
ECONOMIC REWARD AND SECOND LANGUAGE LEARNING:
EVIDENCE FROM THE 1971 CENSUS IN MONTREAL

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ABSTRACT

In the Montreal metropolitan area, a minority of speakers of English are less often bilingual in the language of the majority, French, than speakers of French are bilingual in English. Nearly all accounts attribute this asymmetry to English Canadian control of large business organizations. These organizations operate in English and can reward French Canadian bilinguals over French monolinguals by giving them preference in hiring, retention, promotion, or pay. Oddly, research on motivation in second language learning done in the Montreal metropolitan area stresses the importance of factors other than economic reward in motivating second language learning. This paper hypothesizes that it is the dollar reward for bilingualism through advantage in occupational placement or directly in the pay check that motivates people to become bilingual. The net reward for bilingualism in 12 major occupational types is computed separately for French and English mother-tongue people with data from the 1971 Census. These rewards are then correlated with percent bilingual by major occupational type. The product-moment correlation is .71. Fifty percent of the variance in percent bilingual over major occupational types for English and French mother-tongue people is explained by the net reward for bilingualism. Previous research which found economic reward to be unimportant in second language learning should be re-examined.

ECONOMIC REWARD AND SECOND LANGUAGE LEARNING:
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It is commonly observed that people of some mother-tongue groups are much more often successful in learning a second language than others. Some are conspicuously unsuccessful. Americans, for example, are notorious, worldwide, for their sloth in learning foreign languages and their quickness to expect other people to speak English (Cleveland, et al., 1960:259). Within some societies there are sharp contrasts in the willingness of different language groups to accommodate each other by learning each other's language. These asymmetries in bilingualism are unfortunate because an accommodation repeatedly made without reciprocity is subordination (Blau, 1964:25-31).

Naturally, a linguistic minority does not have as much claim to expect as large a proportion of the majority group to learn its language as vice versa, particularly if there are a number of different minorities. However, there are societies where second language learning has little to do with the ratio of speakers of the different languages. There are privileged minorities who are less often bilingual in the language of the minority than vice versa. The Montreal metropolitan area is such a society. A majority of French Canadians are more often bilingual in English than a minority of English Canadians are bilingual in French. This paper tests the hypothesis that an economic reward for bilingualism, that is, a reward in terms of advantage in

occupational placement and earnings, explains the frequency of bilingualism of both French and English mother-tongue people in the Montreal labor force.

Sixty-five percent of the population of the Montreal metropolitan area gave their mother-tongue as French in the 1971 Census.¹ Twenty-three percent gave it as English. The remainder are people whose mother-tongue is an immigrant or native American language. French mother-tongue people outnumber English mother-tongue people by a factor of almost three to one. Nevertheless, more French mother-tongue people are bilingual in English, 40%, than vice versa, 35%. The difference in bilingualism among those in the labor force is dramatic. Twenty-four percent of the labor force, defined as those who worked in 1970, has an English mother-tongue. Forty-eight percent of these are bilingual in French. Sixty-two percent of the labor force has a French mother-tongue, but fully 60% of these are bilingual in English.¹ The simplest explanation of this asymmetry in bilingualism is that English Canadians as a group are in an economically advantaged position. French mother-tongue people tend to have to make linguistic accommodations to English mother-tongue people more than vice versa in order to be hired, retained, promoted, given raises, and treated well.

This explanation is persuasive. It is clear that the asymmetry in bilingualism between English and French mother-tongue people has something to do with labor force participation since the percent bilingual of those who did

not work in 1970, 24%, is the same for both French and English mother-tongue people.¹ Only in the labor force are French mother-tongue people more often bilingual than English mother-tongue people. The evidence shows that bilingualism in Canada is a concomitant of relative economic disadvantage. The Report of the Royal Commission on Bilingualism and Biculturalism (Canada, 1969:chap.1,3) makes clear that English Canadians in Montreal have a higher occupational distribution and earn more money than French Canadians. This economic advantage is attributed by nearly all observers to the management by English Canadians of large firms in manufacturing and other industries (cf., Porter, 1961; Lussier, 1967; Cormier, 1968; Canada, 1969:chap.4; Lieberman, 1970:83-85). Morrison (1970:51) notes that the language of ownership is usually the language of management which in turn becomes the operating language of the firm. Not all large employers in the Montreal area are English-speaking, however. Provincial and local government, public utilities owned by the Province of Quebec, and many businesses use French. Because English mother-tongue people are a relatively small minority in the Montreal area they need to employ French Canadians. However, the English-speaking companies are free to selectively hire and thereby reward French Canadians who speak English.

Lieberman (1970:142) shows that in 1961 the occupational pay and prestige of male French Canadians was closely tied to bilingualism. French Canadians in white collar occupations were very often bilingual. Male English Canadians

in white collar occupations were, if different from blue collar English Canadians, bilingual slightly less often. It is apparent that bilingualism did not affect the occupational placement process of most English Canadians in 1961, since the more desirable occupations, those with higher pay and prestige, have no more bilinguals than those with less pay and prestige. If bilingualism were an advantage in the occupational placement process, then the more desirable occupations would be expected to have more bilinguals than the less desirable occupations. In each one of the major occupational type groupings that Lieberman (1970:142) uses, French Canadians have a higher percent bilingual than English Canadians. Table 1 shows that ten years later in 1971, in a population defined somewhat differently from Lieberman's, French mother-tongue people are still more concentrated into blue collar occupations than English Canadians and are still more often bilingual than English Canadians in every one of the major occupational groups defined in Table 1.

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 Table 1 about here
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Even after the effect of the impact of bilingualism on occupational placement is controlled for, bilingualism makes a difference in the earnings of French Canadians in the Montreal area in 1960 (Canada, 1969:75). The Royal Commission Report also found that bilingualism had no significant impact on the earnings of English Canadians in Montreal. Lieberman (1970:172), however, also with the data of the 1961 Census but a different subpopulation and different

controls, found that bilingual English Canadians earned less money than monolinguals. Since bilingualism is easily concealed, this finding could only be explained by the fact that bilingual English Canadians are disadvantaged by comparison to monolingual English Canadians, and quite possibly, subject to the same sort of incentives for second language learning as are a larger proportion of French Canadians.

