Demographic change, attendance area adjustment and school system impacts

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Abstract. In the extensive litigation over school board liability for segregated schools, a great deal of attention has been focused on changes in school attendance areas. Evidence presented in several trials suggested that school boards have gerrymandered boundaries to keep some schools "black" and others "white." Even though both district and appeal courts have found violations in attendance zone changes, there has been little other than anecodotal evidence to support these findings. In many cases the areas with the most changes in attendance boundaries are also the areas of rapid racial transition, but correlation does not necessarily mean causation. This case study examines boundary changes in Topeka and suggests that racial change in schools is more directly attributable to demographic shifts than to attendance boundary changes.

Introduction

Litigation over school board liability for segregated schools has often focused attention on the nature, extent, and ramifications of attendance boundary changes, optional attendance zones and school closings. Numerous court findings have suggested that school boards have "created and altered attendance zones ... in a manner which has had the natural, probable and actual effect of continuing black and white pupils in racially segregated schools" (Wolf, 1981: 191). But despite extensive court commentary there have been few attempts to unravel the complex interplay of demographic changes, the opening and closing of schools, the structuring of attendance boundaries, and the use of optional attendance zones. The failure to study the interplay of demographic change and school system change is not surprising. Much demographic data is available only from the decennial census, but major shifts in population composition occur in periods as short as a year or two and can lead to substantial change in the racial make-up of school attendance populations. In addition, court testimony emphasizing anecdotal commentary on specific boundary change adds to the difficulty of evaluating the impact of system-wide boundary change.

In a post-decision analysis, Wolf (1981) emphasized the complexity of the situation in which boundary changes are made. As she noted, "it is important to know not only the capacities, enrollments, and racial proportions of the schools but also the variations and/or changes in grade structures within them, locational factors, distances, and (often) new schools opening in the area ..."

(Wolf, 1981: 192). In the conclusion to her discussion of the boundary changes in the Detroit desegregation case, Wolf notes that what was offered in that trial was "ambiguous, contradictory, and insufficient," and that it was "impossible to assess the legitimacy of many of the claims and counter claims involving specific zoning and feeder changes" (Wolf, 1981: 198). Wolf argued that there should be considerable skepticism of the finding that the effect of the attendance zone alterations was tocreate and perpetuate school segregation.

   Recent research in conjunction with a reassessment of the changes in the Topeka school system has provided a rich data source to pursue just this question of the effects of boundary changes in a school system. The analysis to follow will show that, while there have been numerous boundary changes, the effects were either neutral or desegregative in nature both in the system as a whole and in the subset of schools most affected by demographic change.

Historical background

The Topeka school district was the school system addressed in the now-famous 1954 decision of the U.S. Supreme Court in *Brown v. Board of Education*. The court action was actually begun in 1951 when several black elementary school students brought suit to allow them to attend school in their neighborhood. Prior to the complaint and the Supreme court ruling, black school children were required by law to attend racially-segregated schools and thus to go past their neighborhood school. It is difficult not to emphasize the irony of a situation in which the initial integration decision emphasized neighborhood schools while recent decisions have requiredsignificant busing of both black and white students away from their neighborhoods schools. The 1954 decision (Brown I) removed the doctrine of separate but equal. The second ruling (Brown II) bound the trial courts to hold proceedings to admit plaintiffs to public schools on a racially non-discriminatory basis.

   In 1955 a three-judge panel concluded that "although complete desegregation has not been accomplished in the Topeka school system a good faith effort toward that end has been made" (Brown v. Board of Education, 1955). During the 1970s several cases concerned with the extent of desegregation were brought and argued. The filing of one of these cases (Johnson v. Whittier) precipitated an investigation of the Topeka school system by the Department of Health Education and Welfare (see U.S.D. #501 v. Weinberger, 1974). In 1979, a new group of Black parents and school children enrolled in Topeka Public Schools sought to intervene in the original *Brown* case. At nearly the same time, two other black school children and their parents, represented by different counsel, filed actions against Unified School District No. 501 (formerly Topeka Public Schools), in *Miller v. Board of Education*

and *Chapman v. Board of Education.* After granting intervention in the *Brown* case, the court dismissed the *Miller* and *Chapman* cases, determining that the issues presented by the intervenors were virtually identical to the issues presented in the *Miller* and *Chapman* cases and that to allow these actions to proceed independently would result in duplication and waste of time and effort.

After a lengthy series of discovery activities, the claims of the intervenors were brought to trial in 1986. At the trial the plaintiffs alleged that the school board engaged in activities (including school closings and attendance boundary changes) that had segregative impacts on the system as a whole. Using anecodotal evidence and case-by-case description, Foster (1986) concluded that "the history of desegregation in the Topeka Schools illustrates a system of racial duality in which a large number ofschools have been 'earmarked' as Black and minority or white and maintained that way. In the case of Black or minority schools many have gone through a transitional phase of becoming increasingly identifiable racially . . . and are maintained that way by various techniques. These techniques – attendance boundary changes, . . . optional zones, . . . opening and closing schools, . . . and the like – can be segregative or desegregative depending on how they are used. In Topeka, most of them were used in the segregative mode" (Foster, 1986: 43–44). It is just such allegations which Wolf (1981) examined in the Detroit case and which are central in this paper.

Taeuber also argued that boundary changes were "used by school administration to preserve racial identifiability in schools" (Taeuber, 1979: 164), but he did not provide a substantive analysis to support his arguments. The following provides a background for a substantive statistical analysis of the impacts of boundary changes.

The Topeka school district

The present Topeka school district is not coincident with the district against which the original complaint was filed. The present district (Topeka School District #501) is the result of a reorganization and consolidation of the school districts of Kansas in 1966. To indicate the changes between the present and former district the first figure shows the extensive annexations to the district (Fig. 1). The most significant of the annexations was that of the Highland Park district, which was added in 1959 and which increased the territory of the original Topeka district by almost one-third. Whether the school board for the present Topeka district can be held accountable for school boundaries which were drawn up by an entity outside of its control is a legal rather than a demographic question, but it illustrates the complexity of deciding on the
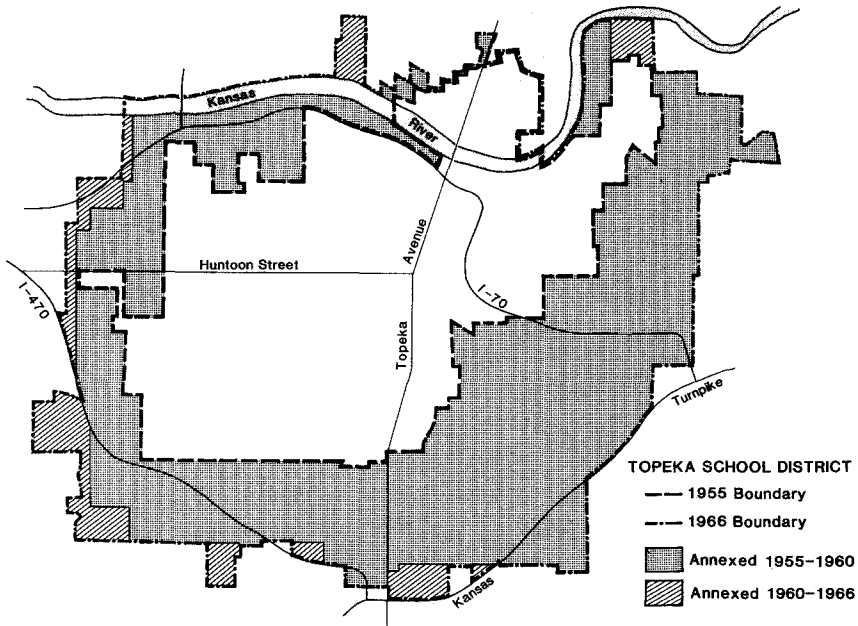
Fig. 1. Changes in the extent of the Topeka School District prior to consolidation in 1966.

impacts of boundary changes and accountability. Two events bound the logical starting point for the analysis. First, most of the annexed territory was included by 1963–64, and by that date a four-step plan to desegregate the Topeka school system (which involved closing one of the four all-black elementary schools and adjusting attendance boundaries to bring the other three formerly all-black schools into the general framework of a neighborhood school system) had been implemented. Second, the school consolidation program was completed in 1966. Thus, the 1963–64 date is used as the base line for the attendance areas and the actual changes in the attendance area populations are computed starting in 1966.

