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ABSTRACT

The city of Montreal provides an example of how residential patterns are related to linguistic background and how linguistic pluralism is maintained under conditions of constant contact and extensive bilingualism. Residential segregation between linguistic and ethnic groups is determined by the index of dissimilarity; this index has been applied to the French and British populations and to the French-speaking and English-speaking populations in Montreal. Certain basic sociolinguistic principles become evident. The mother tongue is a far more powerful determinant of ethnic residence than is a language acquired later in life. The paramount factor influencing location is proximity to ethnic compatriots. The bilinguals in each ethnic group tend to locate in areas where their monolingual compatriots are found. The continued maintenance of the various language groups reduces the need for bilingualism. The linguistic outcome in a diverse city such as Montreal is closely intertwined with the residential pattern among language groups. (VM)

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RESIDENCE AND LANGUAGE MAINTENANCE IN A MULTILINGUAL CITY*

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Because of the pressures for communication between the different segments of a society's population, some form of bilingualism will occur in all nations inhabited by more than one language group. Although bilingualism is inevitable, its consequences for the language groups are not predetermined. Basically, there are two possible outcomes: mother tongue shift between generations will occur if bilinguals raise their children in the acquired language; or the bilinguals may maintain linguistic pluralism in the society by raising their children in the same mother tongue. In the first process, bilingualism is but a temporary stage intermediate stage between the initial contact of two monolingual populations and the final outcome of a linguistically homogeneous society. This is largely the case for various non-English speaking immigrant groups in the United States, Australia, and Canada, where bilingualism is followed in a generation or two by descendants who can speak only English and have more or less no fluency in their ancestral language. On the other hand, in some settings the mother tongue of bilinguals has not been undermined. In the Republic of South Africa and Belgium, for example, large numbers are bilingual but pass on their native language to the next generation. In this context, bilingualism is a potentially stable form of adaptation to the presence of another linguistic group. but one which does not undermine language diversity. Indeed, bilingualism may provide a high level of mutual intelligibility without generating a linguistically homogeneous society in a few generations.

Of particular interest are the patterns of language contact within the major metropolitan areas of multilingual nations. Although there are many exceptions, the rural hinterlands are often divided into relatively homogeneous linguistic regions. In some of the major urban centers, however, the various linguistic groups are brought together and maintenance of their languages is actively challenged. Montreal provides an illustration of the forces operating to maintain linguistic pluralism under conditions of constant contact and extensive bilingualism. French Canadians are the numerically dominant ethnic group, amounting to nearly two-thirds of the metropolitan population in 1961, but the

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British number 380,000 — about 18 per cent of the population. In addition, nearly 20 per cent of Montreal's residents are members of other ethnic groups. More than 20 per cent of the Italians in Canada and over 40 per cent of the Dominion's Jewish population reside in Montreal. Most of these groups strengthen the position of the English language in Montreal.

An earlier paper analyzes the *demographic* processes whereby bilingualism occurs in Montreal without a significant degree of mother tongue shift between generations.[1] Attention is focused here on the *residential* processes which support mother tongue maintenance in a community where bilingualism is widespread and therefore exposure to the risk of intergenerational shift is great. The goals are two-fold: first, to examine the influence of residential segregation on mother tongue maintenance and, second, to suggest some general propostions about the conditions under which these mechanisms will operate.

DATA AND METHODS

Canadian censuses provide ethnic and official language distributions for the census tracts of metropolitan Montreal in 1961. Census tracts are small subdivisions of the city and suburbs, rarely containing more than 10,000 residents, which are designed to be relatively uniform in area and population.[2]

Residential segregration between linguistic and ethnic groups in Montreal is determined by the index of dissimilarity, a commonly used ecological measure. It is based on the proportionate distributions of two populations within the spatial subareas of the city. The index in effect states the percentage of one group that would have to relocate into different subareas if the two groups were to have identical percentage distributions in the city's tracts or wards.[3] Values of the index range from 0 (no segregation) to 100 (complete segregation). The former occurs if the two groups have identical frequency distributions by tracts. The maximum index occurs if no subareas contain members of both groups, that is, if the areas holding 100 per cent of the city's X population have no residents from group Y.[4]

