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# HORIZONTAL AND VERTICAL — the Dimensions of Occupational Segregation by Gender in Canada

by Gale Moore

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# HORIZONTAL AND VERTICAL

# THE DIMENSIONS OF OCCUPATIONAL SEGREGATION BY GENDER IN CANADA

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# HORIZONTAL AND VERTICAL

# THE DIMENSIONS OF OCCUPATIONAL SEGREGATION BY GENDER IN CANADA

## INTRODUCTION

Occupational segregation by gender is a fact of life for Canadian women in the labour force in 1981,[1] a fact that has been part of the collective experience of Canadian women as far back as we can analyse.[2] Similar patterns of occupational segregation by gender have been observed in Great Britain and the United States. This pattern of female employment, however, cannot be assumed to be characteristic of all nations, nor even of all industrialized or industrializing nations. While a degree of occupational segregation by gender is observed in most nations, there is considerable cross cultural variation in the pattern. A 1968 historical review by Sullerot showed that:

> the division of labour between the sexes is largely random when considered cross nationally. ... On the whole the labelling of jobs as 'women's work' or 'men's work' is determined by social, economic and historical factors operating in a particular country or continent (cited in Hakim, 1979:39).

A 1973 study by Galenson showed that there is considerable variation in the occupations regarded as typically female or male, even within the European context (Hakim, 1979:39). For example, "the proportion of women among dentists varied from 10.6 per cent in Britain in 1966 to 77 per cent in Finland in 1960. Only one-third of pharmacists in Britain in 1966 were women, compared to 86 per cent in Finland (1960) and 92 per cent in Norway (1970)" (Hakim, 1979:39). The traditional female occupations or female job ghettos, however, may show less variation when industrialized countries are considered. In a study which compared American and Soviet occupational segregation, Lapidus (1976) reported that while Soviet women have successfully entered male fields of work, occupations such as nursing, librarianship, telephone operating, nursery school work and typing and stenography have a 95-99% female labour force. Overall, however, the arguments are convincing that attempts to explain how and why similar or different patterns of occupational segregation by gender have developed in different nations must take account of cultural, economic

and historical factors. The indices used to measure segregation, on the other hand, are more objective, but their usefulness in describing patterns of segregation is dependent on the quality and specificity of the data base to which they are applied. The problem of measurement will be the focus of this paper. We need to look carefully at the types of indices that have been used to study segregation, to specify how the concepts employed have been operationalized and the nature of the data bases used for analysis. In order to study historical trends in occupational segregation by gender, it will be argued that the changes in the gender composition of the total labour force over time must be taken into account if reliable comparisons are to be made across the years. A number of indices to measure occupational segregation have been developed and the examples discussed in this paper will be drawn primarily from Canadian, British and American studies. One index, used by Catherine Hakim with British census data, does not take into account the gender composition of the labour force at each period of measurement. This index will be used to analyse Canadian census data from 1901 to 1981 and the results of this analysis will be discussed and compared with the Canadian findings previously reported in the literature. In addition, as comparable detailed occupational data is available for Canada for the 1971 and 1981 census, the use of this index will be extended to a preliminary analysis at the national level of individual occupations and to an exploration of regional differences in occupational segregation by gender.

Several factors are problematic in the measurement of occupational segregation. First, there is the general sociological concern about the nature of the concepts used to study segregation and how these concepts are operationalized. Second, there is a methodological concern with the validity and reliability of the types of indices that have been developed to measure segregation. Third, there are the problems associated with the data base from which the measures of segregation are computed.

## I. Dimensions of Segregation

The concept of occupational segregation by gender refers to the observation that females and males are differentially distributed over the occupational categories that comprise the occupational structure of a particular economy. Females and males tend to concentrate in different occupations and are concentrated at different levels within occupations. The origin, the persistence and, in some cases, the change in occupational distribution by gender has received considerable atten-

tion in the North American and European literature in the past ten years as feminist researchers, of both genders, have begun to question assumptions which traditional occupational sociology left unexplored. While there is no theoretical consensus on these questions among neoclassical, institutional and Marxist theorists, all accept the fact that occupational segregation by gender exists.

Hakim, a British researcher, suggests that occupational segregation can be both horizontal and vertical, and that the two concepts are logically separate (1979:19). Horizontal segregation exists "when men and women are most commonly working in different types of occupations" (1979:19). Vertical segregation exists "when men are most commonly working in higher grade occupations and women are most commonly working in lower grade occupations, or vice versa" (1979:19). Hakim does not define precisely what is meant by higher and lower grade occupations, nor the basis for distinguishing between them. Ranking scales based on prestige, authority or income would produce different occupational hierarchies. In addition, the concept of vertical segregation as defined applies both to the differential distribution of males and females in higher and lower grade occupations and to their allocation to higher and lower grades of work within an occupation. For conceptual clarity, the between and within dimensions of vertical segregation need to be specified. The use of the terms intraoccupational vertical segregation and interoccupational vertical segregation are suggested.

**Figure 1**

Dimensions of Occupational Segregation

1.0 Horizontal
2.0 Vertical
  2.1 Interoccupational
  2.2 Intraoccupational

## II. The Indices of Segregation

A number of types of indices can be constructed to measure occupational segregation. Hakim's work offers the most systematic classification. She suggests that "the indices themselves can be absolute, absolute standardized or relative" (1979:20), and argues that the ideal index of segregation is a relative one. We must

note carefully, however, exactly what is implied by Hakim when she refers to a relative index. For Hakim, the relative index is a ratio of percentages or proportions and not a simple percentage. The ideal index for the measurement of occupational segregation by gender is a relative index that takes into account both the gender composition of an occupation and the gender composition of the total labour force for the period of measurement. As others (e.g., Armstrong, 1984) have referred to segregation indices as relative when the measure is a simple proportion, we need a way to distinguish the particular relative index proposed by Hakim. The most important aspect of this index is that it takes into account the gender composition of the total labour force at each period of measurement. Women still do not comprise 50% of the total labour force in Britain, the United States or Canada and their percentage of the total labour force has changed dramatically in the last 70 years. In Canada, for example, this percentage has risen from 13.3% in 1901 (Connelly, 1978:104) to 40.4% in 1981.[3] "A relative index would thus only define an occupation as segregated if the ratio of women to men workers was greater or less than the sex ratio in the labour force as a whole, and thus higher or lower than what would be expected if men and women were evenly distributed throughout the labour force" (Hakim, 1979:21). Accounting for this difference in the gender composition of the labour force at each period of measurement increases the reliability of an index used in historical analysis. The concept of a relative 'adjusted' index seems to capture the distinctive feature of this measure and this term will be used in the remainder of the paper when reference is made to the relative index proposed by Hakim.

**Figure 2**

Types of Indices[4]

Absolute
Absolute standardized
Relative
Relative adjusted

## III. The Data Base

Before proceeding further, we must return to the third problem identified at the outset - the data base used to compute the indices developed.

The problem of obtaining valid and reliable data is faced by all researchers. The problem is further complicated when historical or cross cultural analysis is desired, as data that are comparable on the parameters under investigation are required. It is generally agreed that official statistics, general census data and, in some cases, labour force survey data, are the data of choice in studying occupational segregation by gender.[5] But even official data are not without limitations. Four major limitations in the use of census data have been identified by Kalbach and McVey as:

> (1) the periodic disruption of historical series, (2) discontinuities created by revision of data collection area boundaries, (3) changes in basic concepts, and (4) updating of specific indicators of social and economic conditions (cited in Connelly, 1978:77).

The discussion in this section will focus on the Canadian data base. Similar problems are encountered with the official statistics of other nations, as examples used later in this paper will illustrate.

A complete decennial census has been carried out since 1871 in Canada, and since 1891 information on the occupations of women has been provided. However, both the labour force definitions and the occupational classification scheme used to code census data have been revised several times. An additional concern for those interested in the study of women's labour is that a large number of women are excluded from official labour force statistics as they are engaged in household labour, volunteer work or unpaid work,[6] and are not officially defined as part of the labour force.

