THE RESIDENTIAL CORRESPONDENCE BETWEEN JAPANESE AND OTHER ETHNIC GROUPS IN SAN FRANCISCO

Yoshiharu IZAKI*

ABSTRACT

In social geography, a number of studies have delineated the residential patterns of individual ethnic groups using the concept of concentration and segregation. Ironically, none of those studies have demonstrated the degree to which a given group lives with other groups in part of a city. This study investigates the degree of areal correspondence between the residential patterns of Japanese in San Francisco and six other ethnic groups: White, Latin, Black, Chinese, Filipino and American Indian. Analysis of 1970 census data, utilizing Spearman’s rank order correlation, reveals three major patterns in ethnic residential areal correspondence and it also reveals the fact that only the Japanese group shows a positive correspondence, at a statistically significant level, with the White category among all other groups.

I Introduction

In recent decades, a tremendous number of studies on ethnic residential patterns have been made by urban sociologists and urban and social geographers in English-speaking countries. As F. L. Jones (1967) has indicated, these studies have concentrated on the following questions: (1) What are the patterns of residential distribution among various ethnic groups; (2) To what extent are these patterns similar or dissimilar; and (3) To what extent do these various patterns represent differing degrees of residential concentration? In regard to the first question, a number of studies have investigated residential patterns for ethnic groups in many cities (Jones, 1956; Yamaoka, 1959; Morrill, 1965). Work dealing with the third question has utilized innovative techniques in quantitative analysis such as Hoyt’s index (1939), Bell’s index (1954), the dissimilar index (Taeuber, K. E. and Taeuber, A., 1965), Location Quotient, and the Gini coefficient of concentration (Isard, 1960). In answer to the second question, however, only a few people have attempted to scrutinize a selected, small area from an ecological viewpoint (Duncan and Liberson, 1959; Lee, 1973). Furthermore, few studies have been made on the question from a geographical point of view—that is, the spatial correspondence of the residential patterns among different groups.

Another major characteristic evidence in the above mentioned studies is the concentration of one or two specific groups. By identifying only one group’s residential pattern,
we do not have an opportunity to understand the implications of its distribution relative to others. Many recent studies have examined residential patterns between two groups. Group one is usually newly migrated, as compared with the host group in a society. For example, in the United States, studies of ethnic relations, particularly Black-White relations, appeared in approximately four hundred papers every year during 1960's (Freeman and Sunshine, 1970). In contrast, synthetic studies, which include more than two groups, are scarce. In the field of American geography, Jones' work (1967) can be regarded as a synthetic study that covers almost all residents in a city. The reason for so few studies examining multiple ethnic groups is probably due to limited data and to the complexity of the object.

The major task of this study is in response to question two. It seeks to analyze the spatial relations among different groups in terms of their residential patterns, particularly in relation to that of Japanese. San Francisco (Fig. 1) was selected as the study area, because many different ethnic groups can be found in the city, and it contains the oldest Japanese community on the mainland of the United States. Precise population data for many ethnic groups is available at the census tract level (San Francisco, Department of City Planning, 1975). The study includes six ethnic groups in addition to Japanese: White, Latin, Black, Chinese, Filipino and American Indian. The population of those seven groups is 98.5 percent of the total population of the city.
II Method of Analysis

This study surveys two aspects of ethnic residential patterns: the degree of concentration for each ethnic group, and the degree of areal correspondence among their residential patterns.

1. The concept of concentration

The study of ethnic residential patterns has been based on two significant terms: "concentration" and "segregation". Unfortunately, these terms have been used in many ways, which consequently has led to confusion and abuse. Jones (1967) has clarified the difference between these terms as follows: (1) Residential "concentration" is not equivalent to residential "segregation". Two ethnic groups may show different degrees of concentration but may be equally segregated from some other groups. (2) "Segregation" and "isolation" have much stronger behavioral implications than does "concentration". This interpretation of "concentration" has been adapted in this paper: thus differences in concentration among groups do not imply any degree of "segregation" for particular groups.