It may well be that attentiveness in learning, whether in school or out, may be motivated by an appraisal of how much that knowledge is worth in terms of income. The perception by people in Montreal of the worth of learning a second language in terms of a payoff in the labor market may not be accurate, but if a reward for learning a second language really does exist, it is quite plausible that it influences language learning behavior. There are two components to such a possible reward. There is the effect of bilingualism on the probability of a person being placed in a particular occupation. A bilingual in an occupation has an expectation of a certain level of income. The higher this amount the greater is the reward for bilingualism. The second component is the premium bilinguals receive in their paycheck above what monolinguals in the same or similar occupations receive. If these rewards exist and affect people's language learning behavior, then the reward for bilingualism in an occupation ought to explain the percent bilingual in that occupation.

The Test

The hypothesis to be tested is whether the proportion

bilingual of French and English mother-tongue people in an occupation can be explained by the net reward for bilingualism for them in that occupation, that is, the reward for bilingualism per se in that occupation. French mother-tongue people are analyzed separately from English mother-tongue people because the literature on language group relations in Montreal suggests that the two language groups are exposed to different rewards for second language learning. The question of whether being in the labor force at all is a reward is ignored because of its difficulty. The computation of the reward is done only for those in the labor force in 1970.

A reward can take two forms. One is the net contribution of bilingualism to a person's placement into a particular type of occupation. The other is the effect of bilingualism on earnings net of the effect of occupation and the occupation-bilingualism interaction. Each type of occupation has its own distinctive distribution of earnings. The higher the average earnings in an occupation, the more rewarding is the net contribution of bilingualism to placement into that occupation. In addition, bilinguals in an occupation may be above or below the mean earnings of people in that occupation. If they are above the mean, the difference is an additional reward for bilingualism. As Hodge (1973) has observed, occupational placement can be thought of as a queue of applicants waiting to be hired. Place in the queue is partly a function of characteristics which employers find

salient. Desirable characteristics move an applicant forward, toward being hired. Undesirable characteristics have the reverse effect. Bilingualism in Montreal is quite possibly a desirable characteristic. If undesirable, it is easily concealed. Advantage in a queue waiting for placement into a well paid occupation is more valuable than an equal advantage in a queue waiting for placement into a less well paid occupation. If bilingualism is an advantage in the competition for placement into a well paid occupation, then the people in that occupation, other things being equal, will tend to be bilingual and these bilinguals will have been rewarded for their effort in second language learning. Apart from a reward in occupational placement, bilinguals may also receive a premium in their paychecks for their bilingualism, more money than what otherwise identical monolinguals in the same or similar occupations receive.

It is hypothesized that the total reward for bilingualism for French mother-tongue people is greater than for English mother-tongue people. It is further hypothesized that the total net reward for bilingualism in an occupation correlates very highly with the percent bilingual of a mother-tongue group in that occupation, and thus explains a great deal of second language learning in the labor force in Montreal. If the explained variance in bilingualism is very high, then educators and government planners concerned with language learning ought to consider intervention into the economic rewards for second language learning as a technique for affecting that process. As it now stands, previous

social science research has produced quite mixed findings on the importance of economic rewards in language learning. There actually appears to be some consensus among educational psychologists that economic rewards are not important in second language learning. Jakobovits (1970:243-250) reviews a number of studies showing just that, while most social psychologically oriented articles on second language learning simply ignore the matter of economic reward (cf. Spolsky, 1969; Guiora, Brannon and Dull, 1972; Brown, 1973). Before testing the hypothesis that people become bilingual in response to a reward for bilingualism in the labor market, the findings of small surveys by social psychologists, and larger scale studies of the language learning process in whole societies, macro studies, are reviewed.

Surveys of Motivation in Second Language Learning

If one accepts the proposition that aptitude and opportunity to learn a second language are not related to mother-tongue in a compact area such as Montreal where both official languages are taught in the school system, then the only factor capable of explaining the differential success of the mother-tongue groups in second language learning is differential motivation. Spolsky (1969:271) notes that the primary difference between first and second language learning is that second language learning is affected much more by aptitude and motivation. Learning a second language is much more optional than learning the first.

A number of studies have been conducted in small groups of students on their attitude toward and motivation

in second language learning. Jakobovits (1970:243-250) cites a number of experiments and surveys in the U.S. involving fewer than 200 subjects or respondents that show that money rewards or the expressed hope that foreign language learning would help in occupational placement are not related closely to effective language learning. Gardner and Lambert (1972) report a series of surveys on motivation in second language learning. Their original studies in the late '50's and early '60's were of English Canadian high school students' attitudes toward learning French (cf. Lambert and Gardner, 1959; Gardner, 1960; Lambert, Gardner, Barik, and Tunstall, 1963). They found that an attitude of friendly curiosity and a desire to share in French culture was an important component in a student's success in learning French. This type of motivation was labeled "integrative" (Gardner and Lambert, 1972:13-15). Another type of motivation in second language learning was explored: motivation from a calculus of tangible personal benefit, "instrumental" motivation. In Gardner's 1960 dissertation instrumental motivation was measured by questions such as:

"What advantages, if any, have you experienced by speaking French with your French friends?"

"What disadvantages are there for not being able to speak French?" (Gardner and Lambert, 1972:201)

A factor analysis of success in learning French in school showed that the factor which loaded heavily on positive answers to these questions was not important.

The prospect of French helping in occupational placement is not specifically included as a part of instrumental

motivation in Gardner's dissertation. However, in later studies a scale was constructed to measure instrumental motivation which included an item on the value of a second language in occupational placement (Gardner and Lambert, 1972:148).

The item is:

"I think it [a second language] will some day be useful in getting a good job."

The respondent would check a scale of agreement and disagreement with the statement. Gardner and Lambert (1972) conducted surveys similar to their Montreal study among English-speaking American high school students in three areas in the United States: in Maine and Louisiana where there are concentrations of Franco-Americans who still speak French, and in Connecticut where there is no such large concentration. The instrumental motivation scale including the item on occupational placement was used, but the scale was not found to be important in the actual learning of French.

Knowledge of French or any language other than English is not known to be a crucial factor in placement into many occupations in the United States, although there is evidence that it is becoming more important (cf. Honig and Brod; Arnett). There is no reason to expect English-speaking Americans to be motivated to learn a second language by the prospect of success in the labor market. It has been shown that English Canadians in Montreal are in not that different a situation. Even though they live in a society where the majority speaks French, their ability to speak French does not affect their prospects in occupational placement very much.