Detailed descriptions for each occupation coded by the census have been provided since 1971 in the CCDO: the Canadian Classification and Dictionary of Occupations. The scheme operates under a policy of continuous revision as the 1982 Guide points out.

> If an occupational classification scheme is to accurately reflect the world of work, it must be sufficiently flexible to adjust to the dynamics of an ever-changing world. New occupations emerge, others become obsolete and still others combine or fractionate (1982:3).

By 1982 the CCDO identified some 7,500 unique occupations existing in Canada. "The significant duties, or the 'kind of work performed', act as the basic principle for classifying occupations" (1982:23). Every occupation is uniquely identified by a 7 digit number, the first 2 of which refer to the Major Group, the first 3 to the Minor Group and the first 4 to the Unit Group. The last 3 digits ...

> ... determine the sequence of occupations within a Unit Group, for occupations are normally arranged in a descending order of complexity as determined by training time requirements (1982:23).

In general, supervisory or administrative positions within the Unit Group fall near the top and general labour to the bottom. The example below from the Major Group - Service Occupations - illustrates how information is embedded in the code.

**Figure 3**

| | | CCDO Groups |
|---|---|---|
| Major Group | 61 | Service Occupations |
| Minor Group | 611 | Protective Service Occupations |
| Unit Group | 6111 | Fire-Fighting Occupations |
| Occupational Title | 6111-110 | Fire Chief |
| | 6111-114 | Fire Captain |
| | 6111-126 | Fire-Fighter |

The homogeneity of the group identified by the code increases as we move from the top to the bottom of the figure. The CCDO thus provides access to information on individual occupations. Unfortunately, the census codes only to the 4 digit level. In the example given above, we could find the number of individuals engaged in fire-fighting occupations for the census year but we could not separately identify the number of fire captains or firemen. This is an obvious loss for studies of vertical occupational segregation as much of the 'within' occupational variation is captured at the 7 digit level. Aggregation of the data from the occupational level to the Unit, Minor and Major Groups successively masks more and more information. This is crucial in studies of occupational segregation for as Oppenheimer points out: "The more detailed the classification, the more likely were 'men's' and 'women's' jobs to be distinguished" (1970:68).

Regarding the occupational classification scheme to code census data, Meltz reports:

> Up to and including the 1921 census, the type of work persons performed was classified on the basis of a mixture of job function and types of goods or services produced. There was no separate identification of occupation and industry. In 1931, the published tables on the work force showed persons classified both by occupation and by industry. However, many of the occupational groups were given industrial titles based on the industry in which most of the jobs in the occupational group were located. The classification basis changed with each census ... (1965:11).

These problems are not trivial and historical comparisons of labour force activity and the occupational structure generally require that the data be modified in some way to allow for comparison. The more recent classification schemes are the most detailed and systematic and, in general, the data can be aggregated so that comparisons can be made with the earlier schemes.

The following table shows how the number of groups defined by the classification schemes has changed in the last forty years.

**Table 1**

**Classification of Occupations**

| | 1951 | 1961 | 1971 | 1981 |
|---|---|---|---|---|
| No. of Major Groups | 16 | 13 | 22 | 23 |
| No. of Minor Groups | 21 | | 81 | 83 |
| No. of Unit Groups | 280 | 273 | 486 | 505 |

Source: Classification of Occupations, 9th Census of Canada, 1951, p. 5, Occupational Classification Manual, Census of Canada, 1961, p. 7, 1971, p. 7, Standard Occupational Classification, 1980, pp. 29-43.

However, it is not only the number of groups that has changed; the definition of the groups has also changed. For example, in 1961, 'Professional Occupations' were considered a Major Group. By 1971 this Group was gone and seven new Major Groups were defined, including 'Occupations in Medicine and Health', 'Occupations in Social Sciences and Related Fields', etc. These new Groups included many of those earlier defined as 'Professional Occupations'. The difficulties faced in historical analysis are immediately evident. However, the census remains the data base of choice for broad historical analysis and there may be some comfort in the fact that similar problems have been faced by British and American researchers.

**Measures of Occupational Segregation by Gender Used in Selected British, American and Canadian Studies**

**Horizontal Segregation**

Horizontal segregation exists when men and women are working in largely separate occupations. One way to measure this type of segregation is to calculate the proportion of occupations with a specified percentage of women workers. The percentage specified varies with the researcher's definition of what constitutes a segregated occupation. For example, an occupation might be considered segregated if there were no women workers in the occupation, or conversely if women comprised 70% or more of the occupational work force. Hakim carried out this kind of analysis with British census data for the period 1901-1971. The table below illustrates the results.

**Table 2**

**Occupational Concentration**

| Year | Total number of occupations identified at each census | % of all occupations which have | |
|---|---|---|---|
| | | No. of women workers | 70% or more women workers |
| 1901 | 380 | 9 | 9 |
| 1911 | 475 | 13 | 9 |
| 1921 | 611 | 8 | 8 |
| 1931 | 591 | 8 | 8 |
| 1941 | - | - | - |
| 1951 | 587 | 6 | 11 |
| 1961 | 201 | 9 | 10 |
| 1971 | 223 | 2 | 12 |

Source: C. Hakim, Occupational Segregation, London, Department of Employment, 1979, p. 23.

This table suggests that the occupational concentration of women has increased over the seventy year period. While there are fewer occupations in which no women are present, the percentage of occupations in which women are dominant has increased from 9-12%. There are problems, however, in interpreting this index too literally.

It will be noted that the total number of occupations identified varies over the years and the way in which the occupational data has been aggregated and the ways in which the aggregates have been defined is likely to have changed as well. If, for example, telephone operators who are primarily female have been included in a minor group which includes all transportation and communication workers in one year and in a group that includes clerical workers in another, the change in the gender composition of transportation and communication workers between the two periods does not, in any way, measure a change in the occupational distribution of women. Second, the index takes no account of the differences in size of the occupational groups. Third, the index takes no account of the change in the gender composition of the total labour force which has changed over the years. The data does, however, suggest the direction of change in the occupational structure. Consequently, this absolute index is more appropriately used in exploratory, rather than confirmatory, data analysis.

A second measure of horizontal segregation that has been used by Hakim analyses the male and female labour force separately. In this case, the index records the change in the proportion of the total female (or male) labour force that works in an occupation dominated by one sex. Results of this absolute standardized measure are reported in Table 3 below.

**Table 3**

**Occupational Segregation**

| Year | % of men working in occupations which had | | | | | | % of women working in occupations which had | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 100%+ men workers | 90%+ | 80%+ | 70%+ | 60%+ | 50%+ | 100%+ women workers | 90%+ | 80%+ | 70%+ | 60%+ | 50%+ |
| 1901 | 47 | 74 | 83 | 89 | 92 | 95 | 11 | 52 | 54 | 71 | 74 | 82 |
| 1911 | 44 | 70 | 76 | 86 | 90 | 93 | 3 | 45 | 50 | 64 | 68 | 78 |
| 1921 | 29 | 70 | 76 | 83 | 86 | 92 | .1 | 40 | 48 | 56 | 61 | 72 |
| 1931 | 35 | 69 | 75 | 84 | 90 | 94 | .1 | 41 | 52 | 62 | 69 | 73 |
| 1941 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1951 | 20 | 61 | 73 | 82 | 85 | 92 | .3 | 31 | 39 | 50 | 64 | 68 |
| 1961 | 22 | 62 | 73 | 77 | 84 | 85 | 0 | 21 | 32 | 53 | 56 | 79 |
| 1971 | 14 | 53 | 69 | 77 | 84 | 87 | 0 | 25 | 44 | 51 | 75 | 77 |

Source: C. Hakim, Occupational Segregation, London, Department of Employment, 1979, p. 24.

As Hakim reports:

> By 1971, over half of all men were still in occupations where they outnumbered women by at least nine to one, and over two-thirds were in occupations where they outnumbered women by at least four to one (1979:23).

