sociological science

Social Influence on Observed Race

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Abstract: This article introduces a novel theoretical approach for understanding racial fluidity, emphasizing the social embeddedness of racial classifications. We propose that social ties affect racial perceptions through within-group micromechanisms, resulting in discrepancies between racial self-identifications and race as classified by others. We demonstrate this empirically on data from 12 Hungarian high school classes with one minority group (the Roma) using stochastic actor-oriented models for the analysis of social network panel data. We find strong evidence for social influence: individuals tend to accept their peers' judgement about another student's racial category; opinions of friends have a larger effect than those of nonfriends. Perceived social position also matters: those well-accepted among majority-race peers are likely to be classified as majority students themselves. We argue that similar analyses in other social contexts shall lead to a better understanding of race and interracial processes.

Keywords: race and ethnicity; observed race; social influence; social networks; random-coefficient multilevel SAOMs; sienaBayes

Recently, a growing number of studies has been concerned with racial fluidity, providing evidence that individual race is changeable, contextual, and multidimensional (Telles and Lim 1998; Harris and Sim 2002; Hitlin, Brown, and Elder 2006; Ladányi and Szelényi 2006; Campbell and Troyer 2007; Saperstein and Penner 2012). Focusing on multidimensionality, observed race (one's race as classified by others) and its differences from racial self-classification have received significant attention (see Roth 2016).

Observed race has a crucial sociological relevance by determining how others interact with the individual. In fact, many traditional arguments for how race affects social, political, and economic outcomes (e.g., same-group preference, acts of discrimination) are implicitly based on observed rather than self-identified race. This is easy to overlook if analyses do not recognize the importance of the distinction between self-identified and observed race.

Recent studies find that not only does observed race influence individual outcomes but also the other way around: individuals with higher socioeconomic status (SES) are, on average, classified as "whiter" and those with lower SES as "darker" by others than by themselves (Telles and Lim 1998; Telles 2002; Saperstein 2006). These reverse effects may magnify the discrepancies between self-identified and observed race, and so they are very important to understand and account for when analyzing racial inequalities.

At the same time, experiencing discrepancies between someone's own racial self-classification and her observed race is shown to be related to negative health outcomes (Campbell and Troyer 2007; Stepanikova 2010). Therefore, further study-

Citation: Boda, Zsófia. 2018. "Social Influence on Observed Race." Sociological Science 5: 29-57.

Received: November 4, 2017

Accepted: December 4, 2017

Published: January 18, 2018

Editor(s): Jesper Sørensen, Mario Small

DOI: 10.15195/v5.a3

ing observed race and the way it differs from self-classification is a research topic relevant from multiple aspects.

Studies focusing on the empirical analysis of observed race typically rely on data sets for which not only self-classification but also the interviewer's judgement of the respondent's race was recorded. This variable is then used as a proxy for how the respondent would "normally" be judged by others. Although this approach takes into account the multidimensionality of race, it oversimplifies observed race to a "typical" category pertaining to an individual, and thus it fails to capture that classifications about the same person can also vary between observers. Beyond conceptual concerns of whether or not the "typical" racial category of an individual actually exists, using the classification of the interviewer as a proxy is problematic in itself because the interviewer is a nontypical observer in a nontypical situation.

To overcome these problems, our study proposes a new *relational approach* to understanding observed race: it treats the collection of racial classifications as a network. Each classification is represented by a tie in this network linking two individuals (often referred to as a "dyad"). A network tie expresses how the tie sender classifies the tie receiver. For each dyad, the classification depends on the person whose race is judged, the person who makes the classification, their relationship, and the social context. In terms of social context, a big advantage of the network approach is capturing dependencies between classifications: individuals do not necessarily make independent observations about others' race but can, for example, adopt classifications of others. Using a data set that, to our knowledge, is the first one including individuals' classifications about each other in a community, we are now able to test specific mechanisms to explain how racial memberships are constructed in everyday interactions.

This article proposes two microlevel social mechanisms shaping racial classifications. We focus on school communities, capturing the processes between classmates and (within-class) friends. First, the perceived racial composition of someone's friendship group should affect how this person is classified by others. Because individuals tend to overestimate their friends' similarity to themselves (Morry 2005), they may also consider the race of someone else's friends as a signal of her own race. Therefore, perceiving that a given peer has many friends from a certain racial group should increase the likelihood to classify this peer as a member of that group as well, more than her self-classification would suggest. Second, opinions and perceptions are subject to social influence in communities (e.g., Steglich, Snijders, and West 2006; Huisman 2013). Therefore, we expect that peers, and especially friends, affect each other's perceptions about others' race in the group and tend to agree in their classifications.

Our new microlevel approach is based on applying concepts and techniques from social network analysis. This is extremely useful for our purpose, as it allows a focus on how a given actor observes a given peer in the community and explains this by the characteristics of these two individuals, their relationship, and the network structure they are embedded in. For this, classification of others is understood from the observers' point of view. Examining our first proposed mechanism (that is, the effect of friends' perceived racial composition on observed race), each individual is assumed to rely on her *own* classification about given peer's friends. Similarly, for analyzing the influence of friends, we model how each individual's judgment is affected by the opinion of her *own* friends about the same others. This allows us to take several classifications about the same person into account without unnecessary aggregation of data.

For the analysis, stochastic actor-oriented models (SAOMs) (Snijders 2001; Snijders, van de Bunt, and Steglich 2010; Steglich, Snijders, and Pearson 2010) are utilized. This method has been developed for modeling network dynamics using panel data, and it estimates parameters explaining the formation of social ties and changes in individual characteristics. The approach allows a distinction between the effect of friendship ties on observed race and that of observed race on friendship ties. This, combined with our previous argument about modeling at the microlevel, provides us with more robust results and more reliable conclusions than nonnetwork methods could. Moreover, we use a very recent addition to the stochastic actor-oriented models—that is, random-coefficient multilevel SAOMs. This, similarly to the hierarchical linear model in multilevel analysis, allows us to analyze multiple communities together and estimate global parameters (Koskinen and Snijders 2017; Ripley et al. 2017).

This study proposes a novel relational approach for examining shifts in racial classifications; this can be empirically tested in various different social contexts. Our empirical analysis focuses on a Hungarian example, explaining the formation of ethnic classifications[1] among Hungarian majority and Roma minority students in Hungarian school communities. Although our particular results describe the Hungarian interethnic situation, they are found based on our more general theoretical approach and thus may be also interpreted as indicators of general racial and ethnic tendencies.

Theory

Racial Dimensions and Racial Shifts

The idea that race has multiple aspects in not new, and by now, several aspects have been identified and studied. Following the topology of Roth (2016), racial self-classification is the category (or categories) one publicly identifies with in a given context (e.g., ticks it in a questionnaire), whereas racial identity is a more complex psychological concept, expressing how individuals think of themselves in relation to race. Altogether, racial self-classification and racial identity constitute the private and public side of racial self-identification. At the same time, racial classification by others—or observed race—is the race others believe the individual belongs to. Roth (2016) provides a more detailed overview of these and other dimensions, including previous research on multidimensionality. In our article, we will mostly focus on theories and empirical studies explicitly addressing relationships and discrepancies between racial self-identifications (both identities and self-classifications) and observed race.

Self-identification and observed race are theoretically and empirically related to each other. The long-known concept of the looking-glass self suggests that self and identity develop via interactions with others in society as a context (Cooley 1902;

Yeung and Martin 2003). Studies on reflected appraisals show that indeed, self-identification is strongly influenced by others: people tend to conform to external judgments about their racial membership (Khanna 2004, 2011).