What about language learning in mother-tongue groups that are not as insulated from pressures and incentives to learn a second language as English-speaking Americans and English Canadians are? Gardner and Lambert (1972:chap.7) report a survey of attitudes toward second language learning among a small group of Filipino high school students in a suburb of Manila. Instrumental motivation was very closely related to success in learning English for them, much more so than integrative motivation. These students were high enough in the social class structure of the Philippines to have a reasonably good chance of achieving upward social mobility. In the Philippines a knowledge of English is a key to upward social mobility because it is a language of national communication in a country with many languages (cf. Tucker, 1968). Lukmani (1972) also replicated the Gardner and Lambert survey of attitudes toward second language learning in a non-western context. She surveyed several English classes in a high school in India where Marathi was the language of instruction. In India, as in the Philippines, English is a second language used in white collar occupations. As in the Philippines, instrumental motivation turned out to be more important than integrative motivation in explaining success in learning English.

Gardner and Lambert in their approach to integrative and instrumental motivation neglect to consider whether the perception of a second language's usefulness may be a cause of liking to speak the language, that is, instrumental motivation may be causally prior to integrative motivation. While

it is not possible to show that one attitude is prior to another in a survey conducted at one point in time, it is possible to show whether the two attitudes have a relationship to each other net of the effect of background variables which can affect both. Such a net relationship would be expected to exist if instrumental motivation affects integrative motivation. Angle (1976b:chap.6) performs a secondary analysis on a survey of attitudes of ninth graders in Puerto Rico toward learning English (cf. Epstein, 1966). The survey replicates many of the Gardner and Lambert questions. Angle (1976b:chap.6) raises the question of what the relationship between agreement with the item, "I think a knowledge of English will some day be helpful in getting a good job," and a scale of liking to speak English is. The zero-order relationship between the variables is strong and positive. When controls are applied for background social variables: parents' social class and bilingualism, school type (public or parochial), and the pupil's sex, the perception that English is useful in occupational placement does have a net relationship with liking to speak English. This finding is consistent with the hypothesis that instrumental motivation is a cause of integrative motivation.

Macro Studies of Second Language Learning

The fundamental insight of studies of mass second language learning is that the process is strongly affected by inequality of social power (cf. Angle, 1976b:chap.1). Hempl (1898) is an early effort to delineate the different types of social inequality in which second language learning

occurs. Hempl (1898:35) notes that "other things being equal" the question of who learns whose language is a matter of the ratio of the number of speakers in contact, but adds "other things are not usually equal." Bloomfield (1933:461, 462,485), a distinguished linguist, concurs in the importance of social power in language diffusion. Deutsch (1966) gives a number of examples of the direction of language learning being affected by social inequality. Haugen (1972:258), an important contemporary sociolinguist, puts the matter of mass second language learning into a proposition as universal as there is to be found in sociology: ... (the spread of languages) ... "is everywhere the result of a concentration of political power..." which creates incentives for people to learn the language of those with that power. Leach (1954:50) observes that stratification of language groups leads to bilingualism and shift (switching principal language) "due to very simple economic causes," namely that it is advantageous to talk to and identify with the wealthy and powerful. Greenberg (1971: 206), a linguistic anthropologist interested in West Africa, notes that language learning often occurs as part of "passing," that is, presenting oneself as a member of a more privileged language group in a linguistically stratified society.

Hope of receiving a reward in terms of advantageous occupational placement or a premium in earned income is a convenient explanation of much second language learning. It is convenient not only because it can explain which language is learned but also the rate of language learning in the population. Deutsch (1966:162,163), for example, notes that

language learning occurs more rapidly in industrial societies than agricultural societies. Angle (1976b:chap.1) cites some examples of the remarkable linguistic conservatism of peasant societies in France. Industrial societies have higher rates of upward mobility than agricultural societies (Lenski, 1966: 410-413), hence more opportunities to reward the potentially mobile for learning the language of those who keep the gates to upward mobility. Such gatekeepers are governmental bodies who set standards for admission to higher education, recruitment into the civil service, or who license and regulate professions. The greater speed of second language learning in industrial societies is not necessarily all attributable to people responding to the expansion of economic rewards. Industrial societies have public school systems that expose masses of people to second language instruction. School systems have their own reward structures, grades and certificates, frowns or smiles from a teacher, to motivate students to learn the curriculum. Public education usually appears and expands rapidly in its enrollment with industrialization (cf. Anderson, 1965). The effect of greater exposure to a second language is thus entangled with the effect of greater rewards for learning a second language, created by an expansion of the number of better paid jobs.

Angle (1976a) proposes a test to disentangle the effect of change in the occupational structure on incentives for second language learning from the effect of the higher levels of education attendant with industrialization. Puerto Rico is used as a test case. A sample of individual records

are available from the 1935 and 1970 Censuses. In 1935 Puerto Rico was a poor, agricultural society, with 47% of the labor force in agriculture (Puerto Rico Reconstruction Administration, 1938). By 1970, 19% of the labor force was employed in manufacturing with only 8% remaining in agriculture (U.S. Bureau of the Census, 1972:190). In 1935 12% of the labor force was in white collar occupations;² by 1970 39% was (U.S. Bureau of the Census, 1972:table 39). The rapid industrialization of Puerto Rico, where Spanish is nearly everyone's mother-tongue (Angle, 1976b:chap.3), under the auspices of English-language American organizations such as corporations and the Federal Government, could be expected to produce many new bilinguals under the economic reward theory of second language learning. In fact, bilingualism in English in Puerto Rico for those aged 10 and older increased from 23% in 1935 to 43% in 1970 (Puerto Rico Reconstruction Administration, 1938:32; U.S. Bureau of the Census, 1973:213). Levels of education, however, increased as well. Literacy increased from 65% of the population 10 years old and over in 1935 to 89% in 1970 (Puerto Rico Reconstruction Administration, 1938:30; U.S. Bureau of the Census, 1972:213). When literacy, an appropriate measure of education, is controlled for, change in the occupational distribution between 1935 and 1970 explains part of the change in bilingualism. Angle (1976b:chap.5) demonstrates that in 1970, a time when bilingualism in Puerto Rico was increasing, there is an economic reward, particularly in terms of occupational placement, for bilingualism per se. Angle (1976a) shows that bilingualism was rewarded in 1935

by a higher standard of living than would otherwise be expected.