2. The measurement for degree of concentration

To measure the degree of concentration three techniques are utilized: Location Quotient\(^3\), Lorenz Curve\(^4\), and the concentration index\(^5\). The first two indices have been pervasive in the literature of social geography. Both the Location Quotient and Lorenz Curve are relatively easy to calculate and express simply the general characteristics of the pattern to be studied. However, precise comparisons are difficult using either index. Hammond and McCullagh introduced the index of concentration (1978), which can be directly calculated from the information of Lorenz Curve in the order of the proportion either from the largest to the smallest or the smallest to the largest. This index is expressed in precise numeric notation so that the use of the concentration index may complement any other analytical procedures and thus erase certain defects in the study.

For this study, the data are arranged from the least value to the largest in order to use SPSS (Statistical Package for the Social Sciences) for computer calculation. The index of concentration \(I\), is found by

\[
I = \frac{R - A}{R - M}
\]

where \(R\) is the total population cumulative percentage total. \(A\) is the group cumulative percentage total, and \(M\) is the minimum cumulative percentage total assuming 100 percent in the final rank.

An index figure of 1.0 represents an "absolute" concentration of all frequencies into one census tract. On the other hand, an index approaching 0 does not mean absolute diversification, but rather a distribution of frequencies in a particular group that is similar to that for the whole city population. In this sense, the index is a good measure of any one group which has the same level of concentration as the whole population of a city.

3. The analysis for degree of areal correspondence
For the analysis of areal correspondence of the residential patterns among seven groups, Spearman’s rank order correlation is utilized instead of parametric correlation analysis. The reason is that Spearman’s rank order correlation can measure the degree of correspondence between two sets of variables which are not numerical values, but rather are expressed in interval and ordinal data. When only ordinal measurement is possible or when the margin of error is sufficiently great to make the use of an interval scale unrealistic, Spearman’s correlation is also useful (Hammond and McCullagh, 1978 p. 29). Since data of each ethnic population by census tract is analyzed and arranged in order from the smallest to the largest percentage and the range of total population of each group is extremely wide, Spearman’s rank order correlation is more effective than the parametric simple correlation analysis. Spearman’s rank order correlation coefficient can be found by calculating the following:

\[ r_s = 1 - \frac{6 \sum d^2}{n^3 - n} \]

Where \( d \) is the difference in rank of each pair of values (population in the study) and \( n \) is the number of pairs. The value of \( n \) for this study is 148, the number of census tracts in San Francisco. The value of \( r_s \) can range from -1.0 (perfect inverse correlation) to +1.0 (perfect positive correlation) as do the ranges of parametric correlation coefficient.

### III Results

1. The degree of concentration

The result of the Location Quotient is shown on Table 1. Each value indicates the sum of percentages of the population which belong to a given level of Location Quotient. For example, 33.4 percent of the Black population in San Francisco is found in the census tracts that contain more than five times the expected population compared to the average distribution of the whole city’s population. Approximately two thirds of the Black and Chinese groups are located in census tracts which have Location Quotients of more than 2.00. Both groups are heavily concentrated in their respective residential patterns. On the other hand, 94.4 percent of the White population is located in the census tracts which range from 0.5 to 2.0 in terms of Location Quotient. In between these extremely different residential patterns, Japanese are found to be neutral in the value of the Location Quotient, as is also true for Latin, Filipino and American Indian populations.

