

A Critique of Exchange Theory in Mate Selection¹

Michael J. Rosenfeld
Stanford University

Status-caste exchange theory predicts that in interracial marriages one partner's socioeconomic status is exchanged for the other's racial caste status. The author examines the contradictory literature on the theory specifically in relation to black-white intermarriage and offers three explanations for the divergent findings. First, black-white inequality has obscured the actual status homogamy typifying intermarriage. Second, gender differences among young couples have been mistaken for racially specific patterns of exchange. Third, the empirical findings that appear to support status-caste exchange are not robust. The author's conclusions favor the simplest tabular analyses, which cast doubt on status-caste exchange theory.

Several decades ago William Goode (1970, p. 8) wrote that "all courtship systems are market or exchange systems." Goode's claim only slightly exaggerates the influence of the market metaphor in scholarship about mate selection. More recently the influence of market, exchange, and utility-maximizing theories of the family have increased as the new economics of the family has gained more adherents (Becker 1991; England and Farkas 1986). "The marriage market" is an alliterative and ubiquitous phrase whose underlying assumptions are too rarely scrutinized.

One form of exchange theory predicts that men with high status and earnings should marry women of great physical beauty (Elder 1969; Waller 1937; Goode 1951; Taylor and Glenn 1976) and that the union between

¹ Thanks are due to Zhenchao Qian and Matthijs Kalmijn for help replicating their results, and to those who have provided comments on earlier drafts: Nancy Tuma whose comments were especially thorough, Robert Freeland, Noah Mark, Cecilia Ridgeway, Monica McDermott, Doug McAdam, Mark Granovetter, Susan Olzak, Aaron Gullickson, Kenny Dinitz, Steven Stigler, and *AJS* reviewers. Any remaining errors of fact or emphasis are mine. See <http://www.stanford.edu/~mrosenf> for additional data sets and supplementary materials regarding this work. Direct correspondence to Department of Sociology, Stanford University, 450 Serra Mall, Building 120, Stanford, California 94305. E-mail: michael.rosenfeld@stanford.edu

two such individuals is supposed to represent an exchange of the man's economic resources for the woman's youth and attractiveness. In a second form of exchange theory, men with excellent labor-market skills are predicted to marry women with especially strong domestic skills (Becker 1991). The influence of these forms of exchange theory has declined somewhat as women have entered the labor force in greater numbers and as the traditional nuclear family of working husbands and dutiful housewives has lost some of its central dominance in American family life.

In a third form of exchange theory, whites of relatively low socioeconomic status (SES) marry blacks of higher SES in an exchange of racial caste position for economic resources and status (Davis 1941; Merton 1941; Schoen and Wooldredge 1989; Kalmijn 1993; Qian 1997; Fu 2001). This third form of exchange theory, status-caste exchange, has been especially popular in the recent literature on racial intermarriage.

In this article I examine the theoretical and empirical bases for status-caste exchange. Despite the claims of many researchers, including a wave of recent technically sophisticated research, I show that the empirical support for status-caste exchange is not as strong as it appears to be. Simple educational homogamy (i.e., the tendency for mates to have similar educational backgrounds) is the dominant educational marriage pattern, regardless of the race of either spouse.

STATUS-CASTE EXCHANGE AS FIRST PROPOSED

A pair of articles in 1941 by sociological giants Kingsley Davis (1941) and Robert Merton (1941) introduced the idea of status-caste exchange. Merton and Davis based their theory on the literature about the Hindu caste system of India. Both Merton and Davis argued from purely theoretical grounds that status-caste exchange should have substantial relevance for marital choices in the United States, especially marriage between whites (the high-caste group) and blacks (the presumed low-caste group). According to Merton, blacks with low SES would hardly ever marry whites with high SES, but blacks with high SES might sometimes marry whites with low SES. According to Merton, marriage between high-status blacks and lower-status whites would represent a kind of informal exchange; that is, the higher SES of the black spouse would directly compensate the white spouse for the loss of social standing that the white spouse would experience for having thrown their lot in with black society.²

² Status-caste exchange theory has an influential if implicit place in U.S. culture. The first and most famous major Hollywood movie about interracial marriage was Stanley Kramer's 1967 *Guess Who's Coming to Dinner*. The movie starred Sidney Poitier as the dashing and accomplished black doctor about to accept a senior position with the

