an introductory psychology course. Grade point averages for each subject served as the criterion. Multiple regression analysis was conducted in order to identify the best set of EPPS scores and patterns for predicting GPA. The authors concluded that academic achievement for both males and females appeared to be associated with high Need for Achievement and Intraception and a low Need for Abasement.

Yi-Guang and McKeachie (1970) studied the relationships among aptitude, anxiety, study habits, and academic achievement. Students in an introductory course were classified into two anxiety groups -- high debilitating and high facilitating -- on the basis of their scores on the Achievement Anxiety Test (Jacobs, 1963). Students were also given the Survey of Study Habits and Attitude Scale (Brown &

Holtzman, 1953) and supplied written responses to six items on the Thematic Apperception Test (TAT, Murray, 1943). College Entrance Examination Board Scholastic Aptitude Test (SAT, Educational Testing Service, 1926) scores and the American Council on Education Psychological Examination (ACE, Thurstone & Thurstone, 1924) served as the covariates. The authors of this study concluded that significant differences in academic achievement between the two extreme anxiety groups was largely due to differences in ability for both male and female samples. However, student study habits were related to achievement independent of ability.

Fox (1975) sought to determine which personality traits, as measured by the California Psychological Inventory (CPI, Gough, 1964), would predict academic achievement in urban college freshmen at the Federal City College. The measure of achievement employed was grade point average (GPA). A multiple regression equation was used separately for male and female samples. He found a significant relationship between all of the CPI scales taken together and GPA for females, but not for males. He also found an insignificant negative relationship between GPA and the Femininity scale of the CPI for males and a significant positive relationship for females.

Felmlly (1975) sought to examine the usefulness of a number of biographical, personality and attitudinal variables in predicting the academic success of 80 female students

enrolled in the Associate Degree Nursing Program at McLennan Community College. The predictor variables included responses on a biographical inventory, attitude scores on a semantic-differential instrument and scores on the Personal Orientation Inventory (POI, Shostrom, 1966). Criteria of success were defined as the grade point average (GPA) in three areas (science courses, liberal arts courses, and nursing courses) along with the results of three achievement tests in obstetric nursing, pediatric nursing, and psychiatric nursing. Using scoring keys developed through item analysis to handle the biographical data, the investigators found moderate to high correlations with all the criterion measures. The investigators also found that eight of the fourteen scales of the POI were significantly correlated with one or more of the criterion measures. Most significant was the positive relationship between the operationally defined measure of self-actualization and the criterion variables, suggesting that self-actualized nursing students at McLennan Community College did have a better chance of success in nursing training than less self-actualized students. The investigators concluded that the POI was of value in predicting academic performance. The investigators further found that the semantic-differential instrument was not useful in predicting academic success.

Hall (1972) studied the relationship between personality variables of achieving and non-achieving students of middle

and low socioeconomic status (SES). The population sample for this study consisted of 468 freshmen who were entering a community college. The groups consisted of 150 low SES Anglo-Americans, 111 low SES Mexican-Americans, and 207 middle SES Anglo-Americans. Analyses of variance were conducted with SES, ethnicity, personality factors and academic achievement as the independent variables. Several measures of academic progress over a five-semester period served as dependent variables. The personality variables studied were: (1) authority relationships; (2) peer relationships; (3) moral and social values; (4) school related experiences and aspirations; (5) self-concept; (6) interest patterns; and (7) need to achieve. The authors concluded that the middle SES subjects were more successful than low SES subjects in terms of academic achievement, persistence in college, completion of graduation requirements, and transfer to four-year institutions of higher learning. The results suggested that SES, rather than ethnicity, appeared to be the more significant determinant of personality traits that are related to academic achievement. Results of the McClelland Thematic Apperception Test of n-Achievement (McClelland, 1953) did not support a conclusion that students of low socioeconomic status experienced less academic success because they lack the need to achieve. In fact there was more similarity than dissimilarity in the three groups' achievement motivation.

The finding that SES was significantly related to academic achievement in the above study is consistent with most studies that have examined SES as a determinant of academic achievement. Another demographic variable frequently found to be related to academic achievement is sex. A large proportion of studies that have assessed the relationship between sex and academic performance show that females have higher academic performance than males (Lavin, 1965).

In summary, a voluminous body of research exists which examines various personality and sociological factors related to academic achievement. However, it is difficult to organize a summary in terms of a systematic classification of the various personality and sociological factors related to academic achievement. This can be attributed primarily to the massive number of personality and sociological factors studied.

However, a few generalizations can be extrapolated from the studies reviewed. One type of study emphasizes the importance of student maturity. For example, the findings of some studies reviewed indicate that good study habits are related to academic performance. Another type of study focuses on achievement motivation. This variable appears to be positively related to academic performance in the studies reviewed. Another type of study emphasizes self-actualization. One study reviewed indicates a positive

relationship between degree of self-actualization and academic achievement.

Other studies reviewed in this section were concerned with the effects of social factors on academic performance. The types of studies reviewed emphasized the effects of demographic variables. The findings indicated that there are positive relations between socioeconomic status and academic performance at all levels except the upper. The findings also point to the importance of sex in the prediction of academic performance. Reports generally indicate that females tend to have higher academic performances than males.

4. Vocational Interests and Academic Achievement

A number of investigators of college academic achievement prediction have employed interest measures as predictors of academic achievement. According to Lavin (1965) interest measures have generally been utilized in three ways for the prediction of academic achievement. First, scores on particular interest categories have been related to performance in corresponding course work. For example, one prediction could be that students with high scores on interest in science will have higher grades in science than students whose expressed interests are low in science. Second, expressed interests and/or scores on

interest inventories have been related to a variety of indices of academic achievement. For example, several studies have examined the relationship of interests as measured by the Strong Vocational Blank for Men (SVIB, Strong, 1966). A third general approach focused on general dimensions which cut across the content of interests, such as their clarity and their intensity. For example, studies examining whether students with definite vocational goals do better than students who remain uncommitted would be an example of this approach. As this third approach most clearly reflects the objectives of this present study, this section of the literature review will be restricted to an examination of studies of this nature.

Weitz, Clark and Jones (1955) compared the academic performance of freshmen college students who expressed "clearly defined" educational goals with those who expressed no "clearly defined" educational goals. The total sample consisted of 2,111 freshmen students; 1,296 of whom expressed clear vocational goals and 715 who did not express a major field preference. Samples of 100 students who expressed a clearly defined preference for a major field of study were matched with 100 students who did not. Employing an analysis of variance procedure for males and females separately the authors reported the following results: (1) male college students with "clearly defined" vocational choices had a higher academic performance than male college students who

did not have "clearly defined" educational goals; and (2) there was no statistically significant difference between the academic performance of female freshmen with "clearly defined" educational goals versus those without any educational goals.

Although Weitz, Clark and Jones (1955) did not specifically employ the term differentiation to describe the variations between students with clearly defined educational goals and students without, this concept could be substituted without distorting the authors' conclusions.

That a lack of clearly defined educational/vocational goals or educational/vocational indecisiveness is related to an undifferentiated and inconsistent personality pattern was shown by Holland, Gottfredson and Nazifer (1975). Using 1,005 high school juniors, 692 college juniors, and 140 employed adults, the authors compared the scores of "good" and "poor" decision-makers (as determined by a decision-making task) on a range of measures, including the Self-Directed Search (SDS, Holland, 1972), the Career Maturity Inventory (CMI, Crites, 1973), an interest questionnaire, and a series of scales measuring identity, anomaly, originality and interpersonal competence. The authors reported good decision-makers to exhibit relatively greater degrees of personality pattern differentiation and consistency than their less decisive counterparts. Furthermore, decision-making ability was predicted more

efficiently by assessing personality pattern than a number of other criteria, including age, social class and personality type. Individuals with sharp, well-defined personality patterns, the authors concluded, appeared to cope with their educational and vocational plans more effectively and decisively than those with ill-defined or relatively flat profiles.

At this point, the question may well be asked: If undifferentiation and inconsistency are indeed precursors of educational and vocational indecisiveness, as research has suggested, then is it not possible that undecided individuals are more likely to obtain lower grades than those who are more decisive?

Evidence exists which supports the above hypothesis. One such study by Lunneborg (1977), compared 127 vocationally undecided college graduates matched by sex, age, and college major with 127 graduates who had selected an occupation on a survey of graduating seniors. The responses of the graduate students were compared on 16 items related to indecision. Using chi-square analyses the authors found that undecided graduate students has a significantly lower grade point average than decided graduates, more often intended noncareer activities following graduation, were more likely to miss classes, and were far less satisfied with their university experience. The author concluded that the undecided graduate students of his sample were not motivated in college study by

vocational goals.

The foregoing investigations, although largely inferential, support the hypothesis that the student who is undifferentiated, inconsistent and prone to indecisiveness, is apt to have a lower grade point average than one who is differentiated, consistent and more decisive about his vocational or educational goals.

The next section examines more specifically the constructs of differentiation and consistency and their relationship to academic achievement.

5. Consistency, Differentiation and Academic Achievement

In order to present a more coherent and structured presentation of the studies examining the relationship of consistency and differentiation to academic achievement, this section is divided into three subsections. The first subsection examines studies that investigate the relationship of consistency and academic achievement; the second investigates differentiation and academic achievement; and the third subsection looks at studies that have looked at combinations of consistency and differentiation and their relationship to academic achievement. Because of this breakdown, some studies are reviewed in all of the subsections.

Consistency and Academic Achievement

One of the earliest studies examining the relationship between consistency and academic achievement was that of Werner (1969). This study employed 257 high school students in occupational training center programs in New York State. Werner employed Holland's (1966) standard method of defining consistency. In this method the highest personality type score is coded along with the second highest personality type score for each individual. Code combinations are of two types: (1) consistent, where the two highest coded types represent related psychological attributes. For example, a realistic-investigative code combination would be classified as consistent because realistic and investigative personality types possess similar psychological attributes; and (2) inconsistent, where the two highest coded types represent contradictory psychological attributes. For example, a realistic-social code combination would be classified as inconsistent because realistic and social personality types do not possess similar psychological attributes. Holland (1969, 1973) introduced a third set of code combinations based on his hexagonal model which permitted the classification of code combination as moderately consistent. For example, a realistic-artistic code combination is classified as moderately consistent because realistic and artistic personality types possess some psychological

attributes which are similar. The reader is referred to Figure 1 of Appendix 2 for an example of Holland's Hexagonal Model.

Werner employed the Vocational Preference Inventory (VPI, Holland, 1965) in order to obtain the six personality type scores, and to determine the various code combinations. Using an academic questionnaire to measure academic achievement, he found that inconsistent students obtained significantly higher achievement scores than consistent students. This finding is opposed to Holland's stated hypothesis. However, in this study Werner failed to control for initial aptitude.

Posthuma and Navran (1970) provided support for Holland's hypothesis that high consistency is related to high achievement. The authors divided their sample of 110 military college freshmen students into four levels of academic achievement. Group 1 consisted of 30 cadets whose final grade averages were in the A and B range; Group 2 had 35 cadets with C grades; Group 3 included 26 cadets with D grades; and group 4 had 19 cadets who failed. They found that the three highest achievement groups obtained consistent codes, while the academic failures obtained inconsistent codes. In addition, the ratio of passing to failing was 7:1 among the consistent students, while the ratio for inconsistent students was 2:1. The difference in these pass-fail ratios was significant at the .03 level. These

authors used the older 1966 definition of consistency.

With 88 full time graduate students and 65 full time graduate professors from six different graduate environments, Frantz and Walsh (1972) sought to examine the relationship between academic achievement (GPA) and two measures of consistency: (1) Holland's hexagonal model definition, where the two highest personality type scores are coded and then classified as to whether they are consistent, moderately consistent or inconsistent, and (2) the comparison of the two highest expressed occupational choices using Holland's normative data for compatibility (VPI Manual, 1965). Using a one-way analysis of variance they found no significant differences in academic achievement (GPA) with either measures of consistency. In a factorial analysis of variance, the consistency (second definition) main effects were not significant with (GPA) as the criterion variable. The result does not support Holland's assumption.

In discussing possible reasons for the lack of significant results the authors speculated that the nature of a graduate environment may be such that it restricts the range of variability of Holland's constructs. More specifically it is speculated that the homogeneous intellectually pressured environment of graduate school may reduce the variability of a graduate's personality pattern to the extent that distinctions between the various dimensions, on which consistency depends become blurred. Thus the

authors raised the interesting hypothesis that Holland's constructs may be more applicable to some populations and not others.

Using student Strong Vocational Interest Blank (SVIB, Strong, 1966) profiles regrouped according to Holland's six vocational categories, Foster (1970) studied the relationship among ability, internal-external locus of control, academic achievement and consistent and inconsistent vocational patterns on a population of 493 males at the University of North Dakota. Among the findings of this study, it was stated that there were no significant differences between vocationally consistent and vocationally inconsistent subjects in terms of academic achievement.

Florence (1973) obtained results supportive of Holland's theory with a sample of 506 male students enrolled in 16 different vocational/technical programs. A three way analysis of variance with congruency, consistency and differentiation as the independent variables and GPA, student satisfaction, and instructor ratings as dependent variables revealed that students with consistent VPI profiles had predictably higher GPA averages and were rated higher by their instructors ($p < .05$). Holland's hexagonal model definition of consistency was used.

Cain (1973) obtained results opposite that hypothesized by Holland (1973). The population sample for this study consisted of a random sample of 133 disadvantaged male and

121 disadvantaged female students enrolled in a Special Services Program at Ohio State and Central State Universities. Using an analysis of covariance for statistical purposes and controlling for aptitude, the author found that the consistent students obtained significantly lower GPA scores than inconsistent students. However, this result should be interpreted cautiously since an incorrect number of degrees of freedom was used for this error term.

Johnson and Moore (1973) found a nonsignificant correlation of .03 between consistency and achievement with a sample of 232 male students enrolled in technical vocational training programs. The 1966 definition of consistency was used in this study. In addition, the authors used standard score norms to obtain the VPI personality pattern profile. However, it is not clear if they used the data from the VPI manual to obtain the norms.

In a study designed to examine the relationship of consistency, academic ability, and locus of control to academic achievement, Foster and Gade (1973) reported no significant difference in academic achievement for two levels of consistency (consistent/inconsistent) with 356 freshmen male college students. The Strong Vocational Interest Blank (SVIB, Strong, 1966) was used to establish the profile of personality patterns and Holland's hexagonal model to define consistency; the James Scale of Internal-External Locus of Control (I-E Scale, James, 1963) was used to dichotomize the

group into internal and external categories; and the American College Test (ACT, American College Testing Program, 1959) was used to dichotomize the group into high and low ability categories. In a three-way analysis of variance they found significant main effects for academic ability (ACT) and locus of control (I-E Scale) on academic achievement, but not for consistency. Although the consistent students obtained slightly higher mean achievement scores than inconsistent students, the difference did not reach significance. In addition, none of the second or third order interaction effects reached significance.

Aderinto (1975) examined the relationship between congruency, consistency, and differentiation and the academic achievement of 82 male and 96 female liberal arts students. Using the 1969 hexagonal model definition of consistency and an analysis of covariance with academic aptitude (SAT) as the covariate, she did not find significant main effects for consistency with academic achievement (GPA) as the criterion for either male or female groups.

O'Neil (1977) investigated the utility of consistency and differentiation as predictive measures of academic aptitude, as measured by the College Entrance Examination Board Scholastic Aptitude Test (SAT, Educational Testing Service, 1926), and academic achievement (GPA) over a four year college period. Using the Self Directed Search (SDS, Holland, 1970) to establish the personality pattern codes and

the hexagonal model as a definition of consistency, he did not find significant differences in academic achievement or academic aptitude for three levels of consistency (high, middle, and low) with a sample of 127 male freshmen.

In a more comprehensive investigation of the relationship between consistency and academic achievement (GPA) Chislett (1977) also reported negative findings. This was the first study that used a multivariate technique (i.e., canonical correlation) to examine the relationship among these variables. She used both raw scores and standard scores on the first six scales of the Vocational Preference Inventory (VPI, Holland, 1965), and three methods of measuring consistency: (1) Holland's hexagonal model; (2) the square of published correlations between the two highest VPI personality pattern scores (Holland, Whitney, Cole and Richards, 1969); and (3) the square of published correlations between the two highest VPI personality types plus half the squared published correlations between the first highest and the third highest VPI personality types. She only obtained one significant canonical correlation ($R=.247$, $p < .03$) between raw score measures of congruence, consistency, differentiation and GPA, satisfaction, and maladjustment. However, the canonical component loadings revealed that the three raw score measures of consistency contributed very little to this significant relationship.

In addition, several univariate analyses were conducted.

Using the hexagonal model definition of consistency, she found a significant main effect for consistency with academic achievement (GPA) as the criterion measure. However, the finding was opposite to what Holland's (1973) theory predicts. Low consistency subjects obtained significantly higher academic achievement scores than high consistency subjects. When the newer definitions of consistency were used (i.e., squared published correlations) a nonsignificant main effect for consistency with (GPA) was found. Thus Chislett (1977) found very little support for Holland's assumption that high consistency is predictive of high academic achievement.

Another investigation by Reuterfors, Schneider and Overton (1979) tested Holland's predicted relationships between the academic performance of college freshmen and consistency. Groups of 392 male and 424 female freshmen students were administered the Strong-Campbell Interest Inventory (SCII, Campbell, 1974). This instrument was employed to establish the personality pattern codes. Holland's hexagonal model was employed to determine three levels of consistency. The criterion measure was first semester GPA. Employing an analysis of variance procedure for both sexes, the authors found that students with personality codes of high and low consistency obtained significantly higher GPA scores than students with moderately consistent codes ($F=6.57$, $df=2$, 672 , $p < .05$). However

neither the sex nor interaction main effects were significant ($F=1.46$, $df=1$, 672) and ($F=.05$, $df=2$, 672) respectively. The above finding is contrary to Holland's hypothesized linear relationships.

In summary, twelve studies examining the relationship of consistency and academic achievement were reviewed. Six investigations reviewed reported nonsignificant results. However, one study employed a sample of graduate students which was believed to be one of the reasons for the nonsignificant results. In addition, most of these studies employed small samples and varied instruments with which to derive consistency scores. Two studies found significant results, but in the opposite direction to Holland's hypothesis. However one of these studies failed to control for academic aptitude, and the other use a sample of disadvantaged students. Finally, two studies supported Holland's assumption that high consistency is related to high achievement; while two found partial support.

Differentiation and Academic Achievement

Nine studies were found that examined the relationship between differentiation and academic achievement. As many of these studies were reviewed in the last section, they will not be reviewed with as much detail in this section.

With a sample of 527 vocational high school subjects

from six different vocational areas, Werner (1969) obtained mixed results. Nondifferentiated males obtained higher achievement scores than differentiated males. However, differentiated females obtained higher achievement scores than nondifferentiated females. Thus Holland's differentiation assumption is supported for females, but not for males.

Frantz and Walsh (1972) tested 65 full-time graduate professors and 88 full-time graduate students and found significant differences in achievement (GPA) with two measures of differentiation: (1) the difference between the highest and lowest VPI personality orientation scales (the range definition), and (2) the difference between the two highest VPI personality orientation scales (modified definition). In a factorial analysis of variance, the differentiation main effects (modified definition) were significant with academic achievement (GPA) as the dependent variable. However, the differentiation main effects, using the standard range measure definition, were not significant with academic achievement (GPA) as the dependent variable.

Cain (1973) obtained significant results but in the opposite direction with a sample of 133 disadvantaged students. Using the range measure to define differentiation, the VPI to obtain personality type scores, and an analysis of covariance for statistical purposes, he found that differentiated subjects obtained significantly lower GPA scores than nondifferentiated students. However, as

mentioned earlier, this result should be interpreted cautiously since an incorrect number of degrees of freedom was used for the error term.

Florence (1973) reported nonsignificant findings with 506 males enrolled in 16 different vocational-technical programs. A three way analysis of variance (congruency, consistency, differentiation x GPA, student satisfaction, instructor ratings) revealed no significant relationship between differentiated VPI profiles and grades.

Likewise, Johnson and Moore (1973) obtained a nonsignificant correlation coefficient of .00 between differentiation and achievement with 232 male technical vocational students.

Using the Self-Directed Search (SDS, Holland, 1970) to establish personality pattern codes and the absolute difference between the highest and lowest scores (Holland's range measure) as his definition of differentiation, O'Neil (1977) found partial support for Holland's assumption that differentiated subjects show greater academic achievement than nondifferentiated subjects. A one-way analysis of variance revealed significant differences in academic aptitude (SAT) with two levels of differentiation (high/low) with a sample of 127 freshmen males. However, another one-way analysis of variance showed no significant mean difference between high and low differentiation subjects in terms of academic achievement (GPA). One limitation of the

study cited by the author is that the statistical techniques may have contributed to spurious findings. He suggested the use of multivariate techniques in future studies to control for Type 1 error and to examine the relationships among the dependent variables.