In 1901, over half of all women were in occupations where they outnumbered men nine to one, but by 1971 this had fallen to 25% of all women. The female dominated occupations have either been eliminated or have desegregated more rapidly than the male dominated occupations. By 1961, there were no women working in occupations that are 100% female while, in the same period, almost 25% of all males still worked in exclusively male occupations. Although gender segregation declines over the years, separation of the labour force on the basis of gender persists.

While this absolute index is standardized by taking into account changes in the size of the total female (and male) labour force in each period, each labour force is considered separately, and it does not, therefore, indicate change in the occupational composition overall. In addition, there is no indication of the total number of occupations in which 50-100% of the workers are female (or male) nor the size of these occupations. It is unlikely that these numbers are identical, and there is considerable difference if the 25% of women who work in occupations with 90%+ women workers in 1971 work in two occupations or in twenty.

Another measure that has been applied to the study of occupational segregation by gender is the Index of Segregation (or Dissimilarity) developed by Duncan and Duncan (1955:494). This index measures the difference between the percentage of the male labour force and the percentage of the female labour force in each occupational category. The absolute differences are summed up and the result divided by two.

$$\text{Index of Segregation} = \frac{\sum \left( \begin{array}{c} \% \text{ female labour force} \\ \text{(in each occupation)} \end{array} - \begin{array}{c} \% \text{ male labour force} \\ \text{(in each occupation)} \end{array} \right)}{2}$$

The table below illustrates how this index is calculated.

**Table 4**

**Index of Segregation**

(calculations based on a hypothetical labour force with 3 occupational categories)

| Occupation | % female labour force | % male labour force | Absolute differences |
|---|---|---|---|
| 1 | 20 | 40 | 20 |
| 2 | 40 | 10 | 30 |
| 3 | 40 | 50 | 10 |
| | 100% | 100% | Total = 60 |

Index = 60/2 or 30%.

An index of 0 implies that there is no segregation, an index of 100 implies complete segregation and any value between 1 and 99 refers to the percentage of males (or females) who have to change occupations to bring about an index of 0. In the example above, 30% of females would have to change occupations to produce an index of 0.

This index is problematic as it takes no account of changes in occupational size or in the occupational structure. While Joseph (1983) suggests that the occupational categories can be standardized to overcome the size differential, he still concludes:

> An observed change in [the index] could either indicate a change in the proportion of women in one or more occupational categories (i.e., a sex-composition change) and/or a change in the occupational structure being studied (i.e., a structural change) ... or a simultaneous change in sex-composition and occupational structure (1983: 146).

Joseph's work raises the theoretical question of the source of the change, a problem which is beyond the scope of this paper. However, Joseph's work also raises the problem of the interpretation of the results obtained by the types of measures discussed so far.

All are summary measures, i.e., they are based on a total of the observations in each occupational group, and they mask a great deal of what is occurring at the level of individual occupations. Also, they take no account of the changing gender composition of the labour force as a whole. It cannot be assumed that both these

dynamic processes will affect all occupations in the same way. The interpretation of all these measures should not be ahistorical, but there is a danger of this occurring when the measures mask so much detail. As tools of exploratory data analysis, however, these measures have pointed out general trends in occupational segregation and raise questions for future research.

The final measure of historical segregation that will be discussed is a relative measure used by Valerie Oppenheimer in her now classic study on The Female Labour Force in the United States. This index has also been used by Catherine Hakim with British census data and Patricia Connelly has applied it to Canadian census data.

Oppenheimer describes the measure as follows:

> For any census data, if women were randomly distributed throughout the occupational system, they would form the same proportion of workers in each occupation that they form of the labour force as a whole. ... We can classify every occupation according to the percentage of its workers who are female, and then go on to determine what proportion of all women workers were in occupations that were disproportionately female (1970:68).

Once again, this is a summary level measure, but it takes into account the gender composition of the total labour force. The following tables illustrate the results from the British, American and Canadian studies using this measure of horizontal occupational segregation.

**The U.S. Results**

**Table 6**

**Women in Disproportionately Female Occupations: 1900-1960**

| Year[b] | Females as a percent of total labour force | Disproportionately female occupations[a] Percent of female labour force: Expected in these occupations[c] | Observed in these occupations | Ratio of observed to expected |
|---|---|---|---|---|
| 1900 | 18 | 21 | 74 | 3.5 |
| 1910 | 20 | 30 | 83 | 2.7 |
| 1920 | 20 | 33 | 86 | 2.6 |
| 1930 | 22 | 35 | 89 | 2.5 |
| 1940 | 24 | 36 | 89 | 2.5 |
| 1950 | 28 | 40 | 86 | 2.2 |
| 1950* | 28 | 37 | 85 | 2.3 |
| 1960 | 33 | 38 | 81 | 2.1 |

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a An occupation is considered "disproportionately female" when women form a higher proportion of the workers in the occupation than they do in the labour force as a whole.

b The 1960 occupational classification system is not quite comparable to the 1950 system. Data adjusted to the 1950 census are available for 1900 through 1940, but data comparable to 1960 are available only for 1950. For this reason, 1950 data are presented twice: "1950" is according to the 1950 system and "1950*" is according to the 1960 occupational classification system.

c This is the percentage of the female labour force that would have been observed in these occupations if their sex compositions had been the same as the sex composition for the work force as a whole.

Source: Cited in V. Oppenheimer, The Female Labour Force in the United States, Berkeley, Institute of International Studies, University of California, 1970, p. 69.

**The British Results**

**Table 7**

**Women in Disproportionately Female Occupations: 1901-1971**

| Year | Females as a percent of total labour force | Disproportionately female occupations[1] Percent of female labour force: Expected in these occupations[2] | Observed in these occupations | Ratio of observed to expected |
|---|---|---|---|---|
| 1901 | 29 | 33 | 88 | 2.7 |
| 1911 | 30 | 36 | 87 | 2.4 |
| 1921 | 30 | 38 | 88 | 2.3 |
| 1931 | 30 | 37 | 87 | 2.4 |
| 1941 | — | — | — | — |
| 1951 | 31 | 39 | 86 | 2.2 |
| 1961 | 32 | 40 | 84 | 2.1 |
| 1971 | 36 | 42 | 84 | 2.0 |
| 1971[3] | 33 | 40 | 83 | 2.1 |

1 An occupation is considered 'disproportionately female' when women form a higher proportion of the workers in the occupation than they do in the labour force as a whole.

2 This is the percentage of the female labour force that would have been observed in these occupations if their sex composition had been the same as the sex composition for the work force as a whole.

3 Analysis of whole-time equivalent statistics for men and women in employment. A small number of persons not stating hours worked are included with those working full-time (30 hours or more a week). On this basis, the proportion of women in the labour force is slightly lower at 33 per cent.

Source: C. Hakim, Occupational Segregation, London, Department of Employment, 1979, p. 26.

**The Canadian Results**

**Table 8**

**Women in Disproportionately Female Occupations: 1901-1971**

| | | Disproportionately female occupations[1] | | |
|---|---|---|---|---|
| | | Percent of female labour force | | |
| Year[2] | Females as a percent of total labour force | Expected in these occupations[3] | Observed in these occupations | Ratio of observed to expected |
| 1901 | 13 | 17 | 85 | 5.0 |
| 1911 | 13 | 23 | 91 | 4.0 |
| 1921 | 15 | 26 | 92 | 3.5 |
| 1931 | 17 | 24 | 88 | 3.7 |
| 1941 | 20 | 28 | 90 | 3.2 |
| 1951 | 22 | 28 | 84 | 3.0 |
| 1961 | 27 | 37 | 88 | 2.4 |
| 1971 | 34 | 36 | 76 | 2.1 |

1 A "disproportionately female" occupation is one in which women form a higher proportion of the workers in the occupation than they do of the labour force as a whole.