However, there is also evidence for individuals actively trying to manage their observed race. This is often described as "shifting" or "crossing" racial boundaries. Boundaries are results of dialectical processes between individuals and groups in society negotiating where "us" ends and "not us" begins (Barth 1969; Zolberg and Long 1999). They can be bright or blurred, expressing the level of ambiguity in racial memberships (Alba 2005). Boundary shifting is a macrolevel process that occurs when the social status of a whole group changes. This refers to major changes in society. Boundary crossing is a microlevel process, and it means an individual racial shift or assimilation (Zolberg and Long 1999). According to social identity theory (Tajfel and Turner 1979), individual mobility between racial categories can be understood as a valid strategy for members of (perceived) lower-status social groups to enhance their social identity and, therefore, their self-esteem. This means that they dissociate themselves from their original group and attempt joining a more positively perceived one. Changing a racial membership is known as "passing": this refers to individuals from minority groups changing their behavior, appearance, language, accent, or even their name to adopt those of a more advantaged group (Nagel 1995; Ginsberg 1996; Bourgois 2003).

In general, options for individuals' self-identifications are "generally limited to socially and politically defined ethnic categories with varying degrees of stigma or advantage attached to them" (Nagel 1994:156). Whether and to what extent individual mobility is a relevant strategy depends on the cognitive availability of this and of alternative options for the individual, such as engaging in direct competition with the higher-status group. This is strongly influenced by the nature of boundaries (bright or blurred) and the extent and stability of hierarchical differences between the groups (Tajfel and Turner 1979; Alba 2005). Besides, in different social settings, perceptions about who belongs to the same group are related to different dimensions; in other words, not the same attributes (e.g., skin color, language) are salient in different social contexts (Tajfel and Turner 1979). Therefore, individual opportunities can also be limited based on what the salient dimensions are, depending on the attributes of a given individual along these dimensions.

Racial Inconsistencies

Recently, a number of quantitative studies have focused explicitly on inconsistent racial classifications. These studies rely on data from surveys in which not only self-classification but also the interviewer's classification of the respondents' race is recorded.

Self-classifications of race can differ substantially from observers' classifications; however, not all groups are equal subjects of ambiguity. Harris and Sim (2000) show that discrepancies are much more common in the case of American Indians and self-classified mixed-race individuals than in case of those self-classified as white, black, or Asian. Hitlin, Brown, and Elder (2007) focus on the analysis of self-identified Hispanic groups and argue that they are also difficult to classify for others, especially when answer options in a survey are limited to traditional racial categories (white, black, Asian, American Indian). Difficulties for classifying self-classified Hispanic individuals were also reported by Roth (2012).

In a Brazilian context, Telles and Lim (1998) and Telles (2002) find that people are more likely to be classified as "whiter" or "darker" than their self-classification if their socioeconomic status is higher or lower, respectively; though the effect varies by respondent characteristics and neighborhood. In a U.S. setting, Saperstein (2006) finds that discrepancies between self-classified and observed race are in relation to income; moreover, Saperstein and Penner (2012) show that changes in both racial aspects are associated with respective changes in socioeconomic status. They also find relationships between others' classification and previous or later arrests and/or incarceration (Saperstein and Penner 2010; Penner and Saperstein 2015).

Apart from socioeconomic characteristics, a link between inconsistent categorization and health has also been discovered: Campbell and Troyer (2007) show evidence that self-classified American Indians experience high rates of psychological distress when classified as a member of another category by the observer. Finally, Stepanikova (2010) finds that being classified as a lower-status racial group by others is associated with negative physical and mental outcomes. This last study is different from the other ones in an important way: here, perceived misclassification was measured—namely, the respondents were asked how their race was "routinely classified" by others.

This body of evidence highlights that discrepancies between self-classifications and observed race exist and are related to important sociological and psychological outcomes. However, because of the lack of appropriate data and analytical approach, empirical studies so far have relied on the interviewer's classification as a proxy for the "typical" classification by others. This is problematic in two major ways. First, others' racial classifications about a person vary. Therefore, trying to find one category expressing how someone is typically classified by others is conceptually questionable. Second, this variance is systematic based on, among other things, observer characteristics (Harris 2002; Herman 2010; Feliciano 2016). Therefore, even when relying on only one person's classification as a proxy for one's observed race, using the interviewer's judgement can be problematic. The group of interviewers who worked on collecting a given data set is representative neither of society as a whole nor of any sociologically meaningful context for the individuals. Interviewers are typically white females with high levels of education (Telles 2002; Saperstein and Penner 2012) who observe a nonstandard slice of the individual's life (for some data sets, some interviews were even conducted via telephone). For these reasons, it is difficult to fully assess validity of earlier results on observed race.

Given these problems, our article proposes a new *relational approach* to understanding racial classifications: classification in a certain dyad is explained by characteristics of the individual making the classification, the individual whose race is classified, their relationship, and the social context the dyad is embedded in. We also focus on a context subjectively meaningful to the individual: high school students and their classmates.

In this article, we focus on discrepancies between self-classified and observed race. It is not expected that these aspects are independent of each other, and in many cases, they will coincide. Therefore, processes presented in this article are proposed as *extra* effects on top of this expected relationship between self-classified and observed race. This can give us explanations for the cases when these two aspects of race are different. Therefore, we start with an initial baseline hypothesis (H/baseline) that

> H/baseline: *Individuals will tend to agree with others' self-classifications.*

We argue that when actors are embedded in groups, racial classifications cannot be fully explained by external characteristics, but they are also results of different endogenous social micromechanisms. To understand the nature of these processes, it is essential to take social networks into account. In the next sections, we briefly summarize the most relevant theories and empirical findings related to the relationship between race and social ties, processes behind racial categorization, and different social influence effects, mainly from the fields of social psychology and social network analysis.

Friendship Context

Social identity theory (Tajfel and Turner 1979) suggests that individuals tend to prefer members of their perceived ingroups (that is, others similar to them along relevant social categories such as race). Indeed, empirical studies confirm that friendships and other close relationships tend to form based on racial homophily (McPherson, Smith-Lovin, and Cook 2001). In a school context, several studies find that students from similar racial backgrounds are more likely to befriend each other (e.g., Moody 2001; Block and Grund 2014; Leszczensky and Pink 2015; Smith et al. 2016). Boda and Néray (2015) also show that classifications of each other are more important for social ties than self-classifications: individuals choose friends based on how they classify each other, not how others classify themselves.

We expect that in addition to the effect of race (and most importantly, racial classifications) on friendships, friendships also influence how race is classified. This is because individuals classify others' race partly based on contextual, social, and interactional cues (Roth 2016). The attraction–similarity hypothesis (Morry 2005) suggests that people often perceive their friends as similar to themselves. Generalizing this, people could also assume that those attracted to each other must be similar to one another (even more than their actual level of similarity). Thus, the race of someone's friends can be used as a social cue for classifying this person.

Indeed, Khanna (2004) and Khanna and Johnson (2010) report that individuals with an ambiguous visual appearance often strategically choose friends from racial groups they want to be perceived as members of, which means that they expect such an effect. Portes and Sensenbrenner (1993) also argue that dropping social ties with individuals from someone's original racial group and building new relationships with majority-race others can contribute to successfully passing as a majority-race person.

Choosing certain friends thus can be interpreted as a racial signal, and those perceiving someone's relationship structures will use this information for classifying her. This means that individuals having more friends who are classified (by a certain peer) to belong to a certain racial group will be more likely to be also classified as members of that group (by the same peer). Therefore, we hypothesize that

> Hypothesis 1 (H/1): *An individual will tend to classify others as members of a racial group if these others have more friends whom the individual also classifies as members of that group.*

Using the basic case of two groups, this suggests that others will be more likely to classify individuals as minority members if they perceive that these individuals have more minority-group friends, and others will be more likely to classify individuals with more majority-group friends as majority members—which means such individuals will be *less* likely to be classified as a minority member (because for this example, we use only these two categories). The number of someone's friends can be defined either based on those naming her as a friend (her popularity) or based on those she names as friends (her friendship activity). We expect that someone's popularity and activity will be highly correlated, as friendships tend to be mutual, but we consider both because they can be slightly different signals of friendships. Therefore, H/1 has four predictions: those someone perceives as more popular among minority members will be *more likely* to be classified as minorities by this person (hypothesis 1a [H/1a]), those someone perceives as more active towards minority members will be *more likely* to be classified as minorities by this person (hypothesis 1b [H/1b]), those someone perceives as more popular among majority members will be *less likely* to be classified as minorities by this person (hypothesis 1c [H/1c]), and those someone perceives as more active towards majority members will be *less likely* to be classified as minorities by this person (hypothesis 1d [H/1d]).