Two of Greenberg's measures of linguistic diversity, H_w and A_w, have been adopted to measure respectively mutual intelligibility in an official language and mother tongue diversity.[5] Official language data, available in 1941, 1951, and 1961, classifies each resident of the subareas into those able to speak English only, French only, both English and French, or neither official language. H_w gives the probability that two randomly drawn residents from a given neighborhood will share knowledge of one or both official languages. The measure ranges from 0, when no two people share a common tongue, to 1.0 which would occur if everyone could communicate with everyone else in a mutually understood official language. An extension of Greenberg's measure, H_b, determines the degree of mutual intelligibility *between* ethnic groups.[6] Using the same scale, 1.0 means that all members of one group can communicate with all members of the other group; a value of 0 means that no mutually understood language was common to the two groups.

A_w and A_b are comparable measures of the mother tongue diversity within and between groups.[7] A_w thus describes the degree of mother tongue diversity within a group by giving the probability of two or more people randomly meeting and not sharing a common mother tongue. A_b describes the degree to which two groups share common mother tongues by giving the probability that a member of one group and a member of another group (both randomly selected) will have different mother tongues. Of course, random interaction is rare in actual social life. However, these measures do serve as valid indicators of the potential diversity and mutual intelligibility in a given area.

The reader should keep in mind that the data on linguistic ability were obtained by the census through self-reporting of the respondents and, therefore, are rather subjective in nature. Some respondents indicating an ability to speak a second language are doubtlessly less bilingual in fact than others who reported an ability to speak only their mother tongue. Nevertheless, Montreal is so bilingual that residents of the city for the most part are subject to a constant "reality-check." Moreover, much of the analysis hinges upon the differential distributions in the city. Thus, many parts of the study can be valid even if there is a persistent error occurring. To a far lesser degree is there difficulty with the mother tongue data since it is fairly unambiguous what one's mother tongue is. There are also certain difficulties based on the subjectivity of ethnic origin declarations, but probably they are less subject to error for the British and French populations of Montreal.[8]

BASIC PATTERNS OF RESIDENTIAL SEGREGATION

Both ethnic and linguistic segregation in Montreal are vital forces operating to minimize linguistic shift. First, the index of dissimilarity between the British and French ethnic groups in the metropolitan area is 55 in 1961. This means that 55 per cent of one or the other group would have to relocate themselves into different census tracts if the spatial frequency distributions of the two groups were to be identical. Moreover, if anything, British-French segregation actually increased slightly between 1951 and 1961.

The persistence of fairly substantial segregation between the British and French prevents other ethnic groups from developing close residential proximity to both of the city's major populations. Since the British and French are segregated to a fairly high degree, no ethnic group can achieve very low segregation from both of these populations, although some can be highly isolated from both groups. In other words, if the Italians were to have a low index of segregation from the French (say 10), then their minimum segregation from the British would be at least in the mid 40's. This is due to a mathematical property of segregation indexes described elsewhere which shows that segregation between two groups is not independent of their spatial relationship with respect to any third group.[9] Table 1 indicates that actually a number of the remaining ethnic groups are highly segregated from both the British and French groups. The Scandinavians, Dutch, and Germans, however, are much more segregated from the French than the British.

TABLE 1

BRITISH AND FRENCH RESIDENTIAL SEGREGATION FROM OTHER ETHNIC GROUPS IN MONTREAL METROPOLITAN AREA, 1961

Ethnic Group	British	French
German	30.2	52.2
Italian	66.3	51.0
Netherlands	28.2	59.0
Polish	47.1	54.3
Russian	55.7	70.2
Scandinavian	18.6	56.4
Ukrainian	54.3	53.5
Other Europe	55.9	66.9
Asiatic	52.8	55.4
Other and Not Stated	38.4	63.1

Given the presence of substantial segregation between the British and French ethnic groups, one would also expect a fairly high degree of isolation between the English and French speaking segments of the population. In point of fact, these linguistic elements are even more highly segregated from one another. The index of dissimilarity is 64 in 1961 between French and English monoglots.

