

Changing Intergroup Boundaries in Brazilian Marriages: 1991-2008

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The prevalence of marital homogamy provides insight into the social organization of group boundaries. For example, educational homogamy reflects the importance of social class (Schwartz and Mare 2005), and racial homogamy is a key indicator of race relations (Qian and Lichter, 2007). It follows that changing rates of intergroup marriage are indicative of shifts in the strength of social boundaries between groups. Marriage implies strong attachment in the most intimate of settings such that increasing intergroup marriage indicates a weakening of social barriers to interaction. The weakening of barriers may also extend to kin, friends and other social networks. Conversely, if social characteristics become more salient in interpersonal relationships, then rates of intermarriage will decline. In turn, increased visibility of couples in heterogeneous relationships can be a force for social change in the social acceptance of these types of relationships, and this change is further reinforced when new cohorts are reared in homes with greater degrees of homogeneity or heterogeneity.

Education, race, and religion form different contexts where people form relationships that could lead to marriage. Religious beliefs and behavioral codes shape preferences based on moral judgments and racial preferences are shaped by social constructions of race. Educational and religious institutions also provide a context where potential partners meet. Race affects marriage markets to the degree that neighborhoods, recreational activities and institutions such as education and religion are segregated. Thus, it follows that changes in the racial, religious, or educational context of a society would strongly influence rates of intermarriage. In fact, a large body of research documents multiple mechanisms through which religious, educational, and racial context influences intermarriage rates around the world (Goode 1970; Mare 1991; Kalmijn

1991a, 1991b, 1998; Thornton 2005; Qian and Lichter 2007; Esteve and McCaa 2007; Fu and Heaton 2008; Rosenfeld 2008; Jacobson and Heaton 2008). However, despite the extensive research showing that religion, education, and race each structure interpersonal interaction, the relative importance of these characteristics is not well understood. To date, some research has examined the joint distributions of marriage by education and race, but few have been able to study the joint distributions of all three. Further, none of these studies have examined changes in racial, educational, and religious assortative mating simultaneously.

The purpose of this research is to explore changes in the relative importance of religion, race and education in mate selection in a society undergoing dramatic changes in race relations, educational expansion, and religious diversity. More specifically, this research addresses four sets of questions about the nature of intergroup marriage in Brazil. Each set of questions involves both a description of the general tendency and the pattern of change. First, how does the overall likelihoods of homogamy compare across education, race and religion? Second, do sub-categories of education, race and religion vary in the likelihood of homogamy? Third, are there specific patterns of heterogamy that are more common? Finally, is education associated with racial and religious homogamy? This paper addresses these questions by comparing national probability samples for the periods 1991 to 2000, and 2001 to 2008. Answers to these questions will not only provide information about the relevance of these three characteristics in mate selection, but also give clues about how broad social change influences the formation of intimate relationships. Thus it offers a more comprehensive analysis of changing patterns of intermarriage by considering education, race, and religion.

Social Change and Intermarriage in the Brazilian Context

Theories of change in homogamy include changes in social structure that reduce the importance of ascribed vs. merited characteristics, changes in group sizes—either through government actions or through demographic processes, changes in values about the meaning and purpose of marriage, the large expansion of education, and changes in the operation of the marriage market (Treiman 1970; Mare 1991; Parsons and Platt 1970; Goode 1970; Thornton 2001, 2005; Kalmijn 1991a, 1991b, 1998; Rosenfeld 2008; Qian and Lichter 2007). A more general approach consolidates all of these social changes under the framework of modernization, or in the case of religion, secularization (Wilson 1976; Blau and Schwartz 1984; Smits, Utlee, and Lammers 1998; Rosenfeld 2008). Assimilation theorists also note decline in the importance of ethnicity and religion in mate selection (Alba, 1981). Inherent in the modernization perspective is the notion that fundamental shifts in the nature of intergroup relationships will occur (Welzel, Inglehart, and Klingemann 2003; Inglehart and Welzel 2005). In the case of mate selection, the perspective suggests that economic development, the expanding ideology of individual choice, and weakening of traditional social boundaries will lead to a shift in the relative importance of ascribed and achieved social characteristics (Kalmijn 1998). More specifically, as labor market opportunities become increasingly tied to human capital and less gender specific, and as educational opportunities expand, educational attainment will become more salient as an attractive characteristic in mate selection. In contrast, race will diminish in importance as a relevant attribute of potential partners. As religious tolerance increases and becomes more a matter of personal choice than of family and community tradition, it may also become less important in mate selection. However, as has been documented elsewhere, the modernization and secularization framework is often built on a flawed premise of universal and deterministic change, and regularly relies on the substitution of geographic variation for temporal

variation, if not in practice, then often in theory (Raymo and Xie 2000; Thornton 2001; Welzel, Inglehart, and Klingemann 2003; Thornton 2005; Inglehart and Welzel 2005). In fact, however, changes in endogamy appear to be path dependent, and frequently are subject to regional and cultural context (Halpin and Chan 2003; Raymo and Xie 2000; Smits, Utleer, and Lammers 2000; Welzel, Inglehart, and Klingemann 2003; Katrnák, Kreidl and Fonadova 2006).

The Brazilian context is particularly interesting for the study of intermarriage because of its contrast to the primary locations of intermarriage research in the U.S. and Europe. One common problem for many locations is that they often do not have significant changes in education, religion and race (and especially all three simultaneously) over the period of observation, therefore making it difficult for researchers to examine trends in intermarriage in a context of social change. In contrast, even in just the last decades of the 20th century, Brazil experienced striking social changes. Brazil has a unique history in terms of race relations, especially compared to the U.S., but it has also had interesting recent changes in race relations and racial diversity. As well, Brazil's current change from a largely Catholic nation to a more heterogeneous Christian nation is also well documented. There has also been a relatively large increase in the number of Brazilians with no religion. Finally, the improvements in education over the past two decades provide an intriguing backdrop from which to study educational homogamy. Although we only examine changes in endogamy and homogamy from 1991-2008, we acknowledge that social changes prior to this would have contributed the direction and size of any intermarriage change. Therefore, we are careful to discuss social changes in the last few decades of the 20th century. In the paragraphs that follow we briefly outline some of the possible factors related to both the level of educational, racial and religious endogamy, and important

social changes that may be related to transformations in educational, racial and religious endogamy from 1991-2008.