The Data

The data are drawn from the 1:100 sample of individual records from the 1971 Census of Population in the Montreal metropolitan area prepared by Statistics Canada (cf. Statistics Canada, 1975). There are 27,433 cases in this sample. Not all of these cases are used in this analysis because it is concerned with the behavior of people who are clearly English-speaking and clearly French-speaking, who have been Canadians for at least a short time, who have been in the labor force, and whose earnings are not exceptionally high or low.

First, only French and English mother-tongue people who currently use their mother-tongue at home are selected. In Montreal there is considerable intermarriage and many individuals in the process of shifting from their mother-tongue to their second language as their most often used language. In order to be sure that the rewards for bilingualism are calculated for people with a clearly primary and a clearly secondary language, this condition is imposed. Secondly, only people in the labor force are of interest. In the 1971 Census, data on participation in the labor force is gathered for the preceding year. Thirdly, so that the labor force characteristics of cases be reasonably stable, the subset of cases under study is limited to people 20 years of age or older, and very recent immigrants, those arriving in 1970, are excluded. Finally, people earning more money than Statistics Canada was willing to divulge are excluded. These

are men making \$75,000 or more and women making \$50,000 or more in 1970. Anyone not making any money in 1970 or taking a loss is also excluded since their earned income is probably not indicative of earnings in their occupation. The Royal Commission on Bilingualism and Biculturalism similarly excluded the highest and lowest earners in its study of the impact of language on earnings in the Montreal metropolitan area with 1961 Census data (Canada, 1969:71). There are 2,282 English mother-tongue people and 6,917 French mother-tongue people who pass these screens. In the analysis a one-third sample of the French mother-tongue people is taken. Thus the N of English mother-tongue people in the analysis is 2,282 and of French mother-tongue people, 2,305.

The Computation of the Reward for Bilingualism Per Se

The calculation of the effect of bilingualism all by itself, or per se, on earnings through occupational placement requires two steps. First is the estimation of the net contribution of bilingualism to placement in a particular occupation, net of the effect of other relevant variables. Canonical correlation is used to estimate the net effect of bilingualism on the probability of being in a particular occupation. Multiple regression is used to estimate the net earnings of bilinguals in particular occupations.

The fact that Occupation is measured by a set of categories for major occupational groupings forces the use of a statistical technique suitable for a polytomous, nominal dependent variable. Canonical correlation is one of several techniques suitable. In canonical correlation, the dependent

variable, Occupation, is converted to a set of $k-1$ dummy variables where k is the number of major occupational group categories. People who worked in 1970 but who were not classified in a specific occupational category are in the "left-out" category, the category assigned all zeroes. Canonical correlation is chosen as the way to calculate the net effect of bilingualism on being in an occupational category because the product of the transformation weights of Bilingualism and any dummy variable for a particular occupation with the canonical correlation can be interpreted as the path coefficient from Bilingualism to that occupation (cf. Van de Geer, 1971:167). This path coefficient can be in turn multiplied by the amount of money a bilingual makes in a particular occupation to yield the effect of Bilingualism on Earnings through a particular occupation.

Figure 1 illustrates the effect of Bilingualism on Earnings through placement into a managerial occupation. If 'a' is the transformation weight of Bilingualism in the first canonical variate, C_1 , 'b' is the canonical correlation, and 'c' is the transformation weight of the dummy variable, Managerial Occupations, in the second canonical variate, C_2 , then the product 'abc' is the path from Bilingualism to Managerial Occupations, or the net effect of Bilingualism on a person's likelihood of being in a managerial occupation. The canonical correlation algorithm produces many other pairs of canonical variates out of the residual variance left after the first pair is computed. However, the canonical correlation coefficients between these pairs can be no larger than the first.

If these correlations are small or the transformation weight of Bilingualism in its canonical variate is near zero, then these later pairs of canonical variates can be ignored.

 Figure 1 about here

Why is it assumed that bilingualism affects occupational placement but not vice versa, when it is known for example that some Canadian companies pay their managerial employees to take second language courses (cf. Carlisle, 1966: 141,159; Morrison, 1970:170-172; Gagné, 1968:471)? These courses are not notable for their success, however. While it cannot be ruled out that some people become bilingual on the job or because of their job, Table 2 shows that for people in the labor force between 25 and 39 years of age, relatively recent entrants to the labor force, bilingualism does not increase with age. This age group is examined because most of the people who are going to enter the labor force have done so by age 25 and it is unwise to assume that changes in bilingualism over a longer age span than fifteen years are due to on-the-job learning or forgetting. There may be cohort effects (cf. Carlsson and Karlsson, 1970). Neither French nor English mother-tongue people increase their percent bilingual between ages 25 and 39. See Table 3. Lieber-son (1970:138,139,149-167) in a study of bilingualism in the Montreal labor force has suggested that white collar work is more sensitive to communication needs than blue collar work. It may be that white collar workers tend to become bilingual as a result of their work while blue collar workers tend to

forget their bilingualism because it is not needed as much in their work. This hypothesis holds for neither French nor English mother-tongue people as a glance at Table 4 shows. It appears that occupational placement does not affect bilingualism.

 Table 2 about here

 Table 3 about here

 Table 4 about here

The next step in estimating the effect of bilingualism on earnings through occupational placement is a multiple regression in which Average Weekly Earnings, arrived at by dividing earned income in 1970 by number of weeks worked, is the dependent variable. Predictor variables in this regression are Sex, Age, Marital Status, Place of Birth, Level of Education, Occupation, Bilingualism, and the Bilingualism-Occupation interaction. The intercept, the coefficient for an occupation, and the coefficient for the interaction between Bilingualism and that occupation are added together. The intercept is added because analyses are performed separately for French and English mother-tongue people and if one group has substantially higher earnings, then placement into an occupation for that group is financially more rewarding than for the group making less money. The product of the path from Bilingualism to an occupation with the sum of the intercept, the occupation effect on earnings, and the

interaction of Bilingualism with that occupation on Earnings becomes the net reward for bilingualism through placement into a particular occupation.

The last coefficient of interest is the regression coefficient for Bilingualism. It is added to the net reward for bilingualism through occupational placement to make the total reward for bilingualism in an occupation for a mother-tongue group. If the path from Bilingualism to an occupation is 'w', the regression coefficient for that occupation 'x', the regression coefficient for the interaction between Bilingualism and that occupation 'y', the regression coefficient for Bilingualism 'z', and the regression intercept 'a', then the total net reward for bilingualism in dollars earned a week is $w(a+xy)+z$.