RESIDENTIAL PATTERNS OF BILINGUALS

Of special interest are the residential patterns of the bilinguals in each ethnic group. Both the French and British ethnic groups are linguistically diverse in the sense that there are components who speak both official languages and some who speak only French or English. Since monoglots have essentially no choice but to raise offspring in their mother tongue, it is only the bilingual segment of each ethnic group who may be influenced by their residential location. The residential pattern of either the French or British bilingual may take several paths with different and profound implications for mother tongue shift. Since the French bilinguals, for example, can communicate with either English or French monoglots, they may opt to locate in either predominantly English- or French-speaking residential areas. In turn, the linguistic capacities of their neighbors will affect the language pressures on the children of bilinguals.

Despite their ability to speak either official language, the bilinguals of each ethnic group favor their own ethnic compatriots over the other ethnic group. For the British ethnic group in 1961, the segregation index between the bilingual and English monoglot components is 19. While this is by no means a trivial level of segregation, British bilinguals are much more isolated from the French ethnic population. The indexes of segregation between the British bilinguals and, respectively, bilingual and monolingual French speaking components of the French ethnic group are 44 and 56. To be sure, monolingual English speaking members of the British ethnic group are even more segregated from these components of the French Canadian population, the indexes being respectively

59 and 70. But while it is clear that acquisition of the second official language influences the residential pattern of British Canadians, the fact remains that the bilingual component is still much less segregated from ethnic compatriots who speak only English.

In similar fashion, French Canadian bilinguals are residentially closer to their monolingual French compatriots than to various British segments in Montreal. French bilinguals have a segregation index of 19 from monolingual French compatriots, but their segregation from British bilinguals is 44 and even higher from those British who speak English only. Bilingualism does affect residence in so far as French Canadians who speak only French are even more highly isolated from the British.

In short, the bilinguals of both the French and British populations are much less segregated from their ethnic compatriots with the same mother tongue than they are from the other major ethnic group. Thus, while bilingualism is related to the residential patterns among both ethnic populations, the paramount factor influencing location is still proximity to ethnic compatriots. Accordingly, knowledge of the other ethnic group's tongue does not lead to a grand exodus of bilinguals into the camp of their ethnic rivals. This is of great importance since it indicates an ecological mechanism which allows both the British and French to maintain their mother tongue among the new generation of offspring. Although there is considerable bilingualism among both groups and therefore an "exposure to risk" that the acquired tongue may be passed on as the next generation's first language, danger to the mother tongue is reduced because bilinguals in each ethnic group tend to locate in areas where their monolingual compatriots are found.

THE RELATION BETWEEN LANGUAGE AND ETHNIC SEGREGATION

The results presented above suggest that mother tongue is a far more powerful determinant of ethnic residence than is a language acquired later in life. Witness the stronger residential bond between the bilingual and monoglot components within both the French and British ethnic groups. Further, among the small numbers of French ethnic origin with an English mother tongue, there is a closer linkage residentially to the competing ethnic group who possess the same mother tongue. French Canadians who speak English only have segregation indexes of 52 and 63 respectively from French Canadian bilinguals and monolingual French speakers. By contrast, their index of segregation from the British population, 25, is considerably lower. Likewise, the small number of persons of British ethnic origin with French as their mother tongue are far less segregated from the French ethnic group than from the British.