Education

Education in Brazil has historically been something only the elites could obtain. Over the past several decades, and particularly between 1970 and 2000, Brazil moved from a largely homogenous country of low education, to a country with a wide range of educational attainment (Esteve and McCaa 2007; Fígoli 2006; IBGE 2004). For example, in 1950 half of the population age 15 and above were illiterate, but by the end of the century that number had declined to 13.6%, and only 4.2% of children ages 10-14 were illiterate. More recent educational changes have moved beyond basic literacy levels by encouraging children to stay in school longer. For instance, between 1992 and 2001 the percent of 15-17 year olds not enrolled in school declined from 40.3% to 18.9%, implying that many youth are remaining in school for several years. In fact, Brazil's education ranking often supersedes its other rankings on national indicators. For example, in 2006, Brazil ranked 39th (out of 178 countries) in primary, secondary and tertiary education enrollment ratios, while it was 80th in life expectancy and 77th in GDP per capita (UNDP 2008). Interestingly, most of the increase in Brazil's education is due to its high levels of migration and urbanization (Silva and Hasenbalg 2000). Even considering moderate levels of segregation by SES, this has led to a much more educationally heterogeneous pool of possible spouses for the average Brazilian. Thus by 1991, with such an educationally heterogeneous population, educational homogamy is expected to be relatively low, although still significantly different from random assortment (Esteve and McCaa 2007). The large expansion of education may have facilitated educational homogamy in Brazil in the 1991-2008 period. Research on the

causes of change in educational homogamy¹ suggests that it responds strongly to changes in general life course patterns like increases in length of school attendance (Halpin and Chan 2003; Mare, 1991). As the educational needs of the country expand, not only are preferences concerning other endogamous marriage factors (such as race and religion) expected to decline, but preferences for educational homogamy are generally expected to increase (Kalmijn 1991b; Kalmijn 1998). Therefore, Brazil's attempt to improve education may have also increased people's preference for education in a marriage. Some informal sanctions by peers and family favoring higher education levels may have increased (Esteve and McCaa 2007). As well, recent work suggests that education-induced delays in marriage restrict the marriage market (especially for college educated), thus increasing educational endogamy (Mare 1991; Kalmijn 1991b; Blossfeld and Timm 2003). For Brazil, as education has increased, college has replaced high school as the primary social class partition (Schwartzman 2007). In sum, these changes point to an expected increase in educational homogamy.

Contrary to the above hypothesis, recent changes toward greater educational equality in Brazil suggest that educational homogamy may decline. Inequality among educational groups is associated with greater educational endogamy (Fu and Heaton 2008). As SES inequality increases, preferences for similar SES also increase. As well, SES group identification would increase and create stronger group sanctions against exogamy. Finally, increasing inequality also often means increasing segregation by class, thus constraining the marriage market. Over the last two decades of the last century, there was a rise in inequality and poverty through most of the

¹ Although we only focus on educational homogamy, it is important to note that it correlates highly with other measures of SES homogamy (Mare 2000; Raymo and Xie 2000; Fu and Heaton 2008; Rosenfeld 2008).

1980's, followed by an equally large decline through the 1990's and early 2000's (Ferreira, Leite and Litchfield 2008). Thus, for 1991-2008, we might expect a decline in educational homogamy due to the decrease in inequality over the same time period.

Of course, the expansion of education and the changes in inequality may influence educational homogamy in different ways across the educational distribution. As in other contexts, research in Brazil suggests that people tend to marry others of adjacent education levels (Schwartzman 2007). This pattern often results in higher homogamy rates for those at the two ends of the education spectrum because both groups have only one direction of choice other than their own level of education (i.e. people with the highest level of education can only marry people with the same or lower levels of education, and people with the lowest education can only marry people with the same or higher levels of education) (Fu and Heaton 2008). By comparison, there is often low educational endogamy for the middle education level because they have choices of spouses with both higher and lower adjacent levels of education (Esteve and McCaa 2007). There is also evidence that while educational homogamy has remained steady over the last few decades for the lowest education group, it has increased for the college educated, and that heterogamy is more common than homogamy in the middle education level (Esteve and McCaa 2007). Thus, while higher levels of education are seeing an increase in homogamy due to the role of education in delaying marriage and constraining the marriage market, lower levels of education may be experiencing an increase in educational intermarriage due to a decrease in inequality and a more educationally heterogeneous population (IBGE 2000; IBGE 2004).

Finally, it is important to note that the changes in education occurred across all levels of education and were experienced equally by men and women (Fígoli 2006; Esteve and McCaa 2007). Typically, having similar educational distributions for men and women implies that hypergamy should decline (Goldstein and Kenney 2001; Sweeney and Cancian 2004). As educational homogamy has declined, in its place female hypergamy has increased slightly, while female hypogamy has almost tripled in size (from about 10% of the population in 1970 to 30% in 2000) (Esteve and McCaa 2007).

Race

The racial context of Brazil is complex (Bailey 2004; Sansone 2003) and continues to be contested (Bailey, 2008). While still a Portuguese colony, over 4 million slaves from Africa were brought to work primarily in the Northeastern region. For much of this period, White men far outnumbered white women leading to high levels of miscengation between white men and non-white female slaves (Telles 1992, 2004). By the end of the 19th century this resulted in a population largely made of mixed ancestry and a broad spectrum of skin colors. To this, the 20th century added a large stream of Asian immigrants, causing Brazil to have even higher levels of population admixture. Also, through much of its history Brazilian culture has emphasized color of skin over racial identity, in part due to the complex racial ancestry of many Brazilians. Thus, even within one family, an observer may classify members of the family in two or more races or skin colors (Telles 2004; Schwatzman 2007; Telles and Lim 1998). Racial classifications are varied and flexible in Brazil (Penha-Lopes 1996). Compared with the predominance of a dichotomous distinction between Black and White in the United States, Brazilians have long recognized mixed racial ancestry. Racial designations are also influenced by social class (Penha-

Lopez 1996; Schwartzman 2007). As well, unlike places like the United States and South Africa, Brazil has never had formal sanctions against interracial marriage since the abolition of slavery in the late 1800's. This is not to imply that there is no racism, but rather, that racial identification, and thus racial preferences and group sanctions, may not be as strong as in other countries (Bailey 2004). Because of this history, racial intermarriage is still common today—although marriages between blacks and browns are more common than between blacks and whites (and both are more common than black-white exogamy in the U.S.) (Degler 1986; Telles 2004).