Data and methods

The data sets for the present analysis come from the U.S. Bureau of the Census and the Topeka school district. The first data set is population statistics for blocks for the 1960, 1970, and 1980 census years. Block statistics report the total population by race, some limited information on tenure (owner/renter), and (for some years) data on persons under 18 years of age. Unfortunately, detailed data on age are not available. For 1960, the block statistics provide
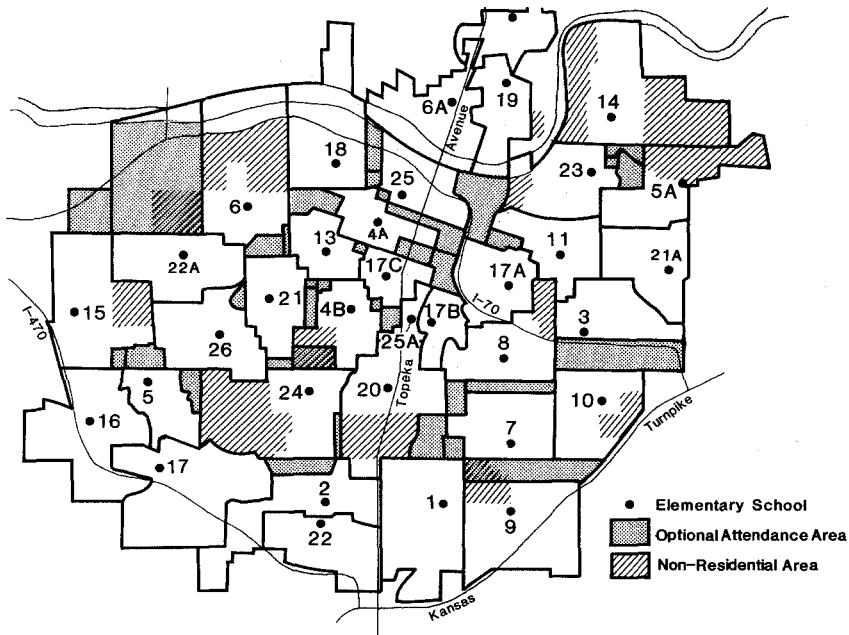
Fig. 2. Elementary School attendance areas in 1963/64.

1	– Avondale East	2	– Avondale S.W.	2	– Avondale West
3	– Belvoir	4	– Bishop	4A	– Clay
4B	– Central Park	5	– Crestview	5A	– Dawson
6	– Gage	6A	– Grant	7	– H.P. Central
8	– H.P. North	9	– H.P. South	10	– Hudson
11	– Lafayette	13	– Lowman Hill	14	– Lundgren
14A	– Lyman	15	– McCarter	16	– McClue
17	– McEachron	17A	– Parkdale	17B	– Polk
17C	– Monroe	18	– Potwin	19	– Quincy
20	– Quinton Hgts.	21	– Randolph	21A	– Rice
22A	– Sheldon	23	– State Street	24	– Stout
25	– Sumner	25A	– VanBuren	26	– Whitson

data on the percent of households per block occupied by nonwhites. (As there were few other races in Topeka in 1960 the designation nonwhite can be equated with black). In 1970, the proportion of the total population per block that is Negro is reported, and in 1980, the number of black persons per block is reported.

The second data set is the detailed attendance boundary maps of the Topeka school district for each school for each year. These maps can be used to establish the changes from year-to-year or between certain points in time. In this analysis, boundaries for the years 1963/64, 1966/67, 1969/70, 1974/75, 1979/80, and 1985/86 were utilized to establish the nature of change over the
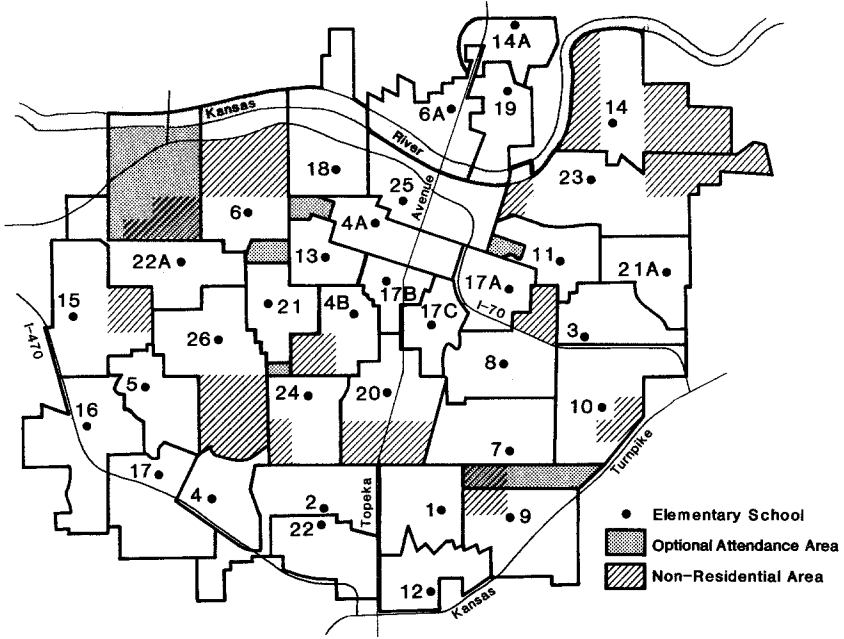
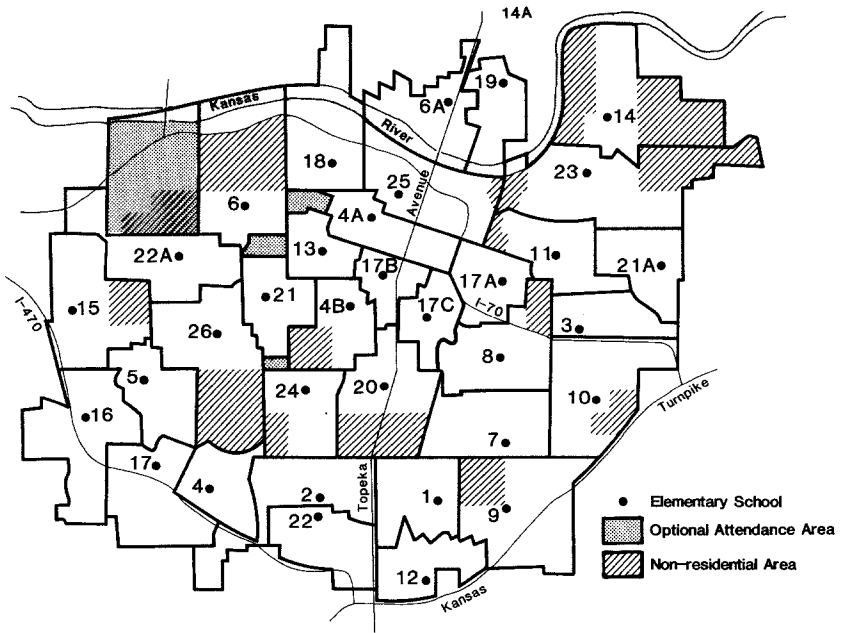*Fig. 3.* Elementary School attendance areas in 1966/67.