General Peer Influence and Friendship Influence

Social networks have essential roles in the diffusion of opinions, attitudes, and tastes in communities (e.g., Steglich et al. 2006; Huisman 2013). Social interactions are generally embedded in different social groups, providing direct and indirect opportunities for the actors to affect each other in several ways. In closed and relatively small communities, it is reasonable to expect that to some extent, everyone has the chance to affect others. In this case, we could expect that peers in the same group somewhat adopt each other's opinions on who belongs to which racial group. In other words, we should see a Matthew effect (Merton 1968) in racial classifications. This effect generally refers to the phenomenon of "the rich get richer while the poor get poorer" along many dimensions; in this case it refers to the general polarization of classifications in the community.

However, not all peers are equally relevant in this matter, and the main sources of social influence are those subjectively meaningful to the individual, such as their close friends (Lomi et al. 2011). Sociological and psychological studies, therefore, typically tend to focus on actual relationships, mostly friendships within the communities, when analyzing peer influence.

In schools, students have been found to influence each other's deviant behavior, aggression, or academic achievement (Wentzel, Barry, and Caldwell 2004; Steglich et al. 2006; Sijtsema et al. 2010; Lomi et al. 2011; Light et al. 2013). Moreover (without suggesting causal inference), general prejudice against minorities is also found to be shared with friends in classrooms (Váradi 2014). There are also a few articles that go beyond correlating prejudice and friendship and test for selection and influence processes on intergroup attitudes. van Zalk and his colleagues (2013) show that friends' tolerance predicts increases in one's own tolerance, whereas friends' xenophobia predicts increases in one's own xenophobia. Stark (2015) finds that prejudiced majority-group members form fewer intergroup friendships than less prejudiced ones by avoiding having friends who already formed friendships with minority peers and thus could introduce them to potential minority-group friends.

Given the evidence about students' capability of affecting each other's attitudes about other racial groups, they may be expected to affect each other's opinions on their peers' race as well. Based on this argument, the second hypothesis refers to the social influence of classmates in general:

> Hypothesis 2 (H/2): *Classroom members will tend to agree in their classifications;*

this means that the more peers classify someone as a minority member, the more likely that others will do so as well. Finally, the last hypothesis predicts an additional friendship effect:

> Hypothesis 3 (H/3): *Friends will tend to agree in their classifications even more strongly than other classroom members.*

Context, Data, and Measurements

Context

This article uses a Hungarian data set on high school students with two ethnic groups: the Roma minority and the non-Roma Hungarian majority. In Hungary, the Roma group is the only large minority group with a proportion of 5 to 6 percent in the total population and 10 to 12 percent among adolescents (Kertesi and Kézdi 2011). Since the fall of the communist system, the unemployment rate among Roma workers has become very high, with a 40-percentage-point difference from the Hungarian majority (Janky 2006; Kézdi and Kertesi 2011).

Differences in educational outcomes are large: academic test score gaps are similar to those between African American and white students in the United States in the 1980s (Kézdi and Kertesi 2011). Mostly in consequence of long-term poverty among the Roma population, the dropout rate after eighth grade (the end of primary school) is high (Kertesi and Kézdi 2005). Moreover, although a large proportion of non-Roma Hungarians graduate from high school and half of them continue their studies for a college degree, the vast majority of the Hungarian Roma leave the schooling system without completing secondary education and only a negligible proportion go to college (Kertesi and Kézdi 2006). In Hungarian society, including high school communities, there is strong prejudice against Roma people (Kertesi and Kézdi 2011; Váradi 2014). In spite of the high level of prejudice, it is not always easy to decide for an external observer in Hungary who is Roma and who is not—even though stereotypes are often related to visual appearance of Roma people, and there are family names more common amongst Roma families, there are no unambiguous cues to distinguish between Roma and non-Roma people. Most Roma people in Hungary (including those in our sample) speak Hungarian as a first language. There is evidence that Roma students in Hungary change their self-identification over time relative to their socioeconomic status (Simonovits and Kézdi 2014).

Data

For the analysis, we use a panel sample collected in Hungary among high school students.[2] The four-wave survey was started in 2010 and ended in 2013. It covers 44 classes from 7 schools, including schools in the capital, a major town, and two medium-sized towns (N = 1,439). The sample contains classes from the three different training programs of secondary education in Hungary.[3]

Roma students are not distributed equally among classes in the sample: they are mostly clustered into a few classrooms with, on average, more vocationally oriented training programs. For the current analysis, we restricted the sample to 12 classrooms with (1) at least 10 percent but not more than 90 percent of self-declared Roma students and (2) not more than 25 percent of missing cases in the social network data (more than 25 percent would make our results unreliable). Although excluding classes with high missing rates can induce some bias in the analysis, classes excluded this way do not seem to be significantly different from classes in the remaining subsample based on aggregated background variables.

For this analysis, the first two waves of the whole sample are used. The first wave was collected a month after the students started high school together. The second wave was collected six months later, so the students had already spent seven months together by then, allowing friendships to emerge.[4]

Measurements

Friendship. The direction and intensity of emotional relationships is measured on a scale; students were asked to judge each of their classmates along a five-point scale: "–2" for "I hate him/her, he/she is my enemy"; "–1" for "I do not like him/her"; "0" for "He/she is neutral for me"; "+1" for "I like him/her"; and "+2" for "He/she is my friend." For friendships, the positive end of the scale ("+2," "He/she is my friend") was used. The average density (the number of existing ties compared to the number of potential ties when everyone is tied together with everyone else) is 0.20 in the first wave and 0.19 in the second wave for the friendship networks (standard deviation $[\text{s.d.}]_1$ = 0.02, s.d._2 = 0.03). This suggests that the number of friendship ties did not change a lot between the waves, and classes are quite similar in the proportion of friendships. The Jaccard index measures the stability of ties, comparing the number of ties that exist in both data waves to the number of ties existing in at least one of the data waves; Jaccard indices in this data set have an average value of 0.34 (s.d. = 0.05). This value is excellent for dynamic network analyses (Ripley et al. 2017:19–20). There are missing cases in both waves—an average 5 percent in the first wave and 14 percent in the second wave. This difference in the missing proportion should not mean too much bias because the valid data seem quite similar across observations along dimensions important for this study.

Roma classification. Observed race was measured as a network using the method of network rosters. This means that all students had to nominate their classmates whom they considered Roma by putting an "X" at their columns in the roster. This resulted in a network with an average density of 0.15 in the first wave and 0.21 in the second wave (s.d.$_1$ = 0.13, s.d.$_2$ = 0.2). These values suggest that in the second wave, students classified more others as Roma than in the first wave; also, there is a big difference between classes in the number of Roma classifications in both waves. In spite of the change, ties are still relatively stable: the average Jaccard index is 0.36 (s.d. = 0.14). This means that although the number of Roma nominations increased by the second wave, Roma classification ties that had already existed were unlikely to disappear. The proportion of missing values was an average 6 percent in the first data wave and 10 percent in the second data wave.

Roma self-classification. Ethnic self-classification was measured using four different categories: "Hungarian," "Roma," "Hungarian and Roma," and "Other." For the analysis, we created two groups: *Roma minority* (from "Roma" and "Hungarian and Roma") and *non-Roma majority* (from "Hungarian" and "Other").