Between 1980 and 2000, racial distribution in Brazil remained about the same, with blacks (*preta*) between 5-6%, browns (*parda*) 39-42% and whites (*branca*) 54-52% and less than 2% other (IBGE 2004). Although the distribution of race has seen only minor changes, two important transformations in the racial context occurred at the end of the 20th century. One change is that intermarriage appears to be more acceptable now than even two decades before (Telles 2004). Brazilians appear to recognize racial problems, and most are in favor of affirmative action policies (Bailey 2004). Interestingly, Bailey (2004) also shows that favoring affirmative action is more strongly (negatively) correlated with education than it is with race. All of these changes in values and attitudes point to possible changes in the preferences and informal sanctions around interracial marriage. Some work in the U.S. shows that people whose attitudes become favorable towards interracial relationships positively correlate with having more interracial relationships (Fiebert, Karamol and Kasdan 2000). Thus if the change in attitudes represents a reduction in racial endogamous preferences, or a reduction of informal sanctions against racial intermarriage, then we would expect to see racial endogamy decline. One important caveat to this change is that for some people, the movement since the 1990's to

address remaining racial inequalities may have increased the salience of race as a social identity, thus possibly increasing racial endogamy among those people (Daniel, 2006; Telles, 2004).

A second change in Brazil's racial context is that there has been a large migration from the predominately nonwhite Northern regions to the predominately white, economic center of the South and from the rural areas to the urban centers (IBGE 2000, 2004, 2007; Silva 1999). To the extent this migration racially integrates the marriage market by reducing racially segregated peer networks and residential segregation, racial endogamy should decline (Lee and Edmonston 2005; Qian and Lichter 2001; Massey and Denton 1993; McPherson, Smith-Lovin and Cook 2001; Quillian and Campbell 2003). The segregation literature in Brazil suggests some racial segregation is unexplained by SES, but that the level of racial segregation is far lower than the U.S. (Telles 2004). Of course, because the migration is primarily unidirectional, the reduction in segregation may primarily be in the South and in the urban areas, while the North and rural areas may continue to have higher levels of racial segregation, and consequently possibly higher levels of racial endogamy. Considering both the changes in attitudes toward more acceptance of racial intermarriage and the increasing racial heterogeneity in the marriage market due to migration, we expect that racial endogamy should decrease between 1991-2008.

Religion

The Brazilian religious context is also an interesting contrast for most locations of intermarriage research. Religious endogamy in Brazil has been historically high for several reasons. First, for most of Brazil's history, the population was almost entirely Roman Catholic. It wasn't until the 1970's that Roman Catholics were less than 95% of the population (IBGE 2004). Being Catholic has always been a strong social identifier, and many people claim to be strong

Catholics even without attending frequently. Even the Afro-Brazilian religions contain strong Catholic components, with some people participating in both religions (Prandi 2000). Second, the increase in Protestants over the last two decades, and especially since 1990, has dramatically changed the religious landscape of Brazil. Protestants (particularly the Pentecostal Protestants) have consistently separated themselves from the rest of the Brazilian society, and have made it a point of honor to be in stark contrast to the rest of society (McKinnon, Potter and Garrard-Burnett 2008; Chesnut 1997). Typically, religious groups that are more independent of society will have higher rates of religious endogamy (Cavan 1970). Third, sanctions against marrying outside of the Protestant faith are extremely high. And although not as strong, Catholic rhetoric is also negative toward religious intermarriage (Cavan 1970). Thus, based on the strong third party role religion plays in Brazil, religious endogamy is expected to be very high.

Theories of change in religious intermarriage typically work from a model that assumes societies move toward being less religious, and more secular, causing religious institutions to have less regulation and influence over the lives of the population, leading to a decrease in religious homogamy (Wilson 1976, Blau and Schwartz 1984; Rosenfeld 2008). Although there have been important changes in the religious context in Brazil, most people still claim to be religious. In 1970, 1% of the population reported being unaffiliated with any religion, by 2000 this had increased considerably to about 7% reporting no religious affiliation (IBGE 2004). Clearly, the rise in the number of nonreligious has been remarkable, and it may suggest a decline in the importance of religious identity, and thus a possible decline in religious endogamy.

Other important changes in religious context also predict a decline in religious homogamy. Primarily known for having the largest Roman Catholic population in the world,

since the 1980's and especially since the 1990's Brazil has experienced a large change in the distribution of religious affiliation (McKinnon, Potter and Garrard-Burnett, 2008; Pierucci and Prandi, 2000). In 1970, 92% reported being Catholic, 7% Protestant, 1% without religion and 1% other religion, but by 2000 only 74% reported as Catholic, 15% Protestant, 7% no religion and 4% other (about half of which are Afro-Brazilian) (IBGE 2004). Protestants, and particularly Evangelical and Pentecostal Protestants, grew in part due to their counter culture (and thus counter Catholic) message that focused not only on eternal salvation, but on daily events and actions of their parishioners (McKinnon, Potter and Garrard-Burnett 2008). These Protestants typically have smaller congregations and have much higher control over their members, leading to lower teenage fertility and higher rates of marriage (McKinnon, Potter and Garrard-Burnett 2008). Nevertheless, assuming the group sanctions have remained constant, the sheer demographic increase in religious heterogeneity suggests that religious endogamy might decrease slightly.

Interactions

To this point our discussion has been conducted as though race, religion and education were independent social identities and unique social changes, which is far from reality. For example, race and education in Brazil are highly correlated. That is, despite the emphasis on phenotype through skin color over racial ancestry, as Telles (2004) explains, race in Brazil is bidimensional. One dimension is the cultural or ideational views of race discussed above. The second dimension, however, is related to the immense inequality within Brazilian society that is highly correlated with skin color (Lam 1999; Silva and Hasenbalg 2000). More specifically, whites run the entire spectrum of social class, blacks are primarily located in the lower class and

browns are also located in the lower class—with a few also found in the middle class. This results in nonwhites having lower educational attainment, lower wealth and worse health than whites. It should also be noted that compared to whites, it is substantially harder for nonwhites to increase their SES over their lifetime (Halsenbalg and Silva 1988).

