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Urban Stud 2005 42: 1221

DOI: 10.1080/00420980500122010

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On the Measurement and Meaning of Residential Segregation: A Response to Simpson

Ron Johnston, Michael Poulsen and James Forrest

[Paper received in final form, May 2004]

Summary. Using an alternative conception of ethnic residential segregation, and associated statistical measures, this paper re-examines Simpson's analysis of the situation of South Asians in Bradford. It suggests that, *contra* Simpson, segregation of that ethnic group did increase over the period 1991–2001, with implications for public policy.

In a recent paper in this journal, Ludi Simpson (2004) has challenged some of the interpretations of the race riots in several northern British cities in 2001, which had been linked to growing ethnic residential segregation there. That segregation, according to the commentators, resulted from greater self-segregation—the tendency of members of ethnic minority groups to concentrate only in certain areas of the relevant city. Against this, he claimed that “Increasing residential segregation of South Asian communities is a myth” (Simpson, 2004, p. 668), a case which he sustains by showing that net growth in the areas of South Asian concentration in Bradford was less than the sum of new arrivals and the excess of births over deaths: South Asians are dispersing through the city (a conclusion also reached by Phillips, 1998, 2002).

Simpson's argument raises a number of important questions, both semantic and technical regarding the nature of segregation, which we address in this brief note.

attach to different aspects of the phenomenon—which Massey and Denton (1988) classified into five: unevenness; isolation; clustering; concentration; and centralisation. Simpson uses just one measure of segregation—the index of dissimilarity/segregation (when the population is split into just two groups, the two indices are the same)—which measures the degree of unevenness of two population distributions. Using this with a hypothetical example, he shows that when an ethnic group's population increases by 50 per cent, but neither its nor the other group's distribution changes, then the index of segregation is unchanged (Figure 1).

This is the case with that measure. But what is meant by segregation? If instead of the unevenness of an ethnic group's distribution over a set of census enumeration districts or similar areas, you use the isolation aspect—and the relevant index—you get a different result. The index of isolation developed by Lieberson (1981) is computed as

The Measurement of Segregation

A plethora of measures of residential segregation is available in the literature. These

$$I_i = \sum_{i=1}^n \left[\left(\frac{x_i}{X} \right) * \left(\frac{x_i}{t_i} \right) \right] \quad (1)$$

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DOI: 10.1080/00420980500122010

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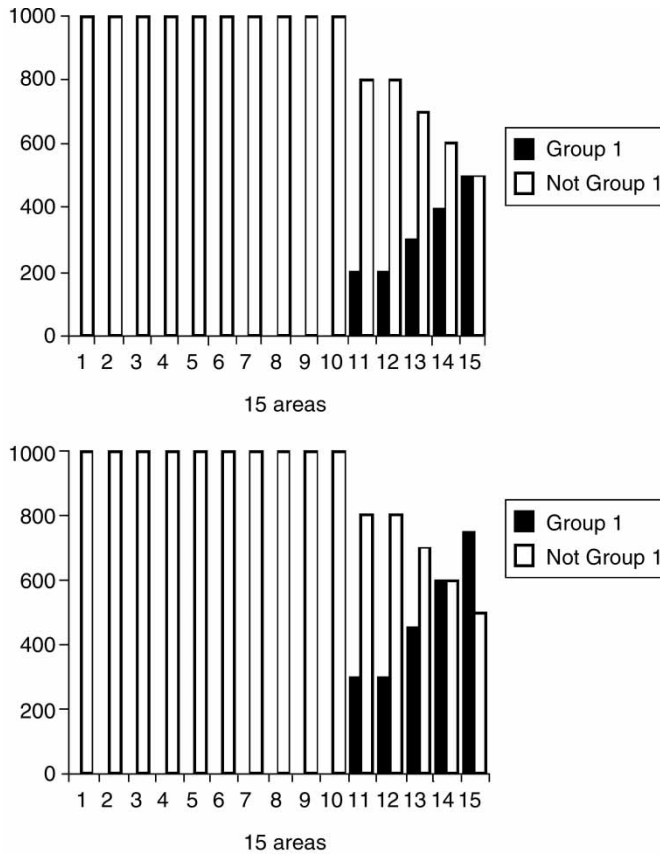