Even though theoretically, racial self-classifications are also changeable, in this analysis, they are only used as an explanatory variable, treated as fixed over time. This is because during the analyzed time interval, only very few changes happened in self-classifications, not providing enough information to analyze them with dynamic network models. This means that self-classifications in the first point of time are predictors of classifications observed later.

For handling missing cases, we consider Roma those students who did not specify their ethnicity in the first data wave but (1) gave a valid answer to the question "If you consider yourself a Roma, which Roma subgroup do you belong to?" or (2) considered themselves Roma in the second or third data wave *and* never considered themselves non-Roma. After this, the remaining proportion of missing cases on self-classifications is 2 percent.

The subsample consists of 255 self-declared non-Roma (71 percent) and 102 self-declared Roma students (27 percent), with 8.5 self-declared Roma students per classroom on average. Similarly to Roma classifications, there are relatively big differences between classes (s.d. = 0.19, minimum = 11 percent, maximum = 74 percent).

Socioeconomic status. When analyzing context and social influence effects on observed race, it is important to control for socioeconomic status, as social background is strongly related to racial and ethnic classifications (Telles and Lim 1998; Saperstein and Penner 2012; in the case of Hungary, see Kertesi and Kézdi [2011]). For this purpose, a principal component was created from the father's education level and cultural assets that are in the students' personal use at home (a desk, a place to study without being disturbed, a computer that can be used for school assignments, Internet, a calculator, literature books, books to help preparing for school). We created this variable to be able to take several aspects of SES into account without having to add too many variables into our (already quite complex) model. Score distributions in each individual classroom can be found in the online supplement (Appendix C).

Gender. Gender is the most important factor of friendship formation among children and adolescents (McPherson et al. 2001); therefore, it is also used as a control variable in the friendship networks. Thirty-eight percent of the students are male and 62 percent of them are female; this includes one only-female class.

Method and Models

Stochastic Actor-Oriented Models

Results are obtained using SAOMs (Snijders 2001; Snijders 2005; Snijders et al. 2010) that have been developed for modeling network dynamics of panel data and for estimating parameters for the effect of selection and influence processes, depending on, among other factors, characteristics of individuals and dyads in the network. In SAOMs, network change is represented as a sequence of many small changes, like in an agent-based simulation model. In each step, one randomly selected actor has the chance to create or terminate an outgoing tie. The first wave of data serves as a starting point, and every later data wave is modeled based on the previous network state observed. SAOMs also model the simultaneous *coevolution of multiplex networks* (Snijders, Lomi, and Torló 2013), in which the two (or more) networks change in alternate steps.

Practically, network evolution modeled with SAOMs can be understood as the result of individual actors' "choices" about their ties towards other actors in the network: they can create new ties and maintain or terminate existing ones. These decisions are made based on different explanatory variables related to characteristics of the decision-making actor called *Ego*; those of the actor to whom *Ego* considers creating, maintaining, or terminating a tie, called *Alter*; and network structure dependencies. It is assumed that *Ego* has complete information about the ties in the network. In coevolution models, each network is modeled using a separate set of explanatory variables, including variables based on the other network. Therefore, it is possible to estimate cross-network dependencies.

The parameter interpretation is similar to that of logistic regression models; parameter values refer to the conditional probabilities of a tie to exist (being created *or* maintained) as a function of the explanatory variables. At the end of the simulation process, parameters are estimated based on comparing the characteristics of the observed networks to the simulated networks.

This article proposes a new approach for analyzing racial classifications and friendship ties together by treating both as networks: in the friendship network, a tie from *Ego* to *Alter* is sent if *Ego* names *Alter* as a friend, whereas in the race network, a tie from *Ego* to *Alter* is sent if *Ego* classifies *Alter* as a minority member. By estimating a dynamic coevolution model of multiplex networks, minority classification ties and friendship ties are modeled together over time, allowing us to distinguish between friendship ties affecting racial classifications and racial classifications affecting friendships.

Effects

In SAOMs, it is necessary to specify the exact ways in which network structure or attributes affect tie evolution (Ripley et al. 2017). For instance, (self-classified) *race* can affect in several ways whether a social tie between *Ego* and *Alter* will be present or not, such as *race of Ego* (modeling whether members of a racial group send more or less ties in general), the *race of Alter* (modeling whether members of a racial group receive more or less ties in general), or the interaction of the two (together with the main effects, modeling whether same-race nominations are more likely than cross-race nominations). These configurations are called *effects* and serve as explanatory variables in the analysis. In the explanations below, we include formulae for each effect we use (Ripley et al. 2017).

A SAOM model specification should be such that a good fit with the observed data can be obtained and that hypotheses can be represented by parameters in the model. Technically, SAOMs always include effects referring to different relevant network configurations (like actors' tendency to reciprocate friendship ties or make friends with friends of friends) in order to take network dependencies into account. Usually, attribute-based effects, called covariates, are also included as exogenous independent variables (e.g., race of *Ego,* race of *Alter*, and interaction effects). Structural and covariate effects can be interacted with each other. In coevolution models, various mixed structural effects may also be specified, which consist of ties from both networks (e.g., the tendency for "reciprocating" a friendship nomination tie with a minority classification tie).

Random-Coefficient Multilevel SAOMs

In this article, data from twelve school classes are analyzed. Our goal is to get global estimates for the whole sample, taking into account that it consists of different subgroups. One option would be to analyze individual classrooms separately and then combine the results in a meta-analysis (Snijders and Baerveldt 2003), but our classroom-level subsamples are too small for the complicated coevolution models to converge for all groups, and they do not have enough statistical power to produce significant results. To solve this problem, we conduct a random-coefficient multilevel SAOM analysis, which is a very new addition to the method (Koskinen and Snijders 2017; Ripley et al. 2017). In these models, group-wise and global (combined) parameters are estimated simultaneously; therefore, there is enough power in the data to produce meaningful results even with small classrooms, but it is not assumed that all parameters are the same for all groups. This is analogous to the hierarchical linear model of multilevel analysis (Raudenbush and Bryk 1985; Snijders and Bosker 1999). In these models, parameters can be set to randomly vary between groups according to a multivariate normal distribution or to be constant across groups (Koskinen and Snijders 2017). The analysis is based on a Bayesian estimation method.

Model

For our analysis, we need to operationalize our hypotheses in SAOM terms and "translate" them to SAOM configurations. The effect of these exact configurations will be tested on the dependent variable—that is, the probability of *Ego* classifying *Alter* as a minority member (1 is minority, 0 if majority).[5] For these configurations, others' minority nominations (1 if minority, 0 if majority in all cases), minority self-classifications (1 if minority, 0 if majority), and friendship nominations (1 if *Ego* nominates *Alter* as a friend, 0 otherwise) are taken into account. Table 1 lists, illustrates, and explains the configurations tested in the model. Black ties stand for minority nominations, white ties for majority nominations, and dashed ties for friendship nominations. Black nodes are self-classified minority students, white nodes are self-classified majority ones; the race of white nodes is not specified, and they can be either minority or majority members. For example, the table starts with H/baseline, where we test whether in cases in which *Alter* is a self-classified minority member (therefore, *Alter*'s node is black in the table), it will be more likely that *Ego* classifies *Alter* as a minority member, compared to the reference category (that is, *Alter* is a majority member). Here, *Ego*'s classification is irrelevant; she can self-classify with either minority or majority group (therefore, *Ego*'s node is white in the table).

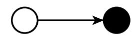
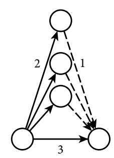
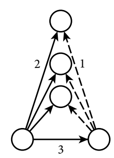
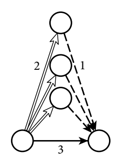
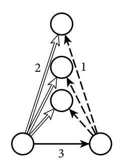
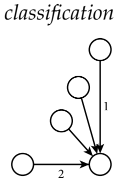
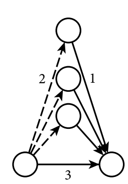
Table 1 illustrates the configurations that capture our hypotheses in social networks terms. Because not all of these configurations can be expressed by one SAOM effect each, we present more information in the online supplement (Appendix A) on how exactly these configurations are calculated, with visual illustrations and the mathematical formulation of the combinations of SAOM effects used.