2 These census data have not been adjusted and therefore are not entirely comparable. Since I have always used the most detailed occupational classification, much of the change could be the result of a more or less refined set of occupational categories.

3 This is the percentage of the female labour force that would have been observed in these occupations if their sex composition had been the same as the sex composition of the labour force as a whole.

Source: P. Connelly, Last Hired, First Fired, Toronto, Women's Press, 1978, p. 85.

Any attempt to compare the results obtained in these three studies must be conservative. First, each study faced the problems of changes in the occupational classification at different censual periods and, consequently, the problems of validity and reliability of intercensual comparisons. Second, differences in the classification schemes among the countries will affect the number of occupations that will be counted as disproportionately female. But with these limitations in mind, it is interesting to note the remarkable similarity of the pattern in these three countries. The ratio of the observed to the expected percentage of the female labour force in

disproportionately female occupations has declined in all three countries. In Britain, the decline has been extremely slow. In both Canada and the United States, the ratio has fallen more rapidly, but in both cases it started from a higher point. By 1960-1961, the index for all three is almost identical: 2.1 in the United States, 2.1 in Britain and 2.4 in Canada. By 1971, the Canadian index had fallen to 2.1 also.

Again, what is masked by this measure is an indication of where the change has taken place, i.e., in what occupations? As Boulet and Lavallée (1984) point out, there are two ways that occupational desegregation or occupational diversification of the sexes can occur. Women may enter traditionally male occupations[7] or men may enter traditionally female occupations.[8] Both processes may also operate simultaneously (1984:15). However, if women's share of the more highly valued traditionally female occupations, such as teaching, nursing, librarianship, etc., declines with no increase in the more highly valued male occupations, the decline represents a net loss for women.

Several studies (e.g., Armstrong, 1984; Connelly, 1978) have looked at segregation at the level of occupations and occupational groups using the sex-typing[9] and concentration[10] index. While these studies provide useful information on horizontal segregation, they are more appropriately included in the discussion of vertical segregation. Since the census occupational classification scheme which is used in these studies is not merely a list of occupations, but a listing which embeds hierarchical information on the occupational structure, these studies show not only how males and females are differentially distributed in occupations, i.e., horizontal segregation, but also they make apparent the different grades of occupations performed by females and males, i.e., vertical segregation. It is to this dimension that we now turn.

**Vertical Segregation**

Vertical segregation exists when there is a difference in the grades of occupations normally performed by females and males. It will be recalled that vertical segregation is concerned with both interoccupational and intraoccupational segregation. An index of interoccupational segregation measures the degree to which females and males are differentially distributed in higher and lower grade occupations. Intraoccupational segregation indices measure the degree to which females or males occupy the higher or lower grades within an occupation. Unlike the indices of

horizontal segregation which are summary occupational measures, or descriptive measures of individual occupations, the measures of vertical segregation focus on the hierarchical nature of the occupational structure.

**Interoccupational Vertical Segregation**

One way to operationalize this concept is to rank occupations according to a defined criterion, compute the gender ratio for each occupation and record the degree to which males or females are concentrated in higher and lower occupations. In Canada, for example, occupations could be ordered by their Pineo-Porter prestige score (1967:24-40). The gender composition of each occupation could then be calculated and, by comparison of the results of the two measures, the association between occupational prestige and gender could be observed.

Another measure of interoccupational gender segregation is the concentration index. This index records the occupational distribution of the labour force. Separate indices can be computed for (1) the total labour force, (2) the female labour force, and (3) the male labour force. The index for female concentration would be computed as follows:

$$\text{Female concentration} = \frac{\text{No. of females in an occupation}}{\text{No. of females in the total labour force}}$$

The results of these indices, as computed by Armstrong (1984:197-199), are presented below. The first table shows the distribution of the total labour force across occupational categories and the second shows the distribution of males and of females.

**Table 9**

**The Concentration of Labour Force[1] by Occupation, Canada, 1951, 1961, 1971 and 1981**

| Occupation[2] | 1951 | 1961 | 1971 | 1981 |
|---|---|---|---|---|
| Managerial | 8.1 | 8.6 | 8.7 | 7.1 [3] |
| Professional and Technical | 7.4 | 10.0 | 13.8 | 15.8 |
| Clerical | 11.1 | 13.2 | 16.2 | 19.2 |
| Sales | 6.5 | 6.5 | 6.7 | 10.1 |
| White Collar Sub Totals | 32.0 | 38.3 | 45.4 | 52.2 |
| Service and Recreation | 9.9 | 12.6 | 12.8 | 12.5 |
| Transport and Communications | 6.3 | 6.2 | 5.5 | 4.0 |
| Farmers and Farm Workers | 15.8 | 10.3 | 6.4 | 4.5 |
| Loggers and Related | 1.9 | 1.3 | 0.7 | 0.7 |
| Fishermen, Trappers and Hunters | 1.0 | 0.5 | 0.4 | 0.4 |
| Miners, Quarrymen and Related | 1.2 | 1.0 | 0.8 | 0.7 |
| Craftsmen, Production | 25.0 | 24.3 | 23.3 | 23.0 |
| Process and Related Labourers | 6.7 | 5.5 | 4.8 | 2.1 |
| Blue Collar Sub Totals | 68.0 | 61.7 | 54.6 | 47.9 |
| TOTALS | 100.0 | 100.0 | 100.0 | 100.0 |

---

1 The 1951 and 1961 data exclude persons looking for work who never worked before. For 1971 and [1981], figures exclude persons looking for work who last worked prior to January 1 in 1970 or 1980, respectively. Not including occupations unspecified or undefined.

2 Occupations are not precisely comparable due to definition changes each Census.

3 The managerial category was more strictly defined in the 1971 Census. The 1981 data used here are based on 1971 definitions. 1981 Census definitions change the numbers of people in the managerial category from 814,035 (1971 definition) to 1,060,015 (1981 definition). Many of these people were shifted by this definition from management to sales.

Source: P. Armstrong, Labour Pains, Toronto, Women's Press, 1984, p. 197.

**Table 10**

**The Concentration of Female and Male Labour Force[1] by Occupation, Canada, 1951, 1961, 1971 and 1981**
(percentages)

| Occupation[2] | Females | | | | Males | | | |
|---|---|---|---|---|---|---|---|---|
| | 1951 | 1961 | 1971 | 1981 | 1951 | 1961 | 1971 | 1981 |
| Managerial | 3.3 | 3.3 | 2.3 | 4.4 | 9.4 | 10.5 | 6.2 | 9.0 |
| Professional and Technical | 14.5 | 15.8 | 20.1 | 19.9 | 5.4 | 7.8 | 11.1 | 12.9 |
| Clerical | 28.1 | 29.6 | 35.9 | 36.7 | 6.3 | 7.1 | 8.5 | 7.2 |
| Sales | 8.7 | 8.6 | 9.5 | 10.1 | 4.6 | 5.8 | 11.1 | 10.0 |
| White Collar Sub Totals | 54.6 | 57.3 | 67.8 | 71.1 | 25.7 | 31.2 | 36.9 | 39.1 |
| Service and Recreation | 21.4 | 23.0 | 17.1 | 16.1 | 6.6 | 8.7 | 10.2 | 10.1 |
| Transport and Communications | 2.9 | 2.2 | 0.3 | 0.6 | 7.3 | 7.7 | 6.5 | 6.3 |
| Farmers and Farm Workers | 2.8 | 4.4 | 4.1 | 2.3 | 19.5 | 12.5 | 7.9 | 5.9 |
| Loggers and Related | 0.0 | 0.0 | 0.1 | 0.1 | 2.5 | 1.7 | 1.3 | 1.1 |
| Fishermen, Trappers and Hunters | 0.0 | 0.0 | 0.0 | 0.1 | 1.3 | 0.7 | 0.5 | 0.6 |
| Miners, Quarrymen and Related | 0.0 | 0.0 | 0.0 | 0.0 | 1.6 | 1.4 | 1.2 | 1.1 |
| Craftsmen, Production | 16.5 | 11.9 | 9.2 | 8.6 | 27.4 | 28.9 | 32.3 | 32.9 |
| Process and Related Labourers | 1.8 | 1.2 | 1.5 | 1.2 | 8.1 | 7.1 | 3.2 | 2.8 |
| Blue Collar Sub Totals | 45.4 | 42.7 | 32.3 | 29.0 | 74.3 | 68.7 | 63.1 | 60.8 |

---

1 The 1951 and 1961 data exclude persons looking for work who never worked before. For 1971 and 1981, figures exclude persons looking for work who last worked prior to January 1 in 1970 or 1980, respectively. Not including occupations unspecified or undefined.