Figure 1. Simpson's Figure 1 (Hypothetical regions of 15 areas with 2 groups. Lower graph shows Group 1 increased by 50 per cent). *Source:* Simpson (2004, p. 667).

where, x_i is the number of members of the ethnic group in census ED i ; t_i is the total population of census ED i ; X is the total population of the ethnic group across all EDs; I_i is the index of isolation for ethnic group i ; and summation is over all n census EDs.

For Simpson's hypothetical city, the index of isolation for his Group 1 (the ethnic minority group) is 0.36 at the first date and 0.45 at the second. This suggests an increase in segregation between the two dates—of the order of 25 per cent. Other authors (for example, Cutler *et al.*, 1999; and Noden, 2000) have argued that the index as originally formulated should be corrected to take account of the relative size of the ethnic

group (see also Sin, 2003).

$$MI_i = I_i - \left(\frac{X_i}{T} \right) \quad (2)$$

where, I_i is the index of isolation for ethnic group i as computed by formula (1); X_i is the total population of ethnic group i ; T is the total population of the city; and MI_i is the modified index of isolation for ethnic group i .

In Simpson's example, the city's population has grown from 15 000 to 15 800, entirely as a result of growth in the size of the ethnic minority group. Taking this into account, the index of isolation at the two dates is 0.253 and 0.298 respectively.

Holding constant the minority group's increased proportion of the total population, its isolation increases.

Which index you use depends on which aspect of the minority group's distribution across the set of EDs you wish to focus on. The index of segregation used by Simpson shows that the distribution of the two groups did not change between the two dates—each ED has the same percentage of that group's population living there at the second date as it did at the first. The unevenness of their distributions—relative to each other—is unchanged. The index of isolation indicates the probability that a member of the group under consideration—in this case, the ethnic minority—is likely to meet another member of the same group by chance, given the ethnic composition of the ED that he/she lives in. This probability increases over time, because the relative size of that group in the five EDs increases: at time 1, group 1 comprises 0.2, 0.2, 0.3, 0.4 and 0.5 of the population of areas 11–15 respectively; at time 2, it comprises 0.27, 0.27, 0.39, 0.5 and 0.6 respectively.

Neither index is right and neither is wrong: it depends on what you want to measure. Our preference between the two is for the index of isolation, since it encapsulates—to a greater extent than the index of dissimilarity/segregation—what we understand to be the central feature of a segregated population, following Philpott (1978) and Peach (1996, 1999). This involves the degree to which it dominates the population of areas rather than shares those areas with members of other groups, and hence the degree to which it is encapsulated from the remainder of society. On that measure, Simpson's group 1 has become more segregated over time: it is more dominant in the five areas and shares residential space less with group 2.

Residential Segregation in Bradford

If we apply the index of isolation to Bradford's South Asian population at the ED scale over the decade 1991–2001, using Simpson's data (which he kindly supplied to

us), we get indices of isolation for the South Asian population of 0.53, 0.57 and 0.62 in 1991, 1996 and 2001 respectively. Over the decade, the South Asian population (which increased from 65 469 to 94 251, or some 44 per cent) became somewhat more isolated. The South Asian group also became a larger proportion of Bradford's total, as the non-South Asian population declined: in 1991, the South Asians formed 14 per cent of the total; in 1996, 16 per cent; and, in 2001, nearly 20 per cent. Correcting the index of isolation to take this relative growth into account, and thus provide strictly comparable figures, gives modified indices of 0.39, 0.41 and 0.42 respectively. As it is growing in absolute and relative size in Bradford, the South Asian population is becoming slightly more isolated residentially.

An alternative way of looking at the degree of segregation—based on the same definition as the index of isolation—uses visual methods (Poulsen *et al.*, 2002). These deploy concentration profiles to indicate what proportion of the members of an ethnic group lives in areas—EDs in this case—where their co-ethnics form a given percentage of the total population. Figure 2 shows such profiles for Bradford's South Asians at the three dates in Simpson's data-set.