Other Variables

Besides these main explanatory variables, many others are also necessary for a correct model. Most importantly, whereas minority classifications are modeled based on configurations also including friendship ties, friendship networks are simultaneously modeled based on configurations also including minority classifications. This way, it can be separated whether friendships affect racial classifications (e.g., I, as a minority member, will classify the friends I already have as minority members) or racial classifications affect friendships (e.g., I, as a minority member, will befriend others I already classify as minority members). In order to model friendships properly, structural effects based on findings of earlier studies are also included (Steglich et al. 2010). For modelled SAOM configurations, it is also essential to model all subconfigurations to be able to control for alternative explanations. The collection of all effects for both parts of the model can be found in the online supplement (Appendix B).

There are two kinds of attribute effects in the model that are important to mention here. First, gender effects are explanatory variables for the friendship networks, as gender is considered the most important factor of friendship segregation during adolescence (McPherson et al. 2001). Second, because of the strong relationship between social background and ethnicity, many SES effects are also included to

Table 1: Configurations tested in the model.

Configuration	Illustration	Prediction	Expected β
H/baseline: Individuals will tend to agree with others' self-classifications			
***Alter* self-classified minority**	 *Ego* *Alter*	Ego will be more likely to classify *Alter* as a minority	$\beta_{H/baseline} = +$
H/1: An individual will tend to classify others as members of a racial group if these others have more friends whom the individual also classifies as members of that group			
***Alter's* popularity among those *Ego* classifies as minorities:** (1) The number of friendship ties *Alter* receives (2) from those classified as minorities by *Ego*	 *Ego* *Alter*	(3) *Ego* will be more likely to classify *Alter* as a minority	$\beta_{H/1a} = +$
***Alter's* activity towards those *Ego* classifies as minorities:** (1) The number of friendship ties *Alter* sends (2) towards those classified as minorities by *Ego*	 *Ego* *Alter*	(3) *Ego* will be more likely to classify *Alter* as a minority	$\beta_{H/1b} = +$
***Alter's* popularity among those *Ego* classifies as majorities:** (1) The number of friendship ties *Alter* receives (2) from those classified as majorities by *Ego*	 *Ego* *Alter*	(3) *Ego* will be less likely to classify *Alter* as a minority	$\beta_{H/1c} = -$
***Alter's* activity towards those *Ego* classifies as majorities:** (1) The number of friendship ties *Alter* sends (2) towards those classified as majorities by *Ego*	 *Ego* *Alter*	(3) *Ego* will be less likely to classify *Alter* as a minority	$\beta_{H/1d} = -$
H/2: Classroom members will tend to agree in their classification			
Peer influence (1) The number of others classifying *Alter* as a minority	 *Ego* *Alter*	(2) *Ego* will be more likely to classify *Alter* as a minority	$\beta_{H/1a} = +$
H/3: Friends will tend to agree in their classifications even more strongly than other classroom members			
Friend influence (1) The number of others classifying *Alter* as a minority by (2) who are named as friends by *Ego*	 *Ego* *Alter*	(3) *Ego* will be more likely to classify *Alter* as a minority	$\beta_{H/1d} = -$

Solid black arrow: minority classification; white arrow: majority classification; dashed black arrow: friendship tie; black node: self-classified minority actor; white node: any actor.

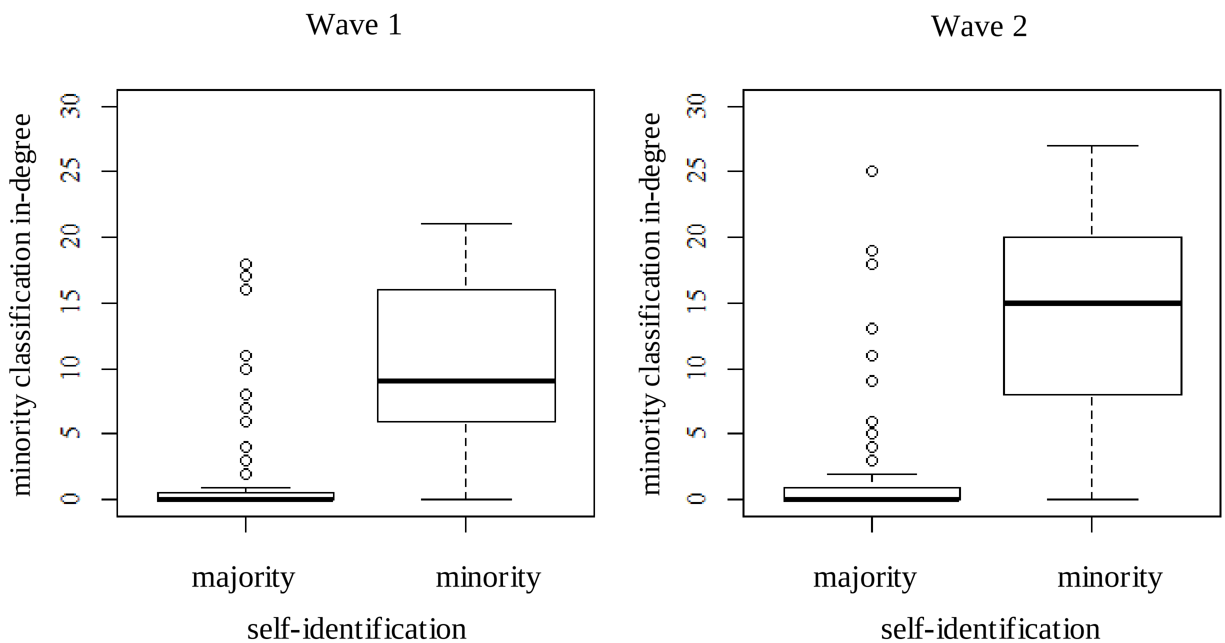


Figure 1: Minority self-identifications and the number of incoming minority classifications received in wave 1 and wave 2.

control for minority self-classification effects: for each configuration that includes a self-classification, the equivalent one with SES also enters the model.

Software

For the current analysis, random-coefficient multilevel stochastic actor-oriented models are estimated. This is done in R by the package RSienaTest.[6] The version used for this analysis is RSienaTest 1.1-284.

Results

Descriptive Results

First, we present some descriptive characteristics of our sample. In the main text, we only include the ones that are directly interesting for our hypotheses; more general descriptive statistics can be found in the online supplement (Appendix C).

Our baseline hypothesis states that minority self-classifications and classifications by others are not independent: those who self-classify as minority members will be more likely to be classified this way. Figure 1 illustrates the relationship between minority self-classification and students' in-degrees in the observed race networks (that is, how many others classify someone as a minority peer).