2 Occupations are not precisely comparable due to definition changes each Census. For 1971 and 1981, materials handling and related occupations, n.e.c. is used for the labourers category. Included in craftsmen, production process and related are processing occupations, machining and related occupations, product fabricating, assembling and repairing occupations, as well as other crafts and equipment operating occupations. Occupations not elsewhere classified have been subtracted for the calculations.

Source: P. Armstrong, Labour Pains, Toronto, Women's Press, 1984, pp. 198- 199.

This measure shows that women have become increasingly concentrated in white collar work. In 1951, when approximately one-third of the total labour force was in white collar work, almost 55% of women worked in these occupations. This rises to 71.1% by 1981. But women are not evenly distributed over all the white collar occupations. As the tables show, women are increasingly concentrated in clerical work, and the proportion of women in professional and technical work, which increased from 1951-1971, begins to decline by 1981. The proportion of women in the female labour force who are managers has risen just over 1% in thirty years. While the percentage of the total labour force engaged in blue collar occupations has declined over the thirty year period recorded by the table, the proportion of males in the Craftsmen, Production occupations, where income levels are generally higher than in other areas of blue collar work, has steadily increased.

This index takes into account the changes in the size of the female labour force over the years, and can be considered reliable for historical comparisons. It tells us how the female labour force is distributed over the occupational categories, and the occupations in which females are concentrated. It does not, however, tell us anything about the gender composition of the occupations, or whether the occupations in which females are concentrated are also occupations which they dominate.

One of the simplest measures of segregation is an index which reports the gender proportions of each occupation or occupational group. Armstrong has called this index sex-typing (1984:190).

$$\text{Sex-typing} = \frac{\text{No. of females (or males) in an occupation}}{\text{No. of females and males in the occupation}} \times 100$$

For each occupation, the percentage of males plus the percentage of females is equal to 100%. Calculation of the sex-typing index was preliminary to the calculation of many of the indices of horizontal segregation already discussed. However, as these indices were summary measures, the gender proportions of individual occupations or occupational groups were not reported. A sex-typing index has been used in several Canadian studies to describe segregation,[11] although it appears that Armstrong was the first to label it sex-typing. This measure has also been used by Bain and Price with British census data (cited in Hakim, 1979:28). The results from one Canadian study are presented in Table 11 below.

It is clear from the table that men and women, in general, work in different occupations, and that segregation has not changed dramatically over time. While women in 1981 hold more than 55% of white collar occupations, they are over-represented in the lower status clerical occupations and under-represented in proprietary and managerial occupations. In fact, the increase in the female proportion of the proprietary and managerial occupations between 1971 and 1981 may be anomalous. Armstrong reports that it "may primarily reflect the reclassification, as a result of the new technology, of many formerly clerical jobs as executive work" (1984:173-74). Women have traditionally played a major role in professional occupations and continue to do so. However, information on vertical segregation is masked in the table presented as it groups into a single Major Group such diverse and traditionally gender segregated occupations as teaching, nursing, medicine, dentistry, etc. This, however, is not a limitation of the index and, with recent census data, the sex-typing index for the individual professions can be readily calculated.

The major problem with this index comes when we attempt to interpret the change by comparing one censual period with another. When intercensual comparisons are being made, the gender composition of the total labour force at each period of measurement should be taken into account. Women still do not participate in the labour force in numbers equal to men and, in Canada, their proportion of the total has risen from 13.3% in 1911 to 40.4% in 1981 (see Table 11). Hakim proposed an index that is the ratio of the percentage of all workers in each occupation or occupational group who are female to the percentage of women in the total labour force. The index can be visualized as follows:

$$\text{Relative adjusted index of segregation} = \frac{\text{Sex-typing index}}{\text{\% of the total labour force that is female (or male)}}$$

An occupation in which women were represented in equal proportion to their participation in the labour force would produce a value of 1. An occupation which was completely segregated would produce a value of 0 if it was an exclusively male occupation and a value greater than 1 if it was an exclusively female occupation. It should be noted that any occupation in which the percentage of the occupation that is female is greater than the percentage of the total labour force that is female will produce an index greater than 1.

**Table 11**

**Female Sex-Typing of the Canadian Labour Force**

| Census date | 1901 | 1911 | 1921 | 1931 | 1941 | 1951 | 1961 | 1971 | 1981 |
|---|---|---|---|---|---|---|---|---|---|
| All Occupations | 13.3 | 13.4 | 15.5 | 17.0 | 19.8 | 22.3 | 27.8 | 34.3 | 40.4 |
| White Collar Occupations | 20.6 | 23.8 | 29.5 | 31.5 | 35.1 | 38.1 | 41.3 | 48.5 | 55.4 |
| Proprietary and Managerial | 3.6 | 4.5 | 4.3 | 4.8 | 7.2 | 8.9 | 10.3 | 15.7 | 24.9 |
| Professional | 42.5 | 44.6 | 54.1 | 49.5 | 46.1 | 43.5 | 43.2 | 48.1 | 51.4 |
| Clerical | 22.1 | 32.6 | 41.8 | 45.1 | 50.1 | 56.7 | 61.5 | 68.4 | 77.7 |
| Commercial and Financial | 10.4 | 19.2 | 23.1 | 23.1 | 29.4 | 35.2 | 36.7 | 30.4 | 40.8 |
| Manual Occupations | 12.6 | 10.4 | 10.4 | 8.5 | 11.0 | 11.5 | 10.6 | 12.0 | 14.5 |
| Manufacturing and Mechanical | 24.8 | 25.9 | 24.3 | 18.7 | 19.1 | 18.8 | 16.8 | 18.5 | 20.6 |
| Construction | * | * | .1 | * | .2 | .3 | .2 | .9 | 2.0 |
| Labourers[1] | .9 | .1 | .2 | 2.6 | 4.4 | 6.0 | 6.1 | - | - |
| Transportation and Communication | 1.4 | 3.5 | 8.4 | 6.5 | 5.3 | 8.2 | 7.9 | 9.5 | 13.6 |
| Primary Occupations | 1.1 | 1.5 | 1.6 | 1.9 | 1.5 | 3.1 | 9.2 | 16.4 | 16.5 |
| Agricultural | 1.2 | 1.7 | 1.7 | 2.1 | 1.8 | 3.9 | 11.7 | 20.9 | 21.1 |
| Fishing, Hunting and Trapping | .2 | .8 | .2 | 1.0 | .6 | .5 | 1.1 | 1.9 | 5.6 |
| Logging | - | - | - | - | - | * | .2 | 2.1 | 6.3 |
| Mining and Quarrying | * | * | * | - | * | * | * | .6 | 2.1 |
| Service Occupations | 68.7 | 65.3 | 58.9 | 63.0 | 65.1 | 55.4 | 57.8 | 46.2 | 52.3 |
| Personal | 71.7 | 67.2 | 68.9 | 69.6 | 72.9 | 64.2 | 66.4 | 57.4 | 60.9 |
| Protective and Other | 2.7 | 6.8 | 11.9 | 2.1 | 1.8 | 3.1 | 5.1 | 3.9 | 12.4 |
| Not Stated | - | - | 23.0 | 18.0 | 15.1 | 20.5 | 25.8 | 43.3 | 42.6 |
| Not Classified Elsewhere | - | - | - | - | - | - | - | 13.0 | 17.4 |

* Less than .05%.
\- None.