A general test of these propositions is not possible in either 1961 or 1951 because of data limitations, but tabulations for the 35 wards of Montreal in 1941 provide an excellent opportunity to examine the influence of both mother tongue and official language composition on ethnic segregation. The segregation of 11 ethnic groups from each of the remaining 10 groups was computed, creating a matrix of 55 pairs

of inter-ethnic segregation indexes. The actual indexes range from 13 (between the English and Irish) to 84 (between Italians and Jews). Since ethnic groups differ in their mother tongue composition and because the mother tongues are differentially distributed among the wards of Montreal, the "expected" influence of mother tongue on ethnic segregation may be determined on the basis of Westergaard's method of standardization.[10]

The influence of official language on the segregation between pairs of ethnic groups is examined in similar fashion. Namely, by considering the official language composition of each ethnic group in the city as well as the distribution of each official language group in the wards of Montreal, a set of "expected" segregation indexes between each pair of ethnic groups can be constructed. These expected indexes give the magnitude of segregation that would occur between ethnic groups if the sole factor influencing residential location is either the group's mother tongue composition or their abilities to speak English and/or French.

Mother tongue goes a lot further in explaining the segregation patterns between ethnic groups than do differences in official language composition. The product-moment correlations between actual ethnic segregation and the indexes expected on the basis of mother tongue is .93, compared with a correlation of only .17 between actual segregation and the expected indexes based on official language. These correlations do overestimate the degree to which mother tongue or official language differences between the ethnic groups account for the actual level of segregation between them.[11] Nevertheless, it is clear that the actual indexes of ethnic segregation are more nearly accounted for by the patterns of mother tongue segregation than by official language. The average difference between the actual and expected indexes of ethnic segregation based on mother tongue is 9, whereas 37 is the average difference between the actual segregation indexes and those expected on the basis of official language.

Another way of viewing linguistic influences on segregation is to consider the importance of either a common mother tongue or a mutually intelligible official language on segregation between ethnic groups. Here the explanation of ethnic segregation is not attempted through the differential spatial distributions of Montreal's mother tongue or official language segments. Rather, ethnic segregation is approached in terms of the potential communication between members of two ethnic groups on the basis of either a shared mother tongue or a common official language. Two ethnic groups may be very dissimilar from one another in their official language composition, but have a high degree of communication potential. For example, an ethnic group whose members largely speak English only would have high communication potential with a group whose members are largely bilingual. Accordingly, two additional measures are computed: H_b, which gives the probability of mutual intelligibility in either of the official languages when members of two ethnic groups are randomly paired together; and $1\text{-}A_b$, which gives the probability that randomly selected members of the two ethnic groups will share a common mother tongue.

The magnitude of the mother tongue bond between ethnic groups has a far greater influence on their segregation than does their potential for communication in an official language. The product-moment correlation between inter-ethnic segregation (converted to logarithms) and $1\text{-}A_b$ is —.84. By contrast, the correlation between segregation (again converted to logarithms) and H_b is only —.39, with 16 per cent of the variance explained. The partial correlations show no association between segregation and official language after mother tongue is taken into account (—.04); whereas the partial correlation between segregation and mother tongue is —.81 after taking official language communication into account.

These results, showing that much of the variation between ethnic groups is accounted for by mother tongue and very little by actual communication potential in the official languages, suggests that the way peoples start out linguistically will greatly influence their residential propensities. By contrast, languages acquired through bilingualism have little influence on ethnic segregation patterns. In a city where a sizable part of the population learns a second language, bilingualism has little bearing on ethnic residential distributions since later language learning plays only a minor role at best in influencing ethnic segregation patterns. What is crucial is the language the child first learns, not languages learned later. There is an ecological counterpart here to the demographic fact that most French Canadian children start with the French mother tongue and most children of British origin start with the English mother tongue. Even though many later acquire a knowledge of the second official language, these findings suggest that this has little impact on their residential segregation and, further, very likely the groups continue to live apart.

THE LINGUISTIC COMPOSITION OF SUBAREAS

Another way in which residential patterns operate to influence the maintenance of the various language groups over time is to reduce the need for bilingualism. The various language groups are distributed residentially in non-random fashion with two important consequences: first, the degree of mutual intelligibility in the subareas is greater than would be expected if the residential population was randomly located; second, the English and French monoglots tend to live away from each other to a greater degree than might be expected on the basis of ethnic origin, thereby reducing the residential pressures for learning the other group's language.