Both boxes suggest that self-classified minority students are classified much more often as minority peers by others than self-classified majority students at both

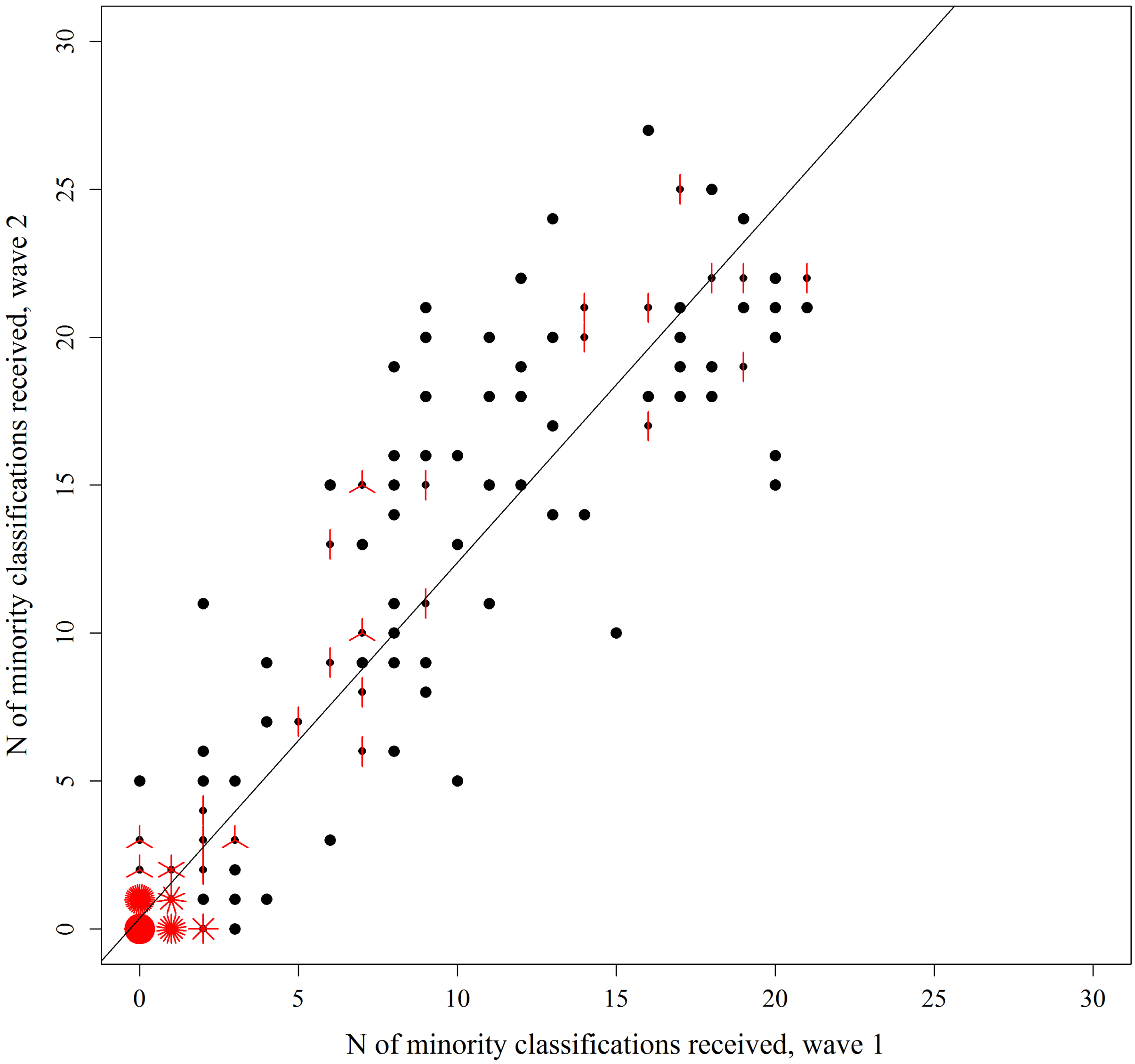


Figure 2: Number of students' incoming minority classifications in wave 1 and wave 2.

points of time (*N* of students in classrooms is between 20 and 30). Furthermore, the sunflower plot in Figure 2 demonstrates that minority classification in-degrees are also related to each other over time: those nominated more at the first observation (axis X) are also nominated more at the second observation (axis Y). "Leaves of the sunflower" (lines around the circles) indicate how many times each point appears in our sample. We can see that a big proportion of students appear at and around

(0, 0); therefore, many students were nominated as minority members by (nearly) no peers both times.

SAOM Results

Details of the procedure can be found in the online supplement (Appendix D). The original table of results, together with the friendship evolution, is presented as part of the online supplement as well (Appendix E). There, we also provide more information on our results, with estimates, standard errors, credible intervals, and whether the parameter was fixed or randomly varying. In this section, we only focus on results directly relevant for our hypotheses. The estimates presented in Table 2 should be interpreted as similar to log odds ratios in logistic regression models.

First, H/baseline states that individuals will be likely to accept their peers' self-classifications. This is expressed by the *Alter* self-classified minority member effect. Table 2 shows that its value is $\beta_{H/baseline}$= 0.86, and it is highly significant. Therefore, we find evidence for this baseline hypothesis: self-classifications and others' classifications are related.

For the first hypothesis, four predictions are tested on how *Alter*'s popularity among and activity towards minority and majority members affect *Ego*'s classifications about *Alter*. As Table 2 shows in the Prediction column, we assume that respective popularity and activity effects point to the same direction. This is because both popularity in and activity towards a group are signals of friendships with members of the given group for the observer.

In terms of popularity effects, results meet our expectations. As predicted by H/1a, those seen as popular among minority students by *Ego* will be more likely to be classified as minority members by *Ego* as well (note again that this is after controlling for their self-classification). The parameter value is $\beta_{H/1a}$= 0.39 ($p <$ 0.001), which should be understood as the added effect of every additional minority member naming *Alter* as a friend. Similarly, as predicted by H/1c, the more popular someone is amongst those classified as majority members by *Ego*, the less likely it is that *Ego* will classify her as a minority member ($\beta_{H/1c}$= –0.08, $p < 0.001$). Altogether, we could say that people tend to classify others into groups they seem to be popular in.

However, for activity, the results are quite different. First, we do not find evidence for H/1b because *Alter*'s friendship activity towards minority peers does not seem to significantly affect how she is classified by others. Second, in the case of H/1d, we find evidence for the *opposite* of our predictions. Despite what we expected, nominating more majority peers as friends, in fact, makes it significantly *more* likely that someone will be classified as a minority peer by others ($\beta_{H/1d}$ = 0.04, $p < 0.01$).

To better understand these surprising results, we should keep in mind that we estimate these parameters in the same model, therefore controlling for each other. Hence, these parameters should be interpreted together. Nominating more majority peers as friends in itself decreases the likelihood that someone is classified as a majority member, but for instance, having a *mutual* friendship with a majority

Table 2: SAOM results.

Hypothesis	Configuration tested	Prediction	Estimate (standard error)	Credible interval From	To
H/baseline	*Alter* self-classified minority	+	0.86* (0.10)	0.66	1.06
H/1a	*Alter*'s popularity among those *Ego* classifies as minorities	+	0.39* (0.09)	0.22	0.58
H/1b	*Alter*'s activity towards those *Ego* classifies as minorities	+	−0.04 (0.07)	−0.18	0.09
H/1c	*Alter*'s popularity among those *Ego* classifies as majorities	-	−0.08* (0.03)	−0.14	−0.03
H/1d	*Alter*'s activity towards those *Ego* classifies as majorities	-	0.04* (0.02)	0.01	0.07
H/2	Peer influence	+	0.13* (0.01)	0.11	0.15
H/3	Friendship influence	+	0.18* (0.04)	0.11	0.26

The estimates presented are log odds ratios; $^*p < 0.01$.

friend (which counts as both an outgoing and an incoming friendship tie), in total, still increases it ($\beta_{H/1c} + \beta_{H/1d} = 0.04$).

Based on our results for H/1c and H/1d, we created the heatmap (Figure 3) to illustrate how the combination of incoming and outgoing friendship ties with majority students (x axis and y axis, respectively) affects observed race. Black and red colors mean high conditional log odds for majority and minority classifications by others, respectively; the red line demonstrates conditional odds ratios of 1 (that is, equal additional probabilities for minority and majority nominations). The black 45° line shows the cases when individuals send and receive an equal number of friendship nominations to and from majority peers.

Based on the figure, we can distinguish between different types of social positions based on incoming and outgoing friendship ties with majority peers. First, those perceived to have balanced social positions in the majority group (a similar number of incoming and outgoing ties) are relatively likely to be classified as majority members (see the 45° black line in Figure 3). Of these individuals, the ones with more friends are even more likely to be classified into the majority group (as we go towards the right-top from the left-bottom along the 45° line in Figure 1, values move farther apart from the red line).

