

Segregation simulation

A simple simulation about segregation, isolation, and group size. The imaginary city has 10 neighborhoods, and there are 4 scenarios showing how different levels of White and Black population and different distributions lead to different levels of segregation and Black isolation. © M. Rosenfeld 2006, 2004, 2002.

Index of Dissimilarity:
 Range 0-100
 Interpretation: percentage of either of 2 groups that would have to move in order to be evenly dispersed w.r.t. the other group
 Note: ID is invariant to relative size of groups
 Formula: $ID=100*(1/2)*\sum(Abs((w_i/W)-(b_i/B)))$

Isolation Index:
 Range 0-100
 Interpretation: average neighborhood concentration of the group.
 Note: Isolation is not invariant to relative size of groups
 Formula: $bPb=100*\sum((b_i/B)*(b_i/T_i))$

Case 1: No segregation, low black isolation

Neighborhood	Populations		Index of Dissimilarity or 'Segregation'	bPb, or	wPw or
	White	Black		Isolation Of Blacks	Isolation Of Whites
1	90	10	0	0.01	0.09
2	90	10	0	0.01	0.09
3	90	10	0	0.01	0.09
4	90	10	0	0.01	0.09
5	90	10	0	0.01	0.09
6	90	10	0	0.01	0.09
7	90	10	0	0.01	0.09
8	90	10	0	0.01	0.09
9	90	10	0	0.01	0.09
10	90	10	0	0.01	0.09
Total Pop	900	100	Segregation Index:	Black Isolation Index:	
			0	10	90

Case 2: Substantial segregation, small Black population, low Black isolation. Think of this as the case of Northern cities before the great Black migration.

Neighborhood	Populations		Index of Dissimilarity or 'Segregation'	bPb, or	wPw or
	White	Black		Isolation Of Blacks	Isolation Of Whites
1	100	0	0.1	0	0.1
2	100	0	0.1	0	0.1
3	100	0	0.1	0	0.1
4	100	0	0.1	0	0.1
5	100	0	0.1	0	0.1
6	100	0	0.1	0	0.1
7	100	0	0.1	0	0.1
8	100	5	0.1	0.010	0.095
9	100	10	0.3	0.036	0.091
10	100	10	0.3	0.036	0.091
Total Pop	1000	25	Segregation Index:	Black Isolation Index:	
			70	8.23	97.71
% Blacks who would move		0.7			

Case 3: Same as Case 2, but the Black population has grown (Blacks become more isolated)

Neighborhood	Populations		Index of Dissimilarity or 'Segregation'	bPb, or	wPw or
	White	Black		Isolation Of Blacks	Isolation Of Whites
1	100	0	0.1	0	0.1
2	100	0	0.1	0	0.1
3	100	0	0.1	0	0.1
4	100	0	0.1	0	0.1
5	100	0	0.1	0	0.1
6	100	0	0.1	0	0.1
7	100	0	0.1	0	0.1
8	100	15	0.1	0.03	0.09
9	100	30	0.3	0.09	0.08
10	100	30	0.3	0.09	0.08
Total Pop	1000	75	Segregation Index:	Black Isolation Index:	
			70	21.07	94.08
% Blacks who would move		0.7			

Case 4: As more Blacks move into the Black neighborhoods, the Whites flee. High segregation And High Isolation for Blacks. The segregation and Black isolation indices here are roughly representative of the worst Northern US cities in 1990							
						bPb, or	wPw or
	Populations:			Index of Dissimilarity	Isolation	Isolation	
Neighborhood	White	Black		or 'Segregation'	Of Blacks	Of Whites	
1	180	0		0.225	0.000	0.225	
2	100	0		0.125	0.000	0.125	
3	100	0		0.125	0.000	0.125	
4	100	0		0.125	0.000	0.125	
5	100	0		0.125	0.000	0.125	
6	100	0		0.125	0.000	0.125	
7	60	0		0.075	0.000	0.075	
8	20	30		0.125	0.090	0.010	
9	20	90		0.425	0.368	0.005	
10	20	80		0.375	0.320	0.005	
Total Population	800	200		Segregation Index:	Black Isolation Index:		
				92.50	77.82	94.45	

Following case 4, what does it mean when we say that 92.5% of either racial group would have to move to eliminate segregation? What would our imaginary city look like after such a move?

Original Case 4

Neighborhood	Populations:		Index of Dissimilarity or 'Segregation'
	White	Black	
1	180	0	0.225
2	100	0	0.125
3	100	0	0.125
4	100	0	0.125
5	100	0	0.125
6	100	0	0.125
7	60	0	0.075
8	20	30	0.125
9	20	90	0.425
10	20	80	0.375
Total Population	800	200	Segregation Index: 92.50

Option 1:

Move Only Blacks in order to create 1 to 4 ratio of blacks to whites in every neighborhood:

Neighborhood	White	Black	B move	Index of Dissimilarity or 'Segregation'
2	100	25	25	0.000
3	100	25	25	0.000
4	100	25	25	0.000
5	100	25	25	0.000
6	100	25	25	0.000
7	60	15	15	0.000
8	20	5	25	0.000
9	20	5	85	0.000
10	20	5	75	0.000
Total Population	800	200	185	Segregation Index: 0.00
		Move Rate:	0.925	

Since blacks and whites are now evenly distributed, segregation index must be zero.

Option 2:

Move Only Whites to create a 4 to 1 ratio of whites to blacks:

Neighborhood	Populations:			Index of Dissimilarity or 'Segregation'
	White	Black	W Move	
1	0	0	180	0.000
2	0	0	100	0.000
3	0	0	100	0.000
4	0	0	100	0.000
5	0	0	100	0.000
6	0	0	100	0.000
7	0	0	60	0.000
8	120	30	100	0.000
9	360	90	340	0.000
10	320	80	300	0.000
Total Population	800	200	740	Segregation Index: 0.00
		Move rate:	0.925	

Again, note that the new index of dissimilarity must be zero. Also note that since blacks were restricted to only 3 of the 10 neighborhoods, whites are forced in this fictional exercise to abandon all but those 3 neighborhoods as well.