With 82 male and 96 female freshmen students, Aderinto (1975) obtained nonsignificant differences for the main effects of differentiation with academic achievement (GPA) as the dependent variable. Holland's range measure for differentiation was employed.

Using 365 undergraduate students and a canonical correlation analysis, Chislett (1977) did not find support for Holland's differentiation assumption. Using both raw and standard score personality profiles on the Vocational Preference Inventory (VPI, Holland, 1965) and three methods of measuring differentiation: (1) the range measure, (2) the absolute difference between the two highest VPI personality orientation scores, and (3) the absolute difference between the two highest VPI personality orientations added to the absolute difference between the first and third highest VPI scores, she obtained only one significant canonical correlation ($R=.247$, $p < .03$) between raw score measures of congruency, consistency, differentiation and GPA, satisfaction and maladjustment. However, the canonical component loadings revealed that although the raw score measures of differentiation contributed more than the raw

score measures of consistency to this relationship, the contribution was not significant.

In an effort to relate the findings of her study to the majority of studies examining the relationship of differentiation to achievement, she performed several additional analyses of variance. Using raw score measures and the first definition of differentiation, she obtained a significant differentiation main effect with GPA as the criterion measure. The highly differentiated subjects obtained significantly higher GPA scores than the undifferentiated subjects. Using the second definition of differentiation there was no significant differentiation main effect with GPA as the criterion measure. Thus only minimal support for Holland's differentiation assumption was provided by this study.

Using the range measure of differentiation and the Strong Campbell Interest Inventory (SCII, Campbell, 1974) to determine the personality codes Reuterfors, Schneider and Overton (1979) found support for Holland's hypothesis for males. Freshmen males with differentiated personal orientations achieved higher grade point averages than males having nondifferentiated personality profiles ($t=1.74$, $p < .05$). For females, differentiation was not significant ($t=1.17$) at the .05 level of significance.

In summary, nine studies examining the relationship of differentiation to academic achievement were reviewed. Two

studies provided support for Holland's differentiation assumption; three reported nonsignificant findings; three reported partial support; and one study found significant results, but in the opposite direction to what Holland hypothesized.

Differentiation-Consistency and Academic Achievement

Although Holland (1973) considers both differentiation and consistency to be predictors of academic achievement, he suggests that prediction will be improved by combining the two constructs. He also proposes that differentiation is a better predictor of vocational and educational behavior than consistency.

Although several investigators have examined the effects of combining measures of consistency, differentiation and congruency with academic achievement as the criterion (Werner, 1969; Frantz and Walsh, 1972; Cain, 1973; Aderinto, 1975) only one study was found that examined the combination of consistency and differentiation with academic achievement (GPA) as the criterion measure (Chislett, 1977).

Chislett (1977) found that raw score measures of congruence, consistency and differentiation were significantly related ($R=.247, p < .05$) to GPA, satisfaction and maladjustment. She concluded that high consistency and high differentiation did not make for higher academic

achievement (GPA), satisfaction and adjustment. She also found that differentiation was slightly more important in the relationship than consistency.

Summary

Determining valid predictors and antecedents of academic achievement has been one of the most vastly studied areas in educational research. A vast range of cognitive and non-cognitive predictive variables have been employed in the search for those variables which most adequately predict scholastic performance. The flood of research generated by the ongoing need for valid admissions criteria among educators and administrators has led to a generally confusing picture. In the words of Romine (1970), "it is abundantly clear ... that knowledge among educators and researchers concerning correlates of academic performance -- especially nonintellective correlates -- is meager indeed" (p. 338).

As seen in the review of the literature, the overall best predictors of college academic achievement (GPA) have been high school grades and scores on standardized measures of scholastic aptitude, producing multiple correlations in the neighborhood of .55. According to Fishman (1966) the addition of personality test scores and socioeconomic indices to the usual predictors has generally created a gain of approximately .05 to the multiple correlation.

In order to gain a better understanding of the variables related to academic achievement several researchers have advocated exploring new theoretical frameworks as well as alternative research designs. According to Fishman (1962), "it is my strong conviction that nonintellective predictors of intellective criteria will finally become both important and comprehensive variables only if we realize that they require alternative theoretical models and empirical designs depending on the specific nature of the individual and institutional differences that are known or assumed to exist between the high school and the college setting in a given study context" (p. 579).

One of the more promising recent models employed in the prediction of academic achievement is Holland's theory of careers. As we have already seen, Holland's typology has been used as a theoretical base for many of the current vocational-interest tests in use (i.e., the Strong Campbell Interest Inventory (SCII, Holland, 1974) and the Vocational Preference Inventory (VPI, Holland, 1965). In addition to this, he has specified, within the context of his theory, certain constructs (i.e., differentiation and consistency) which are hypothesized to increase further understanding of numerous vocational/educational behavioral outcomes such as academic achievement.

This review of the literature indicates that support for Holland's assumption that high consistency and high

differentiation are predictive of high academic achievement is far from settled. In general the studies indicate that differentiation is a slightly better predictor of achievement than consistency. In terms of the studies reviewed, the breakdown of the results as reported are as follows: two ninths of the differentiation studies found significant and supportive results; one third found partial support for Holland's assumption; one ninth found supportive results but in the opposite direction; while one third found non-supportive results. For the consistency variable, one sixth of the studies reviewed found significant and supportive results; one sixth found partial support; one sixth found significant results but in the opposite direction; and one half found non-supportive results.

While these results, in and of themselves, provide equivocal support for Holland's proposal that high levels of differentiation and consistency are related to high levels of achievement, several shortcomings in the studies reviewed add to the lack of clarity in the results. First, five out of the twelve studies that examined the relationship of Holland's constructs to academic achievement failed to control for academic ability (Werner, 1969; Frantz and Walsh, 1972; Florence, 1973; Johnson and Moore, 1973; Reuterfors, Schneider and Overton, 1979). Given the consistent finding that academic ability is predictive of achievement, the failure to control for ability in these five studies leads to inconclusive results.

Second, all of the studies reviewed, except Chislett's (1977), employed a univariate analysis of variance or chi-square analysis for statistical purposes. Thus the failure of most of these studies to deal adequately with the problem of the intercorrelations among the independent variables makes it difficult to adequately interpret the data.

Third, procedural ambiguities and errors in the statistical computations of some of the studies reviewed furthers the questionable validity of reported results. For example, it is unclear if Johnson and Moore (1973) employed norms published in the VPI manual or data from their own sample to obtain standard scores necessary to determine consistency and differentiation scores. Cain (1973) incorrectly reported the degrees of freedom for the error terms in his analysis of variance, which makes his results suspicious.

In summary, sufficient evidence does not exist to adequately support or refute the validity of consistency and differentiation as predictors of academic achievement.

6. Reasons for the Study, Theoretical Rationale, Statement of the Problem and Hypothesis.

Reasons for the Study

A further study is necessary for several reasons. First, weaknesses identified in many of the studies reviewed limit greatly the validity of the results obtained. Among the weaknesses identified

that contributed to ambiguous results was the failure of many studies to control for ability and the use of inadequate statistical techniques. The use of multiple regression analysis to ensure that the interrelationships among the independent variables are examined should assist in averting previous methodological errors. Also, the inclusion of a cross-validation analysis to ensure that the results obtained are not due to chance should enhance the validity of the results obtained. In addition, the inclusion of a greater number of control variables that have been shown to be related to academic achievement (i.e., academic ability, sex, age and faculty) should assist in providing a more meaningful interpretation of the results.

Theoretical Rationale:

The theoretical rationale for this study is derived from Holland's (1973) theory of careers. Holland (1973) has hypothesized that high levels of consistency and differentiation are related to high levels of academic achievement; academic achievement prediction is improved by combining both constructs; and differentiation is a better predictor of academic achievement than consistency.

Differentiation represents a personality pattern which is clearly defined and refers to interests, competencies, values and traits which

are crystallized. A differentiated student possess a personality pattern which has a focused influence. As a result, this individual will have a more restricted repertoire of behaviors than one who possesses an undifferentiated and diffuse personality pattern. Consequently, the former individual will be much more predictable in terms of certain educational/vocational behaviors than the latter. It follows that differentiated students should obtain a higher degree of acadmemic achievement than undifferentiated students.

Consistency represents a personality pattern which is related and refers to interests, competencies, values and traits which are integrated. A consistent student possesses a personality pattern which is integrated. As a result, this individual will have a more restricted repertoire of behaviors than one who possesses an inconsistent and unrelated personality pattern. Consequently, the former individual will be much more predictable in terms of certain educational/vocational behaviors than the latter. It follows that consistent students should obtain a higher degree of academic achievement than inconsistent students.

It also stands to reason that a student who possesses both a differentiated and consistent personality pattern will be more predictable in terms of his/her academic achievement than one who displays a personality pattern which is either differentiated or consistent.

Statement of the Problem

The main questions of this study are summarized as follows:

- (1) Is academic achievement (GPA) directly related to the degree of differentiation (Holland's range measure)?
- (2) Can the above results be cross-validated?
- (3) Is academic achievement (GPA) directly related to the level of consistency (Holland's hexagonal model definition)?
- (4) Can the above results be cross-validated?
- (5) Will the prediction of a counselling student's academic achievement (GPA) be improved by combining measures of differentiation and consistency in a multiple relationship?
- (6) Can the above results be cross-validated?
- (7) Is differentiation a better predictor of academic achievement (GPA) than consistency as Holland (1973) suggests?

Hypotheses

The above questions are translated into the following hypotheses:

- (1) The coefficient of correlation (r_{xy}) between academic achievement (GPA) and differentiation will be statistically significant for the anglophone sample.

- (2) The coefficient of correlation (r_{xy}) between academic achievement (GPA) and differentiation will be statistically significant for the francophone sample.
- (3) The coefficient of correlation (r_{xy}) between academic achievement (GPA) and consistency will be statistically significant for the anglophone sample.
- (4) The coefficient of correlation (r_{xy}) between academic achievement (GPA) and consistency will be statistically significant for the francophone sample.
- (5) The coefficient of multiple correlation (R) obtained by using differentiation and consistency as predictor variables will be significantly greater than the coefficient of multiple correlation (R) obtained by using only differentiation as a predictor variable for the anglophone sample.
- (6) The coefficient of multiple correlation (R) obtained by using differentiation and consistency as predictor variables will be significantly greater than the coefficient of multiple correlation (R) obtained by using only differentiation as a predictor variable for the francophone sample.
- (7) The standard regression coefficient (partial B) of differentiation will be significantly greater than

- the standard regression coefficient (partial B) of consistency for the anglophone sample.
- (8) The standard regression coefficient (partial B) of differentiation will be significantly greater than the standard regression coefficient (partial B) of consistency for the francophone sample.
- (9) The cross-validated coefficient of correlation, employing differentiation in the prediction equation, for the subgroups of the anglophone sample will be statistically significant.
- (10) The cross-validated coefficient of correlation, employing differentiation in the prediction equation, for the subgroups of the francophone sample will be statistically significant.
- (11) The cross-validated coefficient of correlation, employing consistency in the prediction equation, for the subgroups of the anglophone sample will be statistically significant.
- (12) The cross-validated coefficient of correlation, employing consistency in the prediction equation, for the subgroups of the francophone sample will be statistically significant.
- (13) The cross-validated coefficient of correlation, employing differentiation and consistency in the prediction equation, will be more significant than the cross-validated coefficient of correlation,

employing only differentiation in the prediction equation, for the subgroups of the anglophone sample.

- (14) The cross-validated coefficient of correlation, employing differentiation and consistency in the prediction equation, will be more significant than the cross-validated coefficient of correlation, employing only differentiation in the prediction equation, for the subgroups of the francophone sample.

CHAPTER II

RESEARCH DESIGN

This chapter presents the research design of this study. It begins in section one with a description of the setting used in this research project, while section two presents a description of the subjects employed. Section three describes the instruments used to measure consistency, differentiation, academic aptitude and academic achievement. The reliability, validity and development of these instruments is also discussed. Section four outlines the research procedures employed, while section five concludes the chapter by presenting the statistical procedures employed to analyse the data.

1. The Setting

The University of Ottawa Counselling Service (UOCS) is a counselling service available to all full-time graduate and undergraduate students at the University of Ottawa. This service provides individual counselling for educational, vocational and personal concerns. Students with educational and/or vocational concerns are given The Strong-Campbell Interest Inventory (SCII, Campbell, 1974) and The Otis Self-Administering Test of Mental Ability, Higher Examination, Form A (Otis, 1928) or the Examens Otis-Ottawa

d'habileté Mentale, Examen Supérieur, Formule A (Shevenell, 1948) as part of the assessment process. The tests are administered to small groups of 6-8 counseles by a qualified technician. All of the counselees' test data are placed in individual folders and stored in filing cabinets.

All students requesting counselling services are required to report to the receptionist standard biographical and demographic information. The receptionist records this information (i.e., name, address, telephone number, sex, date of birth, age, marital status, first language, whether the individual is bilingual or not, faculty, and the year of study) on a Request for Service Form. A sample of this form is presented in Appendix 3.

2. The Subjects

The subjects of this study were 318 full-time undergraduate students from the University of Ottawa who met the following criteria:

1. Participated in at least 2 counselling sessions at the UOCS between May 1, 1975 and May 1, 1979 inclusively;
2. Reported on the Request for Service Form their name, address, and telephone number;
3. Reported on the Request for Service Form their sex;
4. Reported on the Request for Service Form their date of birth and age;

5. Reported on the Request for Service Form their marital status;
6. Reported on the Request for Service Form their first language;
7. Reported on the Request for Service Form their faculty and year of study;
8. Indicated on the Request for Service Form whether or not they were bilingual;
9. Completed either:
 - a) the SCII and the Otis or,
 - b) the SCII and the Otis-Ottawa;
10. Remained registered as full-time students for the duration of the academic year that they first consulted the UOCS;
11. Had G.P.A. scores in their respective programs at the Registrar's Office.

Counselees who indicated on the Request for Service Form that their first language was French and were given the Otis were discarded from the study as a partial control against language effects. Similarly, all counselees who indicated on the Request for Service Form that their first language was English and were given the Otis-Ottawa were discarded from the study.

It was not possible to have a similar control for language effects with the SCII because the French version of this test has only recently been available at the UOCS. Until very recently, all francophone students were given the English version of the SCII. Consequently, most of the individual files accumulated at the UOCS since 1975 contain

the English version of the SCII. However as a partial control against language effects, all counselees who were given the English version of the SCII and indicated on the Request for Service Form that their first language was French but were not bilingual were discarded from this study.

In order to obtain an adequate estimate of academic achievement it was deemed necessary to use as subjects only those counselees who remained registered as full-time students throughout the academic year in which they first consulted the UOCS. For the purpose of this study "full-time" was defined as meaning maintaining enrollment and completing course requirements in at least four full courses or the equivalent in that particular academic year. Those counselees who became part-time students or who withdrew completely from the University during the academic year that they visited the UOCS were discarded from the study.

The actual sample involved in the study was composed of 318 full-time students, 176 anglophones, 142 francophones, enrolled in first, second, third, or fourth year of an undergraduate program at the University of Ottawa. 137 of the subjects were males while 181 were females. Table 1 gives the composition of the anglophone sample by year and sex. Table 2 gives the composition of the francophone sample by year and sex.

Six different faculties were represented: (1) Arts; (2) Sciences; (3) Social Sciences; (4) Administration; (5) Law;

Table 1

YEAR IN UNIVERSITY FOR THE ANGLOPHONE SAMPLE (N=176)

Year	Males	%	Females	%	total	%
1	39	52	47	46.6	86	48.8
2	24	32	31	30.7	55	31.2
3	10	13.3	21	20.8	31	17.6
4	2	2.7	2	2.0	4	2.3

Table 2

YEAR IN UNIVERSITY FOR THE FRANCOPHONE SAMPLE (N=142)

Year	Males	%	Females	%	total	%
1	26	41.9	40	50	66	46.5
2	20	37.3	26	32.5	46	32.4
3	15	24.2	10	12.5	25	17.6
4	1	1.6	4	5.0	5	3.5

and (6) Health Sciences. Table 3 shows the distribution of the anglophone sample according to the faculty of study and sex. Table 4 shows the distribution of the francophone sample according to the faculty of study and sex.

The age of the combined anglophone and francophone samples ranged from 16 to 43 years, with a mean of 20.802 years. The francophone male subsample was slightly younger with a mean age of 20.694; the anglophone male subsample was slightly older with a mean age of 20.960; while the francophone female and anglophone female subsamples had a mean age of 20.337 and 21.119 respectively.

The number of counselling sessions attended for the total sample ranged from 2 to 29 sessions with a mean of 4.629 sessions. The francophone male subsample had the highest mean number of sessions ($\bar{X}=5.161$); the anglophone male subsample had a mean number of sessions of 4.240; while the francophone female and anglophone female subsamples attended, on the average, 4.637 and 4.548 sessions respectively.

Scholastic ability was measured by the Otis for the anglophone sample and the Otis-Ottawa for the francophone sample. The mean IQ score was 116.635 for the anglophone sample and 108.409 for the francophone sample. The female anglophone mean was 116.871 while the male anglophone mean was 116.4. The female francophone mean was 108.737 while the male francophone mean was 108.081.

Table 3

FACULTY OF STUDY FOR THE ANGLOPHONE SAMPLE (N=176)

Faculty	Males	%	Females	%	Total	%
Social Science	5	6.7	11	10.9	16	
Arts	31	41.3	52	51.5	83	
Law	0	0	1	1.0	1	
Administration	2	2.7	3	3.0	1	
Health Sciences	4	5.3	10	9.9	14	
Sciences	33	44.0	24	23.8	57	

Table 4

FACULTY OF STUDY FOR THE FRANCOPHONE SAMPLE (N=142)

Faculty	Males	%	Females	%	Total	%
Social Science	14	22.6	15	18.8	20	20.4
Arts	25	40.3	36	45.0	66	46.4
Law	1	1.6	4	5.0	5	3.5
Administration	6	9.7	0	0	6	4.2
Health Sciences	0	0	5	6.3	5	3.5
Sciences	16	25.8	20	25.0	36	25.3

In order to fully and adequately describe the subject samples, supplementary data was obtained. Tables 5 to 9 contain data on the year the subject first consulted the UOCS, marital status, and whether the subject was bilingual or not. Inspection of the tables reveals that there is a fairly even distribution of subjects who consulted the UOCS for each of the four years chosen; the overwhelming majority of subjects from both the francophone and anglophone samples were single; and the francophone subjects tended to be more bilingual than the anglophone subjects.

3. The Instruments

The instruments used in this study were: The Strong-Campbell Interest Inventory (SCII, Campbell, 1974), the Otis Self-Administering Test of Mental Ability, Form A (Otis, 1928), the Examen Otis-Ottawa d'Ottawa d'Habilété Mental, Examen Supérieur (Shevenell, 1948), and the subject's grade point average score.

Strong-Campbell Interest Inventory

The SCII was designed to assist people in determining their patterns of interests and how these compared to a norm group of successful people in various occupations. The subject is asked to respond to 325 items by indicating

Table 5

YEAR THE SUBJECT FIRST CONSULTED THE UOCS
FOR THE ANGLOPHONE SAMPLE (N=176)

Year Seen	Male Anglo	%	Female Anglo	%	Total Sample	%
1975-76	18	24.0	20	19.8	38	21.6
1976-77	21	28.0	29	28.7	50	28.4
1977-78	24	32.0	29	28.7	53	30.1
1978-79	12	16.0	23	22.8	35	19.9

Table 6

YEAR THE SUBJECT FIRST CONSULTED THE UOCS
FOR THE FRANCOPHONE SAMPLE (N=142)

Year Seen	Male Franco	%	Female Franco	%	Total Sample	%
1975-76	28	45.2	33	42.4	61	42.9
1976-77	18	29.0	26	32.5	44	30.9
1977-78	13	21.0	19	23.7	32	22.5
1978-79	3	4.8	2	2.5	5	3.5

Table 7

MARITAL STATUS OF THE ANGLOPHONE SAMPLE (N=176)

Marital Status	Male Anglo	%	Female Anglo	%	Total Sample	%
Single	70	93.3	93	92.1	163	92.6
Married	5	6.7	7	6.9	12	6.8
Separated	0	0	1	1.0	1	.6

Table 8

MARITAL STATUS OF THE FRANCOPHONE SAMPLE (N=142)

Marital Status	Male Franco	%	Female Franco	%	Total Sample	%
Single	56	90.3	77	96.2	133	93.6
Married	6	9.7	3	3.7	9	6.3
Separated	0	0	0	0	0	0

Table 9

PERCENTAGE OF SUBJECTS WHO WERE AND WHO
WERE NOT BILINGUAL (N=318)

Bilingual	Male Anglo	%	Female Anglo	%	Male Franco	%	Female Franco	%	Total Sample	%
Yes	24	32	33	32.7	48	77.4	62	77.5	167	52.5
No	51	68	68	67.3	14	22.6	18	22.5	151	47.5

whether he likes, dislikes, or is indifferent to the items. The test is designed to measure interests in three different ways: 1. The General Occupational Themes (GOT), 2. The Basic Interest Scales (BIS), and 3. The Occupation Scales (OS).