Similarly, in Brazil, a prominent theme within race research is that “money whitens” (Schwartzman 2007). For example, nonwhites marry whites at higher rates when they have higher SES (Silva 1987, Telles 2004). This is due to the fact that more educated non-whites have few options but to marry well educated whites, but whites within that same education level, even at lower levels, have many possible white partners to choose from. As well, recent work by Schwartzman (2007) finds that for interracial couples, education is positively correlated with higher probabilities of identifying their children as white. Also, when comparing interviewer and self reported skin color, higher SES respondents are more likely to report lighter skin colors for their family compared to interviewers’ classifications of skin color (Telles and Lim 1998; Bailey and Telles 2006; Telles 2004). As well, the poor and nonwhites are more likely to be found in both Afro-Brazilian religions and in the recent increase in Evangelical or Pentecostal Protestants (McKinnon, Potter and Garrard-Burnett 2008; Chesnut 1997). It is clear that understanding changes in one type of endogamy requires adjusting for its relationship with other types of endogamy.

Status exchange is the most frequently examined concept regarding the interrelationship between homogamy or heterogamy across different social dimensions. The concept was applied to explain marriage between minority and majority groups. The hypothesis was that black men with higher socioeconomic status would exchange this socioeconomic status for higher racial

caste when marrying white women (Merton 1941). Recent research suggests that support of this hypothesis is weak and unreliable (Rosenfeld 2005). Alternatively, there is support for the equal status exchange hypothesis that individuals in low status minority groups with higher socioeconomic status are more likely to marry a spouse with a similar level of socioeconomic status, often leading to out-marriage from their racial or ethnic group (Fu 2008). We will consider the possibility of status exchange by examining the relationship between education and endogamy for each category of race and religion.

In sum, education, race and religion each shape individual preferences, include people in social contexts where norms about preferences are expressed, and provide social settings for interpersonal contact. Modernization theory implies that as achievement replaces ascription, religion and race will become less salient in interpersonal interaction as education becomes more central. More nuanced theories of social change question the evidence for and simplistic logic behind this prediction. Research comparing change in the relative importance of these characteristics in mate selection is rare. Brazil provides an interesting setting for examination of changing patterns of mate selection because racial boundaries have been fluid, religious diversity is increasing and educational attainment is increasing. This paper examines changes the relative strength of homogamy, comparing race, education and religion. In addition, we examine category specific patterns of homogamy and heterogamy, as well as interrelationships across each of these characteristics.

Data and Methods

Data

Data for this analysis are taken from the public use samples of the 1991 and 2000 Census of Brazil, and from the 2001 and 2008 PNAD (*Pesquisa Nacional por Amostra de Domicílio*-National Household Survey). The Census is a standard source for examining intermarriage, but substantial change has occurred since the last census in 2000. In order to provide more current trends and to verify trends by examining two periods of change, we also include a national probability sample conducted after the census. The Census data have been collected and formatted to facilitate access by IPUMS International (international.ipums.org). Samples contain approximately 6 percent of all households that were included in the census. Public use files for PNAD were obtained from www.ibge.gov.br. For our analysis, husbands and wives (including both legal and consensual unions) are matched. Respondents who are not native born are excluded from the analysis (less than 1% of the sample).

Following other research we limit our sample to couples where each spouse is under age 35. In the 2000 census the median age at marriage is 25 for males and 22 for females. By age 35, sixteen percent of males and females have never married. Five percent of males and eight percent of females report being divorced, separated or widowed by age 35. Thus, age 35 seems a logical cutoff to allow focus on recent change while still including a majority of the married population and limiting bias due to marital disruption. Brazil has a long tradition of having both formal unions (legal marriages) and informal unions (cohabitation). In the 2000 census, one third of unions are informal, that is, they are not legally married. We include both types of unions in our analysis. Race is classified as White, Black and Brown, where brown represents a mixture of racial backgrounds. No doubt, the complexity of distinction by skin color is not captured by these simple categories. Different shades of brown are recognized and the boundaries between White, Black and Brown are sometimes blurred. But use of these categories by the national

census indicates they are commonly used and understood terms. Only 1.5 percent of the population reported a race other than these three categories in 2000 (the other responses being Asian, Indigenous and other race). Education is coded into five categories for no education, minimal primary education (some primary or up to four years), higher primary education (5 or 6 years completed), secondary education and post-secondary education. Religion is coded into five groups including Catholic, historical Protestants (Anglican, Episcopalian, Baptist, Lutheran, Methodist and Presbyterian), other Christian (mostly evangelical groups), Afro-Brazilian, and no religion. Other non-Christian religious groups such as Muslims, Jews and Buddhists were not included because these groups may reflect ethnicity and national origin as much as religious membership and because the groups are small (less than 0.5 %). Although the question about religion was open ended in both 1991 and 2000, responses were coded somewhat differently. By grouping responses into broad categories, this analysis maintains comparability across years. The PNAD files do not include religion, but are included to afford the examination of longer term trend in educational and racial assortative mating.

Use of both Census and PNAD data to analyze intermarriage require careful interpretation because characteristics of all members of the household are generally reported by one person and are measured at the date of the survey rather than the time of marriage. If the respondent tends to overstate similarity in reporting or if spouses change to become more similar after marriage, then data will have a systematic bias toward homogamy. It could be argued that overstating homogamy or switching characteristics to match one's spouse also reveal a preference for homogamy. It is also the case that much of the research on homogamy shares the same problem such that comparison across time periods or across countries still yields valid contrasts, even if homogamy is overstated. Unfortunately, data that are not subject to these

limitations and that include a sufficient sample size to examine intermarriage are not currently available for Brazil.

Tables 1, 2 and 3 show the cross-tabulation of each spouse's characteristics. Homogamy is the norm for the largest segments of the population including Whites, those with minimal primary education and Catholics. Other groups are not large enough to sustain high rates of homogamy. There is also a noticeable decline in homogamy for race groups, some religious groups, and the least educated. The patterns are influenced by the shifting marginal distributions.

