Size Matters: the Structural Effect of Social Context

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Abstract

For more than five decades since the work of Simmel (1955), many social science researchers have paid close attention to the effect of social context (e.g. relative group size, heterogeneity, and cultural context) on such social interactions as those measured by inter-racial friendship, dating and marriage. This study explores the effect of total community size on the realized proportion of inter-racial dyads, a subject that has not been fully studied in the existing literature. Based on a theoretical model with multidimensional individual preferences, we posit that net of group composition, the total community size of a social context reduces the proportion of inter-racial dyads among all realized dyads. Using data from National Longitudinal Study of Adolescent Health (Add Health), we model and simulate the process of friend-making by school size. Preliminary results are consistent with our hypothesis.

Theoretical Motivation

We start with the premise that individuals in a society may be categorized into social groups by multiple dimensions. The idea of multi-dimensional social differences dates at least as far back as Simmel. In his work on affiliations, Simmel (1955) proposes that individuals in a social context are located at the intersection of multiple social circles and differentiate from each other along a number of dimensions. Simmel's insight sheds light on two things: (1) the multi-dimensional nature of individuals' social differences, and (2) the effect of social structure on intergroup relations.

Blau and Schwartz (1984) systematically explored Simmel's idea by theorizing the structural effects on intergroup relations, in particular, the effect of group size distributions on out-marriage rates, and by testing their hypothesis with data from 125 SMSAs. Under the assumption of individuals' preferences for people in proximate social positions, they found that an increase of relative size of one group is associated with higher intermarriage rate, and heterogeneity promotes intergroup relations. A key feature of Blau and Schwartz's work is that the measures of size distribution they refer to are all relative– i.e. percentage of each group – instead of absolute sizes.

Recent literature also underscores the importance of the contextual effect on inter-racial relations. Racial homophily, or in-group racial preference, varies substantially with social context (Quillian and Campbell 2003, Jackman and Crane 1986, Moody 2001). For example, Quillian and Campbell find that the likelihood of cross-race friends depends strongly on the share of potential friends in the school context who are other-race (Quillian and Campbell 2003).

In this study, we further investigate the effect of *total community size* net of groups' relative composition. In fact, we propose and test the hypothesis that *total community size* alone can have a substantial effect on intergroup relations. To be specific, holding constant its relative percentage in the social context, we hypothesize that an increase in the total community size increases the rate of out-group relations. We will show this result under a theoretical model with multidimensional individual preferences.

Apart from the theoretical discussion, this study demonstrates how the model may operate in a practical setting by simulating intergroup formation in a school as a function of absolute group sizes. The simulation approach overcomes the confounding problem of attitudinal -- rather than structural -- change caused by contextual change, which is largely unavoidable in a statistical model with structural variables included as independent variables.

Research Model

Individuals maximize their utility as a function of their latent preference, but their utility maximization is constrained by the opportunities in their social contexts. Group size, one important character of social context, is the product of *total community size* and the *relative percentage of groups*. In our model, we demonstrate that holding constant the relative percentages of groups, the proportion of inter-group relations among all realized dyads in the community is an increasing function of total size.

We make two assumptions about individuals' latent preferences (A-1 and A-2):

A-1: An individual's preference for social relations is *multidimensional*.

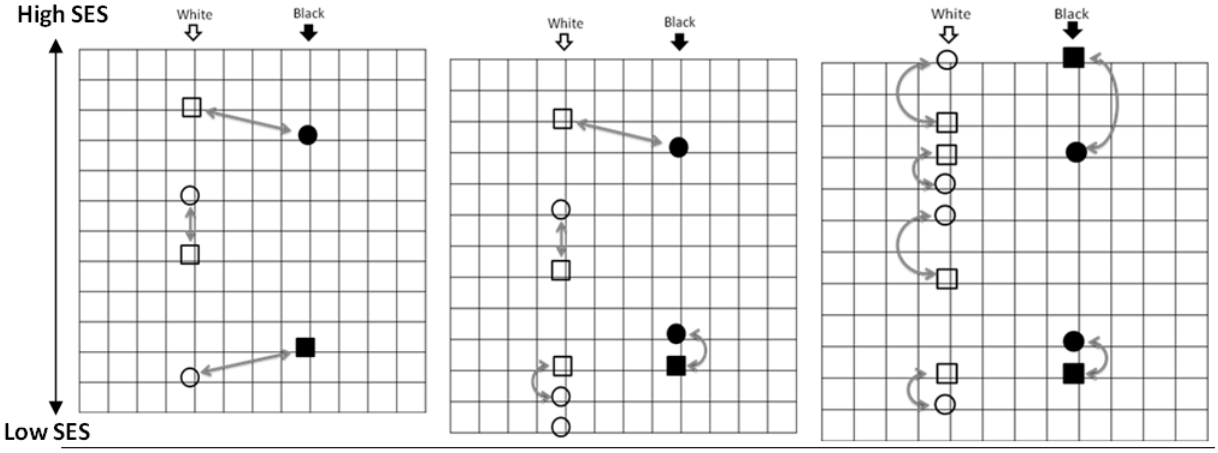
A-2: People tend to establish social relationship with people closer to them in social distance (in-group preference), and social distance depends on multidimensional preference, as stated in A-1.