The status-caste exchange arguments of Merton (1941) and Davis (1941) are two early examples of what Ekeh (1974) refers to as *dyadic exchange*, and what Lévi-Strauss ([1949] 1969) referred to as *restricted exchange* (for more recent examples of dyadic exchange theories see Homans [1961] and Blau [(1964) 1986]). Dyadic exchange theories of mate selection contradict the fundamental finding of the mate selection research, which is that people find mates who are similar to themselves in status, class, and education (Mare 1991; Kalmijn 1998); religion (Johnson 1980; Kalmijn 1991a; Kennedy 1952); as well as race (Heer 1974; Kalmijn 1993; Lieberman and Waters 1988; Qian 1997). In other words, married partners tend to be the same on every dimension except gender. The exchange arguments of Merton (1941) and Davis (1941) require marriage partners to be different in at least two key dimensions (other than gender); without differences the “exchange” cannot take place. Exchange theorists are aware of the importance of homogamy, and they have their own perfectly reasonable explanation for status homogamy (Elder 1969; Goode 1951), which I discuss below.

The influence of status-caste exchange theory derives in part from the extraordinary intellectual reputations and broad achievements of both Merton and Davis. The empirical case for status-caste exchange, however, rests entirely on more recent work by other scholars because only “scanty” data were available in 1941 (Merton 1941, p. 364).

AN EMPIRICAL PARADOX

Ethnographic studies of interracial marriage in the United States have emphasized homogamy and solidarity between spouses and have been explicitly critical of status-caste exchange theory (Porterfield 1978; Root 2001; and especially Spickard 1989). Most black-white racial intermarriages are educationally homogamous, and simple tabular analyses have shown this to be true throughout the 20th century (Wirth and Goldhamer 1944; Bernard 1966; Heer 1974; Gadberry and Dodder 1993; Liang and Ito 1999). The fact of status homogamy in interracial couples casts substantial doubt on status-caste exchange theory, since if the husband and wife have the same level of education and social status, the kind of exchange envisioned by Merton (1941) and Davis (1941) cannot take

World Health Organization. His intended bride was a 23-year-old white woman from a liberal family whose father initially opposed the union. The point of the movie was that the couple (an internationally recognized professional black man and a much younger and less accomplished white woman) was well matched, and only the young woman’s family stood in the way of their happiness.

place.³ These methodologically simple studies questioning status-caste exchange theory have been marginalized by recent methodologically sophisticated research which has (with some reservations) endorsed status-caste exchange (Qian 1997, 1999; Kalmijn 1993; Fu 2001; Hwang, Saenz, and Aguirre 1995; Okun 2001; Schoen and Wooldredge 1989). The two literatures, one that uses simple analyses to question status-caste exchange and a second that uses sophisticated methods to support status-caste exchange theory, are difficult to reconcile.

The disagreement between the simple tabular results and the more complex models represents an empirical paradox that can have two possible resolutions. The first possible resolution is that the complex models have captured something important that was too subtle to be apparent in the simple tabular analyses. The second possible resolution is that the complex models have, as a result of inscrutable complexity, overlooked the obvious. Complex models are necessarily more difficult than simple analyses for the reader to interpret. Simple tabular analyses at least have the advantage of transparency. Some argue that the believability of a model is inversely related to its complexity (Freedman 1991; Leamer 1983, 1985), or that the intellectual dominance of statistical models over other forms of inquiry is undeserved (Abbott 1988; Collins 1984; Freedman 1991; Turner 1989). Model complexity has been a special problem in the intermarriage literature (Kalmijn 1998).

The key question is not whether a single model can be found that produces certain results, but whether the result would be consistent across a range of reasonable models (Leamer 1983) and across a range of different types of models, with different assumptions about functional form and error specification (Berk 1991). That is, are the findings robust or fragile?

Freedman (1983) constructed a simple data set of pure noise and then demonstrated regressions that indicated significant associations between the parameters, an unsurprising result given our usual understanding of statistical significance.⁴ Given the ability of our current generation of computers and software to estimate nearly unlimited numbers of models on data sets with scores or hundreds of variables (Mason 1991) and given the problem of publication bias, which favors positive and significant

³ Merton and Davis's exchange theories were dyadic exchange theories (Ekeh 1974), which are easier to test because the exchange between the two parties is supposed to be direct and reciprocal. Generalized exchange (Ekeh 1974; Lévi-Strauss 1969; Bearman 1997) implies indirect or network exchanges (Yamagishi and Cook 1993). Generalized exchange in marriage markets has mainly been described for small, closed tribal communities (Lévi-Strauss 1969; Bearman 1997).