Findings

Table 5 displays the first canonical correlation between the social background variables, Bilingualism, and the dummy variables for the major occupational groups, along with the unstandardized transformation weights. The second and later pairs of canonical variates can be ignored since the transformation weights of Bilingualism in them are virtually zero, making the path from Bilingualism to any occupation nearly zero. Table 6 displays the unstandardized coefficients of the regression of Average Weekly Earnings on the social background variables, the dummy variables for Occupation, and the dummy variables for the Bilingualism-Occupation interaction term. Table 7 shows the total net rewards for bilingualism calculated from the canonical correlations and multiple

regressions for French and English mother-tongue people. In general, the rewards for bilingualism for French mother-tongue people are higher than those for English mother-tongue people, although not in all cases. The first hypothesis, that the total reward for bilingualism for French mother-tongue people is greater than English mother-tongue people, is born out by the data.

 Table 5 about here

 Table 6 about here

 Table 7 about here

The second hypothesis is that the total net reward for bilingualism in an occupation correlates very highly with the percent bilingual of a mother-tongue group in that occupation, and thus explains a great deal of second language learning in the labor force in Montreal. This hypothesis is born out by the data as well. Total net reward and percent bilingual in an occupation are correlated .71. Total net reward for bilingualism thus explains 50% of the variance in percent bilingual.

What does this high correlation mean? The model set forth in this paper is that people become bilingual in response to a perceived reward for bilingualism in the process of occupational placement. Many people in the labor force in 1970 were placed in occupations years before. Thus, their language learning behavior cannot be causally explained by the economic reward for bilingualism in 1970. For most of

the people in the labor force in 1970 the economic reward for bilingualism in that year is used as a proxy for the economic reward for bilingualism in earlier years. It is assumed that the economic rewards for bilingualism in earlier years are highly correlated with the economic rewards for bilingualism in occupations in 1970. It is quite possible that if the economic reward for bilingualism in earlier years were known along with date of entry into the labor force of people in it in 1970, a much larger proportion of the variance in bilingualism over occupations than 50% might be explained. Since it cannot be proven that the economic rewards for bilingualism have not changed drastically in the thirty years or so prior to 1970, the present cross-sectional study must be considered preliminary. As soon as Statistics Canada releases individual level data for Montreal at another time-point, it can be seen whether bilingualism co-varies with the reward for it over time. This paper's findings provide a solid basis for a re-examination of the widely held notion that economic incentives are not important in language learning.

Summary

In the Montreal metropolitan area, a minority of speakers of English are less often bilingual in the language of the majority, French, than speakers of French are bilingual in English. Nearly all commentators attribute this asymmetry to English Canadian or American control of large business organizations. Not all large employers in the

Montreal metropolitan area use English as the language of work, but many do. These are free to reward French Canadian bilinguals over French monolinguals by giving them preference in hiring, retention, promotion, or pay. The explanation of the asymmetry in bilingualism in terms of an inequality of power in the economy is persuasive. The percent bilingual among English mother-tongue and French mother-tongue people who did not work in 1970 is the same, while among those who did work in 1970, French mother-tongue people are substantially more bilingual than English mother-tongue people. In the face of the great plausibility of this economic explanation of second language learning, it is odd that the social science research on second language learning in Montreal has discounted the importance of an economic reward.

This paper hypothesizes that it is the dollar reward for bilingualism through advantage in occupational placement or directly in the paycheck that motivates people to become bilingual. Earnings are measured as average weekly earnings in 1970. Canonical correlation and multiple regression are used to calculate the total net reward for bilingualism for French and English mother-tongue people separately in 12 major occupational groups. Data from the public use sample of the 1971 Census of Population in the Montreal metropolitan area are used (cf. Statistics Canada, 1975). These rewards are then correlated with percent bilingual by major occupational group.

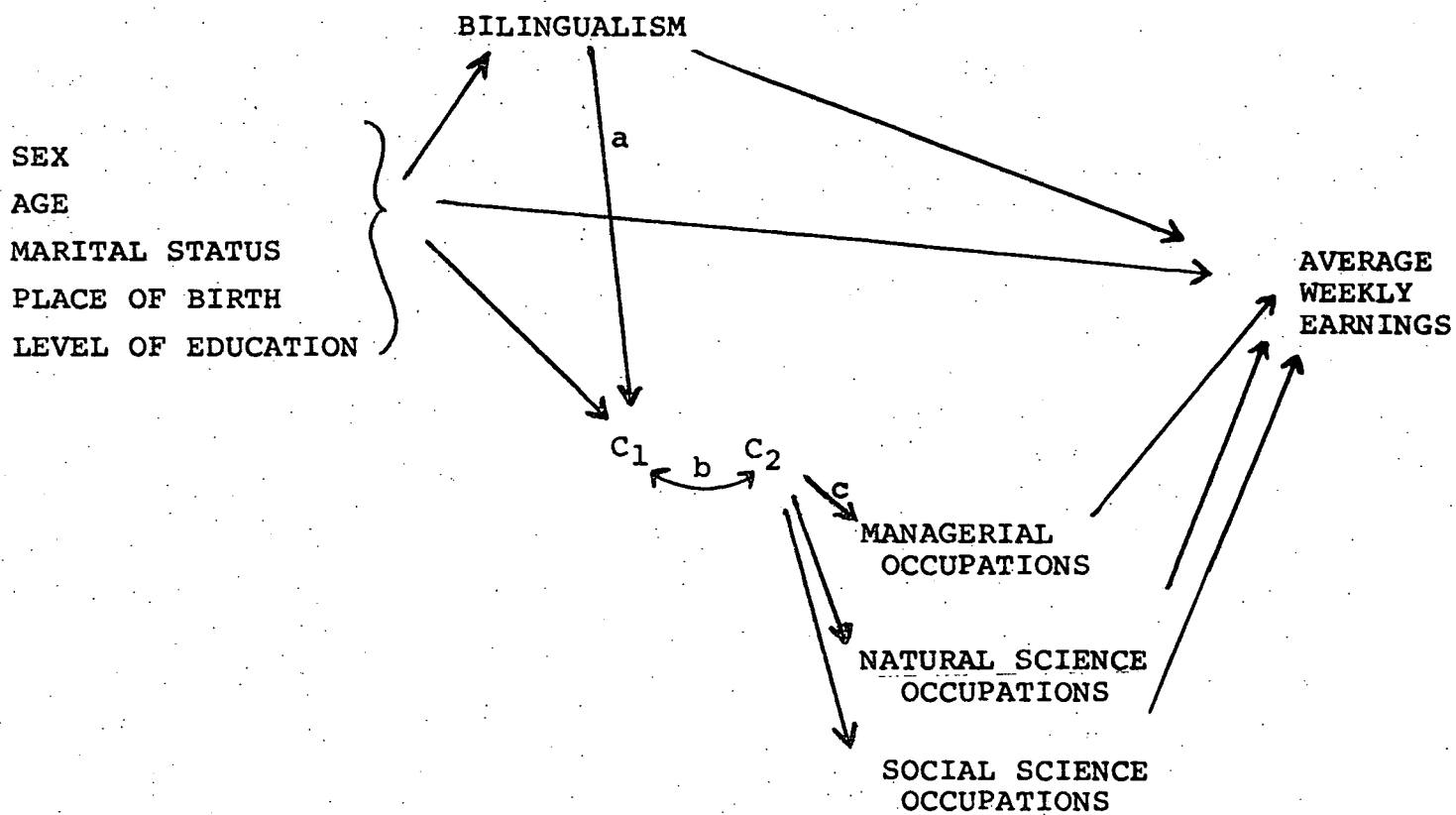
The hypotheses are born out. The total net rewards for bilingualism for French mother-tongue people is higher