The General Occupational Themes consists of six scales which correspond to Holland's six occupational-personality types. The scores provide a general indication of the respondent's occupational orientation. Thus a high score on any of these six scales would suggest the general kind of activities the person will enjoy, the type of occupational environment the person will find most suitable to his needs, the kind of problems the person will be most willing to deal with, and the type of people the person will be most attracted to as co-workers.

As this study is concerned primarily with the GOT scales, additional information concerning the development of these scales is presented. Information concerning the reliability and validity of these scales is presented later.

Item selection for the General Occupational Themes consisted of extracting 20 SVIB items to represent each personality type on the SCII, such that all items "reasonably" corresponded either obviously or intuitively to the type of descriptions presented by Holland (1966). Each scale is scored positively for "Like" responses and negatively for "Dislike" responses, and the six scales together give a profile of similarity and dissimilarity to

each of the six personality types. To facilitate understanding of profile pattern consistency and differentiation, the personality types have been arranged by Holland (1973) in the form of a hexagon. Those types that are adjacent to each other on the hexagon (i.e., investigative and realistic personality types) are most similar personality-wise and have stronger correlations. Those that are opposite each other on the hexagon are most dissimilar personality-wise and less highly correlated with each other.

Raw score to standard score conversion of the GOT scale is based on a distribution of 600 people, half males, half females. All scores were converted into distributions with a mean of 50 and a standard deviation of 10. Because men and women have different distributions on these scales, two scores are generated for each scale. The first is a printed standard score which is based on the combined male and female sample. The second is a printed interpretive comment which is based on the distribution of scores for the respondent's sex. These comments range over a seven-point scale from "This is a very high score" to "This is a very low score".

The Basic Interest Scales consist of 23 homogeneous scales that were formed by clustering together statistically related items with high intercorrelations. These scales have been arranged in clusters corresponding to their relationships to the General Occupational Themes. Because the Basic Interest Scales are formed by using clusters of statistically

related items, three important characteristics emerge (Campbell, 1974). 1. Because of their internal consistency they represent an important focus around which people can group their own interests; 2. Because the items for each scale are all drawn from one area, the content of the scale is easy to understand; and 3. The concentration of several related items into one scale provides a more reliable measure than the same number of unrelated items. The Basic Interest Scales were specifically developed in this fashion to enhance the understanding of the empirically developed heterogeneous Occupational Scales. Since the item content of the BIS is fairly straightforward, the scales are easily interpretable. A high score on one of the scales indicates that the respondent reported substantially more liking than average for the activities represented by that scale.

The Occupational Scales consist of 124 scales that were developed by comparing the item responses of an occupational sample with those of a general reference sample, identifying items yielding large response differences between the two samples, and then drawing these items together into a scale. Each scale was normed on an occupational sample and raw scores were converted to standard scores on the basis of the occupational sample's distribution. The Occupational Scales are ordered on the profiles in the six categories developed by Holland (1973). Each of the occupations has been given a code type corresponding to its high GOT scores. The code

profiles, appearing on the profile, indicate the one, two or three General Occupational Themes most clearly associated statistically with each Occupational Scale. A high score on an Occupational scale indicates that the respondent shares many of the aversions and interests of the members of the occupation that the scale represents.

Reliability

Campbell (1974) provided 30-day test retest correlations calculated on a representative sample of 102 Army Reserve members, students at the University of Minnesota, and women enrolled in a career development course. The median test-retest correlation of the General Occupational scores was .86, suggesting high short term score reliability.

Hansen (no date available, cited in Campbell, 1974) used 65 female and 75 male employees whose occupations ranged from semi-skilled to professional to test reliability over a 3 year period. A median test retest coefficient of .81 was reported, indicating that the scores on the GOT are generally stable.

Validity

No single index to measure the validity of the General Occupational Themes was found, and no data on this topic was

reported by Campbell (1974). However, Utz and Korben (1976) concluded from an investigation of General Occupational Theme construct validity that "...the Occupational Themes and related descriptors were validated in terms of similar personality variables" (p. 31). Convergent and divergent construct validity of the Themes was also researched by Lunneborg (1977) who concluded that "...the validity of the SCII General Themes was strongly supported..." (p. 187).

In an attempt to examine the concurrent validity of the SCII, using the McArthur (1954) method, Worthington and Dolliver (1977) divided 130 male subjects into those classified as "good hits" (i.e., a standard score of 45 or more on the subject's own personality Theme), "poor hits" (i.e., a score of 40-45 on the subject's own Theme), and "clear misses" (i.e., a score of below 40 on the subject's own Theme). These investigators reported a hit rate of 56% good hits.

Although data was not available on the predictive validity of the SCII, studies employing the SVIB have generally reported less predictive than concurrent validity.

The Otis Self-Administering of Mental Ability, Higher Examination, Form A

The Otis, Higher Examination, Form A (Otis, 1956) is a measure of mental ability for both high school and college or university students. Mental ability, as defined by Otis

(1956), refers to "that innate mental ability which increases with age" (p. 3). This test consists of 75 items that are mainly of verbal and arithmetic content. Either a 20 minute or a 30 minute time limit may be used. Although the 30 minute time limit provides a more accurate score, the scores obtained using a 20 minute time limit may be transmuted into terms of 30 minute time limit scores by means of a specially devised table.

Because it is standard practice to use the 20 minute time limit at the Counselling Services, the 20 minute time period was employed in this study.

Item Selection

Items from the Otis Advanced Examination were selected for use in the Otis, Higher Examination, Form A. In addition, other new items were included so that the examination would cover a large variety of questions and therefore afford a more comprehensive measure of mental ability. Preliminary editions of the Otis Higher Examination were administered to 1,000 high school students in California and Illinois, and to 1,000 grammar pupils in Minnesota. The students in each case were divided into two groups: a "poor group" of young students, and "good group" of old students. All groups had reached the same average educational status, but at different rates. Because the mental ability test is

chiefly used to predict the rate at which a student can progress through school, this rate was believed to be the best criterion to judge the validity of each item that went into the Otis Higher Examination. The number of times each item was passed by each group was then found and only those items chosen which showed a distinct gain in number of passes by the good group over the number of passes by the poor group. Therefore only those items that discriminated between students who progressed slowly and those who progressed rapidly were chosen.

Reliability

Reliability, or the degree to which the scores of the Otis Higher Examination, Form A are consistent in measuring mental ability, was determined by means of correlation between different pairs of the same test. Correlation coefficients between the scores of Form A and Form B of the Otis Higher Examination for two groups of high school students were: .917 and .925 for both groups respectively. Group I consisted of 128 students who took form A first. Group II consisted of 125 students who took form B first. The values of the probable error of a score determined from both groups were 2.56 and 2.68 points respectively, indicating that the probable error of an IQ is about 2.5 points.

Validity

The Otis Manual (Otis, 1956) reports evidence of the construct validity of the Otis Higher Examination by presenting the intercorrelations between the Otis Higher Examination and other forms of the Otis tests, as well as the intercorrelation between the Otis Higher Examination and scholarship. These correlations are: .889 between the Otis Higher Examination and the Advanced Examination taken two years earlier for 180 cases; .842 between the Otis Higher Examination and the Otis Intermediate Examination for approximately 100 cases; .55, .57, and .59 between the Otis Higher Examination and scholarship for 240, 204, and 157 cases respectively.

Examen Otis-Ottawa d'Habilité Mental Examen Supérieur: Formule A

The Otis-Ottawa is a measure of scholastic ability designed for high school and college students. It is a translation of the Otis Self-Administering Test of Mental Ability, Form A (Otis, 1929) that was adapted for a French-Canadian population (Shevenell, 1948). The Otis-Ottawa contains 75 items consisting of: antonymes, synonymes, arithmetical problems, general knowledge items, number series, series, analogies, proverbs etc. Like the Otis Higher Examination it is a test that specifically measures

scholastic aptitude. The usual time limit for the Otis-Ottawa is 30 minutes. However provisions exist to reduce the time of testing to 20 minutes.

Because it is standard practice to use the 20 minute time limit at the Counselling Services, the 20 minute time period was employed in this study.

Reliability

Shevenell (1943) administered the Otis-Ottawa, Higher Examination, Form A and B, to four small groups (ranging from 40-70 subjects each) of high school students and to one small group (50 subjects) of Teacher's College students. The coefficients of correlation, corrected with the Spearman Brown formula, ranged from .91 to .93.

Isabelle (1961) examined the reliability of the Otis-Ottawa Higher Form A by correlating the test-retest results on a sample of 61 first and second year Science students. He obtained a reliability coefficient of .843.

Construct Validity

Charbonneau (1968) pooled the Intermediate and Higher Form A Examination of the Otis-Ottawa, and assigned the items to one of 11 different subgroups on the basis of their task similarity. The objective was to examine the extent to which

groupings of similar items correlated with the total score and with each other. Each subgroup had individual time limits and were administered to the sample in one session. The sample consisted of 70 grade nine males. He found correlation coefficients ranging from .47 to .83 that were all significantly different from zero ($p < .01$) between each subgroup and the total score. He also found intercorrelations ranging from .06 to .61, six of which were significantly different from zero ($p < .05$) among the different subgroups.

Predictive Validity

The predictive validity of the Otis-Ottawa is less clearly established. Isabelle (1961) found mixed results. He reported a significant correlation of .33 ($p < .01$) between Otis-Ottawa score and grades for a sample of 99 second year students, but a nonsignificant correlation for a sample of 117 first year students. Vaillancourt (1961) found a significant correlation of .44 ($p < .01$) between Otis-Ottawa scores and grades for 77 second year male students, but reported nonsignificant correlations for first year males ($N=85$) and females ($N=10$) and second year females ($N=8$).

With faculty, age, and family income as moderator variables Ramsey (1976) found a significant correlation of .54 ($p < .01$) between the Otis-Ottawa scores and grades for 35 science students, but found nonsignificant correlations

(median $r=.20$) for other faculty members.

Thus the reliability and validity data indicate that the Otis-Ottawa is an adequate measure of general scholastic ability.

Grade Point Average (GPA)

Reliability and Validity

College grade point average (GPA) has been the most extensively used criterion of college academic achievement in educational research. Although some dissatisfaction has been voiced concerning the use of college GPA as a criterion of academic achievement (i.e., Humphreys, 1969), several studies exist which indicate that it is both a reliable and valid measure of college academic achievement.

The question of college grade point average (GPA) reliability was the subject of an investigation by Etaugh, Etaugh and Hurd (1972). The sample consisted of 4,288 undergraduate students and 215 graduate students who had completed two or more courses. Because of the criticism that GPA reliability is low due to diversity in grading practices (Chansky, 1964), the authors did not employ the standard reliability formulas. Instead, the analysis of variance (ANOVA) reliability model (Hoyt, 1941) was employed because it permits the assessment of the reliability of grades and their averages in situations in which not all

students are rated by the same set of raters. The results of the analyses indicated that all of the grade point average reliability coefficients were significant at the .05 level of significance for the various grade levels. The reliability coefficients ranged from .624 for graduate students to .806 for freshmen. The authors concluded that, "there appears to be little justification for authors of future validity studies to speculate about the low reliability of the GPA criterion ... Adequate reliability for the GPA can almost always be assured by the simple expedient of including a sufficient number of courses" (p. 1048).

Schoenfeldt and Brush (1975) transformed the transcript records of 1,934 freshmen college students into a profile of grade point average scores across 12 curricular areas. The record for each subject also included high school GPA and two scores from the Scholastic Aptitude Test (SAT). The resulting 15 variables were intercorrelated and factor analysed. The intercorrelations among high school GPA and the SAT scores, and the validity of these variables with grade point average scores in the 12 curricular areas were as expected. The intercorrelations among the 12 areas ranged from .19 to .69 with a median of .39. The intercorrelations among the GPA scores in the 12 curricular areas and high school GPA ranged from .31 to .47.

The factor analysis revealed that only three factors accounted for just under 50% of the total variance. The

largest factor was named General Academic Achievement and accounted for approximately one fourth of the total. The second factor was named grades independent of achievement and aptitude and accounted for 15% of the total variance; while the third factor, called tested aptitude, accounted for 10% of the total variance.

The authors concluded that overall GPA is not as multifaceted as some critics had maintained, and thus suggest that the current system of grades (i.e., grade point average) be considered singular for most predictive purposes and valid as a measure of academic achievement.

4. The Procedure

The 318 student counselees selected for participation in this study were student counselees who met all of the requirements outlined in the Subject's section of this chapter. In view of the fact that all of the necessary data was not available from the same source, several steps were necessary to gather all of the necessary information.

Data concerning sex, date of birth, age, marital status, first language, whether he/she was bilingual or not, faculty, year of study, nature of concern (i.e., personal, educational and/or vocational), General Occupational Themes Scores, Otis IQ score, and Otis-Ottawa IQ score were kept in individual files and stored in the UOCS filing cabinets. The academic

status of the student counselee after the academic year that he/she first consulted the UOCS, and the actual point value and credit worth of courses, were kept on transcripts in the University of Ottawa Registrar's Office.

The information stored in the UOCS filing cabinets and the Registrar's Office had to be retrieved manually. The selection procedure involved the following steps:

(1) All of the counselling files that had accumulated in the UOCS filing cabinets between May 1, 1975 and May 1, 1979 were visually inspected by the author. Those files meeting the requirements outlined in the Subject's section of this chapter were removed from the filing cabinets and placed in a special filing cabinet. The information regarding sex, date of birth, age, marital status, first language, whether the student was bilingual or not, faculty, academic status, and the nature of the student's concern (i.e., personal, educational and/or vocational) was retrieved from the Request for Service Form accompanying each file and placed on a special form constructed by the author. A sample of the special file is presented in Appendix 4. The information regarding General Occupational Themes Scores, Otis IQ score, and Otis-Ottawa IQ score was retrieved from the test materials accompanying each file and placed on the special file.

The Strong-Campbell Interest Inventory (SCII) was computer scored by National Computer Services. The Otis Self-Administering Test of Mental Ability, Form A, and the Examen Otis-Ottawa, d'Habileté Mental, Examen Supérieur, Formule A, were hand scored by the technician responsible for group testing at the time in which the subjects were tested.

Any student for whom the above information was missing, was omitted from the study.

(2) Pertinent information from the Special File was matched with information from the respective student's transcript to ensure that the data collected was from the same person. The transcripts retrieved from the files of the Registrar's Office were then photocopied for those students whose transcripts were available.

(3) The photocopies were individually examined to determine if the students met the definition of full-time student. When this process was completed, each student's grade point average (GPA) was calculated. The grade point average score was the sum of the point value obtained for each course weighted by each course's credit worth, divided by the sum of the credits. It can be shown by the following formula:

$$\underline{MY} = \frac{cY}{c}$$

where \underline{MY} = the grade point average score

\underline{c} = each course's credit worth

\underline{Y} = the point value for each course

(4) Once the grade point average scores were determined, the students names were coded from 1 to 318. These code numbers, the data from the special form constructed by the author, and each grade point average score were coded on optical scanning sheets available from the University of Ottawa Computer Center.

Predictor Variables

The main predictor variables in this study were each student's personality pattern consistency and differentiation score.

Standard scores on the six scales of the General Occupational Themes (GOT) of the SCII were used to obtain the differentiation and consistency scores. Raw scores from these scales were not available for use in the computation of the differentiation and consistency scores. Chislett (1977) compared raw and standard score measures of consistency and

differentiation using the VPI and found them to be equally effective as predictors of academic achievement (G.P.A.).

Consistency was defined using Holland's hexagonal model.

2 = two highest letters from the GOT are adjacent on the hexagon,

1 = two highest letters from the GOT are nonadjacent on the hexagon,

0 = two highest letters from the GOT are opposite on the hexagon.

Differentiation was defined using Holland's (1973) definition: The range measure. To obtain it, the lowest standard score on the General Occupational Themes scale of the SCII is subtracted from the highest score.

In instances where the two top scores on the GOT scale were tied, they were rank ordered according to their order of occurrence on the GOT profile. Gottfredson, Holland, and Gottfredson (1975) suggested such a procedure when using the Vocational Preference Inventory.

Control Variables

Sex was controlled because in many research studies of Holland's theoretical constructs, consistency and differentiation have been supported for male, but not for female subjects (Aderinto, 1975; Holland; 1968; Walsh and

Lewis, 1972).

Holland postulated that differentiation and consistency be considered measures of vocational and/or educational maturity. If this proposal is valid and if differentiation and consistency are related to academic achievement as Holland assumes, it is possible that achievement is directly related to age. Therefore in this study, age was statistically controlled.

Reitz (1970) mentions that much of the conflictual evidence provided by earlier studies on the relationship between vocational interests and academic achievement can be attributed largely to the failure of these studies to control academic ability for academic achievement. Thus in this study academic aptitude (Otis) was controlled statistically.

Because of the bilingual nature of the University of Ottawa most students can be either classified as either anglophone or francophone. It is possible that anglophone students might differ significantly from francophone students, thus linguistic groups were controlled. In addition, because faculty has been shown to be related to specific interests (Meuser, 1976) this variable was also statistically controlled.

5. Analysis of Data

All of the obtained data were coded on scanning sheets

and transferred to a tape. Programs from the Statistical Package for the Social Sciences (Nie, Bent, and Hull, 1970) were used to conduct statistical analyses. Descriptive statistics were obtained and correlational and regression analyses were performed on the data.

The following is a description of the statistical procedures used with both the anglophone and francophone samples.

- (1) All of the intercorrelations of the variables considered in the study were presented in two correlation matrix tables in order to test hypotheses 1, 2, 3 and 4.
- (2) Multiple regression analysis were computed for both the anglophone and francophone samples in order to test hypotheses 5, 6, 7 and 8 and to examine the influence of the control variables on the prediction of G.P.A.

Cross-Validation Analysis

In order to ensure that the results from the multiple regression analyses were not due to the result of chance, a cross-validation analysis was done in each sample (Francophone and Anglophone) and their randomly divided subgroups. All the computations were done with the "Compute" and "Select if" cards (Nie et al., 1975, pp. 96-101, 128-129)

of the SPSS.

The cross-validation analysis of a sample involved the following:

1. Finding the statement of linear regression equation of \underline{Y} from \underline{X} (Guilford, 1965, p. 368) of a sample (validation sample).
2. Substituting the predictor values of the subjects in the other sample (cross-validation sample) in the statement of linear regression equation.
3. Correlating the predicted criterion values with the actual criterion values of the subjects in the cross-validation sample.

The formula used was:

$$\underline{Y}' = \underline{r}_{\underline{YX}} \frac{\sigma_{\underline{Y}}}{\sigma_{\underline{X}}} (\underline{X} - \underline{M}_{\underline{X}}) + \underline{M}_{\underline{Y}}$$

where \underline{Y}' = the predicted criterion value,

$\underline{r}_{\underline{YX}}$ = the coefficient of correlation of the validation sample,

$\sigma_{\underline{Y}}$ = the standard deviation of the criterion values in the validation sample,

$\sigma_{\underline{X}}$ = the standard deviation of the predictor values in the validation sample,

\underline{X} = the predictor value of each student in the cross-validation sample,

\underline{M}_x = the mean of the predictor values in the validation sample,

\underline{M}_y = the mean of the predictor values in the validation sample.

One-tailed tests of significance were reported using student's t with $\underline{N}-2$ degrees of freedom for the computed quantity (SPSS, Subprogram Pearson Corr, Nie et al., 1975, p. 280-88).

The cross-validated coefficients of correlation of the cross-validation subgroups were compared using the X^2 Test of Homogeneity for \underline{k} values of \underline{r} (Edwards, 1960, p. 83). The formula was:

$$X^2 = (\underline{n}_i - 3) (\underline{z}_i')^2 - \frac{[(\underline{n}_i - 3) (\underline{z}_i')]^2}{(\underline{n}_i - 3)}$$

where \underline{n}_i was the size of each subgroup

\underline{z}_i' was the Fisher z transformation of a Pearson \underline{r} .

The significance was then reported for a one-tail test with $\underline{k}-1$ degrees of freedom.

CHAPTER III
PRESENTATION OF RESULTS

This chapter presents the results for both the anglophone and francophone samples. For simplicity of presentation, the results are reported according to the order of the hypotheses outlined in Chapter 1. The order of presentation is as follows:

- (1) A presentation of the intercorrelations of all of the variables considered in this study for both the anglophone and francophone samples in order to test hypotheses 1, 2, 3 and 4.
- (2) Multiple regression analyses for both the anglophone and francophone samples in order to test hypotheses 5, 6, 7 and 8 and to examine the influence of the control variables on the prediction of GPA.
- (3) Cross-validation analyses for both the anglophone and francophone samples in order to test hypotheses 9, 10, 11, 12, 13 and 14.