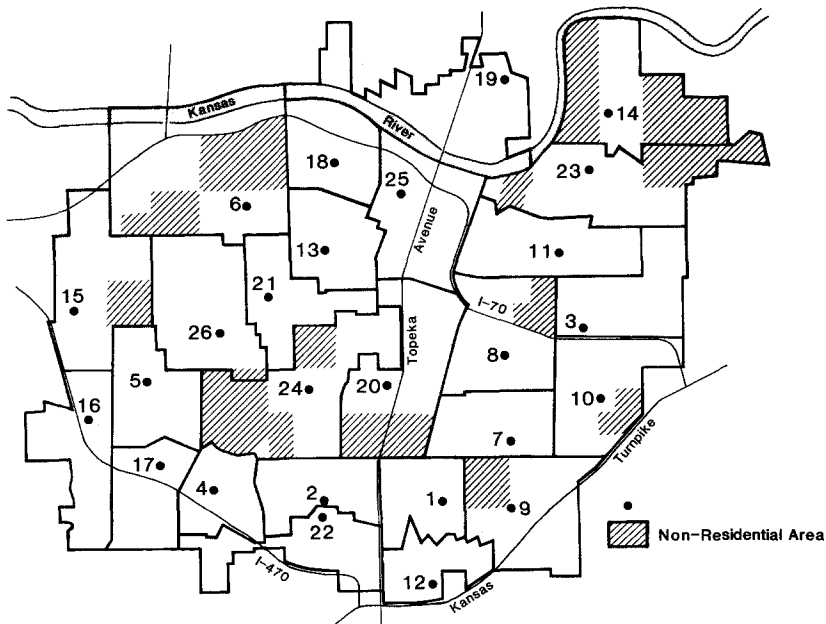*Fig. 4.* Elementary School attendance areas in 1974/75.

Fig. 5. Elementary School attendance areas in 1985/86.

1	– Avondale East	2	– Avondale West	3	– Belvoir
4	– Bishop	5	– Crestview	6	– Gage
7	– H.P. Central	8	– H.P. North	9	– H.P. South
10	– Hudson	11	– Lafayette	12	– Linn
13	– Lowman Hill	14	– Lundgren	15	– McCarter
16	– McClure	17	– McEachron	18	– Potwin
19	– Quincy	20	– Quinton Hgts.	21	– Randolph
22	– Shaner	23	– State Street	24	– Stout
25	– Sumner	26	– Whitson		

past twenty years. The 1966/67 year was chosen because it is the first year after consolidation. The year 1969/70 matches a census year as does 1979/80. The point 1974/75 is midway between census years, and 1985/86 is the most current attendance boundary available.

There are a number of points to be made from an examination of the set of attendance boundary maps (Figs 2, 3, 4, and 5). First, the number of elementary schools has decreased over time and the attendance areas have become larger. This is a function of the demographic effects of a declining white population and a slowly increasing black population. It also reflects the decentralization of the population, a process affecting Topeka and other large metropolitan areas. Second, the maps show that seemingly distended boundary shapes or unusual patterns in the attendance boundaries are often related to the existence of non-residential land use. Thus the existence of a county fair

ground or an army facility is often the reason for a particular boundary formation. Finally, the maps indicate that there has been a reasonable degree of stability in the attendance boundaries since the late 1970s. Many of the changes, at least from a first visual analysis, seem related to the court's mandate to dismantle all-black schools and redesign the attendance area structures. A *technical* analysis of the changes is the focus of the next section.

A methodology for analyzing the effects of boundary line changes

Measuring the impacts of attendance area changes is not straightforward. One approach has been to compute the percentage of blacks in a school before and after boundary change and to identify an increase (or at least a large increase) in the percentage of blacks (or other minorities) as showing a segregative effect. This approach is not satisfactory. The use of the changes in the school population fails to take into account changes that have occurred in the underlying demographics of the city. Even ina one-year period there can be major alterations in school composition simply from the effects of racial residential transition.

A further problem is that school population data are collected and reported for the Fall enrollment period and do not reflect changes in the school over the year. Thus it is not possible to use the school population as a measure of racial change. The ideal data for analyzing population change in an attendance area would be the actual number of students who were allocated from one school to another because of boundary changes. A calculation of the enrollment composition as if the students were in their original school before the boundary changes and after the change would be the most accurate method of estimating composition change. Such data are seldom available much beyond the present and certainly not for a complete school system twenty years ago.

As a result of these data limitations, it is necessary to utilize an alternative strategy. The strategy employed here is to take detailed residential data on a block basis and to compute the changes in the composition of the *school attendance area* based on the *residential* population.[1] Of course, the option that some parents will not send their children to the public school does mean that an imperfect relationship exists between the school population and the resident population, but correlations between the percentage of blacks in school enrollment and percentage of blacks in the resident population are high, ranging between .7 and .95 over the 1966–85 interval.

The actual methodology involves computing the number of black and white persons in each attendance area for the years chosen in the analysis and conducting an evaluation of the degree of change in the attendance area population due to alterations in attendance boundaries. Changes greater than

a minimal 2 or 3 percentage points can be further investigated for potential segregative or desegregative effects, but the problem is how to estimate whether these changes are the result of boundary alterations ordemographic change. A base level against which to compare the situation is required. To provide this base (i.e., the attendance area and school composition if no changes had occurred) the actual boundaries of the attendance areas in 1963–64 were held constant over time and the composition of the resident population in those attendance areas was computed for successive years. Thus the analysis takes the 1963/64 school boundaries and holds them constant over time (for 1966/67, 1969/70, 1974/75, 1979/80, and 1985/86). The 1963/64 boundaries are relevant because they are after the end of freedom of choice when students could choose to remain in their pre-1954 elementary school (the temporary grandfather component of the original four-step desegregation plan) or attend the neighborhood school with the newly-drawn boundaries. Optional attendance areas still exist. This methodology makes it possible to assess the extent of residential composition change (i.e., percent black) that would have occurred *if* the boundaries had been maintained unchanged.

The boundaries for each of these attendance areas and any optional zones that existed were established on appropriate block maps. The data on total, black, and white residential populations were calculated for these attendance areas (and any optional zones) for the appropriate years. Where it was an intercensal year, interpolation was used. A word on the interpolation procedure is in order. To establish the residential population for a school attendance area for a year (1974/75, for example) requires identifying that attendance area on a prior census year (a 1970 map in this instance) and on a later census year (1980 in this case). The populations for 1970 and 1980 for that attendance area are calculated. Then assuming a linear trend between 1970 and 1980 (that is, a regular progression of change), the data for 1974/75 can be determined. This is a standard procedure and gives a better estimate of the population at 1974/75 than using either 1970 or 1980 data for that point. The 1985/86 data are an extrapolation of the trend between 1974/75 and 1979/80. The analysis is limited to those schools which were most subject to racial residential transition.