To construct the profiles in Figure 2, each ED percentage of South Asian and 'others' was computed. A series of thresholds—0, 10, 20, 30 ... 100—was then identified and each ED placed in its relevant between-threshold band (i.e. an ED with 35 per cent South Asians was placed in the 30–40 threshold band). The cumulative distribution of South Asians across the threshold bands was then calculated, to give the concentration profile. In Figure 2, the solid line shows the profile for South Asians in 1991. At the 50 per cent threshold, for example, this shows that 60 per cent of South Asians lived in EDs with populations that were 50 per cent or more South Asian. At the 70 per cent threshold, 30 per cent of Bradford's South Asians lived in EDs where their co-ethnics comprised at least that share of the total population.

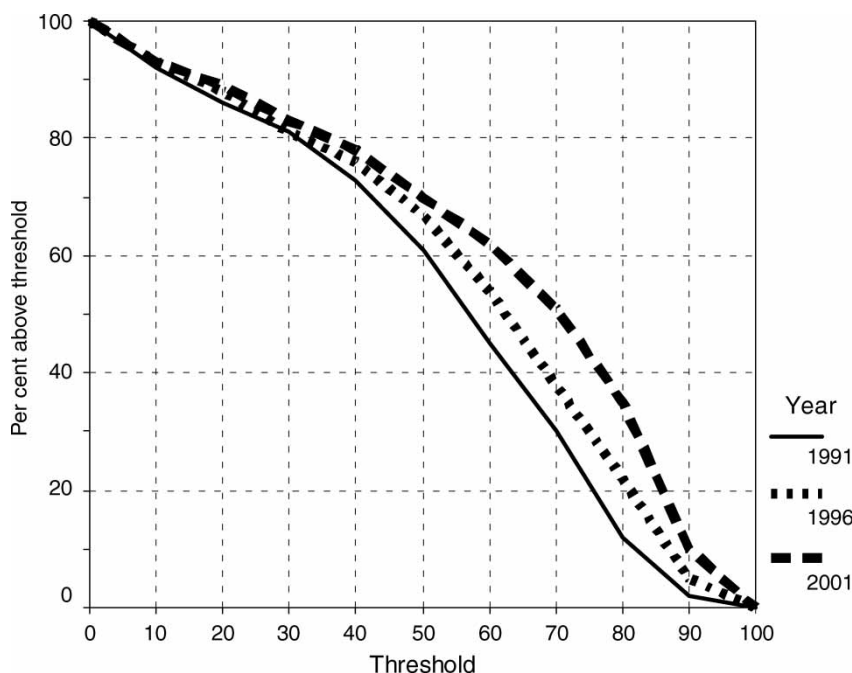


Figure 2. Residential concentration profiles for South Asians in Bradford, 1991–1996–2001.

The three graphs in Figure 2 show the increased segregation of Bradford's South Asians over the decade—using the Philpott–Peach–Poulsen *et al.* definition. Each profile is closer to the upper-right-hand corner than that for the previous date, indicating greater concentration. That increased concentration is particularly noticeable in the areas with the relatively largest South Asian components. In 1991, for example, some 12 per cent of South Asians lived in EDs where 80 per cent or more of the population consisted of their co-ethnics; 5 years later, the figure was 22 per cent; and, in 2001, it was 35 per cent. At the end of the decade, over one-third of Bradford's South Asians lived in EDs where they comprised more than four-fifths of the population, almost three times the ratio 10 years earlier.