Second, students perceived as more popular than active in the majority group (above the 45° line) are even more likely to be classified as majority members. This group includes those who are very important members of the community (the so-called "popular students"), have a high number of others naming them as friends, and often themselves name fewer peers. Both the number of friendship

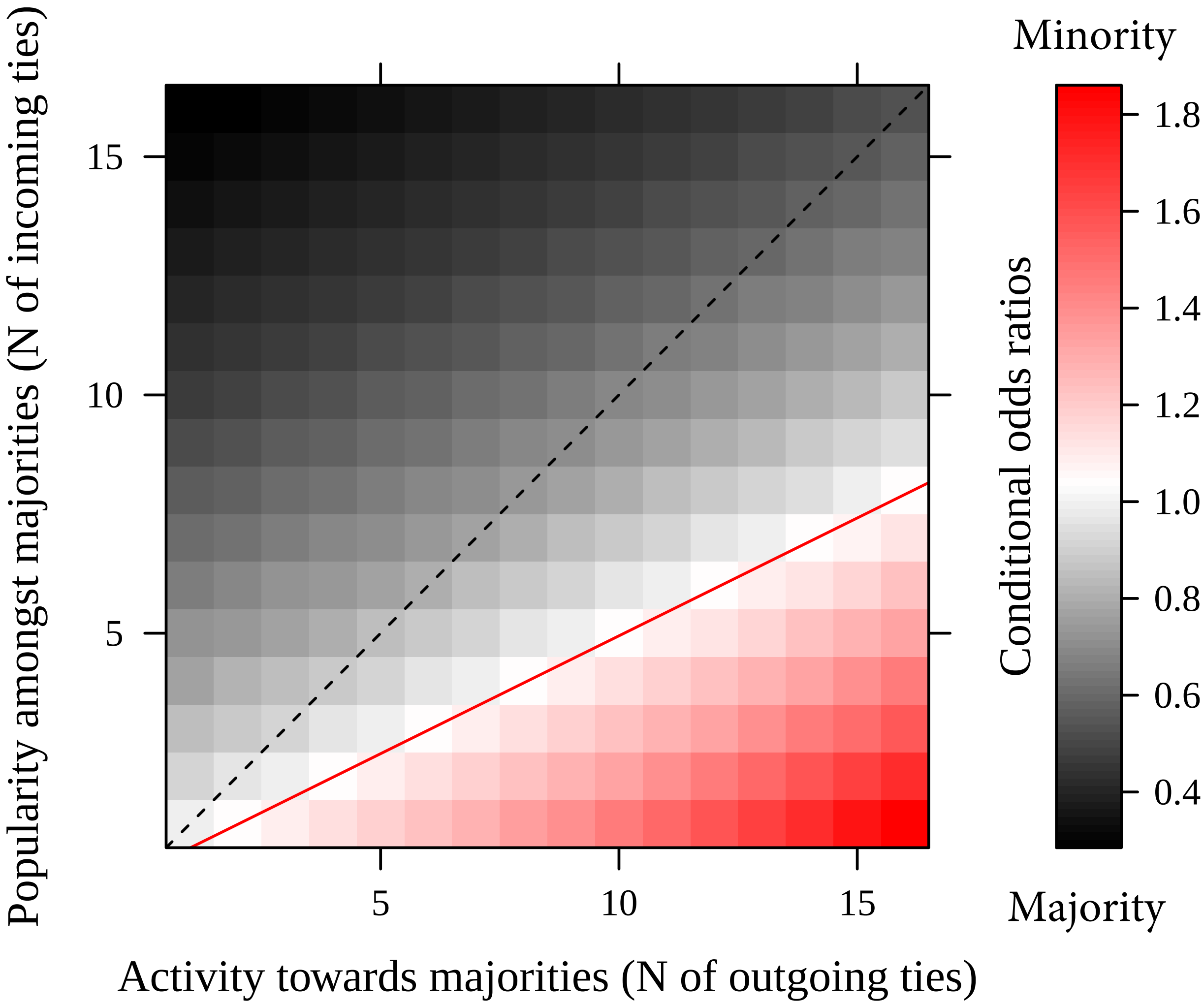


Figure 3: Classifications based on popularity amongst and activity towards majority peers.

ties received and the relative lack of ties sent increase the conditional odds that someone is perceived as a majority student.

Finally, those who choose majority students as friends but are chosen by them much less often are likely to be seen as minority members by others (see those under the red line). Naming more people as friends (those who are "trying too hard") or having a larger difference between ties sent and received further increase this likelihood.

These results can imply hierarchical relationships between the majority and the minority groups in these communities and give us some indications about different social positions related to racial classifications. To extend our previous observations, we can now say that people indeed classify others into groups they seem to be popular in; however, making too much (unreciprocated) effort to befriend members of a given group, especially a higher-status group, could be understood as a signal that someone does not actually belong to that group.

It seems that there are two distinct hierarchies in our communities: the majority and the minority ones. As demonstrated before, students who are popular in the *minority-group hierarchy* are likely to be seen as minority members themselves; those peripheral in the *majority-group hierarchy* but seem to make efforts to belong there are also more likely to be classified as minority members. This paints quite an interesting picture about how students think about interracial relations in the community.

For social influence effects, we find positive and strongly significant parameters ($p < 0.001$), as predicted: $\beta_{H/2} = 0.13$ for the general peer effect, and $\beta_{H/3} = 0.18$ for friend influence. This is strong evidence for both H/2 and H/3: peers tend to agree in their classifications with others, and this is even stronger for friends.

It is also important to note that none of the SES variables are significant in the model (see Appendix E in the online supplement), suggesting that social background is not responsible for the processes in focus. However, the sample examined here is quite homogeneous in social background: these students mostly belong to lower social classes. This is a consequence of the subsample selection criteria: because of the disadvantaged position of Roma people in Hungary, school classes including at least 10 percent minority students attract lower-class (minority or majority) students located in lower-class neighborhoods and are mostly the ones offering lower-status training programs.

Discussion

This article investigates social effects on observed race and identifies micromechanisms influencing one's classifications of others' race. Explaining the formation and fluidity of racial classifications is essential because these play an even more important role in how people relate to each other than self-classifications. Various previous examples imply that in cases of individual mobility, observed race is also the key: the new group membership chosen by the individual has to be accepted by others (e.g., Portes and Sensenbrenner 1993; Bourgois 2003).

Previous quantitative research focusing on observed race has so far relied on the classification of the survey interviewer about the respondent. This assumes that there is a typical category one is classified into and that the judgement of the interviewer is a good proxy for this. We instead suggest that racial classification is a relational concept, and therefore it varies along observers and should be best understood based on characteristics of the observer, of the observed one, their relationship, and the social context. We argue that these shifts cannot be fully explained by external characteristics of the individuals; they are also shaped by endogenous processes within groups. Moreover, we focus on the classification of socially important others: adolescents' peers in the classroom.

The article identified two main groups of microlevel mechanisms shaping racial classifications. First, we expected people to assume that friends are more similar to each other than their "actual" level of similarity (based on their self-classifications). Therefore, the more friends one perceives a given peer has from a certain racial group, the more likely that she will classify this person as a member of that group as well. Results show that the situation is more complex, and the combination of popularity and activity has a crucial role in how someone is classified by an other. The minority group seems to be perceived as a homogeneous social group; everyone who appears to be well liked by minority members will be likely to be classified as a minority peer as well. This is while controlling for individuals' tendency to make friends with each other based on their (self-classified and observed) race and for the tendency that those who self-classify as minority members will be more likely to be classified this way by others. Therefore, it seems that students generally do not assume that majority peers would appear in the center of the minority hierarchy. This is consistent with social identity theory, which suggests that it is the members of the lower-status group who try to join other social groups, although this makes less sense for members of the higher-status group.