Population growth and change

A summary table of population change in the City of Topeka, which is approximately coincident with Topeka Unified School District 501[2] shows that (a) the total population increased up to 1970 but decreased after that date, (b) the black population has had a slow increase over the past thirty years, and (c) Hispanic and other minority populations are now approximately two-thirds of the black population. The small decrease in the Hispanic population between
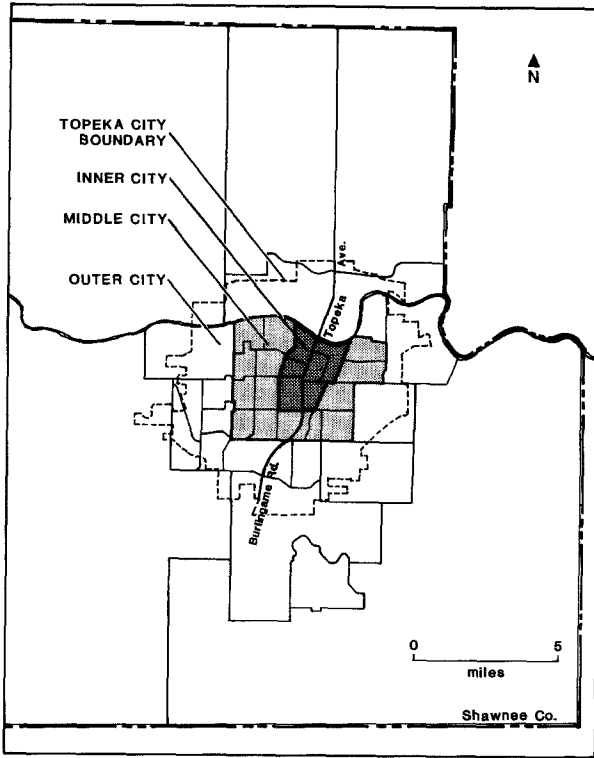
Fig. 6. Urban Structure in Topeka.

1970 and 1980 was probably the result of changing census definitions of "Spanish speaking" and "Spanish surname" between 1970 and 1980. There was a decline in the white population after 1960 and especially after 1970 (Table 1). The proportion of the population that was white also declined while the black population increased slightly.

Table 1. Population characteristics by race for Topeka City.

	1950	%	1960	%	1970	%	1980	%
White	70,607	89.6	107,958	90.4	106,981	85.6	97,099	84.2
Black	8,194	10.4	9,145	7.7	10,444	8.4	10,994	9.4
Hispanic	*		1,729**	1.4	5,832**	4.7	5,345**	4.6
Other	*		652**	0.5	1,754**	1.4	1,828**	1.6
Total	78,791	100.0	119,484	100.0	125,011	100.0	115,266	100.0

* included in white.
** estimated.

Fig. 7. Percent Black population by block 1960.

The overall change in the population masks important deviations in the spatial pattern of that change. A general appreciation of the spatial expression of population growth can be derived from an analysis of growth in the east and west sections of the city (approximately along Topek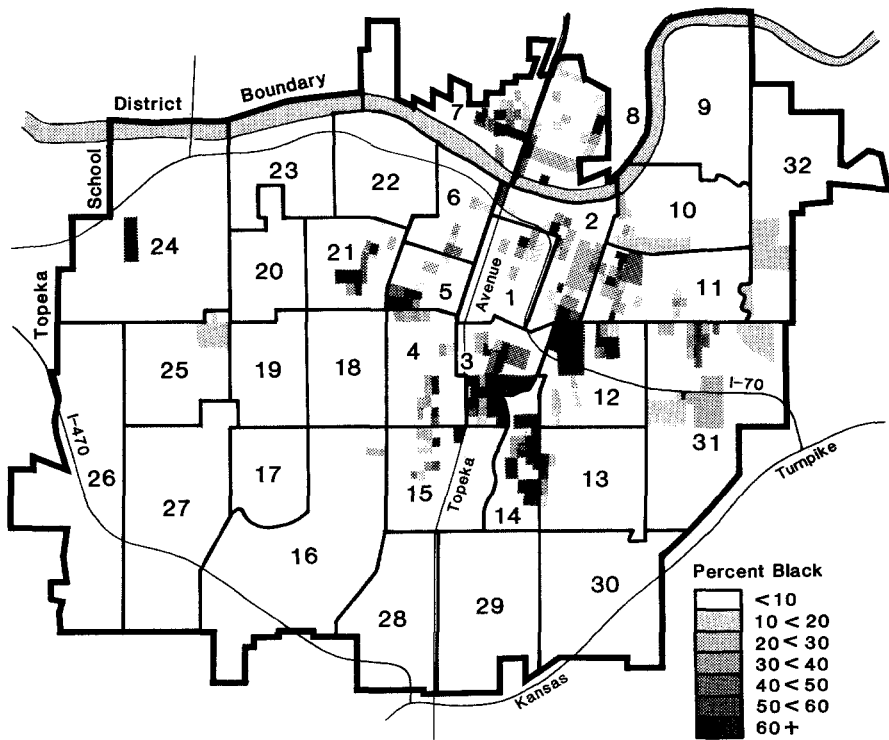a Avenue). Within the broad east-west division we can further divide the city into inner city, middle, and outer city areas. (Fig. 6). Using census tract data and population change between 1960 and 1980 it is possible to show that there are striking contrasts in the spatial expression of population growth in Topeka. Focusing on change between 1960 and 1980 it is clear that the inner city and east Topeka tracts had significant population losses while the outer tracts of west Topeka had significant population increases (Table 2). One of the issues in school attendance area modifications is the issue of population decrease. Losses such as those seen here require school closings and attendance boundary realignment. Such changes have been frequent in the declining enrollment years of the late 1960s and 1970s. Thus school attendance boundary changes were often motivated by very real changes in population composition, age structure, and size. At issue is the way in which the boundary changes were accomplished.

The general population change also hides a significant dispersal of the black
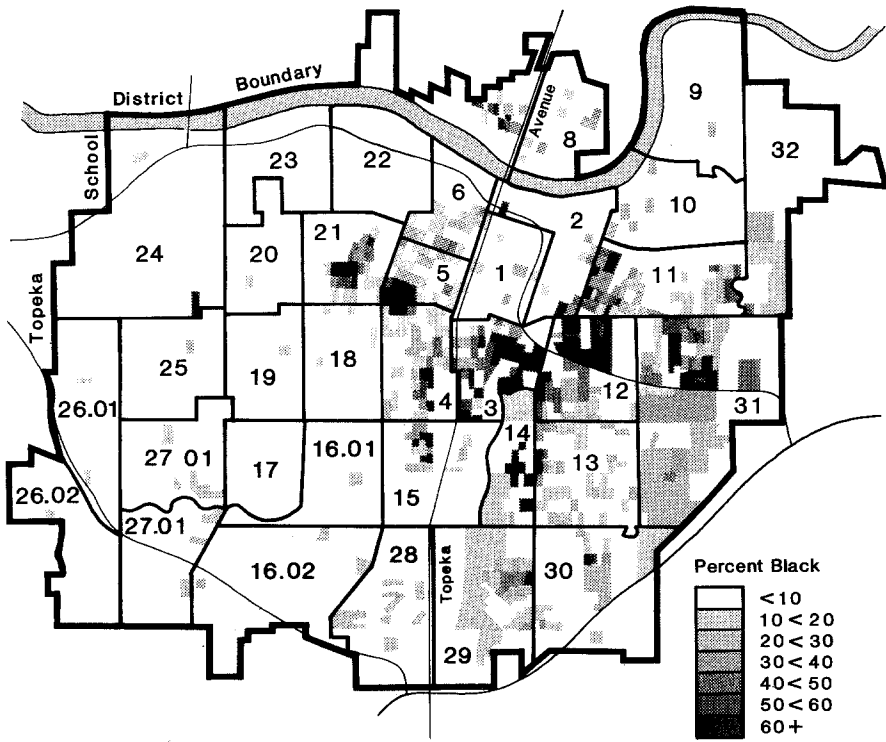
Fig. 8. Percent Black population by block 1980.