This graph of concentration profiles provides very strong visual evidence of the increasing segregation—i.e. isolation from the remainder of the population—of Bradford's South Asian population over that 10-year period. This conclusion is confirmed by a second graph of concentration profiles

(Figure 3), which shows the distribution of South Asians relative to the 'others' (i.e. the remainder of the population, most of whom are 'White'). In this case, the thresholds are defined by the percentage of each ED's population comprised of 'others', so the profiles indicate the percentage of South Asians living in EDs with pre-defined 'other' populations. Thus in 1991, for example, just under 40 per cent of South Asians lived in EDs where the 'other' population was at least 50 per cent of the total. Ten years later, the figure was 30 per cent. This increased isolation of South Asians from 'others' in Bradford is particularly noticeable at the lower thresholds: in 1991, for example, 87 per cent of South Asians lived in EDs where at least 20 per cent of the population was from 'other' ethnic groups; 10 years later, the figure had fallen to 65 per cent.

On the Meaning of Segregation: Pattern and Process

If you accept the definition of segregation employed here—isolation of one group from

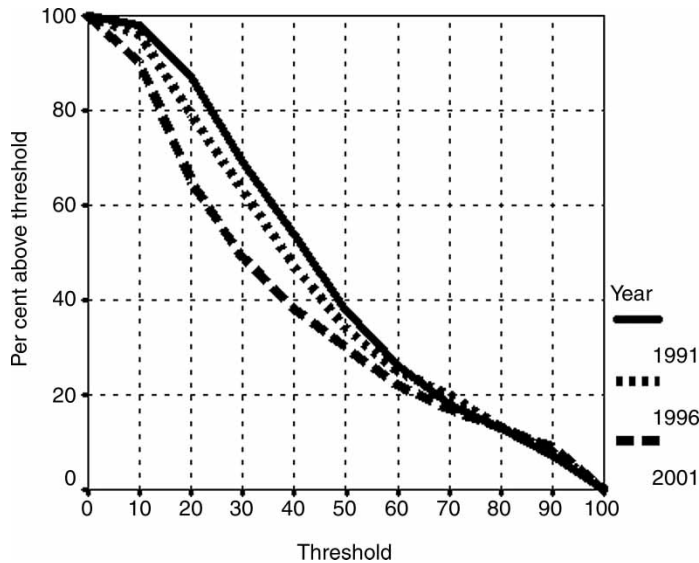


Figure 3. The exposure of South Asians to 'other' groups in Bradford, 1991–1996–2001: concentration profiles for South Asians according to thresholds for 'other' groups.

another—then the evidence from Bradford over the period 1991–2001 seems incontrovertible: South Asians became more isolated. The average South Asian living in Bradford in 2001 was more likely to meet another South Asian in her/his local neighbourhood than he/she was a decade earlier and many more South Asians lived in areas that were predominantly South Asian in their ethnic composition at the later of the two dates.

That conclusion appears to fly in the face of Simpson's claim that 'Increasing residential segregation of South Asian communities is a myth'—at least for Bradford. But, of course, that depends on what you mean by segregation! For Simpson, it is clearly a process or a changing pattern; for many people—including index and concentration profile constructors—it is a pattern. Of course, it is both: you cannot have one without the other—process produces pattern, which constrains process and so on. Segregation of South Asians was high in Bradford at the three dates analysed and changed very little according to Simpson's chosen index. But other indexes, and the associated graphical procedures deployed here, tell a different story.

Which story is relevant? It depends. If you want to show that South Asians are not conforming to the North American ghetto model, but are moving away in some numbers from their original concentrations, then Simpson's approach and his data confirm that. The dispersal of South Asians into areas of Bradford where members of 'other' ethnic groups predominate has ensured that segregation has not increased as much as it might, given the levels of immigration and natural growth experienced by Bradford's South Asians over the decade. Nevertheless, as the depictions here indicate, that dispersal has not equalled the amount of in-movement plus growth in the traditional areas of South Asian concentration in Bradford, and that increased concentration is reflected in the greater segregation displayed here.