Methods

Log-linear models are often used in the analysis of intermarriage. One of the major advantages of these models is that they take into account composition by including effects for the marginal distributions of husband and wife characters. One of the main disadvantages is that cross-tabulations can quickly become unwieldy. For example, the cross-classification of husband's and wife's education, race and religion, and year has 11,250 cells. Adding another variable such as region would result in a table with many empty cells. In order to adjust for marginal distributions, we use log-linear models with the baseline form:

$$\begin{aligned} \log F_{ijklmno} = & \beta_0 + \beta_i^{HE} + \beta_j^{WE} + \beta_k^{HR} + \beta_l^{WR} + \beta_m^{HL} + \beta_n^{WL} + \beta_o^T + \beta_{ik}^{HEHR} + \beta_{im}^{HEHL} + \beta_{io}^{HET} + \\ & \beta_{km}^{HRHL} + \beta_{ko}^{HRT} + \beta_{mo}^{HLT} + \beta_{jl}^{WEWR} + \beta_{jn}^{WEWL} + \beta_{jo}^{WET} + \beta_{ln}^{WRWL} + \beta_{lo}^{WRT} + \beta_{no}^{WLT} \\ & \beta_{ikm}^{HEHRHL} + \beta_{iko}^{HEHRT} + \beta_{iko}^{HEHLT} + \beta_{kmo}^{HRHLT} + \beta_{jln}^{WEWRWL} + \beta_{ilo}^{WEWRT} + \beta_{jlo}^{WEWLT} + \\ & \beta_{lno}^{WRWLT} + \beta_{ikmo}^{HRHEHLT} + \beta_{jlno}^{WRWEWLT}, \end{aligned}$$

where $F_{ijklmno}$ is the expected number of marriages between husbands in education category i , racial category k , religious category m and time period o and wives in education category j ,

racial category l , religious category n and time period o . H and W designate husband's and wife's respectively, E designates education, R designates race, L designates religion, and T designates a dummy variable for time period. Terms that include time show how patterns have changed over the respective time periods. The model is identical for comparisons of Census and PNAD data with the exception that PNAD data do not include religion and so all terms denoting religion are not included in the models fit to PNAD data. This model includes associations among each of the husband's characteristics, and between each of the wife's characteristics, but does not allow for association between husband and wife characteristics. Patterns of homogamy and heterogamy are assessed by including dummy variables for each type of homogamy or heterogamy. First, we add dummy variables for general homogamy (1 if husband and wife have the same value on a given characteristics, and 0 otherwise). We then add category specific dummy variables (e.g. 1 if husband's race=white and wife's race = white, and 0 otherwise). We examine educational heterogamy by including a covariate for the absolute value of the difference between husband's education and wife's education. To consider patterns of religious heterogamy, dummy variables are added measuring particular combinations of husband's and wife's religion. Examination of residuals from prior models indicates that the most common patterns include marriage between Catholics and Historical Protestants, Catholics and Afro-Brazilians, other Christians and Afro-Brazilians, and other Christians and no religion. Finally, the possibility of status exchange is evaluated by adding interaction terms for education and each category of racial and religious homogamy.

Homogamy

Table 4 reports goodness of fit statistics for various log-linear models. The first model includes parameters for the marginal distributions of husband's race, education and religion and interactions among these, and parameters for the marginal distributions of wife's race, education and religion and interactions among these. (Note that the models for PNAD do not include religion). This first model also includes interactions between each of the preceding factors and time period. In other words, the model allows for all possible associations except for associations between characteristics of the husband and the wife. This model does not fit the data very well because there is substantial homogamy. Adding three parameters for homogamy on education, race and religion, along with three parameters for change in homogamy dramatically improves the model fit (four total parameters for PNAD). Indeed, 83 percent of the association between husband and wife characteristics in the census can be explained by the tendency for educational, racial and religious homogamy. Of the three, religious homogamy is the largest (see Table 5 for the coefficients). The parameter implies that couples are about 27 times more likely to marry someone of the same religion ($e^{3.283} = 26.66$) than someone of a different religion once marginal distributions have been taken into account. Likewise, couples are 5.2 times more likely to marry someone of the same race and 3.6 times more likely to marry someone with the same education. Each type of homogamy declined over the decade, but the parameter for change is quite small relative to the corresponding parameter for homogamy. For example the coefficient for change in racial homogamy indicates that the odds of a same race marriage are three-fourths as high in 2000 as in 1991 ($e^{-.283} = .75$). The magnitude of change is approximately the same for race and religion, but noticeable smaller for education.

In the PNAD, 65 percent of the association can be explained by educational and racial homogamy. Racial and educational homogamy parameters are somewhat smaller in PNAD than

in the Census which is to be expected since homogamy has been declining. The decrease in racial homogamy has extended into the 2001-2008 period, but educational homogamy changed very little in the same period. The shift from decline in educational homogamy in the 1991-2000 period to no change in the 2001-2008 period is consistent with research in the U.S. indicating that educational homogamy increases as education becomes a more critical marker for males and females (Schwartz and Mare, 2005).

Assuming that homogamy is uniform across groups may be an over-generalization. To test this, model 3 (in Table 4) includes a homogamy parameter for each category of race, education and religion, as well as a change parameter for each. With Census data, this model improves the overall fit, but only by about five percent. Parameters reported in Table 5 show the relative magnitudes of group specific homogamy. Racial homogamy is greatest for Blacks—a pattern that has been examined extensively in the United States. Whites also have high rates of homogamy. Not surprisingly, those with mixed ancestry (Brown) have much lower rates of homogamy. These patterns show some similarity to the United States where Blacks have the highest rates of homogamy, but the parameters are much smaller in Brazil (Jacobson and Heaton, 2008) indicating that the boundaries between groups are much more fluid in Brazil. Homogamy is declining for Whites and Blacks at the same pace, but is increasing slightly for Browns.

Educational homogamy is greatest at the extremes of the distribution, but relatively low for those with primary education. Homogamy is also increasing somewhat for couples at the two ends of the distribution, signaling increasing isolation for the least and most educated. In contrast, those with more primary education or a secondary education are experiencing lower

rates of homogamy. This mixed pattern explains the overall lower rate of change in educational homogamy compared with race and religion.