[1] Category not separately identified in 1971, 1981.

This index thus incorporates both the sex ratio in the occupation and the gender composition of the labour force in a single measure. When the gender composition of the labour force is not taken into account, a comparison of the changes in segregation between census periods can be misleading. The following example illustrates this point.

If there is an increase of 10% in the female sex-typing index of an occupation between two censual periods, can we conclude that occupational segregation has decreased? Not necessarily, as Figure 4 illustrates. If the gender composition of the labour force changed dramatically between the two periods under study, segregation may have actually increased. Comparing Case 1 and Case 2, we find that, while women are present in the occupation in a higher proportion in the second period in both cases, in Case 2 they have lost ground relative to their overall participation in the labour force.

**Figure 4**

| | Case 1 | | Case 2 | |
|---|---|---|---|---|
| Census Period | Time 1 | Time 2 | Time 1 | Time 2 |
| % of Occupation Female | 10% | 20% | 10% | 20% |
| % of Total Labour Force Female | 20% | 20% | 20% | 50% |
| Relative Adjusted Index | 0.5 | 1.0 | 0.5 | 0.4 |

The following table presents the results of the application of the relative adjusted index to the Canadian data presented in Table 11. The persistence of occupational segregation is clear as few occupations in any period approach the desegregated value of 1. Women are, however, represented in more of the occupational groups in the later years. The increasing proportion of women in white collar occupations is more than balanced by their increased entry into the labour force. With some slight variation in the early years, the overall index for white collar occupations has changed little between 1901 and 1981. The blue collar occupations were virtually desegregated in 1911 with an index of .9 and have become increasingly segregated. The service occupations show the most dramatic change as the over-representation of women in service occupations relative to the number of women in the labour force has declined considerably from 5.2 to 1.3.

**Table 12**

**Relative Adjusted Index of Vertical Segregation in the Canadian Labour Force**

| Census date | 1901 | 1911 | 1921 | 1931 | 1941 | 1951 | 1961 | 1971 | 1981 |
|---|---|---|---|---|---|---|---|---|---|
| All Occupations | 13.3 | 13.4 | 15.5 | 17.0 | 19.8 | 22.3 | 27.8 | 34.3 | 40.4 |
| White Collar Occupations | 1.5 | 1.8 | 1.9 | 1.9 | 1.8 | 1.7 | 1.5 | 1.4 | 1.4 |
| Proprietary and Managerial | .3 | .3 | .3 | .3 | .4 | .4 | .4 | .5 | .6 |
| Professional | 3.2 | 3.3 | 3.5 | 2.9 | 2.3 | 2.0 | 1.6 | 1.4 | 1.3 |
| Clerical | 1.7 | 2.4 | 2.7 | 2.7 | 2.5 | 2.5 | 2.2 | 2.0 | 1.9 |
| Commercial and Financial | .8 | 1.4 | 1.5 | 1.4 | 1.5 | 1.6 | 1.3 | .9 | 1.0 |
| Manual Occupations | .9 | .8 | .7 | .5 | .6 | .5 | .4 | .3 | .4 |
| Manufacturing and Mechanical | 1.9 | 1.9 | 1.6 | 1.1 | 1.0 | .8 | .6 | .5 | .5 |
| Construction | * | * | * | * | * | * | * | * | .1 |
| Labourers[1] | .1 | * | * | .2 | .2 | .3 | .2 | - | - |
| Transportation and Communication | .1 | .3 | .5 | .4 | .3 | .4 | .3 | .3 | .3 |
| Primary Occupations | .1 | .1 | .1 | .1 | .1 | .1 | .3 | .5 | .4 |
| Agricultural | .1 | .1 | .1 | .1 | .1 | .2 | .4 | .6 | .5 |
| Fishing, Hunting and Trapping | * | .1 | * | .1 | * | * | * | .1 | .1 |
| Logging | - | - | - | - | - | * | * | .1 | .2 |
| Mining and Quarrying | * | * | * | - | * | * | * | * | .1 |
| Service Occupations | 5.2 | 4.9 | 3.8 | 3.7 | 3.3 | 2.5 | 2.1 | 1.3 | 1.3 |
| Personal | 5.4 | 5.0 | 4.5 | 4.1 | 3.7 | 2.9 | 2.4 | 1.7 | 1.5 |
| Protective and Other | .2 | .5 | .8 | .1 | .1 | .1 | .2 | .1 | .3 |
| Not Stated | - | - | 1.5 | 1.1 | .8 | .9 | .9 | 1.3 | 1.1 |
| Not Classified Elsewhere | - | - | - | - | - | - | - | .4 | .4 |

* Less than .05%.
\- None.

1 Category not separately identified in 1971, 1981.

Sources: Calculation[illegible]

The interpretation of the index for the primary occupations is somewhat problematic as the major gain for women in recent years appears to have been in agriculture. This may simply indicate that more farm wives have been included in the collection of labour force statistics in these years.

The relative adjusted index is an extremely useful measure of segregation when comparisons over time are required. However, the need for aggregate data to achieve comparability reduces the usefulness of any of these measures and much remains masked. If we restrict the analysis to 1971 and 1981 census data for Canada, it is possible to get more detailed information that is comparable. Although the CCDO has been under continuous revision since 1971, the 1981 Census provides a number of tables of 4 digit occupational data that have been matched with the 1971 census definitions and allow for comparability. Boulet and Lavallée (1984) use this data to study the changing economic status of women. One problem addressed by this study is occupational diversification, or what would be called in this paper decreased occupational segregation. Their emphasis, as economists, is placed on analyzing the wage differentials of males and females in the same occupations or occupational groups. Some information on what has been referred to in this paper as interoccupational vertical segregation can be gathered from this report, but the problem of intraoccupational segregation is not addressed. The distribution of the different grades of work within occupations remains hidden. In addition, in a table of 201 occupations for which they have calculated the ratio of female to male average annual earnings in 1970 and 1980 (1984:52-56), there is still considerable heterogeneity within the occupational categories and horizontal segregation is also masked.

As the occupational hierarchy is captured at the 4 digit level for a number of occupations, it is possible to construct an index of intraoccupational vertical segregation. As the occupational data is also broken down by province, the regional differences in the pattern of occupational segregation can also be explored.

In the next section of this paper, the relative adjusted index of segregation will be used to look at vertical segregation within several occupations.

**Intraoccupational Vertical Segregation**

**Teaching**

Teaching has been considered one of the traditionally female occupations, and an occupation which scores relatively high on the socioeconomic index calculated by Blishen and McRoberts (1976). As secondary school teaching ranks higher than elementary school teaching, secondary school teaching will be considered a higher grade occupation. Unfortunately, data on principals cannot be separately identified. The relative adjusted index for 1971 and 1981 national level data on teaching is shown in Table 13 below.

**Table 13**

**Teaching Profession**

| | 1971 | | 1981 | |
|---|---|---|---|---|
| | RAI* | Sex-typing | RAI | Sex-typing |
| Elementary School (2731) | 2.4 | (82.3%) | 2.0 | (80.4%) |
| Secondary School (2733) | 1.3 | (44.5%) | 1.0 | (42.2%) |

* Relative Adjusted Index.

Source: Calculated from Census of Canada, 1981. Cat. No. 92-920, Table 1.

Women dominate elementary school teaching, the lower grade occupation within the field. In 1981, over 80% of elementary school teachers were female, compared with just over 42% of secondary school teachers. Vertical segregation is clearly evident. The relative adjusted index shows that the over-representation of women in these occupations is decreasing. Both grades of the occupation are becoming segregated. At least in the short run, this is disadvantageous to women as they lose ground in one of the few relatively high grade female occupations. Desegregation of occupations does not take place evenly across the occupational structure and, unless the losses in the teaching profession are balanced by the increased entry of females into more traditionally male occupations, the overall result is a net loss of status for female members of the labour force.