Table 2. Growth of population in Topeka City.

	West Topeka West of Topeka Ave.	East Topeka East of Topeka Ave.
% Change 1960–1970		
Total	14.9	− 4.5
Inner city tracts	− 10.5	− 51.7
Middle city tracts	4.8	− 14.1
Outer city tracts	59.7	42.6
% Change 1970–1980		
Total	− 2.0	− 20.8
Inner city tracts	− 12.1	− 32.7
Middle city tracts	− 17.0	− 31.7
Outer city tracts	23.3	− 31.7
% Change 1960–1980		
Total	12.7	− 24.4
Inner city tracts	− 21.4	− 67.5
Middle city tracts	− 13.1	− 31.7
Outer city tracts	97.0	17.0

population over time (Figs 7 and 8). Briefly, the black population was much less concentrated in 1980 than it was in 1960. The spatial nature of the population is such that by 1980 there were black households throughout the city and there was in 1980 a considerable number of blocks with black population in the western part of the city. The simplest and most powerful way of demonstrating this result is to note the increase in the number of blocks with some black population. The increase is from approximately 250 to 540, an increase of over 100 percent. An initial conclusion to be drawn from the spatial demographic analysis is that if nothing had been done – that is, if there had not been any boundary changes – the demographic processes would have created a change in the racial composition of schools. There would have been a decline in the proportion of students who were black in some schools (where the white population was increasing) and an increase in that proportion in others. However, as we have noted, demographic changes lead to pressures to close and open schools and to adjust boundaries. What were the effects of these actions?

Constant boundary analysis

The 1963/64 constant boundary analysis is designed to answer the question, "If the boundaries were unchanged, what population composition changes would have occurred in the attendance areas over time?" Before presenting the results it is necessary to comment on the impact of optional attendance zones (zones which allow students to attend any one of two or in some cases three local schools). In computations where there are optional zones it is possible that their inclusion or exclusion could affect the results. Thus both scenarios are presented. Tables were prepared with the optional zones attached to any school for which they were options (Table 3), and an analysis was also undertaken without optional zones attached to their respective schools (Table 4). The analysis is presented for the twelve schools which had the greatest racial residential transition. Table 3 indicates that, if the boundaries had been held constant, there would have been an increase in the proportion of blacks in the population (in some cases by as much as one-third) of eleven of the twelve school zones. In the other case there was a modest decrease in the percentage of blacks in the residential area. In every case but Avondale East, by 1985–86 there would have been an increase in the proportion of blacks in the attendance areas of the schools if the boundaries had been kept constant. In some cases, an increase was followed by a slight decrease. In all but two of the areas, there was a significant decline in the white populationover the twenty-year period. Table 4 reports the same analysis excluding optional zones. Although there are differences, the overall results do not change.

Table 3. Topeka school boundaries as of 1963/64 and residential population from block data (includes optional zones).

Year		1963/64*	1966/67*	1969/70	1974/75*	1979/80	1985/86**
Avondale E.	Total	3791	4362	4933	4625	4316	3946
	Black	772	714	656	650	644	637
	% Black	20.36%	16.37%	13.30%	14.06%	14.92%	16.14%
Belvoir	Total	1878	2396	291	2656	2399	2091
	Black	530	804	1077	1054	1031	1003
	% Black	28.22%	33.54%	36.97%	39.68%	42.98%	48.00%
Highland Pk.	Total	6266	5277	4287	3820	3354	2794
Central	Black	277	238	199	241	283	333
	% Black	4.42%	4.51%	4.64%	6.31%	8.44%	11.93%
Highland Pk.	Total	3493	3433	3372	3105	2657	2228
North	Black	333	472	610	598	586	572
	% Black	9.53%	13.74%	18.09%	19.84%	22.05%	25.66%
Hudson	Total	1565	2135	2705	2614	2523	2414
	Black	97	158	218	345	471	623
	% Black	6.20%	7.38%	8.06%	13.20%	18.67%	25.80%
Lafayette	Total	3726	3697	3568	3239	2909	2514
	Black	630	688	746	747	747	748
	% Black	16.91%	18.86%	20.91%	23.05%	25.68%	29.74%
Lowman Hill	Total	5820	5221	4622	4601	4580	4555
	Black	1128	887	645	810	974	1171
	% Black	19.38%	16.98%	13.95%	17.59%	21.27%	25.72%
Monroe	Total	2251	2251	1359	1208	1057	876
	Black	602	557	512	468	423	370
	% Black	26.74%	30.86%	37.67%	38.74%	40.02%	42.20%
Parkdale	Total	4976	3216	2456	2156	1885	494
	Black	1999	1777	1554	1303	1051	749
	% Black	40.17%	47.81%	63.27%	60.43%	56.66%	50.13%
Polk	Total	5702	4744	3786	3931	4076	4250
	Black	216	228	241	433	624	853
	% Black	3.79%	4.81%	6.37%	11.02%	15.31%	20.08%
Quinton	Total	3173	3160	3147	2651	2155	1560
Heights	Black	505	673	840	668	496	290
	% Black	15.92%	21.28%	26.69%	25.20%	23.02%	18.57%
Sumner	Total	6427	5380	4333	3702	3071	2314
	Black	370	249	128	147	166	189
	% Black	5.76%	4.63%	2.95%	3.97%	5.41%	8.16%

* interpolated.
** extrapolated.

To establish some general conclusions about the impact of constant boundaries, we can examine the effects of such boundaries in relationship to the district-wide proportion of the residential population that was black. This percentage was 8.0 in 1960 and 10.0 in 1980. Obviously we would not expect

Table 4. Topeka school boundaries as of 1963/64 and residential population from block data (excludes optional zones).