Hypotheses 1 and 2 were concerned with the magnitude of the coefficient of correlation between academic achievement (GPA) and differentiation for the anglophone and francophone samples respectively.

Hypothesis 1

The coefficient of correlation (r_{xy}) between academic achievement (GPA) and differentiation (Holland's range measure) for the total anglophone sample will be statistically significant.

Table 10 presents the intercorrelations among GPA, differentiation and consistency for the anglophone sample. As shown in Table 10, the coefficient of correlation between GPA and differentiation was .03 which was not significant. As a result, hypothesis 1 was rejected.

Hypothesis 2

The coefficient of correlation (r_{xy}) between academic achievement (GPA) and differentiation (Holland's range measure) for the total francophone sample will be statistically significant.

Table 11 presents the intercorrelations among GPA, Differentiation and Consistency for the francophone sample. As shown in Table 11, the coefficient of correlation between GPA and differentiation was $-.00$ which was not significant. As a result, hypothesis 2 was rejected.

Hypotheses 3 and 4 were concerned with the magnitude of the coefficient of correlation between academic achievement and consistency for the anglophone and francophone samples

Table 10

INTERCORRELATIONS AMONG AGE, SEX, FACULTY, OTIS IQ, DIFFERENTIATION
CONSISTENCY AND GPA IN THE ANGLOPHONE SAMPLE (N=176)

Variables	Age	Sex	Faculty	Otis IQ	Differen.	Consist.	GPA.
Age		.01	** .19	-.10	-.05	.02	*-.13
Sex			** .17	.01	.02	.05	** .31
Faculty				.07	.00	-.02	**-.29
Otis IQ					.05	.02	** .17
Differentiation						** .17	.03
Consistency							.06
GPA							

* $\underline{p} < .05$ (student \underline{t} , one-tail test)

** $\underline{p} < .01$ (student \underline{t} , one-tail test)

Table 11

INTERCORRELATIONS AMONG AGE, SEX, FACULTY, OTIS-OTTAWA IQ,
DIFFERENTIATION CONSISTENCY AND GPA IN THE FRANCOPHONE SAMPLE (N=142)

Variables	Age	Sex	Faculty	Otis OT IQ	Differen.	Consist.	GPA.
Age		-.05	**-.34	-.06	-.07	.10	.05
Sex			.02	.01	-.05	.05	.13
Faculty				.06	-.04	.02	-.12
Otis IQ					-.09	-.04	.06
Differentiation						.01	-.00
Consistency							-.04
GPA							

* $\underline{p} < .05$ (student \underline{t} , one-tail test)

** $\underline{p} < .01$ (student \underline{t} , one-tail test)

respectively.

Hypothesis 3

The coefficient of correlation (r_{xy}) between academic achievement (GPA) and consistency (Holland's hexagonal model definition) for the Anglophone sample will be statistically significant.

As shown in Table 10, the coefficient of correlation between GPA and consistency was .06 and not significant. As a result, hypothesis 3 was rejected.

Hypothesis 4

The coefficient of correlation (r_{xy}) between academic achievement (GPA) and consistency (Holland's hexagonal model definition) for the francophone sample will be statistically significant.

As shown in Table 11, the coefficient of correlation between GPA and consistency was $-.04$ and not significant. As a result, hypothesis 4 was rejected.

Before the results of the first regression analysis is examined, a brief description of the nature of the multiple regression analyses employed in this investigation is presented.

Nature of the Multiple Regression Analysis

In each multiple regression analysis, Pearson product moment correlations were computed between all pairs of variables for both the anglophone and francophone samples. The correlations were then organized in matrices which are reported in Tables 10 and 11.

In order to test hypotheses 5 and 6, a multiple regression equation was computed using differentiation as a predictor for both the anglophone and francophone sample. Then the overall F test for the goodness of fit of the regression equation was determined. Then consistency was added to the regression equation and the overall F test for the goodness of fit of the second regression equation was determined for both samples. The result of these multiple regression analyses are reported in Tables 12 and 13.

In order to test hypotheses 7 and 8 a stepwise multiple regression analysis was employed for both samples. The variables were entered into each equation in the order specified by Holland i.e., differentiation + consistency. The F ratio employed in testing the significance of the regression coefficients for this hierarchical method was that suggested by Nie et al. (1977), pp. 337-39.

The F ratios were obtained by employing the following formulae:

$$F = \frac{r_{y1}^2/1}{(1 - R_{y.12, \dots, k}^2)/(N-k-1)}$$

where r_{y1}^2 = squared part correlation of differentiation or the incremental sums of squares due to differentiation

$(1 - R_{y.12, \dots, k}^2)$ = the residual sums of squares

N = total number of subjects in each sample

k = the number of independent variables

and

$$F = \frac{r_{y(2.1)}^2/1}{(1 - R_{y.12, \dots, k}^2)/(N-k-1)}$$

where $r_{y(2.1)}^2$ = squared part correlation of consistency or the incremental sum of squares due to consistency

$(1-R_{y.12,\dots,k}^2)$ = the residual sum of squares

N = total number of subjects in each sample

k = the number of independent variables

Since SPSS does not provide the F ratios for the hierarchical procedure, they were computed by hand. The results of these multiple regression analyses are given in Tables 14 and 15.

In order to examine the influence of the control variables a multiple regression analysis using the standard regression method was conducted for both samples. The four control variables (faculty, age, sex, Otis IQ or Otis-Ottawa IQ), differentiation and consistency were individually entered into the regression equation. The F ratio employed in testing the significance of the regression coefficient is given by the following formula:

$$F = \frac{r_{y(i.12,\dots,k)}^2/1}{(1 - R_{y.12\dots i\dots k}^2)/(N-k-1)}$$

where $(r_{y.12\dots i\dots k}^2)$ = the incremental sum of squares
due to X_i

$(1-R_{y.12\dots i\dots k}^2)$ = the residual sum of squares

N = total number of subjects in each
sample

k = number of independent variables

The results of these analyses are presented in Tables 16 and 17.

The first two multiple regression analyses were specifically concerned with examining the relative importance of combined measures of differentiation and consistency as predictors of GPA for both the anglophone and francophone samples (i.e., hypotheses 5 and 6).

The second pair of multiple regression analyses were concerned with determining whether differentiation was a better predictor of GPA than consistency for both samples.

The third pair of multiple regression analyses were concerned with examining whether the control variables were confounding factors in predicting GPA in this study. The four control variables were controlled by semipartial correlation. For the fifth and sixth regression analyses faculty, age, sex and Otis IQ or Otis-Ottawa IQ were added to the prediction equations along with differentiation and

consistency for both samples. The goal of these analyses, once again, was to examine whether the control variables were confounding factors in predicting GPA.

Hypotheses 5 and 6 were concerned with the importance of combined measures of differentiation and consistency in the prediction of student academic achievement (GPA).

Hypothesis 5

The coefficient of multiple correlation (R) obtained by using differentiation and consistency as predictor variables will be significantly greater than the coefficient of multiple correlation (R) obtained by using only differentiation as a predictor variable for the anglophone sample.

To test hypothesis 5, measures of differentiation and consistency were combined in a multiple regression equation to predict academic achievement (GPA). The results are shown in Table 12. The variables were entered into the equation according to the order suggested by Holland (1973). i.e., differentiation + consistency.

The F ratio after differentiation was entered in the regression equation was not significant at the .05 level of significance ($R=.03$, $F(1,174) = .15$).

The F ratio after both variables were entered was not significant at the .05 level of significance ($R=.06$, $F(2,173) = .68$). Thus the .003 increase in the variance

accounted for (R^2) by adding consistency measures to differentiation measures in predicting GPA was not significant. Therefore, hypothesis 5 was rejected.

Hypothesis 6

The coefficient of multiple correlation (R) obtained by using differentiation and consistency as predictor variables will be significantly greater than the coefficient of multiple correlation (R) obtained by using only differentiation as a predictor variable for the francophone sample.

To test hypothesis 6, measures of differentiation and consistency were combined in a multiple regression equation to predict academic achievement (GPA). The results are shown in Table 13. The variables were entered into the equation according to the order suggested by Holland (1973), i.e. differentiation + consistency. The F ratio after differentiation was entered into the regression equation was not significant at the .05 level of significance ($R=.00$ $F(1,140)=.00$). The F ratio after both of the variables were entered into the regression equation was also not significant at the .05 level of significance ($R=.04$ $F(2,139)=.14$). Thus, the .00209 increase in the variance accounted for (R^2) by adding consistency measures to the differentiation measures in predicting GPA was not significant. Therefore, hypothesis 6 was rejected.

Table 12

MULTIPLE REGRESSION ANALYSIS OF DIFFERENTIATION AS A PREDICTOR
OF GPA FOR THE ANGLOPHONE SAMPLE (N=176)

Multiple R	.03	Analysis of Variance	<u>DF</u>	<u>Sum of Squares</u>	<u>Mean Square</u>	<u>F</u>	
R ²	.00	Regression	1	0.59	.59	0.15	a
Standard Error	1.93	Residual	174	650.51	3.73		

^aF=3.89, p < .01 (one-tail test)

With consistency included in the regression equation

Multiple R	.06	Analysis of Variance	<u>DF</u>	<u>Sum of Squares</u>	<u>Mean Square</u>	<u>F</u>	
R ²	.00	Regression	2	3.15	1.57	0.42	b
Standard Error	1.93	Residual	173	647.95	3.74		

^bF=3.04, p < .01 (one-tail test)

Table 13

MULTIPLE REGRESSION ANALYSIS OF DIFFERENTIATION AS A PREDICTOR
OF GPA FOR THE FRANCOPHONE SAMPLE (N=142)

Multiple R	.00	Analysis of Variance	<u>DF</u>	<u>Sum of Squares</u>	<u>Mean Square</u>	<u>F</u>	
R ²	.00	Regression	1	0.01	0.01	0.00	^a
Standard Error	2.06	Residual	140	596.27	4.25		

^aF=3.91, p < .01 (one-tail test)

With consistency included in the regression equation

Multiple R	.04	Analysis of Variance	<u>DF</u>	<u>Sum of Squares</u>	<u>Mean Square</u>	<u>F</u>	
R ²	.00	Regression	2	1.25	0.62	0.14	^b
Standard Error	2.06	Residual	139	595.02	4.28		

^bF=3.06, p < .01 (one-tail test)

Hypotheses 7 and 8 were concerned with determining whether differentiation is a better predictor of academic achievement than consistency.

Hypothesis 7

The standard regression coefficient (partial B) of differentiation will be significantly greater than the standard regression coefficient (partial B) of consistency for the anglophone sample.

To test the relative importance of both predictors, stepwise multiple regression analysis was used. The variables were entered into the equation according to the order suggested by Holland (1973), i.e., differentiation + consistency. The results are shown in Table 14. The F ratio for the standardized regression coefficient of differentiation ($BETA=.01$) was not significant at the .05 level of significance, ($F=.15$). Thus although the partial B's indicate that one standard deviation unit change of consistency would introduce a greater change in GPA than one unit change in differentiation, the difference is negligible since both partial B's are not significant. Thus hypothesis 7 was rejected.

Table 14

STEPWISE REGRESSION ANALYSIS OF DIFFERENTIATION AND
 CONSISTENCY AS PREDICTORS OF GPA FOR THE ANGLOPHONE
 SAMPLE (N=176)

Variables	Multi- ple R	R ²	R ² change	Beta	df	F ^a
Different.	.03	.00	.00	.01	1/174	.15 ^b
Consistency	.06	.00	.00	.06	2/173	.68 ^c

^aF values are derived from the F ratio used for the hierarchical method.

^bF = 3.89, p < .01 (one-tail test)

^cF = 3.04, p < .01 (one-tail test)

Hypothesis 8

The standard regression coefficient (partial B) of differentiation will be significantly greater than the standard regression coefficient (partial B) of consistency for the francophone sample.

Stepwise multiple regression analysis was used to test the relative importance of both predictors. The variables were entered into the equation according to the order suggested by Holland (1973), i.e., differentiation + consistency. The results are shown in Table 15. As shown in Table 15, the F ratios for the standardized regression coefficients of both differentiation and consistency were not significant at the .05 level of significance, $F=.00$ and $F=.29$ respectively. Thus, although the partial B's indicate that one standard deviation unit change of consistency would introduce a greater change in GPA than one unit change in differentiation, the difference is negligible since both partial B's are not significant. Thus hypothesis 8 was rejected.

Control Variables

Table 10 gives the intercorrelations of all variables considered in this study for the anglophone sample. An inspection of Table 10 reveals that all four of the control

Table 15

STEPWISE REGRESSION ANALYSIS OF DIFFERENTIATION AND
 CONSISTENCY AS PREDICTORS OF GPA FOR THE FRANCOPHONE
 SAMPLE (N=142)

Variables	Multi- ple R	R ²	R ² change	Beta	df	F ^a	
Different.	.00	.00	.00	-.00	1/140	.00	^b
Consistency	.04	.00	.00	-.04	2/139	.29	^c

^aF values are derived from the F ratio used for the hierarchical method.

^bF = 3.91, p < .01 (one-tail test)

^cF = 3.06, p < .01 (one-tail test)

variables employed in this study were significantly related to academic achievement (GPA). The variables most strongly related to GPA was sex ($r=.32$, $p < .01$) followed by faculty ($r=.29$, $p < .01$); Otis IQ ($r=.17$, $p < .01$); and age ($r=.1363$, $p < .05$). Also significant was the correlation between faculty and age ($r=.19$, $p < .01$); faculty and sex ($r=.17$, $p < .01$); and differentiation and consistency ($r=.17$, $p < .01$).

Table 11 gives the intercorrelations of all variables considered in this study for the francophone sample. An inspection of Table 11 reveals that none of the control variables were significantly related to academic achievement (GPA). The only significant correlation obtained was between faculty and sex ($r=.34$, $p < .001$).

In this investigation, faculty, age, sex, and academic aptitude were controlled by semipartial correlation. Table 16 presents a summary of the multiple regression analysis of these four control variables in addition to differentiation and consistency as predictors of GPA for the anglophone sample.

As seen from Table 16, the F ratio after GPA was regressed on all four control variables was statistically significant at the .01 level of significance ($F=6.42$, $df=4,171$). Differentiation and consistency were then added to the equation, but neither contributed significantly to the prediction of GPA ($F=.04$, $df=5,170$ and $F=.35$, $df=6,169$

Table 16

MULTIPLE REGRESSION ANALYSIS OF FACULTY, AGE, SEX, OTIS IQ
(CONTROL VARIABLES), DIFFERENTIATION, AND CONSISTENCY AS
PREDICTORS OF GPA FOR THE ANGLOPHONE SAMPLE (N=176)

Variables	Multi- ple R	R ²	R ² change	df	F ^a
Faculty	.29	.08	.08	1/174	**11.86
Age	.30	.09	.00	2/173	2.21
Sex	.41	.16	.07	3/172	**15.02
Otis IQ	.45	.20	.03	4/171	** 7.86
Different.	.45	.20	.00	5/170	0.04
Consistency	.45	.20	.00	6/169	0.26

^aF values are calculated on full equation.

* p < .05

** p < .01

respectively).

Table 16 further shows that 20.9% of the variation in GPA is explained by faculty, age, sex, Otis IQ, differentiation and consistency operating jointly. The best predictor among all of the variables studied was faculty which contributed 8.850% of the variation in GPA ($F=11.86$, $df=1,174$, $p < .01$), followed by sex which contributed 7.46 % of the variation in GPA ($F=15.02$, $df=3,172$, $p < .01$), and Otis IQ which contributed 3.75 % of the variation in GPA ($F=7.86$, $df=4,171$, $p < .01$). Age, differentiation, and consistency did not contribute to any significant degree to the variation in GPA.

Table 17 presents a summary table of the multiple regression analysis of the four control variables in addition to differentiation and consistency as predictors of GPA for the francophone sample.

As seen from Table 17, the F ratio after GPA was regressed on the four control variables in addition to the two major predictors was not statistically significant ($F=.45$, $df=6,135$) at the .05 level of significance. Only 2.98 % of the variation in GPA is explained by faculty, age, sex, Otis-Ottawa IQ, differentiation and consistency operating jointly for the francophone sample. Thus, the results of this analysis indicates that the four control variables were not confounding factors in the prediction of GPA, and that the two major predictors (i.e., differentiation and

Table 17

MULTIPLE REGRESSION ANALYSIS OF FACULTY, AGE, SEX, OTIS IQ
(CONTROL VARIABLES), DIFFERENTIATION, AND CONSISTENCY AS
PREDICTORS OF GPA FOR THE FRANCOPHONE SAMPLE (N=142)

Variables	Multi- ple R	R ²	R ² change	df	F ^a
Faculty	.12	.01	.01	1/140	2.05
Age	.12	.01	.00	2/139	0.05
Sex	.18	.03	.01	3/138	2.68
OTISOT IQ	.20	.04	.00	4/137	0.75
Different.	.20	.04	.00	5/136	0.04
Consistency	.20	.04	.00	6/135	0.33

^aF values are calculated on full equation.

* p < .05

** p < .01

consistency) were not significant predictors of GPA for this sample.

Hypotheses 9 and 10 were concerned with the magnitude of the cross-validated coefficient of correlation between the predicted criterion values and the actual criterion values of the students in the cross-validation sample for the subgroups of the anglophone and francophone samples respectively. Only differentiation was used in the prediction equation.

Hypothesis 9

The cross-validated coefficient of correlation, employing differentiation in the prediction equation, for the subgroups of the anglophone sample will be statistically significant.

Table 18 presents the data used in the calculations of the cross-validated coefficients. Table 19 shows that the cross-validated coefficients of correlation for the cross-validated subgroups of the anglophone sample were not statistically significant at the .05 level of significance.

Hypothesis 10

The cross-validated coefficient of correlation, employing differentiation in the prediction equation, for the subgroups of the francophone sample will be statistically

Table 18

DATA FOR CALCULATIONS OF THE CROSS-VALIDATED COEFFICIENTS
OF CORRELATION FOR THE SUBGROUP OF THE ANGLOPHONE
SAMPLE (N=176)

Subgroup	<u>n</u>	Variable	Mean	Standard Devistion	<u>r</u> ^a
0	89	Different.	21.38	5.90	-.02
		GPA	5.12	1.88	
1	89	Different.	20.78	6.68	.08
		GPA	4.74	1.98	

Note: $Y' = r_{yx} \left(\frac{\sigma_Y}{\sigma_X} \right) (\underline{X} - \underline{M}_X) + \underline{M}_Y$

Table 19

CROSS-VALIDATED COEFFICIENTS OF CORRELATION FOR THE
SUBGROUP OF THE ANGLOPHONE SAMPLE (N=176)

Subgroup	<u>n</u>	<u>r</u> ^a
0	89	.17
1	89	-.08

Note: All cross-validated coefficients of correlation were tested using student's t, one-tail test.

$$a_r = .20 , p < .05$$

significant.

Table 20 presents the data used in the calculations of the cross-validated coefficients. Table 21 shows that the cross-validated coefficients of correlation for the cross-validated subgroups of the francophone sample were not statistically significant at the .05 level of significance.

Hypothesis 11

The cross-validated coefficient of correlation, employing consistency in the prediction equation, for the subgroups of the anglophone sample will be statistically significant.

Table 22 presents the data used in the calculations of the cross-validated coefficients. Table 23 shows that the cross-validated coefficients of correlation for the cross-validated subgroups of the anglophone sample were not significant at the .05 level of significance.

Hypothesis 12

The cross-validated coefficient of correlation, employing consistency in the prediction equation, for the subgroups of the francophone sample will be statistically significant.