**Dental Profession**

Vertical segregation is alive and well in the dental profession. Between 1971 and 1981, the number of women dentists increased approximately one and a half times. They now comprise 7.8% of the profession. The under-representation of women has moved from .1 to .2 as Table 14 illustrates. However, if we consider dental hygienists, a lower grade occupation within the field of dentistry, the pattern is reversed. 81.1% of this occupation is comprised of females in 1981, up 4.6% from 1971. The relative adjusted index moves from 2.2 to 2.0. The profession is desegregating, but as with elementary school teachers, women are still over-represented but not in proportion to the increase in the female labour force.

**Table 14**

**Dentists and Dental Hygienists**

| | 1971 | | 1981 | |
|---|---|---|---|---|
| | RAI* | Sex-typing | RAI | Sex-typing |
| Dentists (3113) | 0.1 | ( 4.7%) | 0.2 | ( 7.8%) |
| Dental Hygienists (3157) | 2.2 | (76.5%) | 2.0 | (81.1%) |

* Relative Adjusted Index.

Source: Calculated from Census of Canada, 1981. Cat. No. 92-920, Table 1.

**Engineering**

Engineering is a traditionally male, well ranked profession. Here, change between the two census is uneven and varies with the specialization or type of engineering. In 1971, industrial engineering was the only engineering specialty in which more than 2% of the occupation was female. Interesting, but perhaps not surprising, industrial engineering is one of the lowest ranking engineering specialties on the Blishen-McRoberts scale. The number of women in all types of engineering had increased by 1981 and industrial engineering was still in the lead with 12.2% of the occupation female. The other specialties ranged from a low of 2% to a high of 5.9%. The relative adjusted index has also moved slightly upward, as women began to enter this profession (see Table 15).

**Table 15**

**Engineering**

| | 1971 | | 1981 | |
|---|---|---|---|---|
| | RAI@ | Sex-typing Index | RAI | Sex-typing Index |
| Chemical (2142) | * | (1.4%) | .15 | ( 5.9%) |
| Civil (2143) | * | (1.0%) | * | ( 2.8%) |
| Electrical (2144) | * | (1.2%) | .09 | ( 3.6%) |
| Industrial (2145) | .09 | (3.3%) | .30 | (12.2%) |
| Mechanical (2147) | * | ( .7%) | .05 | ( 2.0%) |
| Metallurgical (2151) | .05 | (1.8%) | .06 | ( 2.6%) |
| Mining (2153) | * | (1.0%) | .07 | ( 2.8%) |
| Petroleum (2154) | * | (1.1%) | .11 | ( 4.8%) |
| Aeronautical (2155) | * | (1.3%) | .05 | ( 2.2%) |

@ Relative Adjusted Index.

* Less than .05

Source: Calculated from Census of Canada, 1981. Cat. No. 92-920, Table 1.

Intraoccupational vertical segregation has been observed in all three of the occupations examined. The relative adjusted index of segregation demonstrates well the degree to which females within these occupations are over- or under-represented relative to what would be observed if females and males were equitably distributed throughout the occupational structure.

**A Final Example of the Use of the Relative Adjusted Index of Segregation**

Most of the analysis of occupational segregation by gender has been done with national level data. Many of the labour markets are regional and the national level data may be masking regional differences much as the aggregated occupational data masks segregation within specific occupations. The relative adjusted index is especially

important in this analysis since it is not expected that the gender composition of the labour force will be identical from region to region. A measure of the degree of over- and under-representation of women in various occupations that can be compared from region to region again requires that the gender composition of the total labour force be taken into account.

To test the usefulness of the relative adjusted index, the provinces of Alberta and Ontario were selected for comparison. Alberta underwent a major industrial expansion and experienced a large increase in population between 1971 and 1981 as a result of the oil boom. Ontario, on the other hand, has the oldest and most established industrial base in the country.

Teaching and engineering, two occupations examined in the previous section, were reviewed for Ontario and Alberta to see if regional differences in patterns of segregation could be detected.

It was found that the gender composition of the labour force was relatively similar in Ontario and Alberta at each of the census periods and in line with the national data (see Table 16).

**Table 16**

**% of the Total Labour Force that is Female**

| | Alberta | Ontario | Canada |
|---|---|---|---|
| 1971 | 34.5% | 35.9% | 34.4% |
| 1981 | 39.6% | 41.9% | 40.4% |

Source: Calculated from Census of Canada, 1981. Cat. No. 92-920, Table 1.

**Teaching**

The pattern of segregation is remarkably similar in the three populations as is shown in Table 17 below.

**Table 17**

**Teaching Profession**

| | | Relative Adjusted Index | | Sex-typing Index | |
|---|---|---|---|---|---|
| | | Elementary | Secondary | Elementary | Secondary |
| Alberta | 1971 | 2.4 | 1.4 | 83.5% | 47.3% |
| | 1981 | 2.0 | 1.1 | 79.4% | 43.6% |
| Ontario | 1971 | 2.2 | 1.1 | 80.0% | 40.1% |
| | 1981 | 1.8 | 0.9 | 77.3% | 39.2% |
| Canada | 1971 | 2.4 | 1.3 | 82.3% | 44.5% |
| | 1981 | 2.0 | 1.0 | 80.4% | 42.2% |

Source: Calculated from Census of Canada, 1981. Cat. No. 92-920, Table 1.

Females are concentrated in the lower grade of the occupation in both regions and secondary school teaching has been virtually desegregated in all three. In Alberta, females are slightly over-represented in secondary school teaching and in Ontario they are slightly under-represented.

**Engineering**

The number of positions in engineering increased dramatically in Alberta between the census. While in Ontario the number of positions in most fields of engineering increased by 50-75%, the increase in Alberta was in the order of 250-500%. The gender composition of these occupations did not change in the same way, but there were significant gains in both Alberta and Ontario for women between these two periods, as is shown in Table 18 below.

In 1981, vertical segregation is evident in both provinces as industrial engineering, a lower grade engineering occupation contains the highest percentage of women in both provinces. However, in the 1971 census, mining engineering in Alberta had 4.8% women compared to 3.3% in industrial engineering and in Ontario petroleum engineering was 5% female compared with 3.0% in industrial engineering. In both 1971 and 1981, the relative adjusted index does not go higher than .2 in any type of engineering other than industrial and the profession remains almost completely segregated. Even the enormous influx of engineers to Alberta did little to change this pattern.

**Table 18**

**Engineering**

| Type | Alberta 1971 RAI@ | Alberta 1971 ST+ | Alberta 1981 RAI | Alberta 1981 ST | Ontario 1971 RAI | Ontario 1971 ST | Ontario 1981 RAI | Ontario 1981 ST |
|---|---|---|---|---|---|---|---|---|
| Chemical | 0 | 0% | .11 | 4.5% | * | 1.6% | .2 | 7.5% |
| Civil | * | .6% | .10 | 4.0% | * | 1.4% | .07 | 2.8% |
| Electrical | .06 | 2.1% | .08 | 3.3% | * | 1.2% | .09 | 3.6% |
| Industrial | .10 | 3.3% | .4 | 14.8% | .08 | 3.0% | .3 | 11.9% |
| Mechanical | 0 | 0 | .07 | 2.7% | * | .7% | .05 | 1.9% |
| Metallurgical | 0 | 0 | 0 | 0 | * | 1.1% | .07 | 2.9% |
| Mining | .13 | 4.8% | .10 | 4.0% | 0 | 0 | .06 | 2.7% |
| Petroleum | * | .5% | .10 | 4.1% | .14 | 5.0% | .14 | 6.0% |
| Aeronautical | .11 | 4.0% | 0 | 0 | * | .8% | .07 | 2.9% |

@ Relative Adjusted Index.

\+ Sex-typing Index.

* Less than .05.

Source: Calculated from Census of Canada, 1981. Cat. No. 92-920, Table 1.