When the total size is small, utility-maximizing individuals have to sacrifice some aspects of their preferences so as to satisfy some others when choosing partners. As total size increases, the same-group alternatives for individuals to choose from increase proportionally, so they are more likely to find partners who are more similar in every dimension – and thus more preferable – to them. Consequently, on the aggregate level, an increase in total size leads to more homogeneous pairs in realized one-to-one social relations, even if individual latent preference has not changed.

For a graphic illustration of this argument, see the thought experiment conducted in *Table 1* below. The three chess boards represent three social contexts, and the distance between the chess pieces represent social distance. For simplicity, we assume two dimensional of preference: race and social status, represented by the horizontal and vertical axis respectively, and concern ourselves only with hetero-gender relations. On the chess board, a white chess piece represents a white person, and a black chess piece represents a black person. A square piece is a man, and a circle piece is a woman. Closer pieces are closer in terms of social position. Individuals choose the chess piece that is closest to them on the chess board.

It is worth-noting that from Cases (a) to (c), the ratio of white population to black population is held constant as 2:1. The total size, and thus the absolute group size of whites and blacks, is what actually changes. In Case (a), where only six people make up the total, two inter-racial dyads are formed because none of the blacks and whites in these dyads has better alternatives. In Case (b), three more people join in, and one inter-racial dyad breaks up to form two same-race dyads because both members have closer same-race alternatives. As we move to Case (c), there no inter-racial relations exist because the size of the two racial groups is enough for people to find satisfactory partners within their own race. In short, with the relative percentage held constant, the change in total size causes the proportion of inter-racial dyads to decrease from 2/3 to 1/4, and then shrinks to zero.

Table 1 Graphic Illustration for Size Effect on Proportion of Inter-racial Dyads



Context size		
6	9	12
Number of dyads		
3	4	6
Number of interracial dyads		
2	1	0
Proportion of interracial dyads		
2/3	1/4	0

Data and Method

This study uses data from the in-school survey of the National Longitudinal Study of Adolescent Health (Add Health), a survey on students in 144 schools in 80 U.S. communities between 1994 and 1995.

In this survey, students are asked to list their five best male friends and five best female friends. The attributes of the nominated friends could also be identified and obtained from the school roster. The Add Health dataset also contains a number of contextual variables, including school size, school heterogeneity, school network conditions, and proportion of racial groups.

We operationalize individual preference on the following four dimensions measured in the dataset:

Table 2 Individual Characteristic Variables Used in the Simulation

Variable Short Code	Variable Name	Description
R	Race	Indicators of the dyad members' racial group;
AD	Age Difference	Absolute value of age difference between i and j ;
SD	SES Difference	Absolute value of family socioeconomic status difference between i and j;
GD	GPA difference	Absolute value of GPA difference between i and j;

For the sake of parsimony, we consider only hetero-gender relations. For every individual i, we calculate the probability of nominating the others as "a friend," similarly to the conditional logit model:

$$\mathbf{Pij} = = \frac{\exp(Zij'p+\varepsilon ij)}{\sum_{i=1,j=1}^{i=m,j=n}(Zij'p+\varepsilon ij)}$$

Where $\mathbf{Z_{ij}} = (R_{ij}\ \ AD_{ij}\ \ SD_{ij}\ \ GD_{ij})'$, is the vector of individual characteristics; and $\mathbf{p} = (p_1\ p_2\ p_3\ p_4)'$, is the vector of preference. εij~Normal (0, 1) is a random component of the probability.