Table 24 presents the data used in the calculations of

Table 20

DATA FOR CALCULATIONS OF THE CROSS-VALIDATED COEFFICIENTS
OF CORRELATION FOR THE SUBGROUP OF THE FRANCOPHONE
SAMPLE (N=142)

Subgroup	<u>n</u>	Variable	Mean	Standard Devistion	<u>r</u> ^a
2	71	Different.	22.85	6.85	.01
		GPA	4.85	2.09	
3	71	Different.	21.35	6.72	-.03
		GPA	5.06	2.01	

Note: $Y' = r_{yx} \left(\frac{\sigma_Y}{\sigma_X} \right) (\underline{X} - \underline{M}_X) + (\underline{M}_Y)$

Table 21

CROSS-VALIDATED COEFFICIENTS OF CORRELATION FOR THE
SUBGROUP OF THE FRANCOPHONE SAMPLE (N=142)

Subgroup	<u>n</u>	<u>r</u> ^a
2	71	-.02
3	71	-.03

Note: All cross-validated coefficients of correlation were tested using student's t, one-tail test.

$$a_r = .23 , p < .05$$

Table 22

DATA FOR CALCULATIONS OF THE CROSS-VALIDATED COEFFICIENTS
OF CORRELATION FOR THE SUBGROUP OF THE ANGLOPHONE
SAMPLE (N=176)

Subgroup	<u>n</u>	Variable	Mean	Standard Devistion	<u>r</u>
0	88	Consist.	1.53	0.67	-.03
		GPA	5.12	1.88	
1	88	Consist.	1.44	0.69	.14
		GPA	4.74	1.98	

Note: $Y' = r_{yx} \left(\frac{\sigma_Y}{\sigma_X} \right) (\underline{X} - \underline{M}_X) + (\underline{M}_Y)$

Table 23

CROSS-VALIDATED COEFFICIENTS OF CORRELATION FOR THE
SUBGROUP OF THE ANGLOPHONE SAMPLE (N=176)

Subgroup	<u>n</u>	<u>r</u> ^a
0	89	-.03
1	89	-.09

Note: All cross-validated coefficients of correlation were tested using student's t, one-tail test.

$$a_r = .20 , p < .05$$

Table 24

DATA FOR CALCULATIONS OF THE CROSS-VALIDATED COEFFICIENTS
OF CORRELATION FOR THE SUBGROUP OF THE FRANCOPHONE
SAMPLE (N=142)

Subgroup	<u>n</u>	Variable	Mean	Standard Devistion	<u>r</u>
2	71	Consist.	1.5	0.6	-.05
		GPA	4.8	2.0	
3	71	Consist.	1.6	0.5	-.03
		GPA	5.0	2.0	

Note: $Y' = r_{yx} \left(\frac{\sigma_Y}{\sigma_X} \right) (\underline{X} - \underline{M}_X) + (\underline{M}_Y)$

the cross-validated coefficients. Table 25 shows that the cross-validated coefficients of correlation for the cross-validated subgroups of the francophone sample were not significant at the .05 level of significance.

Hypothesis 13

The cross-validated coefficient of correlation, employing differentiation and consistency in the prediction equation will be more significant than the cross-validated coefficient of correlation, employing only differentiation in the prediction equation, for the subgroups of the anglophone sample.

Table 26 presents these two cross-validated coefficients of correlation for the subgroups of the anglophone sample. This table indicates that both coefficients were not significant at the .05 level of significance. As shown in Table 27 the computed X^2 values were not significant for the X^2 Test of Homogeneity of \underline{z} values of \underline{r} . As a result, the cross-validated coefficients of correlation employing differentiation and consistency in the prediction equation were not significantly different from the cross-validated coefficients of correlation employing only differentiation in the prediction equation for the subgroups of the anglophone sample.

Table 25

CROSS-VALIDATED COEFFICIENTS OF CORRELATION FOR THE
SUBGROUP OF THE FRANCOPHONE SAMPLE (N=142)

Subgroup	<u>n</u>	<u>r</u>
2	70	-.04
3	70	-.16

Note: All cross-validated coefficients of correlation were tested using student's t, one-tail test.

$$a_r = .23 , p < .05$$

Table 26

CROSS-VALIDATED COEFFICIENTS OF CORRELATION FOR THE
SUBGROUPS OF THE ANGLOPHONE SAMPLE (N=176)

Subgroup	<u>n</u>	Variable	<u>r</u> ^a
0	89	Differentiation	-.03
		Diff. + Consist.	-.06
1	89	Differentiation	-.08
		Diff. + Consist.	-.04

Note: All cross-validated coefficients of correlation were tested using student's t, one-tail test.

$$abcd_r = .20 , p < .05$$

Table 27

CALCULATIONS FOR THE χ^2 TEST OF HOMOGENEITY OF THE CROSS-VALIDATED COEFFICIENTS FOR SUBGROUP 0 AND SUBGROUP 1 OF THE ANGLOPHONE SAMPLE (N=176)

Subgroup	\underline{n}	\underline{r}	(n-3)	\underline{z}'	$(\underline{z}')^2$	(n-3)(\underline{z}')	(n-3)(\underline{z}') ²
0	88	-.03	85	-.03	.00	-2.72	.08
	88	-.06	85	-.06	.00	-5.61	.37

$$\chi^2 = \sum (\underline{n}-3) (\underline{z}')^2 - \frac{[\sum (\underline{n}-3) (\underline{z}')]^2}{\sum (\underline{n}-3)}$$

$$= .4573 - \frac{(-8.33)^2}{170}$$

$$\chi^2 = .04 \quad a$$

Subgroup	\underline{n}	\underline{r}	(n-3)	\underline{z}'	$(\underline{z}')^2$	(n-3)(\underline{z}')	(n-3)(\underline{z}') ²
1	88	-.08	85	-.08	.00	-6.8	.54
	88	-.04	85	-.04	.00	-3.4	.13

$$\chi^2 = \sum (\underline{n}-3) (\underline{z}')^2 - \frac{[\sum (\underline{n}-3) (\underline{z}')]^2}{\sum (\underline{n}-3)}$$

$$= .68 - \frac{(-10.2)^2}{170}$$

$$\chi^2 = .06 \quad b$$

Note: a, b ₂

$\chi(2) = 4.6$, $p < .05$ (one-tail test)

Hypothesis 14

The cross-validated coefficient of correlation, employing differentiation and consistency in the prediction equation, will be more significant than the cross-validated coefficient of correlation employing only differentiation in the prediction equation, for the subgroups of the francophone sample. Table 28 presents the two cross-validated coefficients of correlation for the subgroups of the francophone sample. This table indicates that both coefficients were not significant at the .05 level of significance.

As shown in Table 29 the computed X^2 values were not significant for the X^2 Test of Homogeneity of \underline{z} values of \underline{r} . As a result, the cross-validated coefficients of correlation employing differentiation and consistency in the prediction equation were not significantly different from the cross-validated coefficients of correlation employing only differentiation in the prediction equation for the subgroups of the francophone sample.

Table 28

CROSS-VALIDATED COEFFICIENTS OF CORRELATION FOR THE
SUBGROUPS OF THE FRANCOPHONE SAMPLE (N=142)

Subgroup	<u>n</u>	Variable	<u>r</u>	
2	89	Differentiation	-.01	a
		Diff. + Consist.	-.01	b
3	89	Differentiation	-.03	c
		Diff. + Consist.	-.02	d

Note: All cross-validated coefficients of correlation were tested using student's t, one-tail test.

$$abcd_r = .20 \quad , \quad df = 90, \quad p < .05$$

Table 29

CALCULATIONS FOR THE χ^2 TEST OF HOMOGENEITY OF THE CROSS-VALIDATED COEFFICIENTS FOR SUBGROUP 0 AND SUBGROUP 1 OF THE FRANCOPHONE SAMPLE (N=142)

Subgroup	\underline{n}	\underline{r}	(n-3)	\underline{z}'	$(\underline{z}')^2$	(n-3)(\underline{z}')	(n-3)(\underline{z}') ²
2	71	-.01	68	-.01	.00	-1.56	.01
	71	-.01	68	-.01	.00	-.74	.00

$$\begin{aligned} \chi^2 &= \sum (\underline{n}-3) (\underline{z}')^2 - \frac{[\sum (\underline{n}-3) (\underline{z}')]^2}{\sum (\underline{n}-3)} \\ &= .0278 - \frac{(-1.904)^2}{136} \\ \chi^2 &= .00 \quad a \end{aligned}$$

Subgroup	\underline{n}	\underline{r}	(n-3)	\underline{z}'	$(\underline{z}')^2$	(n-3)(\underline{z}')	(n-3)(\underline{z}') ²
3	71	-.0377	68	-.038	.001444	-2.584	.098192
	71	-.02931	68	-.03	.0009	-2.05	.0612

$$\begin{aligned} \chi^2 &= \sum (\underline{n}-3) (\underline{z}')^2 - \frac{[\sum (\underline{n}-3) (\underline{z}')]^2}{\sum (\underline{n}-3)} \\ &= .159392 - \frac{(-4.624)^2}{136} \\ \chi^2 &= .03 \quad b \end{aligned}$$

Note: a, b ₂

$\chi^2(2) = 4.6$, $p < .05$ (one-tail test)

CHAPTER IV
DISCUSSION OF RESULTS

Chapter IV is divided, for convenience, into six sections: (1) summary of results, (2) discussion of results, (3) limitations and sources of error, (4) theoretical and practical implications, (5) suggestions for future research, and (6) summary.

1. Summary of Results

The results of this investigation represent a failure to substantiate the hypotheses formulated from John Holland's (1973) theory of careers. Failure is indicated by a total lack of support for the proposition that differentiation and consistency, taken either singularly or in combination, are significantly related to academic achievement as measured by the students' GPA.

The salient findings of this study are as follows:

- (1) Personality pattern differentiation is not significantly related to academic achievement (GPA) for both the anglophone and francophone samples employed in this study.

Although this finding is not supportive of Holland's assumption it is consistent with previous

reports (Werner, 1969; Florence, 1973; Johnson and Moore, 1973, and Aderinto, 1975).

- (2) Personality pattern consistency is not significantly related to academic achievement (GPA) for both the anglophone and francophone sample used in this study.

This finding is in accordance with one half of the studies reviewed that failed to report any significant relationship between consistency and academic achievement (Foster, 1970; Frantz and Walsh, 1972, Johnson and Moore, 1973; Foster and Gade, 1973; Aderinto, 1975; and O'Neil, 1977).

- (3) Combined measured of personality pattern consistency and differentiation are not significantly better predictors of GPA, over and above that of personality pattern differentiation taken singularly, for both the anglophone and francophone samples employed in this study.

This finding, although non-supportive of Holland's assumptions, is consistent with the only other study found that examined this relationship (Chislett, 1977).

- (4) Personality pattern differentiation is not significantly superior to personality pattern consistency as a predictor of GPA for both samples studied.

Although differentiation was found to be slightly more important as a predictor of GPA than consistency, the finding did not reach significance. A similar

result was reported by Chislett (1977).

- (5) Faculty, age, sex and Otis IQ were significantly related to academic achievement for the anglophone sample.

This finding is supportive of much of the academic achievement literature which reports a moderate, but fairly consistent relationship between sex and academic achievement (Worthington and Grant, 1971); age and academic achievement (Lavin, 1965); faculty and academic achievement (Klein, Rock and Evans, 1968); and Otis IQ and academic achievement (Dispenzieri, Giniger, Reichman and Levy, 1971).

- (6) Faculty, age, sex and Otis-Ottawa IQ were not significantly related to academic achievement for the francophone sample.

This finding is contrary to that found for the anglophone sample and surprising in lieu of the studies reported above.

2. Discussion of Results

The findings of this investigation concerning personality pattern differentiation and consistency and their relationship to academic achievement are disappointing from a theoretical point of view. However, these findings further the much debated issue concerning the usefulness of

differentiation and consistency as predictors of various psychological-social behaviors by adding to that segment of the literature that views these constructs to be of questionable value as explanatory constructs in academic achievement.

Several possibilities exist to explain the non-significant findings. The first explanation involves the possibility that the hypotheses concerning personality pattern differentiation and consistency are more applicable to some groups than others. More specifically, it is possible that Holland's hypotheses concerning differentiation and consistency are more applicable to student non-couselees than they are to student couselees. One could support the validity of this possibility by arguing that couselees tend to be more homogeneous in terms of certain personality variables that are believed to be related to personality pattern differentiation and consistency. This homogeneity would in turn serve to reduce the variability of a student couselee's personality profile to the extent that distinctions between the various dimensions, on which consistency and differentiation depend, become blurred.

One such study which lends inferential support to the above is that of Osipow and Gold (1968) who investigated 65 personal couselees and 88 non-couselees on a number of variables. They found that the former group had fewer primary interest areas on the Strong Vocational Interest Blank

(SVIB, Strong, 1959), a greater tendency to reject numerous interest areas, and a higher frequency of no crystallized interests. Although the authors did not employ the terms consistency and differentiation, it is clear that the former could be used to replace 'primary interest area' and the latter to replace 'crystallized interests'. Thus the conclusion restated becomes the counselees possessed less consistent and less consistent and less differentiated personality patterns than non-counselees.

However, a number of studies exist which suggest that counselees are not as homogeneous, as formerly assumed, in terms of certain personality variables.

In a comparison of 174 counselees and 174 non-counselees, Smith (1977) hypothesized that counselees were less consistent, less well-differentiated, and more dependent than their non-counselee counterparts. All freshmen students were administered the Vocational Preference Inventory (VPI, Holland, 1965) and the Dependency Proneness Scale (DPS, Flanders, Anderson and Amidan, 1961). Each student was categorized as either counselee or non-counselee, consistent or inconsistent, differentiated or undifferentiated, and dependent or independent. Multiple chi-square analyses indicated no significant differences between counselees and non-counselees on any of the comparisons at the .05 level of probability.

In a similar, but much improved study in terms of the

design and analyses, Meuser (1978) reported similar findings. He employed a series of chi-square analyses to study the degree of relationship between the group membership of 64 personal counselees, 159 vocational counselees, and 361 non-counselees and differentiation and consistency. All subjects were administered the Strong Campbell Interest Inventory (SCII, Campbell, 1974). Multiple chi-square analyses indicated no significant differences between personal counselees, vocational counselees and non-counselees in terms of personality type or differentiation and consistency.

Thus arguing that Holland's hypotheses concerning differentiation and consistency are more applicable to student non-counselees than student counselees is an unlikely explanation for the non-significant results of this investigation.

An alternative, and more likely, explanation for the non-significant results may rest in inherent weaknesses of Holland's theory. The primary weakness being that Holland's hypotheses and the formulae that he presents to test his ideas have yet to be placed within the context of theory. In other words, Holland does not offer any explanatory principles to clarify how his formulae were derived. Rather, he presents his formulae, which, because they are testable, may be supported or altered but do not flow deductively from any clear theoretical base.

Another related difficulty lies in the simplicity and questionable validity of Holland's operational definitions of differentiation and consistency. In discussing his operational definition of differentiation Holland (1973) says, "although differentiation is done by an explicit and simple technique, it is a complex concept" (p. 22). Thus a question arises as to whether Holland's operational definitions of differentiation and consistency capture the complexities supposedly inherent in these two constructs. In other words, is the magnitude of the difference between the highest and lowest scores on the six General Occupational Themes scores of the SCII an accurate measure of the degree of clarity of one's interests, competencies, values, perceptions and traits? Is the degree of similarity between the two highest General Occupational Themes scores of the SCII an accurate measure of the degree of similarity or relatedness of one's competencies, interests, traits, values and perceptions?

Another possible explanation for the lack of significant results, may rest in the omission of variables known to be potent predictors of academic achievement. For example, socioeconomic status was not included as an independent variable in this study. According to Hall (1972) this variable is a potent predictor of academic achievement. Holland's congruency construct has been repeatedly shown to be a significant predictor of academic achievement (Chislett, 1977; Florence, 1973; Werner, 1969).

The influence of these variables and other strong predictors of academic achievement are unknown in this study and may have accounted for a significant amount of variation in GPA unaccounted for by differentiation and consistency.

Finally, it is possible that the divergent points-of-view expressed in the literature reviewed concerning differentiation and consistency in relation to academic achievement stem largely from chance variations among the population samples of the different studies. Thus, slightly varying proportions of consistent and/or differentiated personality patterns in the subgroups, might lead to completely different conclusions in the different studies, depending on the number of subjects

employed. For example, in large samples, even weak relationships may be statistically significant, although not necessarily substantively important.

The findings of this investigation concerning the control variables and their significant relationship to academic achievement (GPA) for the anglophone sample supports much of the literature in Chapter I which reports a moderate, but fairly consistent, relationship between these variables and academic achievement. Thus from a purely research perspective, these results are not surprising.

However, what was surprising was the discovery that these variables, which were included as control variables, were the only ones that were significantly predictive of GPA. Although faculty, age, sex and Otis IQ were found to be the only significant predictors of GPA for the anglophone sample, their combined effect only accounted for 21% of the variation in GPA. Thus it would appear that these variables could be classified more appropriately as background variables rather than major predictors.

The findings of this investigation concerning the control variables and their non-significant relationship to academic achievement (GPA) for the francophone sample is surprising in lieu of other research findings. Perusal of the data indicates that this finding is probably not a function of a restricted GPA range. This finding could be a result of some cultural differences not accounted for in this

study.

3. Limitations and Sources of Error

One clear limitation of the present study focuses on the ex post factor nature of the research. More specifically, it involves the fact that because all of the data was available prior to the research investigation very little control was exerted on factors that could have influenced both the dependent and independent variables. For example, the time period in which each subject was administered the tests, from which many of the independent variables were derived, varied within a four year period; what could have been the influence of various events in between these different time periods on the subjects' test performance? This and other related questions concerning the influence of uncontrollable factors due to the ex post factor nature of the research remain unanswered.

The use of measured interests (i.e., results from the Strong-Campbell Interest Inventory) to obtain scores for the independent variables of differentiation and consistency may also be a limitation for this study. Although the majority of studies reviewed used measured interests, Frantz and Walsh (1972) used expressed major to define consistency and differentiation and obtained more supportive results. Furthermore, Dolliver (1969), in reviewing the literature on

measured versus expressed interests concluded that expressed choice is more predictive of future occupation than measured interests.

4. Theoretical and Practical Implications

The prominent findings of this study suggest that consistency and differentiation either taken singularly or in combination are not related to academic achievement for both anglophone and francophone students. Furthermore, faculty, age, sex and aptitude were found to be significantly related to and predictors of academic achievement (GPA) for anglophone students but not for francophone students.

The theoretical implications of these findings relate to John Holland's (1973) vocational theory in that they raise serious questions concerning the usefulness of differentiation and consistency as predictors of academic achievement. The overwhelming lack of support for Holland's hypothesized relationship between his two constructs and academic achievement found in this investigation suggests that Holland's theoretical constructs of differentiation and consistency and their operational definitions are in need of further study. Particularly important in this respect are longitudinal studies designed to explore the development of differentiated personality patterns and studies designed to examine new operational definitions for these constructs.

In terms of the practical implications of the results, several issues arise. First, extreme caution should be exercised by counselors who use the constructs of differentiation and consistency as diagnostic aids with counselees experiencing educational planning difficulties, particularly when these are used as forecasters of academic success.

Second, vocational counselors or administrators may draw from these findings some carefully limited inferences about anglophone and francophone counselees. The results suggest, for example, that female anglophone counselees tend to have higher GPA scores than male anglophones; anglophones closer to the science end of the faculty continuum tend to have higher GPA scores than those closer to the liberal arts end of the faculty continuum; older anglophones tend to have higher GPA scores than younger anglophones; and that anglophone counselees of higher aptitude tend to have higher GPA scores than anglophone counselees of lower aptitude.

On the other hand, age, sex, faculty and scholastic aptitude were not significantly related to GPA for the francophone counselees. Thus it appears that the more traditional predictors of GPA apply more to anglophone student counselees than francophone student counselees. Although the results do not provide clues as to which factors or predictors of academic achievement are applicable with francophone counselees, they do caution counselees against employing the more traditional predictors of GPA with

francophone counselees.

5. Suggestions for Further Research

The former non-significant findings give rise to the question of whether further research of differentiation and consistency would be fruitful. The findings of other investigators (i.e., Holland, Gottfredson and Nafziger, 1975 and Frantz and Walsh, 1972) indicate that differentiation and consistency are related to a variety of personality variables. This suggests that differentiation and consistency may be too multifaceted to be useful as predictors of behavior. Future studies, therefore, might attempt to determine more precisely the separate components of these constructs by means of factor analysis. One possibility might be to obtain measures of educational/vocational decisiveness, educational/vocational maturity, educational/vocational satisfaction, educational/vocational stability, in addition to separate measures of differentiation and consistency from a large sample of undergraduate students and subject the variables to a series of separate factor analyses to determine the appropriate number of factors.

Following the findings of Dolliver (1969) and Livent (1971), future studies might also attempt to devise more comprehensive measures of differentiation and consistency.

For example, the range measure of differentiation, while being easy to calculate and thus appealing to researchers, may not adequately reflect the complexities that the construct was intended to represent. One possibility might be to include the Basic Interest Scales of the Strong-Campbell Interest Inventory (SCII, Campbell, 1974) in the calculation of differentiation and consistency scores. Since the 23 interest scales are grouped according to the six personality types, one could calculate differentiation scores for each of the interest clusters. For example, the Realistic (R) differentiation score would be the difference between the highest and lowest realistic interest scores (i.e., Nature score - Military Activities score) the Social (S) differentiation score would be the difference between the highest and lowest social interest scores (i.e., Teaching score - Religious Activities score) and so on. The Total (T) differentiation score would be the sum of these component scores.

Definitions based on consistency of expressed vocational and educational choices and on differentiation obtained by indices of decisiveness or certainty should be explored.

The finding that the control variables were significantly related to GPA for the anglophone sample but not for the francophone sample raises some interesting possibilities for further research. Future studies might attempt to ascertain if some as of yet unidentified cultural

factor(s) exist to explain the above finding.