The persistence of occupational segregation by gender, at least in teaching and engineering, is evident in both regions. Similar patterns of vertical segregation are also observed. A systematic analysis of many more occupations and all provinces will have to be conducted before the suitability of the relative adjusted index can be properly assessed. This preliminary analysis suggests that it may prove useful in studying whether the patterns of occupational segregation are similar in all regions of Canada and, if not, how they differ both from the national profile and from each other.

**Conclusion**

This paper has reviewed the problems encountered in the development of measures of occupational segregation by gender. The concepts have still not been fully specified and the problems encountered with the data base are serious.

The measures of horizontal segregation are summary measures that demonstrate the overall pattern of segregation by gender. The measures of vertical segregation describe, in more detail, the changes in the occupational distribution, but the group level data still required for historical comparison assure that much remains hidden. The indices reviewed are most successfully used for exploratory data analysis unless more detailed occupational data are available.

The 1971 and 1981 Census of Canada does provide data that can be analyzed at the level of individual occupations; in some cases, the occupational hierarchy can also be captured. Two dimensions of vertical segregation, interoccupational and intraoccupational, were operationalized and the sex-typing and relative adjusted indices were calculated for several occupations.

The results show the persistence of occupational segregation by gender and the unevenness of change within the occupational groups which was masked by the aggregate level data. The results also show that the pattern of segregation is similar in two distinctly different provinces. While the sex-typing index is more intuitive and easily understood, it is not as valid or reliable for comparative analysis.

Occupational segregation by gender persists in Canada, and the increased participation of women in the labour force has not affected the occupational distribution substantially. The relative adjusted index used in this paper to describe the pattern of occupational segregation over time makes this clear. The development of a suitable index to measure occupational segregation is, however, only a first step in the analysis of occupational segregation by gender. The work of explaining these changes still largely remains to be done. If this methodological tool helps to show old data in a new light, then its purpose will have been served.

## FOOTNOTES

1 This fact has been established by several analysts of the Canadian occupational structure, including Armstrong (1984), Connelly (1978), Meltz (1965) and Ostry (1967).

2 The first census to provide information on the occupation of women was in 1891.

3 My calculation based on the Census of Canada, 1981, Cat. No. 92-920, Table 1.

4 An absolute index is an index which produces a simple percentage or a proportion (see, for example, Table 2). An absolute index frequently masks a great deal of information which can lead to misinterpretation of the statistics produced. An absolute standardized index also produces a percentage or proportion but controls for a known source of variation (see, for example, Table 3). A relative index is a ratio of two percentages or proportions rather than a simple percentage or proportion (see, for example, Table 6). The relative adjusted index is a relative index whose denominator is a value that adjusts the index for each time period to allow for comparisons over time (see, for example, Table 12).

5 See, for example, Armstrong (1984), Connelly (1978) and Meltz (1965).

6 It should be noted that unpaid labour that contributes to a family enterprise has been defined by the 1981 Census to constitute labour force activity (Armstrong, 1984:184).

7 Defined as where men account for 50% or more of the workers (1984:15).

8 Defined as where women make up over 50% of the workers (1984:15).

9 See page 20.

10 See page 17.

11 See, for example, Armstrong (1984), Connelly (1978), Meltz (1965) and Ostry (1967).

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CRIAW ICREF

# MEMBERSHIP INFORMATION

## CANADIAN RESEARCH INSTITUTE FOR THE ADVANCEMENT OF WOMEN

The Canadian Research Institute for the Advancement of Women was founded in April, 1976, as a response to International Women's Year and at the beginning of International Women's Decade (1976-1985). CRIAW's creation met the need for an organization for research on women and women's experience in Canada.

## STRUCTURE

CRIAW is a non-profit organization with members across the country and abroad. The Board of Directors works on a voluntary basis. Each province and territory is represented by an elected member; in addition, there are six directors-at-large. The Executive Committee is composed of the President, Past President, President-Elect, Secretary and Treasurer. CRIAW's bilingual national office and staff are located in Ottawa.

## PURPOSE

CRIAW's purpose is to encourage, co-ordinate and disseminate research into women's experience. In the past, generalizations about Canada, its people, its economy, its politics, have too often been based on research by men about the experience of men. Until the experience of women has also been studied and evaluated, until we know just where it is different from and where it is similar to the experience of men, we will have a limited view of Canadian reality.

## OBJECTIVES

— To promote the advancement of women through feminist research

— To encourage and facilitate communication and information exchange among academic women, community workers, women's groups, and concerned individuals

— To disseminate research results through publications such as **The CRIAW Papers, Feminist Perspectives** and conference proceedings

— To sponsor and assist research in areas of vital interest to Canadian women

## ACTIVITIES

**CRIAW BANK OF RESEARCHERS:** A computerized bank of résumés, listing researchers from all disciplines who are committed to the advancement of women.

**RESEARCH GRANTS-IN-AID:** Small annual grants to innovative proposals promoting the advancement of women.

**RESEARCH ASSOCIATE STATUS:** To assist unaffiliated researchers applying to funding agencies.

**THE CRIAW PAPERS:** Original research papers and review articles drawn from various disciplines, advancing the knowledge and understanding of women's experience.

**FEMINIST PERSPECTIVES:** A series of topical, provocative issue-oriented papers exploring women's experience and concerns.

**NEWSLETTER:** A quarterly publication that offers information and opportunities for communication among individual and group members.

**PRIZES:** Three prizes are awarded annually: the **Marion Porter Prize** for the year's best feminist research article; the **Robertine Barry Prize** for the best feminist article in the popular press; and the **Muriel Duckworth Award**, presented to the feminist woman, who, through her action-research in the field of social justice, including peace work, has contributed significantly to the advancement of Canadian women.

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**CONFERENCE:** A national general meeting and conference held annually, including research networking sessions.

**OTHER ACTIVITIES:** Collaboration in organizing events such as the 1982 national conference on "Women and the Impact of Microtechnology" and various research seminars.

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# RENSEIGNEMENTS POUR DEVENIR MEMBRE

## INSTITUT CANADIEN DE RECHERCHES SUR LES FEMMES

L'Institut canadien de recherches sur les femmes fut fondé en 1976 dans la lancée de l'Année internationale des femmes et le début de la Décennie internationale des femmes (1976-1985). Comme aucun organisme canadien ne tentait de coordonner la recherche sur les femmes et leur expérience de vie au niveau national, l'ICREF fut créé pour combler cette lacune.

## STRUCTURE

L'ICREF est une organisation bénévole sans but lucratif, avec des adhérentes à travers le pays et à l'étranger. Le Conseil d'administration est formé de bénévoles élus par les membres. Il se compose d'une représentante par province ou territoire et de six représentantes indépendantes. La présidente, la présidente sortante, la présidente désignée, la trésorière et la secrétaire forment le Bureau de direction. Le siège social bilingue de l'ICREF est situé à Ottawa.

## BUTS

L'ICREF s'est donnée comme mandat de coordonner, stimuler et diffuser des travaux de recherche portant sur des domaines négligés de la vie des femmes du Canada. Jusqu'à maintenant les données sur le Canada, ses groupes ethniques, son économie et sa politique ont presque toujours été élaborées à partir de recherches effectuées par des hommes et leur expérience. Tant que l'expérience féminine ne sera pas prise en considération et tant qu'on ne saura pas à quel point elle diffère ou non de l'expérience masculine, notre vision de la réalité canadienne restera partielle et partiale.

## OBJECTIFS

— Promouvoir l'amélioration de la condition des femmes par la recherche féministe

— Encourager et faciliter un échange d'information et de communication entre des académiciennes, des travailleuses communautaires, des groupes de femmes et des personnes intéressées

— Diffuser les résultats des recherches à l'aide de publications tels les **Documents de l'ICREF, Perspectives féministes** et les Actes des colloques de l'ICREF

— Commanditer et aider les recherches dans des domaines d'intérêt vital aux femmes canadiennes

## ACTIVITÉS

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