⁴ If the test of a parameter is significant at the 5% level, this means that if the association the parameter measures were actually zero, we might expect a value for the parameter this far from zero (in either direction) as often as 5% of the time (for two-tailed tests).

findings (Begg and Berlin 1988; Card and Krueger 1995; Iyengar and Greenhouse 1988), it is nearly inevitable that statistically significant findings will be published for parameters where no real association exists.

Enough different authors have published technically sophisticated results supporting status-caste exchange that one might imagine that the findings must be robust indeed. There is, however, room for skepticism. Kalmijn (1993) and Qian (1997), whose findings support status-caste exchange are cautious about their findings. Black-white intermarriages still represent a tiny fraction of the population of married couples, usually less than 1%. Analysis of the patterns of educational mating among the black-white intermarried couples can only take place within an analysis of the overall trends in educational intermarriage. Because black-white marriages are such a small fraction of the overall married population, differences in how intermarriage is modeled at the general level can have an inordinate impact on findings for the special case of black-white intermarriage.

Freedman (1991) is especially critical of empirical exercises that attempt to measure secondary forces (see Freedman's discussion of Kanarek et al. [1980]). If the identified factor appears to increase cancer rates by 10 times (such as the effect of smoking on lung cancer), then we may have more confidence in the results. If the identified factor is thought to increase cancer rates by only 5%, then the results must be viewed with great skepticism regardless of the presence of statistically significant parameters. It is not that secondary forces cannot be important—they can be. Something that truly increased the risk of cancer by 5% might be an important subject for public health policy. The problem with secondary forces is that they are much harder to distinguish from the background noise. In the marriage market, educational homogamy and racial endogamy are the major forces. Status-caste exchange is a potentially secondary force that must be subjected to careful scrutiny if we are to have confidence that it is nonzero.

The literature that has endorsed status-caste exchange has generally not denied the importance of status homogamy, and in fact the force of status or educational homogamy is so great (like the effect of smoking on lung cancer) that it cannot be practically denied. The literature on status-caste exchange, starting with Merton (1941), has argued that status-caste exchange is simply another force, or an additional force, in the marriage market. My argument is that status homogamy is indeed a central force (a point on which nearly all authors agree) but that status-caste exchange is in fact probably not a factor at all.

The increasing frequency of citations of Merton (1941) and Davis (1941) is an indication that in the 60 years since their articles were published, status-caste exchange theory has never been conclusively debunked. The

empirical critiques of status-caste exchange, based as they are on simple tabular analyses, have been overlooked and marginalized precisely because of their simplicity. Bernard's (1966) classic research note is only three pages long and consists mostly of tables. Heer (1974) found no evidence for status-caste exchange but expressed doubt about his own findings. Wirth and Goldhamer's (1944) findings against status-caste exchange were reinterpreted by Drake and Cayton ([1945] 1993) as evidence *for* status-caste exchange. In this article I examine both sides of the empirical paradox of status-caste exchange.

Simple tabular analyses.—Following Freedman's (1991) and Mason's (1991) call for simpler analyses, I present tabulations of educational attainment for black-white couples. In addition, I examine census data from 1910 to 2000 using a variety of basic measures of SES for racially intermarried and racially endogamous couples. These analyses revisit the straightforward methods of Wirth and Goldhamer (1944), Bernard (1966), and Gadberry and Dodder (1993) but with wider temporal scope and a greater variety of measures of status.

Complex models.—The substantial critical literature on quantitative analyses in the social sciences demands that results be subjected to analyses of sensitivity and robustness to assumptions (Berk 1991; Blalock 1989, 1991; Freedman 1983, 1987, 1991; Leamer 1978, 1983, 1985; Lieberman 1985).⁵ Following the prescriptions of this critical literature, I test the hypotheses of status-caste exchange with multivariate models in four ways. First, I test status-caste exchange with a series of log-linear models that make different assumptions about the general patterns of educational intermarriage. Log-linear models are the leading methodology for analysis of cross-tabulated marriage data (Botev 1994; Hout and Goldstein 1994; Kalmijn 1991a, 1991b, 1993, 1998; Pagnini and Morgan 1990; Rosenfeld 2001; Sandefur and McKinnell 1986).⁶ Second, I reexamine the tests of status-caste exchange in these same models using robust standard errors for the parameters instead of the ordinary standard errors. Third, I test status-caste exchange with negative binomial instead of log-linear models. Fourth, I reexamine the findings of Fu (2001) and Qian (1997), two intermarriage discussions that used national-level data and log-linear models and that endorsed status-caste exchange theory.