In summary, this chapter was concerned with the discussion of the results. The correlational and regression analyses were summarized and discussed. The chapter also dealt with the limitations of the study, the theoretical and practical implications, as well as suggestions for further research.

6. Summary

The primary purpose of this study was to assess Holland's (1973) theoretical constructs of consistency and differentiation as measures of academic achievement (GPA). Specifically, high levels of consistency and differentiation were hypothesized to be related to high levels of academic achievement; the prediction of academic achievement was hypothesized to be improved by combining measures of differentiation and consistency; and finally, it was hypothesized that differentiation is a better predictor of academic achievement than consistency.

The General Occupational Themes of the Strong-Campbell Interest Inventory (1974) were employed to determine levels of consistency and degrees of differentiation. For example, consistency was either high, medium, or low for each subject, depending upon the relatedness of his two highest personality types. Differentiation was defined as the range between the

highest and lowest personality type scores.

The subjects were 176 anglophone and 142 francophone undergraduate students who consulted the University of Ottawa Counselling Service between May 1, 1975 and May 1, 1979.

A series of correlational and multiple regression analyses were employed to test the major hypotheses. Cross-validation analyses were used to ensure that the results were not due to chance. The major independent variables were consistency and differentiation. Faculty age, sex, and academic aptitude served as control variables.

The results indicated that differentiation and consistency, either taken singularly or in combined form, are not related to academic achievement for both anglophone and francophone counselee students. No evidence was found to support the contention that differentiation is a better predictor of academic achievement than consistency for either the anglophone or francophone sample. However, faculty, age, sex, and academic aptitude were found to be significantly related to and predictive of academic achievement (GPA) for anglophone students but not for francophone students.

It was suggested that weaknesses in Holland's theory, particularly in respect to his operational definitions of differentiation and consistency, may account for the non-significant findings.

Furthermore, it was proposed that counsellors exercise extreme caution when employing these two constructs as

diagnostic aids with counselees experiencing educational planning difficulties and that they proceed cautiously when using faculty, age, sex, and academic aptitude, as measured by the Otis-Ottawa, as factors influencing academic achievement with francophone student counselees.

Finally, it was suggested that future studies devise more comprehensive measures of differentiation and consistency and attempt to determine more precisely the separate components of these constructs by means of factor analysis.

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APPENDIX 1

DESCRIPTIONS OF EACH OF HOLLAND'S SIX PERSONALITY TYPES

APPENDIX 1

DESCRIPTIONS OF EACH OF HOLLAND'S SIX PERSONALITY TYPES¹

Realistic. Persons of this type are robust, rugged, practical, and physically strong; somewhat uncomfortable in social settings; have good motor co-ordination and skills but lack verbal and interpersonal skills; usually perceive themselves as mechanically and athletically inclined; are practical, stable, natural, and persistent; prefer concrete to abstract problems; see themselves as aggressive; have conventional political and economic goals; rarely perform creatively in the arts of sciences, but do like to build things with tools. Realistic types prefer such occupations as mechanic, engineer, electrician, fish and wildlife specialist, crane operator, tool designer, and various technical positions.

Investigative. This category includes those with a strong scientific orientation; they are usually task oriented, introspective, and asocial; prefer to work independently; prefer to think through rather than act out problems; have a great need to understand the physical world; enjoy ambiguous tasks; have unconventional values and attributes; usually perceive themselves as lacking in leadership or persuasive abilities, but are confident in

1. SCII Manual, Campbell, 1974, p. 31.

their scholarly and intellectual abilities; describe themselves as analytical, curious, independent, and reserved; especially dislike repetitive activities. Vocational preferences include astronomer, biologist, chemist, technical writer, and zoologist.

Artistic. Persons of artistic type prefer free, unstructured situations with maximum opportunities for self-expression; resemble investigative types in being introspective and asocial, but differ in having less ego strength and greater need for individual expression, in being more impulsive, and in suffering more frequently from emotional disturbances; they are creative, especially in artistic and musical media, show aversions to problems that are highly structured or require gross physical strength and skills; prefer dealing with problems through self-expression in artistic media; perform well on standard measures of creativity, and highly value aesthetic qualities; see themselves as expressive, disorderly, non-conforming, introspective, and independent. Vocational preferences include artist, author, composer, writer, musician, director, and symphony conductor.

Social. Persons of this type are social, responsible, humanistic, and religious; like to work in groups, and enjoy being central in the group; have verbal and interpersonal skills; avoid intellectual problem-solving, physical exertion, and highly ordered activities; prefer to solve

problems through feelings and interpersonal manipulation of others; enjoy activities that involve informing, training, developing, curing, or enlightening others; perceive themselves as understanding, responsible, idealistic, and helpful. Vocational preferences include school teacher, marriage counselor, speech therapist, clinical psychologist, and missionary.

Enterprising. Persons of this type have verbal skills suited to selling, dominating, and leading; prefer to be strong leaders; have strong drive to attain organizational goals or economic aims; tend to avoid work situations requiring long periods of intellectual work; differ from conventional types in having greater preference for ambiguous social tasks and an even greater concern for power, status, and leadership; see themselves as aggressive, popular, self-confident, cheerful, and sociable; generally have high energy level; show an aversion to scientific activities. Vocational preferences include business executive, political campaign manager, real-estate sales, stock and bond sales, television producer, and retail merchandising.

Conventional. Conventional people prefer well-organized environments and like systematic verbal and numerical activities; are usually conforming and prefer subordinate tasks, but avoid ambiguous situations and problems involving interpersonal relationships or physical skills; describe themselves as conscientious, efficient, obedient, calm,

orderly, and practical; identify with power; value material possessions, and status. Vocational preferences include bank examiner, bookkeeper, clerical worker, financial analyst, quality control expert, statistician, and traffic manager.

APPENDIX 2

HOLLAND'S HEXAGONAL MODEL FOR DEFINING THE PSYCHOLOGICAL
RESEMBLANCES AMONG TYPES AND ENVIRONMENTS AND THEIR
INTERACTIONS

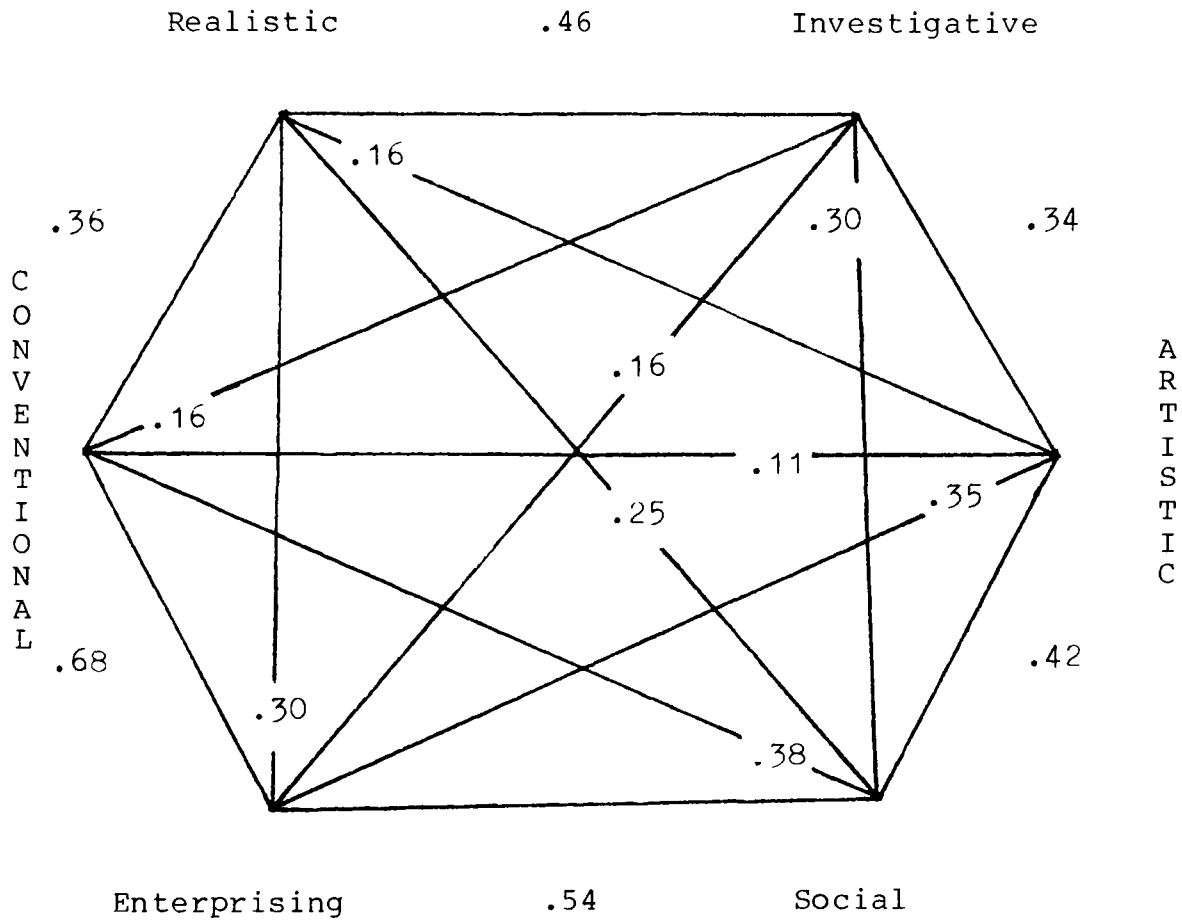


Figure 1. Holland's Hexagonal Model for Defining the Psychological Resemblances Among Types and Environment and their Interactions.

APPENDIX 3
REQUEST FOR SERVICE FORM

APPENDIX 3

FORMULE DE DEMANDE/REQUEST FOR SERVICE FORM

NO. D'ETUDIANT/STUDENT NO. _____ NO. DOSSIER/FILE NO. _____

NOM/NAME _____

ADRESSE/ADDRESS _____

TEL. _____

ADRESSE PERMANENTE _____

PERMANENT ADDRESS _____ TEL. _____

SEXE/SEX: F M DATE DE NAISSANCE _____ AGE _____ C M D D SEP.

DATE OF BIRTH _____ AGE _____ S M W D SEP.

PREMIER LANGUE FRANCAIS _____ ANGLAIS _____ AUTRE _____ BIL. _____

FIRST LANGUAGE FRENCH _____ ENGLISH _____ OTHER _____ BIL. _____

FACULTE/FACULTY _____ ANNEE/YEAR _____

SOURCE/SOURCE _____

CONTACT ANTECEDENT OUI _____ QUAND _____ NON _____

PREVIOUS CONTACT YES _____ WHEN _____ NO _____

PROBLEME TEL QUE PRESENTE _____

PRESENTING PROBLEM _____

JOUR DE L'APPEL _____ HEURE _____

DAY OF CALL _____ TIME _____

.....

APPOINTEMENT/RENDEZ-VOUS

DATE/DATE _____

TIME/HEURE _____

COUNSELLOR/CONSEILLER _____

APPEL RECU PAR/CALL RECEIVED BY _____

APPENDIX 4
SPECIAL FILE

APPENDIX 4
SPECIAL FILE

NAME: _____ DOSSIER NO.: _____
ADDRESS: _____ STUDENT NO.: _____
DATE OF BIRTH: _____ FACULTY: _____
AGE: _____ MARITAL STATUS: _____
1st LANGUAGE: _____ BIL.: _____ SEX: _____

.....

DATE 1st SEEN: _____
TOTAL NO. SESSIONS: _____

.....

OTIS IQ: _____ G.O.T. R _____
I _____
A _____
OTIS-OTTAWA: _____ S _____
E _____
C _____

.....

DIFFERENTIATION SCORE: _____
CONSISTENCY SCORE: _____
GPA SCORE: _____

APPENDIX 5

SCII TEST BOOKLET, FORM T325, MERGED FORM

Strong-Campbell Interest Inventory

Merged Form of the

Strong Vocational Interest Blank

EDWARD K. STRONG, JR. 1884-1963

DAVID P. CAMPBELL

This inventory is used to help you understand your work interests in a general way and to show you some kinds of work you might be comfortable in. The following pages list many jobs, activities, school subjects, and so forth, and you are asked to show your liking or disliking for each. Your answers will be compared with the answers given by people already working in a wide range of jobs, and your scores will show how similar your interests are to the interests of these people. But this is not a test of your *abilities*, it is an inventory of your *interests*. Your scores will be presented to you later, on a special sheet called a profile, with information on how to understand the scores.

Directions:

- 1 With this booklet, you should have a **special answer sheet** on which to mark your answers.
- 2 **Please make no marks on this booklet**, it will be used again by other people.
- 3 Use any soft, black, lead pencil (such as a No. 2) to make your marks on the answer sheet.
- 4 Fill in your name and other information on the answer sheet. Follow carefully the instructions for filling in your name.
- 5 **Instructions for marking your answers** are given on the next page of this booklet and also on the answer sheet.
- 6 **Make a heavy, dark mark for each answer**—not a cross or a check mark.
- 7 If you make a mistake or change your mind, **erase carefully and thoroughly**.
- 8 Your answer sheet will be processed by computer. **Please keep it free from wrinkles or stray marks**, so that it will be scored correctly.
- 9 Try to answer each question. **Work quickly**, first impressions usually give the best results with this inventory. Turn the page and begin.

STANFORD UNIVERSITY PRESS, STANFORD, CALIFORNIA

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Part I. Occupations

Many occupations are listed below. For each of them, show how you would feel about doing that kind of work.

Mark on the answer sheet in the space labeled “L” if you think you would **like** that kind of work.

Mark in the space labeled “I” if you are **indifferent** (that is, if you think you wouldn’t care one way or another).

Mark in the space labeled “D” if you think you would **dislike** that kind of work.

Don’t worry about whether you would be good at the job or about not being trained for it. Forget about how much money you could make or whether you could get ahead. Think only about whether you would like to do the work done in that job.

Work fast. Answer every one.

- | | | |
|-----------------------------------|---------------------------------|--------------------------------|
| 1 Actor/Actress | 46 Editor | 91 Orchestra conductor |
| 2 Advertising executive | 47 Electrical engineer | 92 Pharmacist |
| 3 Architect | 48 Electronics technician | 93 Photographer |
| 4 Art museum director | 49 Elementary school teacher | 94 Physician |
| 5 Art teacher | 50 Employment manager | 95 Playground director |
| 6 Artist | 51 Factory manager | 96 Poet |
| 7 Artist’s model | 52 Farmer | 97 Police officer |
| 8 Astronomer | 53 Fashion model | 98 Politician |
| 9 Athletic director | 54 Florist | 99 Private secretary |
| 10 Auctioneer | 55 Foreign correspondent | 100 Professional athlete |
| 11 Author of children’s books | 56 Foreign service officer | 101 Professional dancer |
| 12 Author of novels | 57 Free-lance writer | 102 Professional gambler |
| 13 Author of technical books | 58 Governor of a state | 103 Psychologist |
| 14 Auto mechanic | 59 High school teacher | 104 Public relations director |
| 15 Auto racer | 60 Home economics teacher | 105 Rancher |
| 16 Auto sales | 61 Hospital records clerk | 106 Realtor |
| 17 Bank teller | 62 Housekeeper | 107 Receptionist |
| 18 Beauty and haircare consultant | 63 Hotel manager | 108 Retailer |
| 19 Biologist | 64 Illustrator | 109 Sales manager |
| 20 Bookkeeper | 65 Income tax accountant | 110 School principal |
| 21 Building contractor | 66 Interior decorator | 111 Scientific illustrator |
| 22 Business teacher | 67 Inventor | 112 Scientific research worker |
| 23 Buyer of merchandise | 68 Jet pilot | 113 Sculptor |
| 24 Carpenter | 69 Judge | 114 Secret service agent |
| 25 Cartoonist | 70 Labor arbitrator | 115 Social worker |
| 26 Cashier in bank | 71 Laboratory technician | 116 Specialty salesperson |
| 27 Chemist | 72 Landscape gardener | 117 Sports reporter |
| 28 Children’s clothes designer | 73 Librarian | 118 Statistician |
| 29 Church worker | 74 Life insurance agent | 119 Flight attendant |
| 30 City or state employee | 75 Machine shop supervisor | 120 Stockbroker |
| 31 City planner | 76 Machinist | 121 Surgeon |
| 32 Civil engineer | 77 Manager, Chamber of Commerce | 122 Toolmaker |
| 33 College professor | 78 Manager, child care center | 123 Traveling salesperson |
| 34 Computer operator | 79 Manager, women’s style shop | 124 Travel bureau manager |
| 35 Corporation lawyer | 80 Manufacturer | 125 Typist |
| 36 Costume designer | 81 Mechanical engineer | 126 TV announcer |
| 37 Courtroom stenographer | 82 Military officer | 127 Vocational counselor |
| 38 Criminal lawyer | 83 Minister, priest, or rabbi | 128 Waiter/Waitress |
| 39 Dancing teacher | 84 Musician | 129 Wholesaler |
| 40 Dental assistant | 85 Newspaper reporter | 130 X-Ray technician |
| 41 Dentist | 86 Nurse | 131 YMCA/YWCA staff member |
| 42 Designer, electronic equipment | 87 Nurse’s aide/Orderly | |
| 43 Dietitian | 88 Office clerk | |
| 44 Draftsman | 89 Office manager | |
| 45 Dressmaker/Tailor | 90 Opera singer | |

Part II. School Subjects

Show in the same way whether you are interested in these school subjects, even though you may not have studied them.

Mark "L" for Like.

Mark "I" for Indifferent (when you don't care one way or the other).

Mark "D" for Dislike.

- 132 Agriculture
- 133 Algebra
- 134 Arithmetic
- 135 Ancient languages (Latin, Sanskrit, etc.)
- 136 Art
- 137 Bible history
- 138 Bookkeeping
- 139 Botany
- 140 Calculus

- 141 Chemistry
- 142 Civics (government)
- 143 Dramatics
- 144 Economics
- 145 English composition
- 146 Geometry
- 147 Home economics
- 148 Industrial arts
- 149 Journalism
- 150 Literature

- 151 Mathematics
- 152 Mechanical drawing
- 153 Military drill
- 154 Modern languages (French, German, etc.)
- 155 Nature study
- 156 Penmanship
- 157 Philosophy
- 158 Physical education
- 159 Physics
- 160 Physiology
- 161 Political science
- 162 Psychology
- 163 Public speaking
- 164 Sociology
- 165 Statistics
- 166 Typewriting
- 167 Zoology

Part III. Activities

Show your interests in the same way as before. Give the first answer that comes to mind.

- 168 Making a speech
- 169 Doing research work
- 170 Repairing a clock
- 171 Cooking
- 172 Operating machinery
- 173 Writing reports
- 174 Discussing politics
- 175 Taping a sprained ankle
- 176 Adjusting a carburetor
- 177 Going to church
- 178 Heading a civic improvement program
- 179 Raising flowers and vegetables
- 180 Interviewing job applicants

- 181 Teaching children
- 182 Teaching adults
- 183 Meeting and directing people
- 184 Taking responsibility
- 185 Sewing
- 186 Making statistical charts
- 187 Operating office machines
- 188 Giving first aid assistance
- 189 Decorating a room with flowers
- 190 Interviewing prospects in selling
- 191 Drilling soldiers
- 192 Pursuing bandits in a sheriff's posse
- 193 Watching an open-heart operation
- 194 Checking typewritten material for errors
- 195 Repairing electrical wiring
- 196 Organizing cabinets and closets
- 197 Adjusting difficulties of others
- 198 Starting a conversation with a stranger
- 199 Cabinetmaking
- 200 Being a forest ranger

- 201 Bargaining ("swapping")
- 202 Looking at things in a clothing store
- 203 Buying merchandise for a store
- 204 Displaying merchandise in a store
- 205 Competitive activities
- 206 Regular hours for work
- 207 Continually changing activities
- 208 Interviewing clients
- 209 Arguments
- 210 Developing business systems
- 211 Doing your own laundry work
- 212 Saving money
- 213 Contributing to charities
- 214 Raising money for charity
- 215 Expressing judgments publicly, regardless of what others say
- 216 Climbing along the edge of a steep cliff
- 217 Living in the city
- 218 Discussing the purpose of life

Part IV. Amusements

Show in the same way how you feel about these ways of having fun. Work rapidly. Do not think over various possibilities. Give the first answer that comes to mind.