<table>
<thead>
<tr>
<th>Location Quotient</th>
<th>White</th>
<th>Latin</th>
<th>Black</th>
<th>Chinese</th>
<th>Filipino</th>
<th>Japanese</th>
<th>American Indian</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.00 or more</td>
<td>0.0</td>
<td>0.0</td>
<td>33.4</td>
<td>42.5</td>
<td>0.8</td>
<td>8.8</td>
<td>1.8</td>
</tr>
<tr>
<td>2.00 ~ 4.99</td>
<td>0.0</td>
<td>41.8</td>
<td>36.1</td>
<td>21.3</td>
<td>3.1</td>
<td>41.9</td>
<td>41.0</td>
</tr>
<tr>
<td>1.50 ~ 1.99</td>
<td>18.3</td>
<td>3.1</td>
<td>10.6</td>
<td>7.1</td>
<td>14.9</td>
<td>2.3</td>
<td>12.9</td>
</tr>
<tr>
<td>1.00 ~ 1.49</td>
<td>54.3</td>
<td>12.0</td>
<td>2.1</td>
<td>1.6</td>
<td>26.6</td>
<td>18.6</td>
<td>18.8</td>
</tr>
<tr>
<td>0.50 ~ 0.99</td>
<td>21.8</td>
<td>21.5</td>
<td>7.0</td>
<td>12.1</td>
<td>14.8</td>
<td>14.1</td>
<td>14.7</td>
</tr>
<tr>
<td>less than 0.50</td>
<td>5.6</td>
<td>15.5</td>
<td>10.8</td>
<td>15.3</td>
<td>39.8</td>
<td>14.3</td>
<td>10.8</td>
</tr>
</tbody>
</table>

(percentage)
Figure 2 shows spatial distributions utilizing the Location Quotient for each ethnic group, and can be summarized as follows: (1) Since the White population comprises 57.2 percent (each group's percentage of the city's population is identified in subsequent discussion within parenthesis of the city population), the White population is quite scattered. Nevertheless, the western part of the city (Sunset district), and the northern part of the city (Marina district) can be regarded as White-concentrated residential areas. On the other hand, the White population is relatively low in the eastern part of the city (South of Market, Mission, South Bayshore). The southwestern part of the city was one of the few neighborhood in the West which did not have a racial covenant, so that a house in the area could not be sold to neither Blacks nor Asians until the late 1960's (Burtle et al., 1979, p. 233). For the northern part of the city, there was no racial discrimination for housing juridically, however, the most of the area was practically reserved for White, upper-middle class until 1960's since the area was created for the site of the Panama Pacific Exposition in
1915 (Burtle et al., 1979, p 219). (2) The distribution of the Latin population (14.2 percent) contrasts to that of the White population. The heavily concentrated areas of Latin population are within and around the periphery of the Mission district which was found by the Spanish and claimed the area as a site for a mission in 1769 (Burtle et al., 1979, pp. 227–228). In the contrast, the census tracts, indicated by a Location Quotient as less than 0.5 for Latin population, are scattered in the northern and western areas of the city. (3) The residential pattern of the Black population (13.4 percent) is unique. Blacks are concentrated in three areas: the Western Addition (the north-central part of the city), South Bayshore (south-eastern part of the city), and Ingleside (south part of the city). Massive Blacks migrated into the city during World War II as an industrial labor. Majority of those Blacks moved into the Western Addition left vacant by the Japanese population, had been interned in relocation camp, and South Bayshore, where the Federal Government temporarily built public housing for munitions factory labors. The substantial Black population in these two districts are lower working class families including singles. Contrastively, Ingleside is predominantly middle class Black families fleeing the city and two other Black neighborhoods (Burtle et al., 1979, p. 224, pp. 232–233). (4) A great number of Chinese (8.2 percent) are found in Chinatown, which is located in the northeast part of the city. Besides Chinatown, the Chinese are generally distributed in the northern part of the city. Although many white collar families have moved out from the Chinatown, the distribution of Chinese still indicates a heavy concentrated pattern as a whole since a great number of Chinese immigrants settle in Chinatown (Burtle et al., 1979, pp. 220–221). (5) It seems that besides White population, the Filipino population (3.5 percent) is the most dispersed among the groups. We can recognize one census tract exceeding 5.0 in the value of Location Quotient located near Chinatown because the original Filipino community has long been settled there. Generally speaking, however, the majority of the Filipino population can be found in the southeast part of the city, similar to the pattern of the Latin population. (6) Japanese population (1.6 percent) is distributed in the north-western part of the city in such districts as Western Addition, Richmond and inner and outer Sunset. In the area indicated, more than 5.0 in the value of Location Quotient, identifies the location of Japan Town and its peripheral area. After the relocation camp during World War II, many Japanese resettled in their original neighborhood and in a while a number of middle class Japanese have spread into Richmond and Sunset districts fleeing the inner city (Burtle et al., 1979, pp. 223–224, p. 235). (7) The distribution of American Indian (0.4 percent) is distinctive from that of Japanese. For the American Indian, higher Location Quotient values are found in the south-eastern area of the city.