in nearly all occupations than for English mother-tongue people. The product moment correlation between total net reward for bilingualism and percent bilingual is .71. Fifty percent of the variance in percent bilingual over major occupational groups for English and French mother-tongue people is explained by the total net reward for bilingualism. Because only cross-sectional data are available, this very strong relationship is not definitive evidence in favor of the theory asserting that bilingualism in the labor force is caused by the existence of an economic reward for bilingualism. However, it is a firm basis for critically re-examining previous research which found economic reward to be unimportant in second language learning.

FOOTNOTES

1. Proportions of people of English and French mother-tongue, proportions who are bilingual, and proportions in and out of the labor force, are calculated from a 10% subsample of the individual file of the public use sample of the records of the 1971 Census in the Montreal metropolitan area (cf. Statistics Canada, 1975).
2. "White collar occupation" is defined as: professional, technical or kindred; managerial or administrative, except farm management; sales occupation; or a clerical occupation. Data for 1935 are from a 1:1000 sample of the 1935 Special Census of Puerto Rico with occupations coded according to the occupational codes of the 1970 U.S. Census of Population. Angle (1976a) describes this data set.

Figure 1. Path Diagram



⋮

Table 1. Marginals and Percent Bilingual in Other Official Language, Montreal, 1971^a

major occupational groups	French mother-tongue		English mother-tongue	
	distribution	percent bilingual	distribution	percent bilingual
managerial and administrative occupations	6.1	86.5	12.6	46.2
natural sciences, engineering, and mathematics	2.4	87.0	5.7	41.1
social science occupations	0.8	89.5	1.4	69.7
religion, teaching, art, literature, and recreation	5.4	61.8	6.4	46.6
medical occupations	4.0	54.8	4.1	39.8
clerical occupations	19.3	74.5	27.3	38.4
sales occupations	10.0	72.5	11.4	53.6
service occupations	9.8	57.1	6.1	43.6
machining and product fabrication, assembly, repairing occupations	12.7	45.0	7.1	34.6
construction trades	5.1	48.3	2.2	37.3
transport equipment operatives	5.1	59.3	2.5	55.4
other and not stated occupations	<u>19.3</u>	34.5	<u>13.2</u>	31.2
	100.0		100.0	

^aPeople in labor force in 1970, 20+ years of age, who speak mother-tongue at home, extremes of earned income excluded. Selected from Public Use Sample of 1971 Census in Montreal (cf. Statistics Canada, 1975). N of English mother-tongue people is 2,282. N of French mother-tongue people is 2,305, a one-third subsample.

Table 2. Bilingualism by Age^a N=5,172

Age	Percent Bilingual
25	52
26	49
27	52
28	50
29	48
30	50
31	48
32	44
33	49
34	52
35	48
36	48
37	49
38	48
39	49

^aSource: Public Use Sample of Montreal Metropolitan Area, 1971 Census (Statistics Canada, 1975). Population in table is everyone of English or French mother-tongue, aged 25-39. N=5,172.

Table 3. Bilingualism by Age by Mother-tongue^a

Age	English mother-tongue percent bilingual	French mother-tongue percent bilingual
25	40	56
26	39	51
27	43	54
28	48	51
29	39	51
30	44	51
31	46	48
32	34	48
33	41	51
34	44	54
35	46	49
36	41	50
37	45	51
38	30	52
39	42	51
	N=1154	N=4018

^aSource: Public Use Sample of Montreal Metropolitan Area, 1971 Census (Statistics Canada, 1975). Population in table is everyone of English or French mother-tongue, aged 25-39.

Table 4. Bilingualism by Age by Mother-tongue by Occupation.
 In percentages. (numbers in parentheses are base of percentages) ^a

Age	English mother-tongue			French mother-tongue		
	white collar	blue collar	occupation not stated or no occupation in 1970	white collar	blue collar	occupation not stated or no occupation in 1970
25-26	49 (101)	20 (25)	33 (52)	69 (253)	51 (144)	38 (229)
27-28	49 (97)	45 (22)	39 (61)	74 (242)	50 (176)	30 (213)
29-30	50 (86)	50 (22)	25 (59)	75 (222)	46 (162)	30 (219)
31-32	41 (74)	57 (23)	28 (46)	69 (162)	49 (130)	31 (190)
33-34	45 (62)	47 (19)	37 (49)	68 (151)	54 (129)	39 (191)
35-36	49 (65)	44 (27)	37 (64)	70 (155)	50 (123)	32 (190)
37-39	43 (91)	34 (29)	36 (80)	72 (215)	50 (224)	38 (298)

^aSource: Public Use Sample of Montreal Metropolitan Area, 1971 Census (Statistics Canada, 1975). Population in table is everyone of English or French mother-tongue, aged 25-39. N=5,172.