Increased segregation—according to the Philpott–Peach–Poulsen *et al.* definition—comes about when growth in the core areas of ethnic concentration increases at a greater rate than the dispersal of households throughout the urban fabric and away from those areas of concentration. This can be represented by a simple model (Figure 4), which shows

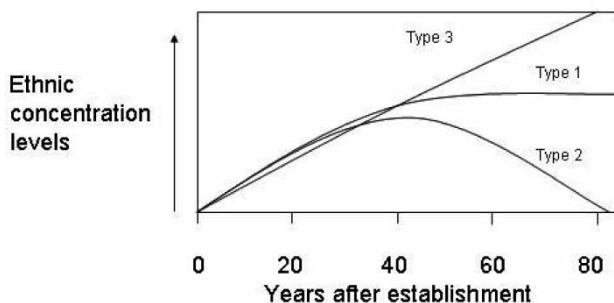


Figure 4. A model of changing patterns of ethnic residential concentration.

different ideal-type trajectories in ethnic concentration in the years after the establishment of a settlement core. (For more details, see Poulsen *et al.*, 2004.) In a Type 1 trajectory, concentration builds up to a particular level and then remains constant—either because the inflow to the core (both immigration and natural growth) is equalled by the outflow to other areas or because there is no further growth in that group. In Type 2, the outflow exceeds the inflow (with the latter perhaps tailing off over time, as replenishment of the original core declines) and so concentration levels fall—after some 40 years in the idealised case. In Type 3, on the other hand, inflow exceeds outflow and so concentration levels continue to rise. In the context of this model, Bradford is experiencing a Type-3 trajectory, but the amount of outflow identified by Simpson could lead to a shift to a Type-2 trajectory in the near future.

Segregation and Policy

Why does all this matter—other than to purists regarding definitions and measurement of concepts? For Simpson (2004, p. 662) “Social policy . . . must address the dynamics of residential location and relocation, rather than simply the existence of segregation at any one point in time”. Of course; and his evidence of rates of dispersal provides an optimistic picture of the evolving situation in Bradford: over time, as more South Asians

move away from the core areas, issues relating to segregation will become less pressing.

But, the evidence presented here suggests that this optimism may be slightly premature. Segregation—defined as the concentration of South Asians into areas where their co-ethnics predominate—increased quite considerably in Bradford between 1991 and 2001, because growth in those core areas exceeded outflows from them. If segregation has negative effects, on feelings of self-esteem and identity among the minority population, for example, on conflict between them and the ‘others’ who live elsewhere, and on educational and other opportunities—all claims made by commentators and exemplified by empirical research (although not necessarily on South Asians in Bradford)—then the pattern now is possibly more important to policy-makers than the emergent process. Segregation, as defined here, not only exists now but is becoming more marked. Thus, it presents a challenge to policy-makers, one which may be relatively short-lived—although if it is not tackled, the dispersal trends that Simpson identifies may be reduced and segregation would then become an even greater problem.

Conclusions

In almost all areas of social science, the results of a piece of research depend on how the questions were phrased and how the relevant concepts were defined and measured. This is certainly the case with ethnic residential

segregation, a concept that has a number of (at least implicit) definitions and a series of quantitative measures linked to them. Segregation can mean either a process, which is what Simpson focused on, or a pattern—and with the latter, there are several competing (and to some extent complementary) definitions of what that pattern comprises. According to Simpson's definition of segregation as pattern, the situation of Bradford's South Asians was largely unchanged over the period 1991–2001; according to our definition, it has been exacerbated.

Evidence-based policy relies on the results of empirical social science research. Thus the nature of that research must be carefully prescribed; using different definitions of key concepts can lead to different results and suggest different policy outcomes. There are, of course, no single right answers: each way a question is asked, each way a concept is measured, produces a different 'right' answer. It all depends on the question. The way Simpson phrased the question and defined the concept led him to "the positive message ... that segregation is not the problem it is perceived to be" (p. 679). The way we phrased it and made our measurements lead to a less sanguine conclusion: although residential segregation—as pattern—did not increase as much as it might have done for Bradford's South Asians between 1991 and 2001, because of the dispersal identified by Simpson, nevertheless concentration of South Asians into a small number of residential areas increased over that period. The problem—if segregation is a problem—has not gone away yet. A mixed message perhaps, but if policy is to deal with issues of today, while preparing for tomorrow, then perhaps we should not be quite as optimistic as Simpson.

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