Lorenz Curves denote the difference in concentration among the seven groups (a straight line implies an even distribution). From Figure 3, we can identify the following facts: (1) The White population is the closest to an even distribution among all groups; (2) Blacks and Chinese are the most concentrated groups in terms of their residential distribution; (3) among the Filipino, Latin and American Indian population, the degree of con-
centration is so close that we are not able to rank them; (4) the degree of concentration of
the Japanese population falls between group (2) and (3).

As mentioned before, the Location Quotient can indicate distribution patterns in general,
but accurate comparisons are not possible. The comparison of Lorenz Curves is a quick
visual means of describing degree difference of concentration among ethnic groups. How-
ever, visual interpretation is inevitably only a rough approximation revealing approxima-
tely as much as the Location Quotient indicates.

Table 2 represents the results of the index of concentration as expressed in numerical
notation, which can provide an opportunity for a detailed comparison. As we recognized
in the previous analysis, the most heavily concentrated group is the Black community and
the least concentrated group is the White community. We can rank these seven groups
in terms of degree of concentration as follows: Blacks (0.6463), Chinese (0.5992), Japa-
nese (0.4608), American Indians (0.3918), Latins (0.3852), Filipinos (0.3528), and Whites
(0.1325). I would like to emphasize that a value of +1.0 indicates absolute concentra-
tion, whereas the value of 0.0 does not imply a perfectly even distribution, but rather ex-
presses the equivalency of the distribution to the entire city population. Therefore, for
example, we are not able to interpret that the residential pattern of Japanese is four times

<table>
<thead>
<tr>
<th>Group</th>
<th>Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>0.1325</td>
</tr>
<tr>
<td>Filipino</td>
<td>0.6463</td>
</tr>
<tr>
<td>American Indian</td>
<td>0.3528</td>
</tr>
<tr>
<td>Chinese</td>
<td>0.5992</td>
</tr>
<tr>
<td>Japanese</td>
<td>0.4608</td>
</tr>
<tr>
<td>Latins</td>
<td>0.3852</td>
</tr>
<tr>
<td>Filipinos</td>
<td>0.3528</td>
</tr>
<tr>
<td>Whites</td>
<td>0.1325</td>
</tr>
</tbody>
</table>
Table 3  Spearman rank order correlation coefficients of residential corresponding relations among given ethnic groups by census tract

<table>
<thead>
<tr>
<th></th>
<th>Latin</th>
<th>Black</th>
<th>Chinese</th>
<th>Filipino</th>
<th>Japanese</th>
<th>American Indian</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>-.2515*</td>
<td>-.6073**</td>
<td>-.6893</td>
<td>-.3871**</td>
<td>.2350*</td>
<td>-.3720**</td>
</tr>
<tr>
<td>Latin</td>
<td>.2186*</td>
<td>-.0661</td>
<td>.5058**</td>
<td>-.2046</td>
<td>.5525**</td>
<td>.4061**</td>
</tr>
<tr>
<td>Black</td>
<td>-.2891**</td>
<td>.3408**</td>
<td>.4342**</td>
<td>-.0631</td>
<td>.5511**</td>
<td>-.0812</td>
</tr>
<tr>
<td>Chinese</td>
<td></td>
<td>.0543</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Filipino</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Japanese</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* 5% level significance  ** 1% level significance

2. The degree of correspondence

The result of analysis for the degree of correspondence in census tract level is shown on Table 3. There are twenty-one relationships among seven groups. Within these relations, ten correlation coefficients are confirmed at the one percent level of significance, and three correlation coefficients are proved at the five percent level of significance. Also, twelve relations are indicated to have a negative correspondence while only nine relations indicate as positive correspondence.