Turning to the first point, H_w gives the proportion of randomly paired interactions between residents in which communication through a mutually shared official language is possible. Because of data limitations, it is not possible to take into account communication in tongues other than English or French. Since H_w is .79 for the entire metropolis in 1961, we would expect the same average degree of mutual intelligibility in the census tracts if there was no segregation. In point of fact, the average H_w in the census tracts, .88, is considerably higher than for the city as a whole. In other words, the potential for mutually intelligible

communication in the average neighborhood of Montreal would be about 10 per cent less if the various linguistic groups were distributed randomly. Thus, the actual residential patterns function to reduce the need for bilingualism in so far as residential location creates such a pressure.

The second way in which segregation operates to reduce the pressures for bilingualism is to isolate the English and French monoglots from one another. This is demonstrated by comparing the numbers of English and French monoglots located in each tract with the numbers expected on the basis of the tract's ethnic composition and the city-wide cross-tabulation between ethnic origin and official language. In other words, if ethnic segregation patterns are now taken as a "given", it is possible to determine the percentage of English and French monoglots expected in each subarea. In turn, these expected percentages can be compared with the actual percentages found in each tract.

Although an extremely high correlation exists between the actual and "expected" percentage of residents in each tract who are English monolinguals, $r = .99$, the regression of the former on the latter is considerably greater than unity ($b = 1.21$). In residential areas where the ethnic composition leads to the expectation that there will be only a small percentage of monolingual English speakers, actually there are usually even less than this small number in the area. By contrast, areas where the ethnic composition leads to the expectation that a sizable proportion of the residents will speak English only, in actuality there is an even higher proportion. Using a procedure for decomposing the variance in situations such as this, only about two-thirds of the variance in the percentage speaking English only in the tracts explained by the net effect of ethnic composition and 28 per cent is due to the joint effect of composition with other factors.[12] In short, although ethnic origin explains a large part of the distribution of English only speakers, there is a strong tendency for English monolinguals to be located away from areas where there are relatively few expected and to concentrate in areas where a particularly large number are expected to begin with.

The pattern for French monolinguals is analogous. Again, where a small percentage of French monoglots would be expected on the basis of the tract's ethnic composition, an even smaller number is actually found. Tracts whose ethnic composition leads to the expectation that a sizable segment of the population will speak French only are areas where even larger proportions are usually monolingual French speakers. In this case, the regression slope of actual on expected per cent speaking only French is even higher, $b = 1.41$, and decomposition of the variance indicates that the net effect of ethnic composition explains only 45 per cent whereas 37 per cent is due to the joint effect of composition with other factors.

Very likely these results are due to the operation of two different forces. On the one hand, monolinguals have a propensity to move to neighborhoods where their potential communication with neighbors is not greatly hindered by an inability to speak the second official language. On the other hand, this pattern whereby monolinguals tend to be over-represented in certain areas and under-represented in others may well

reflect the influence of residential areas on both the acquisition and retention of second language skills. At any rate, it is clear that patterns of residential segregation in Montreal tend to minimize the need for bilingualism in so far as there is greater communication potential within neighborhoods than within the metropolitan area as a whole. Secondly, the residential distributions of French and English monoglots are such that they tend to avoid contact with others to a degree that cannot be explained simply as a function of the area's ethnic composition. Although, as noted above, this may partially reflect neighborhood processes that influence the acquisition of second languages, this pattern also clearly operates to reduce the need for bilingualism.

COMMENT

Obviously residential segregation is not the only influence on the frequency of either bilingualism or mother tongue shift. Even the impact of a given segregation pattern on these crucial facets of language contact will vary in accordance with other pressures generated in the community and society. However, it is clear that the linguistic outcome in a diverse city such as Montreal is closely intertwined with the residential pattern among language groups. Not only are the monolingual groups in Montreal isolated so as to reduce the need for bilingualism, but bilinguals themselves reside in areas that will support mother tongue maintenance in the next generation. The conditions that create these facets of segregation should themselves be considered. First, why are the monoglots in each mother tongue group relatively isolated? Second, since bilinguals may locate among either of two different monolingual populations. what influences their residential choice?