At the same time, the majority-group hierarchy is perceived as more heterogeneous: those with well-balanced social positions are classified as majority members, even those who are somewhat less popular than active; the very popular students are classified as majority members even more strongly; and those perceived to make efforts to belong to the majority group but who mostly fail (as others do not choose them as friends) are classified as minority members. This is also consistent with social identity theory: a group of minority students in these communities might be perceived to attempt to join the majority hierarchy.

Thus, our results provide evidence that the role of friendship ties is crucial when classifying race. There are two social positions associated with being classified as a minority student: having a central position in the (perceived) minority group and, less strongly, trying to join the (perceived) majority group but having only a peripheral position in it. As a mechanism, this should be related to minority students' perceived effort for individual mobility (i.e., for leaving their ethnic group and trying to make friends within the majority group instead).

However, we should emphasize here that minority students attempting to join the majority hierarchy but achieving only peripheral positions in it do not necessarily fail *completely* in their efforts: if they did not have any meaningful contact towards majority students at all, they would probably not name any of them as friends. This is because the questionnaire measures *friendship perceptions* instead of *friendship wishes* or goals. If two students never even spend time together, we cannot expect that either of them would perceive their relationship as a friendship. However, in cases in which some contact is provided, the student for whom the relationship is more important may be willing to overestimate its strength and intimacy relative to the other student.

To describe group hierarchy in more detail and depth, other variables (e.g., power, respect, or status) would be necessary (Coleman 1961). This has not been the purpose of this article. Hence, the topic should be further investigated in the future. Besides status-related ones, many other network dimensions could be potentially linked to racial identifications in the future (Elmer, Boda, and Stadtfeld 2017; Vörös and Snijders 2017). Of these, negative ties could be particularly important because of their strong influence on groups (Huitsing et al. 2012; Boda and Néray 2015; Pál et al. 2016) (though interestingly, initial results did not show significant effects for negative ties on ethnic classifications).

Because opinions and classifications are subjects of social influence in communities, we also expected that peers, and especially friends, affect each other's classifications on others' race in the group: they tend to agree in their classifications. Our results provide strong evidence for such social influence processes. The effect of classmates in general is positive and significant, suggesting that there is indeed a Matthew effect on racial classification (Merton 1968). That is, the more minority nominations someone already has, the more she will have later. At the same time, the influence of friends was, as expected, even stronger. This suggests that students indeed have the ability to affect each other's classifications about their classmates' race. This is a very strong and unique finding: it shows that the evolution of racial classifications is not that different from the formation of other attitudes and opinions shared in groups.

Our microlevel approach utilizes concepts and techniques from social network analysis; our results are based on stochastic actor-oriented models. Because of the actor-oriented perspective, we are able to model social processes at the microlevel, always from the given observer's perspective, which allows us to avoid analyzing aggregated data. At the same time, using longitudinal models makes it possible to distinguish between the effect of friendship ties on racial classifications and racial classifications on friendship ties. Although there are always alternative explanations one cannot control for, these are great advantages of our approach, providing us with robust results on the fluidity of racial classifications. Moreover, using the random-coefficient multilevel SAOMs allowed us to analyze multiple school communities together and estimate global parameters.

The most important limitation of our approach is that it assumes actors' full information about relationships and classifications in the community. This is a strong assumption, and the larger the group, the less likely that it is true. Our groups are relatively small (20 to 30 students), and it is not unreasonable to assume that students have a lot of information about their peers. Moreover, even if individuals cannot tell exactly which peers are friends with each other, they probably see the general friendship tendencies in the community. Our results also support this: individuals seem to observe certain social positions related to the combination of incoming and outgoing social ties and associate these with ethnicity. Similarly, students are probably not aware of everyone's classification about everyone else; however, they seem to somehow perceive—and react to—the general opinion about their classmates' ethnicities in the class. This is an interesting finding itself, and further research should investigate the exact mechanisms behind these processes.

One potential explanation could be that individuals show consistently different behaviors towards those they classify as minority rather than majority peers. Observing the general patterns of these interactions affects students' racial classifications: because these communities are relatively small, and students have most of their courses together, a large part of these interactions can be observed by everyone. As a result, the more students "treat someone" as a minority member, the more likely that others will do so as well. Still, it is not surprising that students adopt their friends' opinions more than others'—friends are more important for the individual, and it is more likely to actually have precise information about friends' classifications.

The context of this article is the case of Roma minorities in Hungary. This limits the conclusions of our analysis. The results cannot be generalized to minorities other than the Roma; even the generalization for Roma people in Hungary is limited because similarly to most smaller-scale social network studies, the sample is not representative. To be able to draw more reliable conclusions about social effects on racial classifications, similar analyses should be conducted on larger representative samples from various social contexts.

We expect that results on other interracial contexts may show substantial differences compared to ours. Racial and ethnic groups experience different levels of ambiguity when being categorized by others: this leaves more or less space for social mechanisms. Thus, variation on observable characteristics among self-identified members of a racial group, such as phenotypical attributes, language, or religion—and the extent to which these characteristics can be changed by the individual herself—can make a crucial difference on the results. The presence of multiple racial and ethnic groups may also have a major effect on how race is observed in the community.

Beyond this, handling more than two racial groups makes the analysis somewhat more complicated. In general, our method can easily be adapted: classifications into each group can be modelled as separate dependent variables (which may or may not overlap with each other, depending on the researcher's decision). Because of multilevel modelling, not all racial groups have to be present in all communities in the analysis (if there are multiple communities). However, for the analysis of minority groups with only very few self-identified members, it may be necessary to create larger racial categories out of these.

In spite of the uniqueness of our context, it is important to emphasize that the hypotheses were derived from general theories; therefore, for the supported hypotheses this still gives evidence for the social mechanisms involved. This study can be an important first step towards a new relational perspective of examining racial shifts in communities.

Notes

1 There are traditional distinctions between race and ethnicity based on several dimensions (e.g., involuntary–voluntary, external categorization–internal self-identification, nature–culture, rigid–flexible); however, distinction based on these is now debated (Brubaker 2009). Though there are other factors that might differentiate between race and ethnicity, according to Brubaker (2009:27–28), "rather than seek to demarcate precisely their respective spheres, it may be more productive to focus on identifying and explaining patterns of variation on these and other dimensions, without worrying too much about where exactly race stops and ethnicity begins." For the research questions examined in this article, race and ethnicity are analyzed in relation to minority and majority status and in- and outgroup processes. As Brown, Hitlin, and Elder (2006:411) put it, "lived experience of race and ethnicity are qualitatively similar conceptual categories"; therefore, in this study we will use the term "race" in a broader sense, including ethnicity as well,

when discussing these general processes. In cases about ethnicity in particular, the term "ethnicity" will be used.

2 The data was collected by the MTA TK "Lendület" Research Center for Educational and Network Studies in Hungary.

3 Training programs: vocational schools, secondary technical schools (which provide vocational training but also allow students to participate in tertiary education), and secondary grammar schools (which are the most prestigious and mainly prepare students for tertiary education). In the Hungarian education system, school classes are relatively small and they have most of their courses together.

4 The third data wave was collected shortly after the beginning of the second academic year, when a significant proportion of students left their classes. Because of the high—and biased—composition change, these data cannot be analyzed together with the first two data waves.

5 The terms "majority" and "minority" are used here referring to the group's general status in society, not relative to classroom proportions.

6 https://r-forge.r-project.org/R/?group_id=461.

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Acknowledgements: This work was supported by the Hungarian Scientific Research Fund (OTKA; grant K 881336) and the Economic and Social Research Council (grant ES/J500112/1). The data were collected in the scope of the MTA TK "Lendület" Research Center for Educational and Network Studies. I would like to thank Tom Snijders, Janne Jonsson, Károly Takács, Bálint Néray, András Vörös, Christoph Stadtfeld, Per Block, Brooks Paige, James Moody, John Ermisch, and many other colleagues for helpful comments on different versions of this article.

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