Figure 4 summarizes these twenty-one relations at both district level and census tract level. By district, we can distinguish two positively corresponding groups. Whites, Japanese and Chinese form one strongly related group, whereas another group consists of Latins, Filipinos and American Indians. All of these relations are found at the one percent level of significance. Regarding negative correspondence, all seven groups associate with at least one other group in a relatively weak manner (five percent level of significance).

![Diagram](image)

W: White  
L: Latin  
B: Black  
C: Chinese  
P: Filipino  
J: Japanese  
AI: American Indian

Fig. 4  The residential corresponding relations among given ethnic groups
The analysis on the district level, however, contains a problem related to the size of the regional unit. Most districts in San Francisco are comprised of two or three ethnic groups which dominate particular discrete census tracts within a district. Consequently, the degree of correspondence among those groups has been reduced. For this reason, the analysis by census tract is probably more accurate and more closely expresses a realistic appraisal.

The general patterns for positive correspondences at the census tract level are almost identical to those patterns at the district level. In contrast, the patterns for negative correspondences are quite different from those determined by district. Several facts are revealed: (1) The White-Japanese correspondence becomes a little weaker, but still shows a positive relationship at the five percent level of significance. Only the Japanese group associates with the White group in a positive relationship at a statistically significant level; (2) Blacks associate with Filipinos and American Indians at the one percent level of significance and Latins at the five percent level of significance; (3) among Latins, Filipinos and American Indians, the degree of correspondence are distinctly strong; (4) all groups exhibit negative relationships with Whites except Japanese, and Chinese; (5) Japanese do not show any significant negative correspondence in association with any groups as indicated by statistical applications.

IV Conclusion

The investigation on residential relationships yields numerical information about seven ethnic groups and reveals twenty-one interrelationships. This information is synthesized
in diagramatic fashion (Figure 5), wherein the X axis indicates the negative correlation coefficient total and the Y axis represents the positive total. The length of the line from lower left corner to upper right corner of the diagram measures the effect of other group distribution upon the distribution of a given individual ethnic group (a). The distance from that line toward the Y axis expresses the inclination of a group to live together with other groups rather than separately (b). On the other hand, the distance from the line toward the X axis implies the propensity of a group pattern to live separately from other groups.

From Figure 5, it is possible to indicate three major patterns.

(1) According to the distance from the origin in Figure 5, the distributions of Japanese and Chinese are not strongly influenced by the other ethnic groups’ distribution (Group IIa), whereas the other five groups are influenced in this manner.

(2) American Indians, Latins and Filipinos show strong areal correspondence (Group Ia). Including Blacks, these four groups form one larger group (Group Ib) in terms of positive correspondence. On the other hand, Japanese-White and Japanese-Chinese also show positive relationships, and those three groups form another larger group (Group IIb).

(3) Between group Ib and IIb, a relatively strong negative correlation exists except for Japanese; in other words, group Ib and IIb tend to do not live together. As an exception, Japanese do not display any statistical evidence toward negative relationships with any of the other groups.

Acknowledgement

This paper is based on my report to the 1980 annual meeting of the Association of Pacific Coast Geographers. Before I started this study, I received helpful suggestions on this subject from Dr. Jean Vance. In the course of research and writing, I received continuous encouragement and helpful suggestions from Dr. Richard Hough and Dr. John Westfall. I also received comments from Bonnie Loyd. I would like to express my special appreciation to these professors, for this paper could not have been done without their supports.

(Received August 22, 1980; Accepted December 6, 1980)

Notes

1) The term “Japanese” implies both Japanese Americans and Japanese citizens who mostly reside in the United States temporarily as businessmen, their family members, and students.

2) The Japanese embassy arrived in San Francisco in 1860 and the first Japanese immigrants to the mainland arrived in the city in 1872. A significant number of Japanese immigrants migrated after 1890’s, until 1924.

3) The Location Quotient indicates the deviations of any proportion from what one would expect if the group were evenly distributed throughout the city. In other words, it compares the proportional expectation of numbers with the actual numbers in any subdivision.