In dealing with both of these questions about language maintenance, it is important to consider the ethnic residential patterns of a city. Since ethnic groups differ rather substantially in their mother tongue composition, it follows that a high level of ethnic segregation will in itself tend to isolate the different monolingual populations. Substantial ethnic segregation in Montreal is hardly surprising when we consider that such groups may be highly segregated even under conditions when they no longer possess distinctive mother tongues. In Montreal, however, it is striking how mother tongue and ethnic segregation are so closely linked, whereas languages learned later in life have little bearing on ethnic segregation. Moreover, residential segregation *within* the ethnic colonies along linguistic lines provides an added degree of isolation for the monolingual members of the group. The linkage between mother tongue and ethnic segregation is hardly unilateral in any causal sense, but it is apparent that they tend to reinforce each other and that, moreover, languages acquired later in life have little relation to the ethnic patterns of segregation.

As for the residential patterns among bilinguals, one can be almost certain that the bilingual and monolingual segments of a mother tongue group will also be sharply differentiated on a variety of other attributes as well, for example, education, occupation, income, and so forth. The *magnitude* of the socio-economic differences between bilingual and monolingual components of a mother tongue group may vary, however, from

city to city, and society to society. Thus, one might speculate that the pattern of intra-mother tongue segregation is a reflection of the way in which the acquisition of a second language differentiates the group. In settings where the bilingual and monolingual components are less sharply differentiated along other dimensions as well, a low level of segregation may be anticipated between these subgroups and in turn this will operate to reduce the chances for mother tongue shift among the children of bilinguals. In communities or societies where the bilingual and monolingual components are differentiated rather radically on other characteristics as well, then they will be more likely to reside in different areas of the city. In turn, this sort of residential pattern will raise the chances of mother tongue shift among the children of bilinguals. Thus the bilingual-monolingual segregation pattern should be viewed as not only influencing the chances of mother tongue shift among the children of bilinguals, but is itself a function of the degree that the community and society differentiates these segments on other socio-economic characteristics as well.

FOOTNOTES

1. Stanley Lieberson, "Bilingualism in Montreal: A Demographic Analysis," *American Journal of Sociology,* 71 (July, 1965), 10-25.
2. Dominion Bureau of Statistics, *Census of Canada, 1961,* "Population and Housing Characteristics by Census Tracts, Montreal," Bulletin CT-4 (Ottawa: Minister of Trade and Commerce, 1963), p.3.
3. A more elegant interpretation of the index of dissimilarity is possible based on the number of each group who would have to redistribute themselves.
4. See Otis Dudley Duncan and Beverly Duncan, "Residential Distribution and Occupational Stratification," *American Journal of Sociology,* 60 (March, 1955), 493-495.
5. Joseph H. Greenberg, "The Measure of Linguistic Diversity," *Language,* 32 (January-March, 1956), 109-15.
6. Stanley Lieberson, "An Extension of Greenberg's Measures of Linguistic Diversity," *Language,* 40 (October-December, 1964), 526-31.
7. *Ibid.*
8. See, however, N. B. Ryder, "The Interpretation of Origin Statistics," *Canadian Journal of Economics and Political Science,* 21 (November, 1955), 466-479.
9. Stanley Lieberson, *Ethnic Patterns in American Cities* (New York: Free Press of Glencoe, 1963), pp. 38-40.
10. This is a form of standardization which allows the investigator to determine the expected association between two variables after taking into account their association with a third variable. It is particularly useful in measuring the effect that linguistic differences between ethnic groups have on the actual degree of ethnic residential segregation. Analysis of the results in terms of correlation coefficients is not fully appropriate and special procedures are employed which will be described later.
11. See Otis Dudley Duncan, Ray P. Cuzzort, and Beverly Duncan, *Statistical Geography* (Glencoe, Illinois: The Free Press, 1961), pp. 118-28; Patricia Hodge and Robert W. Hodge, "Regression Analysis of Standardized Proportions," unpublished manuscript.
12. *Ibid.*