Year		1963/64*	1966/67	1969/70	1974/75	1979/80	1985/86
Avondale E.	Total	3540	4110	4679	4378	4077	3716
	Black	708	588	468	525	581	648
	% Black	20.00%	14.31%	10.00%	11.98%	14.25%	17.44%
Belvoir	Total	1640	2189	2737	2472	2206	1887
	Black	492	765	1038	1013	988	958
	% Black	30.00%	34.96%	37.92%	40.99%	44.79%	50.77%
Highland Pk.	Total	6266	5277	4287	384	3354	2795
Central	Black	277	238	199	241	283	333
	% Black	4.42%	4.51%	4.64%	6.31%	8.44%	11.93%
Highland Pk.	Total	2786	2755	2724	2419	2114	1748
North	Black	322	453	584	566	548	526
	% Black	11.56%	16.44%	21.44%	23.40%	25.92%	30.11%
Hudson	Total	1327	1920	2512	2421	2330	2221
	Black	59	119	179	304	428	577
	% Black	4.45%	6.20%	7.13%	12.54%	18.37%	25.97%
Lafayette	Total	3346	3147	2948	2844	2739	2613
	Black	546	547	547	614	681	761
	% Black	16.32%	17.37%	18.55%	21.59%	24.86%	29.14%
Lowman Hill	Total	4037	3299	2560	2860	3159	3518
	Black	1087	836	584	747	909	1103
	% Black	26.93%	25.33%	22.81%	26.11%	28.77%	31.37%
Monroe	Total	1381	1143	904	791	678	542
	Black	582	527	472	420	367	303
	% Black	42.14%	46.13%	52.21%	53.10%	54.13%	55.94%
Parkdale	Total	3899	2868	1836	1761	1685	1594
	Black	1746	1551	1355	1170	985	763
	% Black	44.78%	54.07%	73.80%	66.46%	58.46%	47.87%
Polk	Total	3738	3135	2531	2604	2876	3202
	Black	164	163	163	324	485	678
	% Black	4.40%	5.20%	6.44%	12.44%	16.86%	21.18%
Quinton	Total	2578	2684	2790	2325	1859	1300
Heights	Black	337	494	650	519	388	231
	% Black	13.07%	18.39%	23.30%	22.33%	20.87%	17.76%
Sumner	Total	3519	3087	2654	2214	1774	1246
	Black	142	101	59	93	127	168
	% Black	4.04%	3.26%	2.22%	4.20%	7.16%	13.47%

* interpolated.

the school attendance areas to be the same as the district-wide percentage. Plus and minus bands in the range of 10 to 20 percentage points have been used to evaluate the level of segregation or desegregation. Using a band of 10 percentage points (a conservative band) around the district-wide average we can pose the question, "how many schools were desegregated by the process of demographic change, how many were segregated by such change, and how many had only minor changes in the percent black." An examination of table 3 shows that three school areas (Belvoir, Parkdale, Monroe) were already out of the plus-and-minus range in 1963/64 and would have continued to segregate if the boundaries had remained constant. Four school areas (Highland Park North, Lafayette, Hudson, Polk) moved out of the plus-and-minus band, that is, they would have continued to segregate over time. One school (Avondale East) moved into the plus-and-minus band; another moved out and then in (Quinton Heights); another school moved in and then out of the band (Lowman Hill); and two schools (Sumner, Highland Park Central) would have remained in the band.[3] In sum, then, maintaining the boundaries would have been segregative. Given the necessity of adjusting boundaries, were the actual changes desegregative, segregative, or neutral?

Actual boundary analysis

Unlike the previous analysis where the concern was with boundaries which did not change, the essence of the analysis in this section is with the actual boundary changes that were employed. Table 5 is a summary of the changes in the proportion of blacks in each attendance area and indicates if there was a boundary change (or changes) between any two time periods. The table includes the population composition (total number of people, number of blacks and % black) for each of the twelve school attendanceareas for the years 1966/67 through 1985/86. Where there were optional zones, they were included with all school attendance areas to which they were assigned. A second table (Table 6) is presented with the optional areas excluded.

To analyze whether there were segregative effects, we can examine the percentage changes and their relationship to the district-wide percentages of 8 percent in 1960, 9 percent in 1970 and 10 percent in 1980. As in the constant boundary analysis, a band of plus and minus 10 percentage points around the district-wide average percent black is used. Examining the table, there were 42 possible instances of change between succeeding years. (There are twelve schools each with four possible periods of change except for Parkdale, Monroe and Polk). There were only fourteen which involved one or more boundary changes. Of those fourteen instances of boundary change, five were associated with a significant increase in the percent black. Of these five cases, three were

Table 5. Topeka, residential population in attendance areas (includes optional zones).

Year		1966/67		1969/70	1974/75		1979/80		1985/86
Avondale E.	Total	4028		4332	3573		2625		2625
	Black	321		411	436		467		467
	% Black	7.97%		9.49%	12.20%		17.79%		17.79%
Belvoir	Total	2259		2289	2028		1930		3105
	Black	836		924	880		888		992
	% Black	37.01%	★	40.37%	43.39%	★	46.01%	★	31.95%
Highland Pk.	Total	5449		4574	3692		3691		3691
Central	Black	257		227	432		431		431
	% Black	4.72%	★	4.96%	11.70%		11.68%		11.68%
Highland Pk.	Total	3562		3563	3239		3534		3534
North	Black	639		754	735		1260		1260
	% Black	17.94%		21.16%	22.69%	★	35.65%		35.65%
Hudson	Total	2314		2688	2613		2520		2520
	Black	178		218	330		471		471
	% Black	7.69%		8.11%	12.63%		18.69%		18.69%
Lafayette	Total	2677		3046	2774		3161		3999
	Black	519		619	652		985		1205
	% Black	19.39%	★	20.32%	23.50%	★	31.16%	★	30.13%
Lowman Hill	Total	4996		4811	4339		5037		7688
	Black	1159		1187	1064		1054		1270
	% Black	23.20%		24.67%	24.52%	★	20.93%	★	16.52%
Monroe	Total	2450		2153	1859		Closed-absorbed by		
	Black	841		856	767		Quinton Heights		
	% Black	34.33%		39.76%	41.26%				
Parkdale	Total	2859		2564	2081		Closed-absorbed by		
	Black	1674		1695	1316		Highland Pk. North,		
	% Black	58.55%	★	66.11%	63.24%		Lafayette		
Polk	Total	3512		3786	2889		Closed		
	Black	194		241	321				
	% Black	5.52%		6.37%	11.11%				
Quinton Heights	Total	3107		3160	2714		4384		4384
	Black	496		530	448		1108		1108
	% Black	15.96%		16.77%	16.51%	★	25.27%	★	25.27%
Sumner	Total	4884		4112	3978		3243		3243
	Black	197		110	154		341		341
	% Black	4.03%		2.68%	3.87%	★	10.51%		10.51%

Attendance areas include all optional zones assigned to that school. Two school attendance areas thus might include the same optional zones.

★ indicates a boundary change. 1979/80 data are used to estimate 1985/86 attendance area composition.

directly related to the closing of schools (Parkdale and Monroe) with higher proportions of blacks and thus had an overall desegregative impact on the system; and one, Parkdale between 1966/67 and 1969/70, appears to be potentially segregative. Although the percent black increased in Sumner it was

Table 6. Topeka, residential population in attendance areas (excludes optional zones).