⁵ Leamer (1978) has in mind a very specific kind of formal sensitivity testing with Bayesian underpinnings, which has adherents and detractors (see McAleer, Pagan, and Volker 1985).

⁶ Another important methodological strain of research was pioneered by Robert Schoen (Schoen 1986, 1988; Schoen and Wooldredge 1989).

STATUS-CASTE EXCHANGE DEFINED AND DISTINGUISHED FROM STATUS HOMOGAMY

Merton (1941) and Davis (1941) defined hypergamy as women “marrying up” in caste and hypogamy as men “marrying up” in caste, so black-white intermarriage would either be hypergamy or hypogamy depending on whether the wife or husband was black.⁷ In place of gender-specific terminology, I will use the phrase “status-caste exchange” to describe all cases of intermarriage between blacks and whites where blacks have or are presumed to have higher status. I will take up the question of gender differences as a separate matter. By “status,” I will mean class or SES. I use “caste” the way it was used by Merton and Davis, to indicate position within a carefully defined hierarchy of racial groups that are separated by nearly impermeable social barriers. The low-caste group is simply the group whose members face discrimination and barriers to advancement. In the 20th-century United States, blacks are the low-caste group.

Figure 1 is a schematic representation of status-caste exchange. The higher-caste group (whites) tends to have greater opportunities to exploit its talents, so its achieved status tends to be higher than that of the lower racial caste group (blacks). The key prediction of status-caste exchange theory is that when intermarriage happens, it will take place between high-achieving persons of the low-caste group, and low-achieving persons of the high-caste group. The assumption is that potential spouses of the same race and the same status are available. Merton and Davis puzzled over the problem of why a white person would marry a black person (given all the disadvantages of being black in America) when potential white spouses were available. According to the theory, the main reason a white person would choose a black spouse over a potential white spouse was that the black spouse had substantial extra endowments of skill, achievement, money, or fame. It is important to note that the high-status black spouse in figure 1 is not only high status when compared to most other blacks, but also has higher status than their white partner. It is the status gap between the partners that forms the basis of the “exchange” in status-caste exchange theory (Davis 1941; Merton 1941; Kalmijn 1993; Qian 1997).

I focus on black-white intermarriage for the same reasons that Davis and Merton did. Among all types of intermarriage in the United States, black-white intermarriage is the most important because the black-white division is the deepest and most enduring division in U.S. society (Massey

⁷ In the Indian caste examples that Merton and Davis cite, hypergamy is much more common than hypogamy, while in the United States hypogamy is more common (there are many more black men married to white women than black women married to white men).

Exchange Theory in Mate Selection

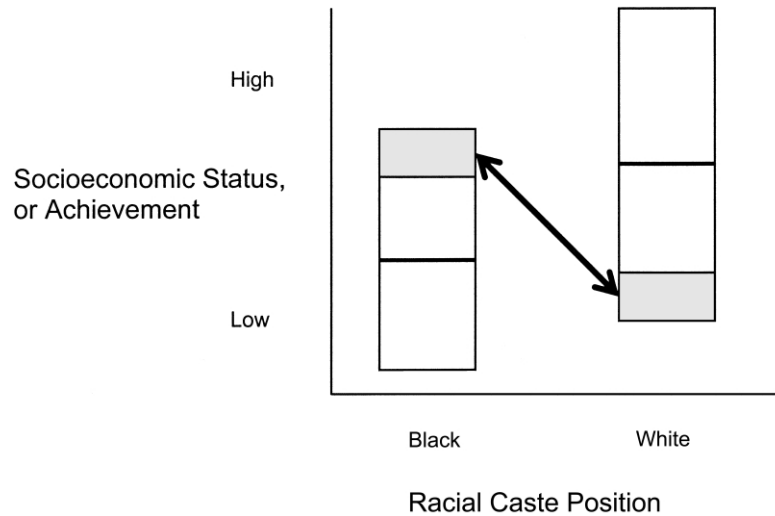


FIG. 1.—Status-caste exchange (diagonal arrow represents exchange)

and Denton 1993; Lieberman and Waters 1988; Myrdal, Sterner, and Rose 1944; White 1988). If intermarriage entails an exchange of social status for caste position, this exchange should be most pronounced for black-white intermarriage.