Religious homogamy is highest among the Historical Protestants, followed by newer Protestant groups. Afro-Brazilian groups and those with no religious preference have somewhat lower rates of homogamy, and Catholics have the lowest rate. Homogamy is actually increasing within Historical Protestants and Afro-Brazilian groups, but declining in other groups.

Results based on PNAD for the 2001-2008 period indicate that the major trends during the 1991-2000 period have continued through the 2001-2008 period. White and Black homogamy are lower in the 2001-2008 period and continue to decline. Educational homogamy is highest at the tails of the distribution and educational homogamy in the middle of the distribution is declining. The major difference is that the Census shows some decline in intermarriages between Brown husbands and wives, but the PNAD shows a decline in Brown homogamy that parallels declining homogamy for the other two groups.

Heterogamy

In this section, we consider patterns of out-marriage in more detail. Racial heterogamy is not considered because adding more parameters would over-fit the data (there are nine cells in the race cross-tabulation, and the model of group specific homogamy uses eight degrees of freedom). The most common pattern of educational heterogamy is to marry a partner who has similar education. This creates a marriage gradient such that greater similarity in education leads to a greater likelihood of marriage. Model 4 (in Table 4) adds a parameter for the absolute value in the difference in education and a parameter for change. This model noticeably improves the fit

of the model. In the Census data, the parameter of the education gradient is large and suggests that the likelihood of marriage is reduced by about 70% for each step in educational difference (see Table 6). The parameter for change in the education gradient indicates that the gradient has moderated a little over the decade. The education gradient is somewhat smaller in the 2001-2008 period, reflecting decline in importance during the earlier period, but the parameter for change is not statistically significant.

Hypergamy is the second most commonly discussed aspect of educational heterogamy. More specifically, men tend to marry women who are less educated. We test for this by adding a dummy variable if the husband is more educated than the wife (results not shown). We also add a dummy variable for change in hypergamy. Adding these effects does not improve the model fit substantially in either Census or PNAD data. Parameters indicate a tendency for hypergamy, but this tendency has declined by half in each time period. If a similar decline were observed in the next decade, hypergamy would disappear.

With five religious groups, there are several possible patterns of religious intermarriage. Preliminary analysis (not shown) identified 4 combinations with particularly high or low likelihoods of intermarriage. Effects for these combinations are estimated in Model 6 (in Table 4). The model yields a modest improvement in fit. Parameters indicate that there are higher than average propensities for intermarriage between Catholics and Afro-Brazilians, and between Catholics and those with no religion (see Table 6). The first type of intermarriage is not surprising because in Brazil it is common for people to be involved in both Catholicism and Afro-Brazilian rituals (Prandi 2000). It thus appears that Catholicism may not be as exclusive as some other groups. This could be because Catholicism has been able to incorporate diverse

groups and allow some flexibility in religious practice. In contrast, the other-Christian group tends to be more exclusive, particularly when it comes to marrying those with Afro-Brazilian identity or with no religious preference (Oro and Semán 2000). Parameters for change indicate that each of the above noted tendencies toward or against intermarriage are weakening over time.

Status Exchange

We test for status exchange by including parameters for the interaction of education and group specific homogamy. Husband's and wife's education are considered in separate models because they are highly correlated (models 6 and 7 of Table 4). Inclusion of effects for the interaction between education and group specific homogamy yields only modest improvement in overall fit. Parameters for husband's and wife's education have the same sign, with one exception, and support similar conclusions (see Table 7). In the Census data, higher educational attainment increases the likelihood of homogamy for whites and blacks, but more educated brown men are more likely to marry someone of a different race. The educational effect on white homogamy is increasing over time, but the reverse is true for educational effects of black homogamy. There is an increasing tendency for more educated brown women to marry exagamously, while the educational effect for brown men is stable. In the PNAD, education increases the likelihood of White homogamy and decreases the likelihood of Brown homogamy as is the case in the census. Results for Blacks homogamy are inconsistent across the two data sets. Most of the parameters for change in the PNAD are not statistically significant. Relatively small coefficients and minimal increases in model fit suggest that status exchange is not a dominant feature of marriage patterns in Brazil.

Higher educational attainment increases the likelihood of religious exogamy for men and women in each religious group. Among men, the educational effect on exogamy is most evident among Historical Protestants, and among women the effect is comparatively large for Historical Protestants, Afro-Brazilians and those with no religious preference. The association between education and religious exogamy has weakened over time for all groups except Afro-Brazilians.

Conclusion

Data from the last two censuses of Brazil and from more recent rounds of the PNAD allow us to compare levels of and trends in racial, educational and religious mate selection. Racial homogamy appears to be less pronounced in Brazil than in a variety of other cultural contexts. For example, Jacobson and Heaton (2008) report odds ratios of 35.8 (in other words homogamous marriages are 35.8 times more likely than heterogamous marriages) in the United States, 9.68 in Hawaii, 37.11 in Canada, 9.63 in New Zealand, 237.7 in South Africa, 11.38 in Beijing, and and 287.2 in Xinjiang Province, China. The comparable ratio for Brazil is 5.2, supporting the claim that racial boundaries are more fluid in Brazil. Not surprisingly, individuals with mixed ancestry are most likely to marry exogamously. The parameter for educational homogamy is similar to that reported for the United States by Fu and Heaton (2008). Consistent with prior research in Brazil and other contexts, educational homogamy is most pronounced at the lower and upper ends of the distribution. Religious homogamy is much more pronounced in Brazil than educational or racial homogamy. This difference is surprising given the attention that is generally focused on racial and educational homogamy, and suggests that more attention should be given to the role of religion in mate selection. Results suggest that the recent growth among non-Catholic groups is an important force shaping interpersonal interaction. Of course,

some of the homogamy may appear because partners decide to belong to the same group. Even religious switching, however, signifies the importance of shared membership among married couples. Religion may play a greater role in day-to-day couple interaction than either social class or ethnicity. Although Catholics are somewhat less likely to marry endogamously, all groups considered here show strong tendencies toward in-group marriage.