Year		1966/67		1969/70	1974/75		1979/80		1985/86
Avondale E.	Total	4028		4332	3573		2625		2625
	Black	321		411	436		467		467
	% Black	7.97%		9.49%	12.20%		17.79%		17.79%
Belvoir	Total	2259		2289	2028		1930		3105
	Black	836		924	880		888		992
	% Black	37.01%	★	40.37%	43.39%	★	46.01%	★	31.95%
Highland Pk.	Total	4612		4574	3692		3691		3691
Central	Black	238		227	432		431		431
	% Black	5.16%	★	4.96%	11.70%		11.68%		11.68%
Highland Pk.	Total	3562		3563	3239		3534		3534
North	Black	639		754	735		1260		1260
	% Black	17.94%		21.16%	22.69%	★	35.65%		35.65%
Hudson	Total	2314		2688	2613		2520		2520
	Black	178		218	330		471		471
	% Black	7.69%		8.11%	12.63%		18.69%		18.69%
Lafayette	Total	2625		3046	2774		3161		3999
	Black	511		619	652		985		1205
	% Black	19.47%	★	20.32%	23.50%	★	31.16%	★	30.13%
Lowman Hill	Total	4333		4143	3678		5037		7688
	Black	1138		1167	1044		1054		1270
	% Black	26.26%		28.17%	28.38%	★	20.93%	★	16.52%
Monroe	Total	2450		2153	1859		Closed-absorbed by		
	Black	841		856	767		Quinton Heights		
	% Black	34.33%		39.76%	41.26%				
Parkdale	Total	2807		2564	2081		Closed-absorbed by		
	Black	1666		1695	1316		HP North & Lafayette		
	% Black	59.35%	★	66.11%	63.24%				
Polk	Total	3512		3786	2889		Closed		
	Black	194		241	321				
	% Black	5.52%		6.37%	11.11%				
Quinton Heights	Total	3107		3160	2714		4384		4384
	Black	496		530	448		1108		1108
	% Black	15.96%		16.77%	16.51%	★	25.27%	★	25.27%
Sumner	Total	4884		4112	3978		3243		3243
	Black	197		110	154		341		341
	% Black	4.03%		2.68%	3.87%	★	10.51%		10.51%

★ indicates a boundary change. 1979/80 data are used to estimate 1985/86 attendance area composition.

closer to the district-wide percentage, after the boundary change (Table 7). The other boundary changes were either minimal (2 or 3 percentage points) or desegregative. In addition, there were several cases of natural desegrative impacts from demographic change and some demographic segregative trends without boundary changes, as in Monroe between 1966/67 and 1969/70. Boundary changes without segregative effects are illustrated in Lowman Hill, where there were attendance boundary changes, between 1974/75 and 1979/80, and between 1979/80 and 1985/86. Indeed, the last of these boundary changes between 1979/80 and 1985/86 had a distinct desegregative effect. Similarly, for Hudson there was only one attendance area change, in fact prior to 1966/67, which increased the minorities from a little over 6 percent of the population to just over 7 percent.

The conclusion of this second analysis is that, overall, the boundary changes had desegregative effects and, where there were increases in the percentage of blacks in the population, they were related to attempts to desegregate the Parkdale and Monroe schools. Now the remaining question is whether the actual changes improved on the constant boundaries.

Table 7. Boundary changes and their impacts.

| School and time	Amount of change/reason for change
1966/67–1969/70	
Belvoir	neutral (within 2–3 percentage points of constant boundary)
Highland Park Central	neutral
Lafayette	neutral
Parkdale	segregative (but the changes in the actual and constant boundaries are parallel, suggesting a demographic explanation for the change)
1974/75–1979/80	
Belvoir	neutral
Highland Park North	changes occur from closing Parkdale
Lafayette	changes occur from closing Parkdale
Lowman Hill	desegregative (reduced % black)
Quinton Heights	changes occur from closing Monroe
Sumner	desegregative (closer to district wide %)
1979/80–1985/86	
Belvoir	desegregative (reduced % black)
Lafayette	neutral
Lowman Hill	desegregative (reduced % black)
Quinton Heights	neutral
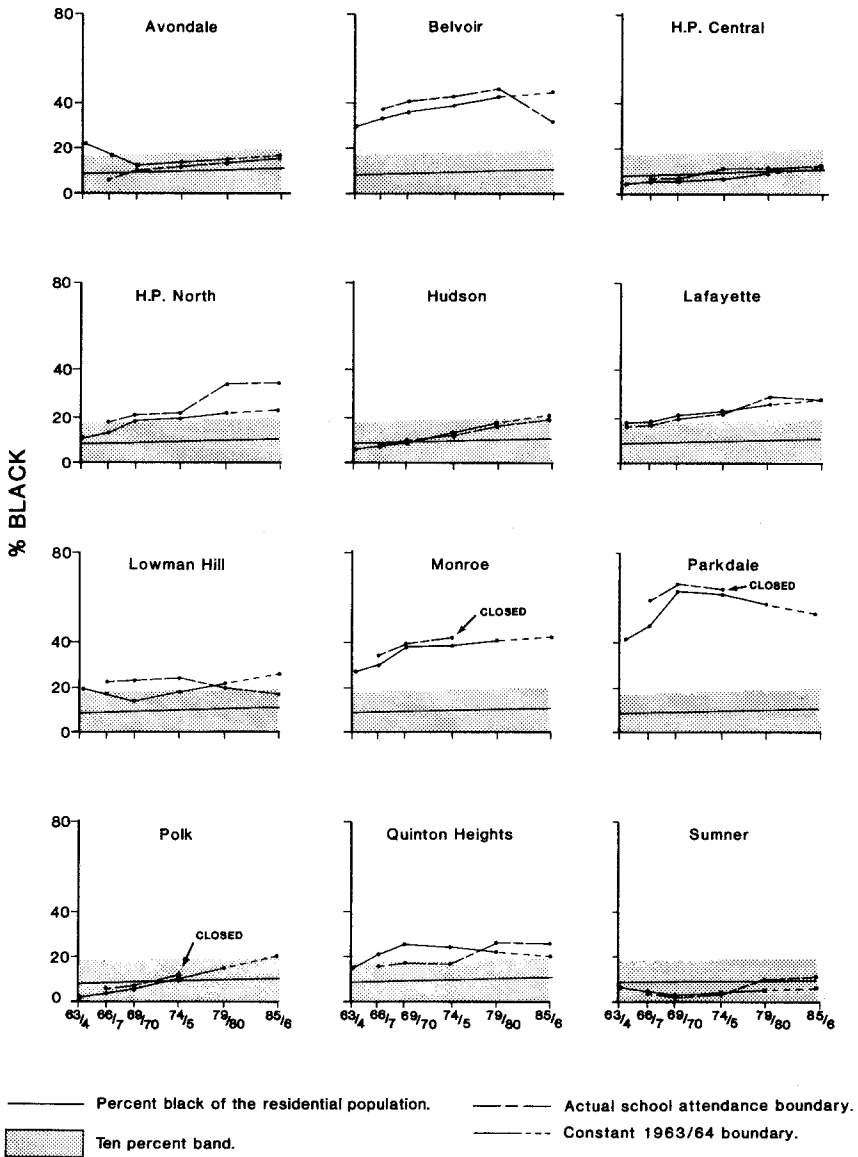
Fig. 9. A comparative analysis of population change by school attendance area.