- 219 Golf
- 220 Fishing
- 221 Jazz or rock concerts
- 222 Looking at things in a hardware store
- 223 Boxing
- 224 Poker
- 225 Bridge

- 226 Solving mechanical puzzles
- 227 Planning a large party
- 228 Religious music
- 229 Drilling in a military company
- 230 Amusement parks
- 231 Conventions
- 232 Formal dress affairs
- 233 Electioneering for office
- 234 Art galleries
- 235 Leading a scout troop
- 236 Writing a one-act play
- 237 Symphony concerts
- 238 Night clubs
- 239 Church young people's group
- 240 Sports pages in the newspaper
- 241 Poetry
- 242 Skiing
- 243 Business magazines
- 244 Popular mechanics magazines

- 245 Reading the Bible
- 246 Magazines about art and music
- 247 Building a radio or stereo set
- 248 Attending lectures
- 249 Family pages in newspapers
- 250 Performing scientific experiments
- 251 Camping
- 252 Playing chess
- 253 Preparing dinner for guests
- 254 Entertaining others
- 255 Trying new cooking recipes
- 256 Being the first to wear the latest fashions
- 257 Organizing a play

Part V. Types of People

Most of us choose jobs where we can work with people we enjoy. Show in the same way as before how you would feel about having day-to-day contact with the following types of people. Work fast. Don't think of specific examples. Just give the first answer that comes to mind.

- | | |
|----------------------------------|---|
| 258 Highway construction workers | 271 Emotional people |
| 259 High school students | 272 People who have made fortunes in business |
| 260 Military officers | 273 Thrifty people |
| 261 Artistic persons | 274 Musical geniuses |
| 262 Foreigners | 275 Outspoken people with new ideas |
| 263 Ballet dancers | 276 Fashionably dressed people |
| 264 Nonconformists | 277 Prominent business leaders |
| 265 People who assume leadership | 278 Athletic persons |
| 266 Religious people | 279 People who daydream a lot |
| 267 Aggressive people | 280 Outstanding scientists |
| 268 Physically sick people | 281 People who live dangerously |
| 269 Babies | |
| 270 Very old people | |

Part VI. Preference Between Two Activities

Here are several pairs of activities or occupations. Show which one of each pair you like better. If you prefer the one on the **left**, mark in the space labeled "L" on the answer sheet; if you prefer the one on the **right**, mark in the space labeled "R"; if you like **both the same** or if you **can't decide**, mark in the space labeled "=".

Work rapidly. Make one mark for each pair.

- | | |
|--|---|
| Airline pilot | 282 Airline ticket agent |
| Taxicab driver | 283 Police officer |
| Headwaiter/Hostess | 284 Lighthouse keeper |
| Selling things house to house | 285 Gardening |
| Developing plans | 286 Carrying out plans |
| Doing a job yourself | 287 Telling somebody else to do the job |
| Dealing with things | 288 Dealing with people |
| Taking a chance | 289 Playing safe |
| Drawing a definite salary | 290 Receiving a commission on what is done |
| Outside work | 291 Inside work |
| Work for yourself | 292 Carrying out the program of a superior whom you respect |
| Supervisor of a hospital | 293 Warden of a prison |
| Vocational counselor | 294 Public health officer |
| Physical activity | 295 Mental activity |
| Dog trainer | 296 Juvenile parole officer |
| Thrilling dangerous activities | 297 Quieter, safer activities |
| Physical education director | 298 Free-lance writer |
| Statistician | 299 Social worker |
| Technical responsibility (in charge of 25 people doing scientific work) | 300 Supervisory responsibility (in charge of 300 people doing business-office work) |
| Going to a play | 301 Going to a dance |
| Teacher | 302 Salesperson |
| Experimenting with new grooming preparations | 303 Experimenting with new office equipment |
| Being married to a research scientist | 304 Being married to a sales executive |
| Working in a large corporation with little chance of being president before age 55 | 305 Working for yourself in a small business |
| Working in an import-export business | 306 Working in a research laboratory |
| Music and art events | 307 Athletic events |
| Reading a book | 308 Watching TV or going to a movie |
| Appraising real estate | 309 Repairing and restoring antiques |
| Having a few close friends | 310 Having many acquaintances |
| Work in which you move from place to place | 311 Work where you live in one place |

Part VII. Your Characteristics

Show here what kind of person you are. If the statement describes you, mark in the space labeled "Y" (for Yes); if the statement does **not** describe you, mark in the space labeled "N" (for No); if you cannot decide, mark in the space labeled "?". (Be frank in pointing out your weak points because these are as important as your strong points in choosing a career.)

- | | |
|---|---|
| 312 Usually start activities of my group | 319 Can prepare successful advertisements |
| 313 Have more than my share of novel ideas | 320 Stimulate the ambitions of my associates |
| 314 Win friends easily | 321 Can write a concise well-organized report |
| 315 Make decisions immediately, not after considerable thought | 322 Enjoy tinkering with small hand tools |
| 316 Prefer working alone rather than on committees | 323 Can smooth out tangles and disagreements between people |
| 317 Have mechanical ingenuity (my inventiveness) | 324 Put drive into my organization |
| 318 Am concerned about philosophical problems such as religion, meaning of life, etc. | 325 Have patience when teaching others |

APPENDIX 6

SCII COMPUTER-SCORED ANSWER SHEET

ITEMS 282-311

- If you prefer the item on the left, mark the "L"
- If you like both items or can't decide, mark the "="
- If you prefer the item on the right, mark the "R"

ITEMS 312-325

- If the item describes you, mark "Yes (Y)"
- If you are not sure, mark the "?"
- If the item does not describe you, mark "No (N)"

ACTIVITIES			AMUSEMENTS		TYPES OF PEOPLE			YOUR CHARAC-TERISTICS									
168	<input type="radio"/> <input type="radio"/> <input type="radio"/>	188	<input type="radio"/> <input type="radio"/> <input type="radio"/>	208	<input type="radio"/> <input type="radio"/> <input type="radio"/>	219	<input type="radio"/> <input type="radio"/> <input type="radio"/>	239	<input type="radio"/> <input type="radio"/> <input type="radio"/>	258	<input type="radio"/> <input type="radio"/> <input type="radio"/>	278	<input type="radio"/> <input type="radio"/> <input type="radio"/>	292	<input type="radio"/> <input type="radio"/> <input type="radio"/>	312	<input type="radio"/> <input type="radio"/> <input type="radio"/>
169	<input type="radio"/> <input type="radio"/> <input type="radio"/>	189	<input type="radio"/> <input type="radio"/> <input type="radio"/>	209	<input type="radio"/> <input type="radio"/> <input type="radio"/>	220	<input type="radio"/> <input type="radio"/> <input type="radio"/>	240	<input type="radio"/> <input type="radio"/> <input type="radio"/>	259	<input type="radio"/> <input type="radio"/> <input type="radio"/>	279	<input type="radio"/> <input type="radio"/> <input type="radio"/>	293	<input type="radio"/> <input type="radio"/> <input type="radio"/>	313	<input type="radio"/> <input type="radio"/> <input type="radio"/>
170	<input type="radio"/> <input type="radio"/> <input type="radio"/>	190	<input type="radio"/> <input type="radio"/> <input type="radio"/>	210	<input type="radio"/> <input type="radio"/> <input type="radio"/>	221	<input type="radio"/> <input type="radio"/> <input type="radio"/>	241	<input type="radio"/> <input type="radio"/> <input type="radio"/>	260	<input type="radio"/> <input type="radio"/> <input type="radio"/>	280	<input type="radio"/> <input type="radio"/> <input type="radio"/>	294	<input type="radio"/> <input type="radio"/> <input type="radio"/>	314	<input type="radio"/> <input type="radio"/> <input type="radio"/>
171	<input type="radio"/> <input type="radio"/> <input type="radio"/>	191	<input type="radio"/> <input type="radio"/> <input type="radio"/>	211	<input type="radio"/> <input type="radio"/> <input type="radio"/>	222	<input type="radio"/> <input type="radio"/> <input type="radio"/>	242	<input type="radio"/> <input type="radio"/> <input type="radio"/>	261	<input type="radio"/> <input type="radio"/> <input type="radio"/>	281	<input type="radio"/> <input type="radio"/> <input type="radio"/>	295	<input type="radio"/> <input type="radio"/> <input type="radio"/>	315	<input type="radio"/> <input type="radio"/> <input type="radio"/>
172	<input type="radio"/> <input type="radio"/> <input type="radio"/>	192	<input type="radio"/> <input type="radio"/> <input type="radio"/>	212	<input type="radio"/> <input type="radio"/> <input type="radio"/>	223	<input type="radio"/> <input type="radio"/> <input type="radio"/>	243	<input type="radio"/> <input type="radio"/> <input type="radio"/>	262	<input type="radio"/> <input type="radio"/> <input type="radio"/>			296	<input type="radio"/> <input type="radio"/> <input type="radio"/>	316	<input type="radio"/> <input type="radio"/> <input type="radio"/>
173	<input type="radio"/> <input type="radio"/> <input type="radio"/>	193	<input type="radio"/> <input type="radio"/> <input type="radio"/>	213	<input type="radio"/> <input type="radio"/> <input type="radio"/>	224	<input type="radio"/> <input type="radio"/> <input type="radio"/>	244	<input type="radio"/> <input type="radio"/> <input type="radio"/>	263	<input type="radio"/> <input type="radio"/> <input type="radio"/>			297	<input type="radio"/> <input type="radio"/> <input type="radio"/>	317	<input type="radio"/> <input type="radio"/> <input type="radio"/>
174	<input type="radio"/> <input type="radio"/> <input type="radio"/>	194	<input type="radio"/> <input type="radio"/> <input type="radio"/>	214	<input type="radio"/> <input type="radio"/> <input type="radio"/>	225	<input type="radio"/> <input type="radio"/> <input type="radio"/>	245	<input type="radio"/> <input type="radio"/> <input type="radio"/>	264	<input type="radio"/> <input type="radio"/> <input type="radio"/>			298	<input type="radio"/> <input type="radio"/> <input type="radio"/>	318	<input type="radio"/> <input type="radio"/> <input type="radio"/>
175	<input type="radio"/> <input type="radio"/> <input type="radio"/>	195	<input type="radio"/> <input type="radio"/> <input type="radio"/>	215	<input type="radio"/> <input type="radio"/> <input type="radio"/>	226	<input type="radio"/> <input type="radio"/> <input type="radio"/>	246	<input type="radio"/> <input type="radio"/> <input type="radio"/>	265	<input type="radio"/> <input type="radio"/> <input type="radio"/>	PREFER -		299	<input type="radio"/> <input type="radio"/> <input type="radio"/>	319	<input type="radio"/> <input type="radio"/> <input type="radio"/>
176	<input type="radio"/> <input type="radio"/> <input type="radio"/>	196	<input type="radio"/> <input type="radio"/> <input type="radio"/>	216	<input type="radio"/> <input type="radio"/> <input type="radio"/>	227	<input type="radio"/> <input type="radio"/> <input type="radio"/>	247	<input type="radio"/> <input type="radio"/> <input type="radio"/>	266	<input type="radio"/> <input type="radio"/> <input type="radio"/>	ENCE		300	<input type="radio"/> <input type="radio"/> <input type="radio"/>	320	<input type="radio"/> <input type="radio"/> <input type="radio"/>
177	<input type="radio"/> <input type="radio"/> <input type="radio"/>	197	<input type="radio"/> <input type="radio"/> <input type="radio"/>	217	<input type="radio"/> <input type="radio"/> <input type="radio"/>	228	<input type="radio"/> <input type="radio"/> <input type="radio"/>	248	<input type="radio"/> <input type="radio"/> <input type="radio"/>	267	<input type="radio"/> <input type="radio"/> <input type="radio"/>	BETWEEN		301	<input type="radio"/> <input type="radio"/> <input type="radio"/>	321	<input type="radio"/> <input type="radio"/> <input type="radio"/>
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APPENDIX 7

SCII COMPUTER-GENERATED PROFILE

N.B. A sample of the SCII computer generated profile
is not available for inclusion in this appendix

APPENDIX 8

OTIS SELF-ADMINISTERING TEST OF MENTAL ABILITY

HIGHER EXAMINATION: FORM A

OTIS SELF-ADMINISTERING TESTS OF MENTAL ABILITY

By ARTHUR S. OTIS

Formerly Development Specialist with Advisory Board, General Staff, United States War Department

HIGHER EXAMINATION: FORM A

20

For High Schools and Colleges

Score.....

Read this page. Do what it tells you to do.

Do not open this paper, or turn it over, until you are told to do so. Fill these blanks, giving your name, age, birthday, etc. Write plainly.

Name _____ Age last birthday years
First name, initial, and last name

Birthday _____ Class _____ Date 19....
Month Day

School or College _____ City _____

This is a test to see how well you can think. It contains questions of different kinds. Here is a sample question already answered correctly. Notice how the question is answered:

Which one of the five words below tells what an apple is?
1 flower, 2 tree, 3 vegetable, 4 fruit, 5 animal..... (4)

The right answer, of course, is "fruit"; so the word "fruit" is underlined. And the word "fruit" is No. 4; so a figure 4 is placed in the parentheses at the end of the dotted line. This is the way you are to answer the questions.

Try this sample question yourself. Do not write the answer; just draw a line under it and then put its number in the parentheses:

Which one of the five words below means the opposite of north?
1 pole, 2 equator, 3 south, 4 east, 5 west ()

The answer, of course, is "south"; so you should have drawn a line under the word "south" and put a figure 3 in the parentheses. Try this one:

A foot is to a man and a paw is to a cat the same as a hoof is to a — what?
1 dog, 2 horse, 3 shoe, 4 blacksmith, 5 saddle ()

The answer, of course, is "horse"; so you should have drawn a line under the word "horse" and put a figure 2 in the parentheses. Try this one:

At four cents each, how many cents will 6 pencils cost?..... ()

The answer, of course, is 24, and there is nothing to underline; so just put the 24 in the parentheses. If the answer to any question is a number or a letter, put the number or letter in the parentheses without underlining anything. Make all letters like printed capitals.

The test contains 75 questions. You are not expected to be able to answer all of them, but do the best you can. You will be allowed half an hour after the examiner tells you to begin. Try to get as many right as possible. Be careful not to go so fast that you make mistakes. Do not spend too much time on any one question. No questions about the test will be answered by the examiner after the test begins. Lay your pencil down.

Do not turn this page until you are told to begin.

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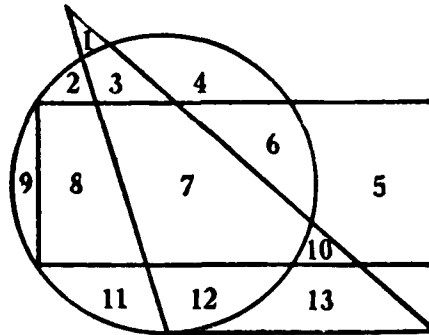
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EXAMINATION BEGINS HERE :

1. The opposite of hate is (?)
1 enemy, 2 fear, 3 love, 4 friend, 5 joy ()
2. If 3 pencils cost 5 cents, how many pencils can be bought for 50 cents? ()
3. A bird does not always have (?)
1 wings, 2 eyes, 3 feet, 4 a nest, 5 a bill ()
4. The opposite of honor is (?)
1 glory, 2 disgrace, 3 cowardice, 4 fear, 5 defeat ()
5. A fox most resembles a (?)
1 wolf, 2 goat, 3 pig, 4 tiger, 5 cat ()
6. Quiet is related to sound in the same way that darkness is related to (?)
1 a cellar, 2 sunlight, 3 noise, 4 stillness, 5 loud ()
7. A party consisted of a man and his wife, his two sons and their wives, and four children in each son's family. How many were there in the party? ()
8. A tree always has (?)
1 leaves, 2 fruit, 3 buds, 4 roots, 5 a shadow ()
9. The opposite of economical is (?)
1 cheap, 2 stingy, 3 extravagant, 4 value, 5 rich ()
10. Silver is more costly than iron because it is (?)
1 heavier, 2 scarcer, 3 whiter, 4 harder, 5 prettier ()
11. Which one of the six statements below tells the meaning of the following proverb? "The early bird catches the worm." ()
 1. Don't do the impossible.
 2. Weeping is bad for the eyes.
 3. Don't worry over troubles before they come.
 4. Early birds like worms best.
 5. Prompt persons often secure advantages over tardy ones.
 6. It is foolish to fret about things we can't help.
12. Which statement above tells the meaning of this proverb? "Don't cry over spilt milk." ()
13. Which statement above explains this proverb? "Don't cross a bridge till you get to it." ()
14. An electric light is related to a candle as an automobile is to (?)
1 a carriage, 2 electricity, 3 a tire, 4 speed, 5 glow ()
15. If a boy can run at the rate of 6 feet in $\frac{1}{4}$ of a second, how many feet can he run in 10 seconds? ()
16. A meal always involves (?)
1 a table, 2 dishes, 3 hunger, 4 food, 5 water ()
17. Of the five words below, four are alike in a certain way. Which is the one not like these four?
1 bend, 2 shave, 3 chop, 4 whittle, 5 shear ()
18. The opposite of never is (?)
1 often, 2 sometimes, 3 occasionally, 4 always, 5 frequently ()
19. A clock is related to time as a thermometer is to (?)
1 a watch, 2 warm, 3 a bulb, 4 mercury, 5 temperature ()
20. Which word makes the truest sentence? Men are (?) shorter than their wives.
1 always, 2 usually, 3 much, 4 rarely, 5 never ()
21. One number is wrong in the following series What should that number be?
1 4 2 5 3 6 4 7 5 9 6 9 ()
22. If the first two statements following are true, the third is (?) All members of this club are Republicans. Smith is not a Republican. Smith is a member of this club.
1 true, 2 false, 3 not certain ()
23. A contest always has (?)
1 an umpire, 2 opponents, 3 spectators, 4 applause, 5 victory ()
24. Which number in this series appears a second time nearest the beginning?
6 4 5 3 7 8 0 9 5 9 8 8 6 5 4 7 3 0 8 9 1 ()
25. The moon is related to the earth as the earth is to (?)
1 Mars, 2 the sun, 3 clouds, 4 stars, 5 the universe ()
26. Which word makes the truest sentence? Fathers are (?) wiser than their sons.
1 always, 2 usually, 3 much, 4 rarely, 5 never ()

27. The opposite of awkward is (?)
 1 strong, 2 pretty, 3 short, 4 graceful, 5 swift ()
28. A mother is always (?) than her daughter.
 1 wiser, 2 taller, 3 stouter, 4 older, 5 more wrinkled ()
29. Which one of the six statements below tells the meaning of the following proverb? "The burnt child dreads the fire." ()
1. Frivolity flourishes when authority is absent.
 2. Unhappy experiences teach us to be careful.
 3. A thing must be tried before we know its value.
 4. A meal is judged by the dessert.
 5. Small animals never play in the presence of large ones.
 6. Children suffer more from heat than grown people.
30. Which statement above explains this proverb? "When the cat is away, the mice will play." ()
31. Which statement above explains this proverb? "The proof of the pudding is in the eating." ()
32. If the settlement of a difference is made by mutual concession, it is called a (?)
 1 promise, 2 compromise, 3 injunction, 4 coercion, 5 restoration ()
33. What is related to disease as carefulness is to accident?
 1 doctor, 2 surgery, 3 medicine, 4 hospital, 5 sanitation ()
34. Of the five things below, four are alike in a certain way. Which is the one not like these four?
 1 smuggle, 2 steal, 3 bribe, 4 cheat, 5 sell ()
35. If 10 boxes full of apples weigh 400 pounds, and each box when empty weighs 4 pounds, how many pounds do all the apples weigh? ()
36. The opposite of hope is (?)
 1 faith, 2 misery, 3 sorrow, 4 despair, 5 hate..... ()
37. If all the odd-numbered letters in the alphabet were crossed out, what would be the tenth letter not crossed out? Print it. *Do not mark the alphabet.*
 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z ()
38. What letter in the word SUPERFLUOUS is the same number in the word (counting from the beginning) as it is in the alphabet? Print it ()
39. What people say about a person constitutes his (?)
 1 character, 2 gossip, 3 reputation, 4 disposition, 5 personality ()
40. If $2\frac{1}{2}$ yards of cloth cost 30 cents, how many cents will 10 yards cost? .. ()
41. If the words below were arranged to make a good sentence, with what letter would the second word of the sentence begin? Make it like a printed capital.
 same means big large the as .. ()
42. If the first two statements following are true, the third is (?) George is older than Frank.
 James is older than George. Frank is younger than James.
 1 true, 2 false, 3 not certain ()
43. Suppose the first and second letters in the word CONSTITUTIONAL were interchanged, also the third and fourth letters, the fifth and sixth, etc. Print the letter that would then be the twelfth letter counting to the right. ()
44. One number is wrong in the following series. What should that number be?
 0 1 3 6 10 15 21 28 34 ()
45. If $4\frac{1}{2}$ yards of cloth cost 90 cents, how many cents will $2\frac{1}{2}$ yards cost? ()
46. A man's influence in a community should depend upon his (?)
 1 wealth, 2 dignity, 3 wisdom, 4 ambition, 5 political power ()
47. What is related to few as ordinary is to exceptional?
 1 none, 2 some, 3 many, 4 less, 5 more ()
48. The opposite of treacherous is (?)
 1 friendly, 2 brave, 3 wise, 4 cowardly, 5 loyal ()
49. Which one of the five words below is most unlike the other four?
 1 good, 2 large, 3 red, 4 walk, 5 thick ()
50. If the first two statements following are true, the third is (?) Some of Brown's friends are Baptists. Some of Brown's friends are dentists. Some of Brown's friends are Baptist dentists.
 1 true, 2 false, 3 not certain ()
51. How many of the following words can be made from the letters in the word LARGEST, using any letter any number of times?
 great, stagger, grasses, trestle, struggle, rattle, garage, strangle... ()
52. The statement that the moon is made of green cheese is (?)
 1 absurd, 2 misleading, 3 improbable, 4 unfair, 5 wicked ()