In addition to homogamy, results of three other aspects of mate selection are also evident. First, there is a strong educational gradient whereby partners who do not marry someone in the same educational category, still tend to marry a partner with only slightly lower or higher education. Second, people who marry out of their religion also show preference for or against marrying into other groups. In particular, there appears to be some compatibility between Catholics and Historical Protestants or Afro-Brazilians, and incompatibility between emerging evangelical groups and Afro-Brazilians and those who do not belong to a religious group. Third, contrary to the status exchange hypothesis, higher education appears to facilitate in marriage for whites and blacks, but education is associated with religious exogamy.

The most common pattern of social change is increased fluidity in mate selection. Homogamy parameters are becoming smaller for race, education and religion, but the pattern of change is not uniform. Boundaries appear to be increasing at the two tails of the education distribution and for some religious categories. Parameters for the education gradient, for the most prominent types of religious inter-marriage, and for the effects of education on inter-racial and inter-religious marriage are also becoming smaller for the most part. These patterns are consistent with the modernization perspective predicting decline in the importance of ascribed characteristics, but not consistent with the prediction that achieved characteristics will become

more important. Rather, they suggest an overall tendency toward more openness in mate selection, countered by increasing social boundaries at the tails of the education distribution and for some categories of religion.

A possible explanation for the declining rates of homogamy in all three areas (race, education and religion) is the expansion of beliefs in equality and freedom as inalienable rights. Research documents substantial worldwide changes in beliefs about freedom and equality over the past 50 years (Cott 2000; Inglehart and Baker 2000; Smith 1990; Thornton 2005; Thornton and Young-DeMarco 2001; Welzel, Inglehart, and Klingemann 2003). Arland Thornton (2001, 2005) has argued that these values have had a particularly powerful influence in generating worldwide change in family behavior due to their perceived positive relationship with modernity. This ideational change would manifest itself through two primary mechanisms. First, it would change people's preferences. That is, groups once perceived as unequal and thus unattractive for marriage, may become seen as equals, thus making their attractiveness higher as well. Second, a society increasing its belief that individuals are free to make their own choices reduces the strength of group sanctions, thus reducing endogamy. Welzel, Inglehart and Klingemann (2003) similarly argue that rising levels of values supporting individual preferences over community/family preferences (in conjunction with increasing individual resources greater democracy) has generated greater individual choice. Assuming few people were constrained to marry heterogamously, an increase in individual choice would probably result in a decline heterogamy. Thus, the ideals of equality and freedom reduce the significance of race, religion and education boundaries, thereby promoting the observed decline in homogamy.

Several limitations to our conclusions are imposed by the data available. Conclusions regarding religion are tempered by the measurement of religion at the time of the survey and religion is not included in the PNAD. The analysis reported here is sufficiently complex that we have not included region in the analysis. Given the different educational, racial and religious compositions of regions, patterns of intermarriage are likely to vary across regions. Nevertheless, the trends we document are substantial and deserve continued analysis.

Race, education and religion each shape the mate selection process in important and complex ways in Brazil. Although race appears to be less of a boundary in Brazil than in other contexts, it is still important. Social class, as indexed by education, is about as important as race in Brazil. Religion plays an even greater role. Even though the constraints formed by race, education and religion appear to be weakening, they continue to provide important contexts for the most intimate of personal decisions.

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Table 1. Cross-classification of Husband's Race by Wife's Race in Brazil: 1991-2008 (couples under age 35)				
1991 Census	Wife's Race:			
Husband's race:	White	Black	Brown	Total
White % (n)	82.1 223678	1.4 3820	16.5 44845	100.0 272343
Black % (n)	23.3 6017	43.6 11251	33.2 8564	100.0 25832
Brown % (n)	27.4 62310	2.4 5535	70.1 159212	100.0 227057
2000 Census				
White % (n)	75.6 224987	3.1 9193	21.3 63247	100.0 287427
Black % (n)	31.8 12855	36.4 14705	31.8 12874	100.0 297427
Brown % (n)	31.7 77139	3.3 8072	65.0 158231	100.0 243472
2001 PNAD				
White % (n)	75.3 8350	2.2 239	22.6 2501	100.0 11090
Black % (n)	23.5 342	44.6 649	31.9 464	100.0 1455
Brown % (n)	26.3 2886	2.4 263	72.5 7833	100.0 10982
2008 PNAD				
White % (n)	64.2 5893	4.5 411	31.3 2872	100.0 9176
Black % (n)	26.9 510	33.9 644	39.2 745	100.0 1899
Brown % (n)	28.8 3125	5.2 569	66.0 7161	100.0 10855

Table 2. Cross-classification of Husband's Education by Wife's Education in Brazil: 1991-2008 (couples under age 35)						
1991 Census	Wife's Education					
Husband's education	None	Lo Primary	Hi Primary	Secondary	College	Total
None % (n)	44.3 32409	47.4 34688	6.4 4706	1.8 1319	0.2 114	100.0 73236
Lo Primary % (n)	9.6 21764	63.6 143910	18.5 41866	7.6 17234	0.7 1519	100.0 226293
Hi Primary % (n)	2.5 2747	35.9 39546	38.4 42248	20.7 22727	2.5 2736	100.0 110004
Secondary % (n)	0.9 777	15.6 13481	27.2 23533	46.6 40346	9.8 8480	100.0 86617
College % (n)	0.4 112	5.0 1460	9.7 2835	36.4 10596	48.4 14079	100.0 29082
2000 Census						
None % (n)	25.9 11024	60.1 25616	10.3 4384	3.5 1491	0.3 116	100.0 42631
Lo Primary % (n)	4.7 11857	59.1 147858	23.8 59616	11.6 29054	0.8 1985	100.0 250370
Hi Primary % (n)	1.3 1779	30.2 42040	40.2 55927	26.0 36155	2.3 3235	100.0 139136
Secondary % (n)	0.5 613	14.1 17139	26.5 32138	50.4 61123	8.5 10291	100.0 121305
College % (n)	0.3 73	4.2 1185	8.9 2470	36.2 10109	50.4 14054	100.0 27891
2001 PNAD	0 years	1-5 years	6-10 years	11 years	12-15	total
0 years % (n)	29.8 615	50.8 1048	15.4 318	3.5 73	0.4 9	100.0 2063
1-5 years % (n)	5.9 481	53.9 4388	31.5 2559	7.8 638	0.9 70	100.1 8136
6-10 years % (n)	2.1 156	23.6 1737	50.9 3757	20.2 1489	3.2 235	100.1 7374
11 years % (n)	0.9 37	8.1 328	31.1 1262	47.6 1933	12.3 498	100.0 4058
12-15 years % (n)	0.2 3	2.0 28	11.4 159	32.2 449	54.2 755	100.0 1394
2008 PNAD						
0 years % (n)	21.0 246	45.8 536	23.3 273	8.9 104	0.9 11	100.0 1170
1-5 years % (n)	4.1 214	39.3 2037	38.2 1980	16.6 860	1.9 97	100.0 5188
6-10 years % (n)	1.9 128	15.6 1068	48.0 3281	30.4 2074	4.1 281	100.0 6832
11 years % (n)	0.8 53	4.5 286	25.2 1584	54.9 3454	14.6 916	100.0 6293
12-15 years % (n)	0.2 4	0.8 18	5.9 129	29.0 633	64.1 1401	100.0 2185