A comparison of actual and constant boundary impacts

The comparison is accomplished visually in Figure 9. This figure shows the population composition (percent black) for the constant boundaries, the per-
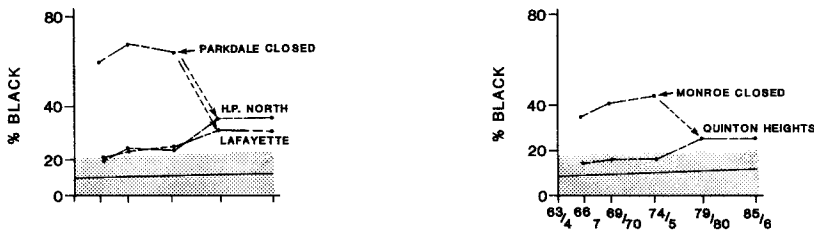
Fig. 10. Examples of the impacts of school closings.

cent black for the actual boundaries, the district percent black, and the plus-or-minus ten percent band. The graph shows that the constant and actual boundaries were often parallel and the school attendance areas with significant increases in the black population were largely the result of (necessary) school closings. For example, Highland Park North has a parallel trend between the constant boundary and the actual boundary. That is, the boundary changes are not generating larger percentages of the black population in the attendance area. Only with the desegregation of the Parkdale school does the actual attendance area increase in percent black. Avondale East, Highland Park Central, Hudson, Polk and Sumner are all within the ten percent band and there is a strikingly similar behavior of the actual and constant attendance boundaries.

A specific study of two school closings (necessitated by declining enrollments) shows the impacts which are sometimes mistakenly identifed as being segregative in nature (Fig. 10). Both Monroe and Parkdale were closed between 1974/75 and 1979/80 and thus removed two predominantly black schools. The students attended the *nearest* other elementary schools, and in all cases the percentage of minorities increased. However, as the last analysis will demonstrate, the overall impact both within the subset of schools and in the Topeka district was desegregative.

Table 8. Indices of dissimilarity and exposure for the schools and attendance areas in the school boundary change analysis.

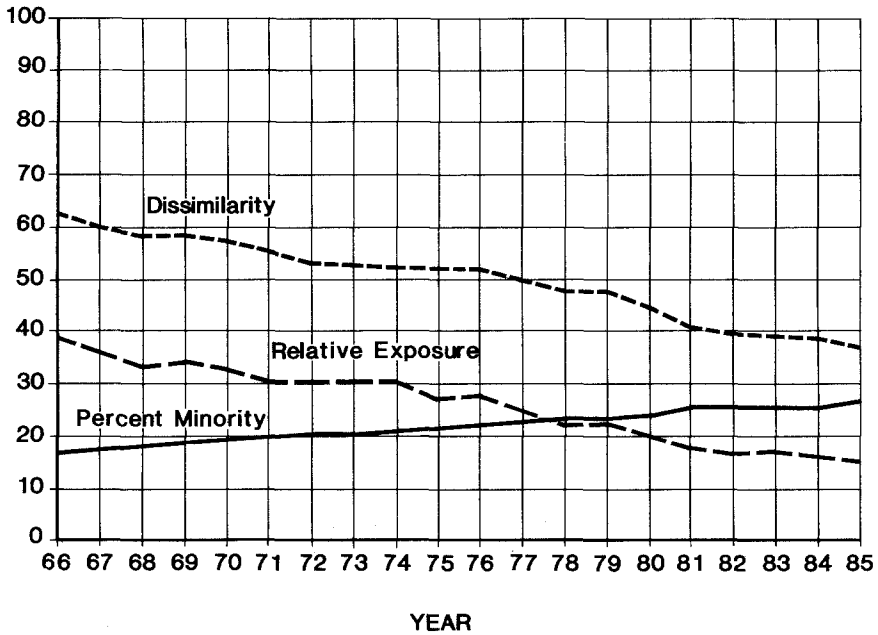| Year	School enrollment		Attendance areas population	
	Dissimilarity	Exposure	Dissimilarity	Exposure
1966/67	.48	.29	.38	.15
1969/70	.39	.22	.38	.17
1974/75	.31	.14	.32	.13
1979/80	.25	.09	.23	.05
1985/86	.15	.04	.22	.04

Fig. 11. Indices of segregation by year for elementary schools in the Topeka school district.

The indices of dissimilarity and exposure can be used to capture the overall impact of the many boundary changes. The indices are used to measure the extent to which the distribution of the black population is similar to or different from the white population. The indices vary from 1.0 for total separation to 0 for a perfectly mixed racial distribution. The dissimilarity index measures racial balance while the exposure index is an attempt to measure the amount of contact between racial groups. Calculating the indices for the set of attendance areas over the period for which there are data both for the attendance areas and the schools is an important way of compressing a large number of details into one table. The results are striking (Table 8). Both indices decline over time. Student populations and their attendance area populations examined in this study are moving to greater racial balance and more interracial exposure. Not only do the twelve schools examined here show increasing levels of integration; the whole elementary school system is less segregated today than it was twenty years ago (Fig. 11). The evidence does not support arguments of gerrymandered attendance boundaries. The indices do not show evidence of segregative boundary changes.

Conclusion

The overall conclusion of this analysis of population growth, its geographic dispersal over time, and attendance boundaries is that the major force driving the system of change in the Topeka school system was demographic processes and not the changes in attendance areas. Changes in school enrollment were due to the growth rates of the white and black populations and their geographic locations, not to the year-to-year attendance area shifts. Even the analysis of the optional zones in the earlier years showed only minimal impacts on the percentage of blacks in the attendance areas. Indeed, focusing on the last dozen years, the decline in the indices is striking. Given the declining white population and the increasing black population, the imbalances which exist are the result of demographic forces and not the result of boundary changes. This case study suggests that we proceed carefully before assigning liability and developing legal remedies as a result of boundary changes.[4]

Acknowledgment

I would like to acknowledge the helpful comments of the editor, Eric Moore and Gary Sebelius.

Notes

1. A closer approximation would use school age (5–17) population, but these data are not available for blocks and the detail of the boundary changes requires block data.
2. In fact, by 1970, the City is slightly larger than the School District.
3. If 1979/1980 rather than 1985/1986 is used as the end point, then the results for two of the schools is different. Polk stays in the band, but Quinton Heights moves out.
4. In the time since the research for this paper was completed, the U.S. District Court of the District of Kansas has filed a Memorandum and Order. The court found that "students are assigned to schools on a race-neutral basis. The district's neighborhood school approach has achieved a high level of integration . . ." (Brown v. Board of Education of Topeka, Kansas, 1987: 49).

References

Clark, W.A.V. (1986). "Residential segregation in American cities," *Population Research and Policy Review* 5: 95–127.

Foster, G. (1986). Racial Segregation in the Topeka Public Schools, Unified School District No. 501 Unpublished manuscript.

Taeuber, K. (1979). "Housing, schools, and incremental segregative effects," *The Annals American Academy of Political and Social Science* 441:157–167.

Wolf, E. (1981). *Trial and Error*. Detroit, Michigan: Wayne State University Press.

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Cases

Brown v. Board of Education of Topeka, 347 U.S. 483, 74 S. Ct. 686 (1954).
Brown v. Board of Education of Topeka, 349 U.S. 294, 75 S. Ct. 753 (1955).
Brown v. Board of Education of Topeka, 139 F. Supp. 470 (1955).
Brown v. Board of Education of Topeka, Shawnee County 84 F.R.D. 383 (D. Kan. 1979).
Johnson v. Whittier, No. T-5430 United States District Court, D. Kansas (1973).
U.S.D. # 501 v. Weinberger, No. 74-160-C5 United States District Court, D. Kansas (1974).
Miller v. Board of Education 79-1408 United States District Court, D. Kansas (1979).
Chapman v. Board of Education 79-1473 United States District Court, D. Kansas (1979).
Brown v. Board of Education No. T-316 United States District Court, D. Kansas (1986).
Brown v. Board of Education No. T-316 United States District Court, D. Kansas Memorandum
  and Order, (1987).