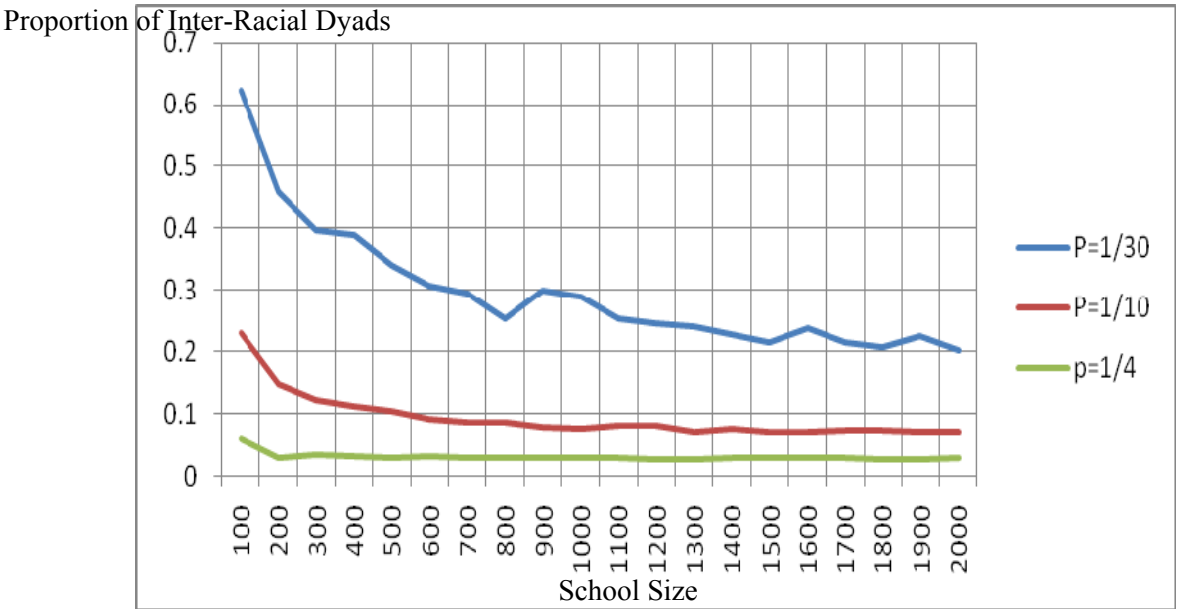
We generate profile data on individuals in a school based on the distribution of variables from the real data set, and then simulate the process of friend-making under the above random probability. By plotting the proportion of inter-racial dyads by school size on a given level of relative group percentage, we will be able to test our primary hypothesis.

Preliminary Results

Following the simulation scheme in the previous part, we are able to generate preliminary simulation results by varying school size from 100 to 2000 students. The sex ratio of all schools is set at 100. We hold the percentage of the minority racial group from 1/30 to 1/10 to ¼ respectively.

Results are demonstrated by the three curves in *Figure 1*. We make two key observations of the curves. First, consistent with previous findings, the larger the percentage of the minority group, the less likely it is that inter-racial dyads are realized. Second, consistent with our hypothesis, all three curves decrease as the school size increases; that is, holding constant the relative size, the larger the total size, the lower the proportion of inter-racial relations among all the realized dyads.

Figure 1 Simulation Results: Proportion of Inter-Racial Dyads by School Size



References

Blau, P.M. and J. E. Schwartz, 1984, *Crosscutting Social Circles.* Orlando: Academic Press.

Jackman, M.R. and M. Crane. 1986, Some of My Best Friends Are Black –Interracial Friendship and White Racial-Attitudes, *Public Opinion Quarterly* 40(4): 459-86

Moody, J. 2001, Race, School Integration, and Friendship Segregation in America, *American Journal of Sociology* 107(3): 679-716

Quillian, Lincoln, and Mary E. Campbell 2003, Beyond Black and White: The Present and Future of Multiracial Friendship Segregation. *American Sociological Review* 68: 540-66

Simmel, Georg, 1955 [1923], *Conflict and the Web of Group Affiliations* , translated and edited by Kurt Wolff, Glencoe, IL: Free Press