1991 Census:		Wife's Religion				
Husband's Religion	Catholic	Historical Protestant	Other Christian	Afro-Brazilian	None	Total
Catholic %	96.4	0.4	2.1	0.4	0.6	100.0
n	426558	1901	9190	1984	2673	442306
Historical Protestant %	16.3	79.5	2.2	0.4	1.7	100.0
n	975	4765	130	22	104	5996
Other Christian %	9.5	0.4	88.6	0.2	1.4	100.0
n	3785	159	35252	60	550	39806
Afro-Brazilian %	26.7	0.5	1.7	67.2	3.8	100.0
n	1657	34	105	4166	234	6196
None %	31.3	2.4	11.3	2.3	52.7	100.0
n	9684	747	3491	721	16285	30928
2000 Census:						
Catholic %	93.4	0.8	4.1	0.5	1.3	100.0
n	400639	3273	17369	1969	5475	428725
Historical Protestant %	9.6	85.9	2.6	0.3	1.6	100.0
n	1216	10885	330	40	206	12677
Other Christian %	8.5	0.5	88.8	0.1	2.0	100.0
n	6504	390	67710	106	1557	76267
Afro-Brazilian %	25.9	0.9	3.1	64.4	5.7	100.0
n	1463	52	175	3637	321	5648
None %	27.1	3.1	16.8	1.5	51.5	100.0
n	15741	1826	9744	845	29860	58016

Table 4. Goodness of Fit Statistics for Log-linear Models for the Cross-classification of Husband and Wife Characteristics						
Model	1991, 2000 Censuses			2001, 2008 PNAD		
	χ^2_{LR}	d.f.	Δ as % of M1	χ^2_{LR}	d.f.	Δ as % of M1
M1. Independence of husband and wife characteristics	1722058.7	10952	--	33647.6	392	--
M2. General homogamy and change in homogamy	284269.6	10946	83.5	11728.0	388	65.1
M3. Group specific homogamy and change in group specific homogamy	191241.4	10926	5.4	7582.5	376	12.4
M4. M3 plus educational gradient and change in educational gradient	39478.4	10924	8.8	2206.9	374	15.9
M5. M4 plus religious heterogamy and change in religious heterogamy	37471.3	10916	0.1	--	--	--
M6. M4 plus interactions between husband's education and group specific homogamy	32359.3	10908	0.4	1732.8	368	1.4
M7. M4 plus interactions between wife's education and group specific homogamy	35485.6	10908	0.2	2054.3	368	0.5

Table 5. Parameters from Log-linear Models 2 and 3 Examining Racial, Educational and Religious Homogamy

M2. General homogamy	Race		Education		Religion					
	Census	PNAD	Census	PNAD	Census					
Homogamy	1.650	1.235	1.292	1.072	3.283					
Homogamy*year	-.283	-.374	-.154	-.019 ^{ns}	-.245					
M3. Group specific homogamy	Race									
	White		Black		Brown					
	Census	PNAD	Census	PNAD	Census	PNAD				
Homogamy	2.407	1.331	3.547	2.883	.599	.816				
Homogamy*year	-.669	-.357	-.669	-.997	.130	-.308				
	Education									
	none		Low primary		High primary		secondary		Post-secondary	
	Census	PNAD	Census	PNAD	Census	PNAD	Census	PNAD	Census	PNAD
Homogamy	1.990	2.107	.713	1.073	.700	.340	1.577	1.317	2.927	2.921
Homogamy*year	.028 ^{ns}	.129 ^{ns}	.148	.136	-.239	-.043 ^{ns}	-.201	-.363	.043	-.083 ^{ns}
	Religion									
	Catholic		Historic Protestant		New Protestant		Afro-Brazilian		None	
Homogamy	2.805		4.048		3.805		3.356		3.229	
Homogamy*year	-.143		.265		-.435		.211		-.502	

Table 6. Log-linear Parameters for Models 4 and 5 Examining Heterogamy					
		Census	PNAD		
Education gradient		-1.263	-.969		
Change in education gradient		.085	-.051 ^{ns}		
Religious intermarriage (Census only)					
	Catholic-Historical Protestant	Catholic-Afro Brazilian	Other Christian-Afro Brazilian	Other Christian-none	
parameter	1.059	.930	-1.105	-.531	
change	-.222	-.063 ^{ns}	.147 ^{ns}	.134	

Table 7. Effects of Education on Homogamy from Models 6 and 7.

Interaction of Education and:	Husband's characteristics				Wife's characteristics			
	Census		PNAD		Census		PNAD	
	parameter	change	parameter	change	parameter	change	parameter	change
White	.176	.032	.382	-.082	.038	.066	.191	.007 ^{ns}
Black	.107	-.105	-.126	-.034 ^{ns}	.086	-.042	-.122 ^{ns}	.086 ^{ns}
Brown	-.161	.001 ^{ns}	-.148	.056 ^{ns}	-.010 ^{ns}	-.043	-.083	.016 ^{ns}
Catholic	-.198	.030	--	--	-.205	.044	--	--
Historical Protestant	-.295	.079	--	--	-.351	.140	--	--
New Protestant	-.176	.091	--	--	-.111	.072	--	--
Afro-Brazilian	-.128	-.129	--	--	-.307	-.083	--	--
No religion	-.143	.057	--	--	-.336	.089	--	--