Table 5. Canonical Correlations: Unstandardized Transformation Weights and Canonical Correlations^a

	English mother-tongue people	French mother-tongue people
	Unstandardized Transformation Weights of First Canonical Variate	
Sex ^b		
male ^c	0.0	0.0
female	-.114	.799
Age in years	.007	.004
Marital Status ^b		
presently married and living with spouse	.428	.017
not ^c	0.0	0.0
Place of Birth ^b		
Quebec	-.095	.008
elsewhere in Canada	.044	.196
elsewhere ^c	0.0	0.0
Education ^b		
no schooling thru grade 4 ^c	0.0	0.0
grades 5-8	.141	.182
grades 9,10	.484	.707
grade 11	.910	1.182
grade 12	.860	1.763
grade 13	1.191	1.289
university 1,2	1.650	2.112
university 3,4: no degree	1.957	2.402
university 3,4: degree	2.484	3.021
some graduate training	3.741	3.075
Bilingualism ^b		
not bilingual ^c	0.0	0.0
bilingual	.126	.295

Table 5 cont.

Occupation ^b	English mother-tongue people	French mother-tongue people
	Unstandardized Transformation Weights of Second Canonical Variate	
managerial occupations	1.753	2.113
natural science occupations	2.758	1.935
social science occupations	3.307	3.071
religion, teaching art, literature, recreation	2.981	2.714
medical occupations	1.215	2.247
clerical occupations	.310	1.434
sales occupations	.787	.680
service occupations	-.207	.219
operatives	.168	-.146
construction trades	.085	-.358
transport operatives	.002	-.639
other and not stated occupation, people who worked in 1970 ^c	0.0	0.0
	Canonical Correlations	
	.526	.582
Level of statistical significance	<.001	<.001

^aThe French mother-tongue population, N=2,305, are people whose mother-tongue is French and who speak French at home, worked in 1970, and are 20 years of age or older. Very recent immigrants, those arriving in 1970, are excluded as are men making more than \$75,000 and women making more than \$50,000 or making no money or taking a loss in 1970. English mother-tongue people, N=2,282, are subjected to the same screens except, of course, that they are people who speak English at home.

^bVariable has been converted to a set of dummy variables. If a case falls into a category it is assigned the number 1, if not, 0. Solution of the equations involved in multivariate analysis requires one category to be assigned all zeroes.

^cThis category is the category of the dummy variable set forced to be zero.

Table 6. Unstandardized Regression Coefficients.
 Dependent Variable is Average Weekly Earnings^a

Regressors	French mother-tongue people	English mother-tongue people
Intercept	84.15	73.21
Sex ^b		
male ^c	0.0	0.0
female	-37.35 (53.51)	-61.33 (58.63)
Age in years	.18 (1.11)*	1.08 (18.08)
Marital Status ^b		
presently married and living with spouse	23.32 (25.87)	15.36 (4.31)
not ^c	0.0	0.0
Place of Birth ^b		
Quebec	2.19	2.19
elsewhere in Canada	-2.07	7.85
elsewhere ^c	0.0	0.0
Education ^b		
no schooling thru grade 4 ^c	0.0	0.0
grades 5-8	9.28	9.68
grades 9,10	22.00	19.06
grade 11	22.37	14.50
grade 12	30.17	23.78
grade 13	-1.93	26.93
university 1,2	31.16	24.65
university 3,4: no degree	59.13	42.73
university 3,4: degree	70.09	94.93
some graduate training	81.36	61.71
Bilingualism ^b		
not bilingual ^c	0.0	0.0
bilingual	18.12 (3.27)	29.59 (2.27)

Table 6 cont.

Occupation ^b	French mother-tongue people	English mother-tongue people
managerial occupations	66.52	108.29
natural science occupations	30.90	113.60
social science occupations	22.58	41.46
religion, teaching, art, literature, recreation	27.76	13.44
medical occupations	12.58	21.18
clerical occupations	-1.03	13.55
sales occupations	-45.57	10.33
service occupations	-6.64	-1.63
operatives	4.08	8.31
construction trades	25.92	51.09
transport operatives	19.44	19.79
other and not stated occupation, people who worked in 1970 ^c	0.0	0.0
Being bilingual in an occupation ^b		
managerial occupations	-13.08	-13.09
natural science occupations	-25.10	-95.42
social science occupations	44.48	8.26
religion, teaching, art, literature, recreation	-23.86	40.90
medical occupations	-38.45	-27.50
clerical occupations	-9.42	-42.17
sales occupations	43.71	-8.00
service occupations	-.85	-45.33
operatives	2.22	-26.69

Table 6 cont.

	French mother-tongue people	English mother-tongue people
construction trades	-10.58	-60.69
transport operatives	-28.06	-58.62
other and not stated occupation, people who worked in 1970 ^c	0.0	0.0
R ²	.134	.166

^aThe French mother-tongue population, N=2,305, are people whose mother-tongue is French and who speak French at home, worked in 1970, and are 20 years of age or older. Very recent immigrants, those arriving in 1970, are excluded as are men making more than \$75,000 and women making more than \$50,000 or making no money or taking a loss in 1970. English mother-tongue people, N=2,282, are subjected to the same screens except, of course, that they are people who speak English at home.

^bVariable has been converted to a set of dummy variables. If a case falls into a category, it is assigned the number 1, if not, 0. Solution of the equations involved in multivariate analysis requires one category to be assigned all zeroes.

^cThis category is the category of the dummy variable set forced to be zero.

^dF-statistic is given in parentheses. An F-statistic not significant at .05 level is marked with an asterisk. Statistical Significance of a set of dummy variables is tested by adding the set to variables listed before it in this table to see if the increment in the r-square is significant. (cf. Kmenta, 1971:370-371). The set of dummy variables for Occupation and the Bilingualism-Occupation interaction are tested this way. Only the Bilingualism-Occupation set of dummy variables for French mother-tongue people fails the F-test at the .05 level of significance. However, its F_{11,2268} of 1.60 just misses significance at the .05 level.

Table 7. Total Net Reward for Bilingualism in Occupations^a
(in dollars per week)

Occupation	French mother-tongue people	English mother-tongue people
managerial occupations	68.03	49.08
natural science occupations	48.00	46.22
social science occupations	97.82	56.43
religion, teaching, art, literature, recreation	77.25	54.69
medical occupations	58.71	34.95
clerical occupations	54.38	30.50
sales occupations	45.85	33.51
service occupations	39.11	29.23
operatives	33.97	30.20
construction trades	30.12	29.95
transport operatives	27.95	29.59
other and not stated occupation, people who worked in 1970	18.12	29.59

^aIf 'w' is the unstandardized path from Bilingualism to an occupation, 'x' the unstandardized regression coefficient of an occupation in the regression of Earnings on social background variables, Bilingualism, Occupation, and the Bilingualism-Occupation interaction terms, 'y' the unstandardized regression coefficient of an interaction term between Bilingualism and that occupation, 'z' the unstandardized regression coefficient of Bilingualism in that regression, and 'a' the intercept, then the total net reward for bilingualism is $w(a+xy) + z$.