4) The Lorenz Curve is widely used to compare several distribution patterns at one time. In this study, the rank of population percentage by census tract is expressed in order from the least value to the largest.
value by the X axis. On the other hand, the Y axis shows the value of the cumulative percentage of population for each group. The advantage of this method is that the information is easily understood visually.

5) Using the same data for the Lorenz Curves, the index of concentration can be calculated in numerical notation which are statistically comparable. The original index of concentration $I$, is found by

$$ I = \frac{A - R}{M - R} $$

in this original formula, both the implication of each notation and the result of calculation are exactly the same as the formula in this study except for $M$, the maximum cumulative percentage total assuming 100 percent of frequencies in rank one. For the above formula, the order of the data is required from the largest percentage to the smallest percentage for a group.

Bibliography


サンフランシスコにおける日系人と他民族間の居住相関係

井崎 義治

都市内部のある特定の社会的人口集団。すなわち、少数民族や宗教的人口集団等の空間的分布形態を取り扱った研究が、英語圏の国々の都市地理学や社会地理学の分野で、相当の蓄積を見るようになった。一方、各種の人口集団を総合的に取り扱った研究、たとえば、各民族間における空間的分布パターンの相関関係についての研究などは、現在のところ、著しく少ない。また、ある特定の少数民族について、あるいは、少数民族と多数民族など、2，3 の人口集団の比較について検討したものは少ないが、調査地域におけるほぼ全人口の空間的パターンを考慮した研究はそれほど皆無である。これは、資料の入手が困難であることと、対象の複雑性に起因するとも推察される。

そこで筆者は、アメリカ合衆国本土で、最も長い歴史を持つ日本人家が形成をみ、多くの民族集団が居住し、さらに、それらの民族について比較的詳細な資料の整っているサンフランシスコ市を調査対象地域とし、本稿の前半で、各民族集団の居住に関する集中度の測定とその比較、後半で、スペアマン（Spearman）の順位相関係数で用いて、各民族集団間の居住相関関係の解明を試みた。

居住に関する集中度の測定については、立地係数（Location Quotient）、ローレンツ曲線比較、および集中指数（Index of Concentration）を用いた。最初の 2 指標は、各民族集団の居住パターンの概観的な情報を提供するが、民族間の厳密な比較において困難があった。そこで、集中指数を用いて、日系人を含めた 7 民族について、居住の集中性を判定した。結果として、黒人、中国系アメリカ人が最も集中した分布パターンを示している。市内の最大人口集団である白人のがそれは、当然のことながら、市人口全体の分布パターンに最も近似していること、その他の少数系は、この両グループの中間に位置しているが、日系人、アメリカン・インディアン、ラテン系、フィリピン系アメリカ人の順に、居住の集中度が高いことなどが判明した。

この研究の主要目的である居住パターンの相関関係については、次のような、三つの関係が指摘される。

1) 日系と中国系アメリカ人の居住パターンは、他の民族の居住パターンの影響を比較的受けていないのに対し、白人、黒人、ラテン系、フィリピン系アメリカ人、およびアメリカン・インディアンの居住パターンは、他の民族の居住パターンに強く影響されている。

2) アメリカン・インディアン、ラテン系、フィリピン系アメリカ人の居住パターンは、相互に非常に強い正の相関関係を示し、これに黒人を含めて、正の居住相関関係を相互に示すグループを形成している。一方、日系人と白人、日系人と中国系アメリカ人間にも正の相関関係が見られ、結果として、日系、中国系アメリカ人、白人の 3 民族が、もう一つの正の居住相関関係を示すグループを形成している。なお、白人と正の居住相関関係を示すのは、日系人だけである。

3) 上記の二つのグループの間には、強い負の居住相関関係が存在している。すなわち、アメリカン・インディアン、ラテン系、フィリピン系アメリカ人および黒人は、白人、中国系アメリカ人とは、一緒に居住しない傾向が認められる。ただし、日系人の居住パターンは、他のどのグループとも、統計的に有意な水準での負の相関関係を示さない。

地理学評論 54－3 115～126 1981 * サンフランシスコ州立大・院 — 126 —