53. Of the five things following, four are alike in a certain way. Which is the one not like these four?
1 tar, 2 snow, 3 soot, 4 ebony, 5 coal. ()
54. What is related to a cube in the same way in which a circle is related to a square?
1 circumference, 2 sphere, 3 corners, 4 solid, 5 thickness. ()
55. If the following words were seen on a wall by looking in a mirror on an opposite wall, which word would appear exactly the same as if seen directly?
1 OHIO, 2 SAW, 3 NGON, 4 MOTOR, 5 OTTO. ()
56. If a strip of cloth 24 inches long will shrink to 22 inches when washed, how many inches long will a 36-inch strip be after shrinking? ()
57. Which of the following is a trait of character?
1 personality, 2 esteem, 3 love, 4 generosity, 5 health. ()
58. Find the two letters in the word DOING which have just as many letters between them in the word as in the alphabet. Print the one of these letters that comes first in the alphabet.
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z. ()
59. Revolution is related to evolution as flying is to (?)
1 birds, 2 whirling, 3 walking, 4 wings, 5 standing. ()
60. One number is wrong in the following series. What should that number be?
1 3 9 27 81 108. ()
61. If Frank can ride a bicycle 30 feet while George runs 20 feet, how many feet can Frank ride while George runs 30 feet? ()
62. Count each N in this series that is followed by an O next to it if the O is not followed by a T next to it. Tell how many N's you count.
N O N T Q M N O T M O N O O N Q M N N O Q N O T O N A M O N O M. ()
63. A man who is averse to change is said to be (?)
1 democratic, 2 radical, 3 conservative, 4 anarchistic, 5 liberal. ()
64. Print the letter which is the fourth letter to the left of the letter which is midway between O and S in the alphabet. ()
65. What number is in the space which is in the rectangle and in the triangle but not in the circle? ()



66. What number is in the same geometrical figure or figures as the number 8? ()
67. How many spaces are there that are in any two but only two geometrical figures? ()
68. A surface is related to a line as a line is to (?)
1 solid, 2 plane, 3 curve, 4 point, 5 string. ()
69. If the first two statements following are true, the third is (?). One cannot become a good violinist without much practice. Charles practices much on the violin. Charles will become a good violinist.
1 true, 2 false, 3 not certain. ()
70. If the words below were arranged to make the best sentence, with what letter would the last word of the sentence end? Print the letter as a capital.
sincerity traits courtesy character of desirable and are. ()
71. A man who is influenced in making a decision by preconceived opinions is said to be (?)
1 influential, 2 prejudiced, 3 hypocritical, 4 decisive, 5 impartial. ()
72. A hotel serves a mixture of 2 parts cream and 3 parts milk. How many pints of cream will it take to make 15 pints of the mixture? ()
73. What is related to blood as physics is to motion?
1 temperature, 2 veins, 3 body, 4 physiology, 5 geography. ()
74. A statement the meaning of which is not definite is said to be (?)
1 erroneous, 2 doubtful, 3 ambiguous, 4 distorted, 5 hypothetical. ()
75. If a wire 20 inches long is to be cut so that one piece is $\frac{2}{3}$ as long as the other piece, how many inches long must the shorter piece be? ()

APPENDIX 9
THE EXAMEN OTIS-OTTAWA D'HABILETE MENTAL,
EXAMEN SUPERIEUR, FORMULE A

EXAMENS OTIS-OTTAWA D'HABILITÉ MENTALE

Otis Self-Administering Tests of Mental Ability, by Arthur S. Otis

traduits et adaptés par

Rodolphe Gendron, o.m.i., et Raymond Shevenell, o.m.i.

EXAMEN SUPÉRIEUR: FORMULE A

Résultat: . . .

20

Pour les Écoles secondaires

A.M. . . . Q.I. . . .

Lisez cette page. Faites ce qui vous y est demandé.

N'ouvrez pas ce feuillet, ne le tournez pas avant qu'on vous le dise. Remplissez les espaces en blanc, indiquant votre nom, votre âge, votre anniversaire de naissance, etc. Écrivez lisiblement.

Nom	Prénom		Nom de famille		Age au dernier anniversaire	ans
Anniversaire	Anniversaire	Classe	Date	19		
	Anniversaire	Classe	Date	19		
	Anniversaire	Classe	Date	19		
Collège ou école	Collège ou école		Ville			
Occupation de mon père	Occupation de mon père		Adresse		Ville	Province

Cet examen a pour but de déterminer votre facilité de penser. Il contient des questions variées. Voici un exemple de question à laquelle on a bien répondu. Remarquez comment la réponse est donnée.

Lequel des cinq mots suivants indique ce qu'est une pomme?

1 une fleur, 2 un arbre, 3 un légume, 4 un fruit, 5 un animal (4)

La bonne réponse est en effet "fruit"; alors le mot "fruit" est souligné. Le mot "fruit" est le n° 4; on inscrit donc le chiffre 4 dans la parenthèse au bout de la ligne pointillée. C'est ainsi que vous devez répondre à toutes les questions.

Essayez celle-ci. N'écrivez pas la réponse; soulignez-la seulement et inscrivez son numéro dans la parenthèse.

Lequel des cinq mots suivants signifie l'opposé du nord?

1 pôle, 2 équateur, 3 sud, 4 est, 5 ouest ()

La réponse est en effet "sud"; donc vous avez dû souligner le mot "sud" et inscrire le chiffre 3 dans la parenthèse. Essayez celle-ci:

Le pied est à l'homme et la patte au chat ce que le sabot est ?

1 au chien, 2 au cheval, 3 au fer, 4 au forgeron, 5 à la selle ()

La réponse est en effet "cheval"; donc vous avez dû souligner le mot "cheval" et inscrire le chiffre 2 dans la parenthèse. Essayez celle-ci:

A quatre sous chacun, combien coûteront 6 crayons? ()

La réponse est en effet 24, et il n'y a rien à souligner; alors inscrivez simplement 24 dans la parenthèse.

Quand la réponse à une question est un nombre ou une lettre, inscrivez ce nombre ou cette lettre dans la parenthèse, sans rien souligner. Écrivez toutes vos lettres en majuscules d'imprimerie.

Cet examen contient 75 questions, on ne s'attend pas à ce que vous puissiez répondre à toutes, mais faites votre possible. Vous aurez une demi-heure à partir du moment où l'on vous dira de commencer. Essayez d'en réussir autant que possible. Prenez garde d'aller si vite que vous fassiez des fautes. Ne vous attardez pas trop sur une question aux dépens des autres. On ne donnera aucune explication une fois l'examen commencé. Déposez votre crayon.

Ne tournez pas cette page avant qu'on vous dise de commencer.

LITHO—CANADA

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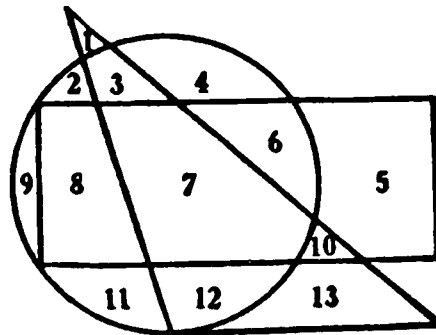
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L'EXAMEN COMMENCE ICI:

1. Quel est le contraire de haine ?
1 ennemi, 2 crainte, 3 amour, 4 ami, 5 joie ()
2. Si 3 crayons coûtent 5 sous, combien de crayons peut-on acheter avec 50 sous ? ()
3. Un oiseau n'a pas toujours (?)
1 des ailes, 2 des yeux, 3 des pattes, 4 un nid, 5 un bec ()
4. Quel est le contraire de courage ?
1 gloire, 2 honte, 3 lâcheté, 4 crainte, 5 défaite ()
5. Un renard ressemble davantage à un (?)
1 loup, 2 bouc, 3 porc, 4 tigre, 5 chat ... ()
6. Le silence est au son ce que l'obscurité est à (?)
1 une cave, 2 la clarté, 3 au bruit, 4 la tranquillité, 5 la sonorité ()
7. Une réunion comprenait un homme et sa femme, ses deux fils et leur femme, et quatre enfants de chacun des fils. Combien de personnes y avait-il à cette réunion ? ()
8. Un arbre a toujours (?)
1 des feuilles, 2 des fruits, 3 des bourgeons, 4 des racines, 5 une ombre ()
9. Quel est le contraire d'économique ?
1 bon marché, 2 chiche, 3 dispendieux, 4 valeur, 5 riche ()
10. L'argent coûte plus cher que le fer parce qu'il est plus (?)
1 pesant, 2 rare, 3 blanc, 4 dur, 5 beau ()
11. Lequel des six énoncés suivants explique le sens du proverbe: "Aide-toi, le ciel t'aidera" ? ()
 1. On n'est pas tenu à l'impossible.
 2. Les médecines sont souvent mauvaises au goût.
 3. Attendons que viennent les épreuves pour nous tourmenter.
 4. Le monde aux plus fins, le ciel aux plus dignes.
 5. Les travailleurs sont plus favorisés que les fainéants.
 6. Il est inutile de gémir sur ce qu'on ne peut réparer.
12. Lequel des énoncés précédents explique le proverbe: "A chose faite, point de remède" ? ()
13. Lequel des énoncés précédents explique le proverbe: "A chaque jour suffit sa peine" ? ()
14. Une lampe électrique est à une chandelle ce qu'une automobile est à (?)
1 une voiture, 2 l'électricité, 3 un pneu, 4 la vitesse, 5 la lueur ()
15. Un enfant court à raison de 6 pieds en $\frac{1}{4}$ de seconde, combien de pieds courra-t-il en 10 secondes ? ()
16. Un repas comporte toujours (?)
1 une table, 2 de la vaisselle, 3 la faim, 4 de la nourriture, 5 de l'eau ()
17. Des cinq mots ci-dessous, quatre ont entre eux une certaine ressemblance. Lequel n'est pas semblable à ces quatre ?
1 plier, 2 raser, 3 hacher, 4 tailler, 5 tondre ()
18. Quel est le contraire de jamais ?
1 souvent, 2 quelquefois, 3 parfois, 4 toujours, 5 fréquemment ()
19. Une horloge est au temps ce qu'un thermomètre est à (?)
1 une montre, 2 au climat, 3 un cadran, 4 au mercure, 5 la température ()
20. Lequel de ces mots rend cette phrase le plus vraisemblable ? Les hommes sont (?) plus courts que leur femme.
1 toujours, 2 habituellement, 3 beaucoup, 4 rarement, 5 jamais ()
21. Un chiffre est inexact dans la série suivante. Quel devrait être le chiffre exact ?
1 4 2 5 3 6 4 7 5 9 6 9 ()
22. Si les deux premiers énoncés suivants sont vrais, le troisième est (?) Tous les membres de ce club sont des libéraux. Gagnon n'est pas un libéral. Gagnon est membre de ce club.
1 vrai, 2 faux, 3 incertain ()
23. Une joute comporte toujours (?)
1 un arbitre, 2 des adversaires, 3 des spectateurs, 4 des applaudissements, 5 une victoire ()
24. Quel chiffre de cette série apparaît une seconde fois le plus près du commencement ?
6 4 5 3 7 8 0 9 5 9 8 8 6 5 4 7 3 0 8 9 1 ()
25. La lune est à la terre ce que la terre est (?)
1 à Mars, 2 au soleil, 3 aux nuages, 4 aux étoiles, 5 à l'univers ()
26. Lequel de ces mots rend cette phrase le plus vraisemblable ? Les pères sont (?) plus sages que leur fils.
1 toujours, 2 d'ordinaire, 3 beaucoup, 4 rarement, 5 jamais ()

27. Quel est le contraire de gauche ?
1 fort, 2 joli, 3 court, 4 habile, 5 rapide ()
28. La mère est toujours plus (?) que sa fille.
1 sage, 2 grande, 3 corpulente, 4 âgée, 5 ridée ()
29. Lequel des six énoncés suivants explique le sens du proverbe: "Chat échaudé craint l'eau froide" ?
1. La dissipation règne en l'absence du maître.
2. Une expérience douloureuse enseigne la prudence.
3. Nos actions sont la mesure de notre valeur.
4. On juge d'un ouvrier d'après ses parents.
5. Les petits animaux ne s'amuse jamais en présence des gros.
6. Les chats souffrent moins de la chaleur que du froid. ..()
30. Lequel des énoncés précédents explique le proverbe: "Le chat parti, les souris dansent" ? ()
31. Lequel des énoncés précédents explique le proverbe: "A l'oeuvre on connaît l'artisan" ? ()
32. Quand le règlement d'une dispute se fait par une concession mutuelle, on dit que c'est (?)
1 une promesse, 2 un compromis, 3 une injonction, 4 une coercition, 5 une restauration ()
33. Qu'est-ce qui est à la maladie ce que la prudence est à un accident ?
1 médecin, 2 chirurgie, 3 médicament, 4 hôpital, 5 hygiène ()
34. Des cinq choses suivantes, quatre ont entre elles une certaine ressemblance. Laquelle ne ressemble pas à ces quatre ?
1 pirater, 2 voler, 3 frauder, 4 tricher, 5 vendre ()
35. Si 10 caisses de pommes pèsent 400 livres, et que chaque caisse vide pèse 4 livres, combien de livres pèsent toutes les pommes ? ()
36. Quel est le contraire d'espérance ?
1 foi, 2 misère, 3 peine, 4 désespoir, 5 haine ()
37. Si toutes les lettres de nombre impair de l'alphabet étaient rayées, quelle serait la dixième lettre non rayée ? Écrivez-la (majuscule d'imprimerie). Ne marquez pas l'alphabet.
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z ()
38. Quelle lettre du mot MAGNIFIQUE tient dans le mot le même rang (à compter du commencement) qu'elle tient dans l'alphabet ? Écrivez-la (majuscule d'imprimerie) ()
39. Ce que le monde dit de quelqu'un constitue (?)
1 son caractère, 2 du bavardage, 3 sa réputation, 4 ses dispositions, 5 sa personnalité ()
40. Si 2½ verges d'étoffe coûtent 30 sous, combien coûteront 10 verges ? ()
41. Si l'on disposait les mots suivants de façon à former une phrase, par quelle lettre commencerait le second mot de cette phrase ? Écrivez-la en majuscule.
même chose signifie haut élevé la que ()
42. Si les deux premiers énoncés suivants sont vrais, le troisième est (?) Georges est plus vieux que François. Jacques est plus vieux que Georges. François est plus jeune que Jacques.
1 vrai, 2 faux, 3 incertain ()
43. Supposez que la première et la deuxième lettre du mot CONSTITUTIONNEL soient interverties, de même que la 3^e et la 4^e, la 5^e et la 6^e, etc. Écrivez la lettre qui serait alors la douzième lettre à compter de gauche à droite ()
44. Un chiffre est inexact dans la série suivante. Quel devrait être le chiffre exact ?
0 1 3 6 10 15 21 28 34 ()
45. Si 4½ verges d'étoffe coûtent 90 sous, combien coûteront 2½ verges ? ()
46. L'influence d'un homme dans le monde devrait dépendre de (?)
1 sa richesse, 2 sa dignité, 3 sa sagesse, 4 son ambition, 5 son pouvoir politique ()
47. Qu'est-ce qui est à quelques ce qu'ordinaire est à exceptionnel ?
1 aucun, 2 certains, 3 plusieurs, 4 peu, 5 encore ()
48. Quel est le contraire de traître ?
1 bienveillant, 2 brave, 3 sage, 4 lâche, 5 loyal ()
49. Lequel des cinq mots suivants diffère le plus des quatre autres ?
1 bon, 2 large, 3 rouge, 4 rire, 5 épais ()
50. Si les deux premiers énoncés suivants sont vrais, le troisième est (?) Quelques amis de Roy sont anglais. Quelques amis de Roy sont dentistes. Quelques amis de Roy sont dentistes anglais.
1 vrai, 2 faux, 3 incertain ()
51. Combien de mots parmi les suivants peuvent être formés avec les lettres contenues dans le mot ESTIVAL, en répétant la même lettre au besoin ?
Valet, taillis, liasses, svelte, largesse, villas, vieille, vestige ()
52. Soutenir que la lune est un disque d'argent, c'est (?)
1 absurde, 2 trompeur, 3 impossible, 4 injuste, 5 méchant ()

53. Des cinq choses suivantes, quatre ont entre elles une certaine ressemblance. Laquelle ne ressemble pas à ces quatre ?
1 goudron, 2 neige, 3 suie, 4 ébène, 5 charbon ()
54. Qu'est-ce qui est à un cube ce qu'un cercle est à un carré ?
1 circonférence, 2 sphère, 3 coin, 4 solide, 5 épaisseur ()
55. Si les mots suivants étaient vus dans un miroir opposé au mur où ils sont écrits, lequel de ces mots apparaîtrait exactement comme s'il était vu directement ?
1 OHIO, 2 NON, 3 VAL, 4 COTON, 5 OTTO ()
56. Si une bande d'étoffe longue de 24 pouces se contracte à 22 pouces au lavage, quelle longueur aura, après le lavage, une bande de 36 pouces ? ()
57. Lequel des suivants est un trait de caractère ?
1 personnalité, 2 estime, 3 amour, 4 générosité, 5 santé ()
58. Trouvez les deux lettres du mot PIÈGE ayant juste autant de lettres entre elles dans le mot qu'elles en ont dans l'alphabet. Écrivez celle qui est la première dans l'alphabet.
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z ()
59. Révolution est à évolution ce que voler est à (?)
1 oiseau, 2 tourbillonner, 3 marcher, 4 ailes, 5 debout ()
60. Un nombre est inexact dans la série suivante. Quel devrait être le nombre exact ?
1 3 9 27 81 108 ()
61. Si Jean parcourt à bicyclette 30 pieds pendant que Georges en fait 20 à la course, combien de pieds Jean parcourra-t-il pendant que Georges en fera 30 ? ()
62. Comptez dans cette série chaque N immédiatement suivi d'un O à condition que l'O ne soit pas immédiatement suivi d'un T. Combien de ces N y a-t-il ?
N O N T Q M N O T M O N O O N Q M N N O Q N O T O N A M O N O M ()
63. On dit de quelqu'un qui est opposé au changement et au progrès qu'il est (?)
1 démocrate, 2 radical, 3 conservateur, 4 anarchiste, 5 libéral ()
64. Écrivez la lettre qui est la quatrième à gauche de la lettre qui tient le milieu entre l'O et le S de l'alphabet ()
65. Quel chiffre occupe l'espace inclus dans le rectangle et le triangle, mais non dans le cercle ?... ()



66. Quel chiffre se trouve dans la, ou les mêmes figures géométriques que le chiffre 8 ? ()
67. Combien d'espaces sont communs à deux de ces figures, mais à deux seulement ? ()
68. Une surface est à une ligne ce qu'une ligne est à (?)
1 un solide, 2 un plan, 3 une courbe, 4 un point, 5 une corde ()
69. Si ces deux premiers énoncés sont vrais, le troisième est (?) On ne peut devenir bon violoniste sans pratiquer beaucoup. Guy pratique beaucoup le violon. Guy deviendra bon violoniste.
1 vrai, 2 faux, 3 incertain ()
70. Si l'on disposait les mots ci-dessous de façon à former une phrase, par quelle lettre se terminerait le dernier mot de la phrase ? Écrivez cette lettre (majuscule d'imprimerie).
savoir bonheur vertu la nécessaires Le et sont au ()
71. On dit d'un homme, dont la décision est influencée par des idées préconçues, qu'il est (?)
1 influent, 2 prévenu, 3 hypocrite, 4 décidé, 5 impartial ()
72. Un hôtelier sert un mélange fait de 2 parties de crème et de 3 parties de lait. Combien de pintes de crème faudra-t-il pour obtenir un mélange de 15 pintes ? ()
73. Qu'est-ce qui est au sang ce que la physique est au mouvement ?
1 la température, 2 une veine, 3 le corps, 4 la physiologie, 5 la géographie ()
74. Un énoncé dont le sens est imprécis est (?)
1 erroné, 2 douteux, 3 ambigu, 4 défiguré, 5 hypothétique ()
75. Si un fil long de 20 pouces doit être coupé de telle sorte qu'une partie soit les $\frac{2}{3}$ de l'autre, quelle sera, en pouces, la longueur de la plus courte ? ()