REFERENCES

Anderson, C. Arnold

- 1965 "Literacy and Schooling on the Development Threshold: Some Historical Cases." Pp. 347-362 in C. A. Anderson and M. J. Bowman, (eds.), Education and Economic Development. Chicago: Aldine.

Angle, John

- 1976a "A Theory of the Diffusion of Bilingualism in Populations: an Application of the Log-linear Analogue of First Differences." Working Paper #127 of the Center for Research on Social Organization, University of Michigan.
- 1976b "A Test of the Economic Reward Theory of the Spread of Bilingualism: Puerto Rico in 1970." Ph.D. dissertation. University of Michigan

Arnett, M. Rex

- 1976 "Languages for the World of Work." Bulletin of the Association of Departments of Foreign Languages. 7:#4:14-24.

Blau, Peter

- 1964 Exchange and Power in Social Life. New York: Wiley.

Bloomfield, Leonard

- 1933 Language. New York: Holt.

Brown, Douglas

- 1973 "Affective Variables in Second Language Acquisition." Language Learning. 23:231-244.

Canada, Royal Commission on Bilingualism and Biculturalism

- 1969 Report, vol. 3a. The Work World. Ottawa: Queen's Printer for Canada.

Carlisle, Arthur

- 1966 "The Effect of Cultural Differences on Managerial and Industrial Relations and Practices: A Study of U.S.-controlled Companies Operating in English and French Canada." Ph.D. dissertation. University of Michigan.

- Carlsson, Gosta and Katarina Karlsson
- 1970 "Age, Cohorts and the Generation of Generations." American Sociological Review. 35:710-717.
- Cleveland, Harlan, Gerard Mangone and John Adams
- 1960 The Overseas Americans. New York: McGraw-Hill.
- Cormier, René
- 1968 "Bilinguisme at biculturalisme dans la grande industrie." Relations Industrielles. 23:440-444.
- Deutsch, Karl
- 1966 Nationalism and Social Communication. Cambridge, Mass.: MIT.
- Epstein, Erwin
- 1966 "Value Orientation and the English Language in Puerto Rico: Attitudes toward Second Language Learning among Ninth Grade Pupils and their Parents." Ph.D. dissertation. University of Chicago.
- Gagné, Aimé
- 1968 "Le bilinguisme dans l'industrie, mythe ou réalité?" Relations Industrielles. 23:466-483.
- Gardner, Robert
- 1960 "Motivational variables in second-language acquisition." Ph.D. dissertation. McGill University.
- Gardner, Robert and Wallace Lambert
- 1972 Attitudes and Motivation in Second-Language Learning. Rowley, Mass.: Newbury House.
- Greenberg, Joseph
- 1971 "Urbanism, Migration, and Language." Pp. 198-211 in A.S. Dil, (ed.), Language, Culture, and Communications. Stanford, Calif.: Stanford.
- Guiora, Alexander, Robert Brannon, and Cecelia Dull
- 1972 "Empathy and second language learning." Language Learning. 22:111-130.

Haugen, Einar

- 1972 "Nationalism and International Languages."
Pp. 255-286 in A.S. Dil, (ed.), The Ecology of
Language. Stanford, Calif.: Stanford.

Hempl, George

- 1898 "Language-Rivalry and Speech Differentiation in
the Case of Race-Mixture." Transactions of the
American Philological Association. 39:31-47.

Hodge, Robert W.

- 1973 "Toward a Theory of Racial Differences in Em-
ployment." Social Forces. 52:16-31.

Honig, Lucille and Richard Brod

- 1974 "Foreign Languages and Careers." Occupational
Outlook Quarterly. 18:#4:26-36.

Jakobovits, Leon

- 1970 Foreign Language Learning. Rowley, Mass.: New-
bury House.

Kmenta, Jan

- 1971 Elements of Econometrics. New York: Mac-
millan.

Lambert, Wallace and Robert Gardner

- 1959 "Motivational Variables in Second-Language Learn-
ing." Canadian Journal of Psychology. 13:266-
273.

Lambert, W. E., R. C. Gardner, H. C. Barik, and K. Tunstall

- 1963 "Attitudinal and cognitive aspects of intensive
study of a second language." Journal of Abnor-
mal and Social Psychology. 66:358-369.

Leach, Edmund

- 1954 The Political Systems of Highland Burma. Cam-
bridge, Mass.: Harvard.

Lenski, Gerhard

- 1966 Power and Privilege. New York: McGraw-Hill.

Lieberson, Stanley

1970 Language and Eghnic Relations in Canada. New York: Wiley.

Lukmani, Yasmeen

1972 "Motivation to Learn and Language Proficiency." Language Learning. 22:261-274.

Lussier, Yvon

1967 "La Division du Travail selon l'Origine au Quebec, 1931-1961." M.A. Thesis. University of Montreal.

Morrison, Robert

1970 Corporate Adaptability to Bilingualism and Biculturalism: A Study of Policies and Practices in Large Canadian Manufacturing Firms. Ottawa: Queen's Printer for Canada.

Porter, John

1961 "The Economic Elite and the Social Structure in Canada." Pp. 486-500 in B. Blishen, F. Jones, K. Naegele, and J. Porter, (eds.), Canadian Society. New York: Free Press.

Puerto Rico Reconstruction Administration

1938 Census of Puerto Rico: 1935. Washington, D.C.: Government Printing Office.

Spolsky, Bernard

1969 "Attitudinal Aspects of Second Language Learning." Language Learning. 19:271-286.

Statistics Canada

1975 1971 Census of Canada, Public Use Sample Tapes: User Documentation. Ottawa: Statistics Canada.

Tucker, Richard

1968 "Judging Personality from Language Usage: A Filipino Example." Philippine Sociological Review. 16:30-39.

U.S. Bureau of the Census

1972 1970 Census of Population. General Social and
Economic Characteristics, Puerto Rico. Washing-
ton, D.C.: U.S. Government Printing Office.

Van de Geer, John

1971 Introduction to Multivariate Analysis for the
Social Sciences. San Francisco: Freeman.