Figure 2 shows the intermarriage pattern based on status homogamy. In figure 2, people tend to seek out and marry partners with similar levels of education or achievement or SES to their own. Status homogamy has long been one of the organizing principles of mate selection (Kalmijn 1991a, 1991b), and figure 2 merely applies this principle to interracial marriages. Status-caste exchange theory and status homogamy theory make divergent and incompatible claims about the relative status of spouses in interracial marriages:

HYPOTHESIS 1.—*According to status-caste exchange, black spouses have higher SES or higher achievement than their white partners.*

HYPOTHESIS 2.—*According to status homogamy, spouses in racial intermarriages have similar levels of SES or achievement.*

If hypothesis 1 is correct, then status-caste exchange should decline over time as the racial boundaries in American society have declined (Wilson 1980). In other words, the empirical bases for status-caste exchange should be stronger in the 1940s when Davis and Merton wrote their seminal articles, and weaker in the post-civil rights era as racial intermarriage has become more common (Okun 2001).

Corollary to hypothesis 1.—*The empirical evidence for status-caste*

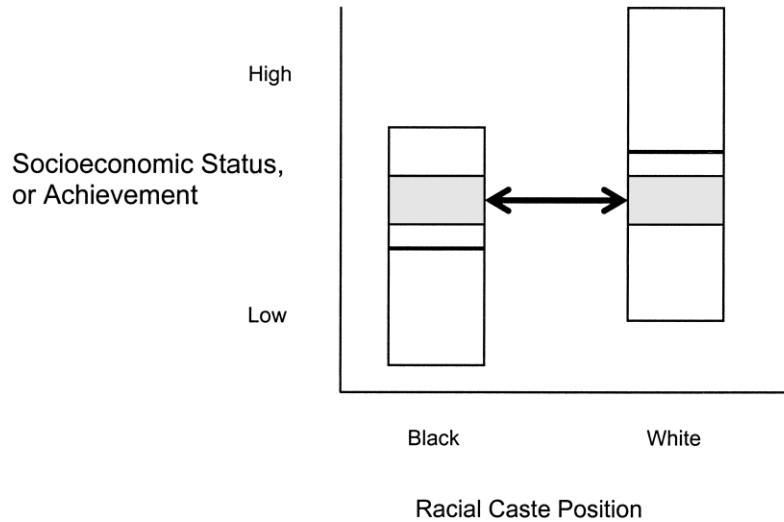


FIG. 2.—Status homogamy across racial caste groups (horizontal arrow represents status homogamy).

exchange should be especially strong in the pre-civil rights era, when racial caste boundaries were strongest.

A generalized exchange theory (Ekeh 1974; Levi-Strauss 1969; Bearman 1997) for interracial marriage would make different assumptions than the dyadic exchange theory posited by Merton (1941) and Davis (1941). In generalized exchange, it would be possible for an exchange to take place even if the black-white intermarried spouses had equal status. The inequality between whites and blacks in the United States could lead whites to be more appreciated in the black community, where their income and status would be comparatively more impressive. Under such a hypothesis we would expect black society to celebrate cases of outmarriage to whites, because such marriages would bring whites (whose education and status are above the median for blacks) into the black community. The ethnographic evidence, however, shows that intermarried couples tend to be viewed unfavorably by both racial communities (DuBois [1899] 1996; Root 2001; Porterfield 1978). Given the lack of empirical or theoretical support for generalized exchange in the context of the U.S. marriage market, I operationalize status-caste exchange the way its advocates have—as an example of dyadic exchange.

HOW STATUS HOMOLOGY CAN BE MISTAKEN FOR STATUS-CASTE EXCHANGE

Because whites have had on average higher socioeconomic status than blacks in the United States, the SES of interracial couples whose spouses have identical status appears different from the perspective of the two groups. The same objective level of SES may appear to be “low status” when compared to other whites, but “high status” when compared to other blacks. In figure 2, both spouses in the symbolic interracial couple share the same SES, yet this level of status is below the median (represented by the thick line in the middle of the box) of white status and above the median of black status.

Given the taboo of intermarriage (especially in the past) and the social distance between blacks and whites, and given the way that interracial couples were shunned by both communities, perfect information about such couples would not necessarily be known. Each community would know about their half of an intermarried couple. Blacks would know that relatively high-standing blacks had married out. Whites would perceive that whites of relatively low standing had married out. With imperfect or incomplete information, the combination of the two racial perspectives might lead to a popular perception that low-status persons of the dominant racial caste group are marrying high-status persons of the lower racial caste group, even in the absence of status-caste exchange. The difference between relative and objective status may be why Drake and Cayton (1993) and Wirth and Goldhamer (1944) came to different conclusions about status-caste exchange with the same data.

Observation.—*In a climate of inequality between groups, homogamy can be easily mistaken for exchange.*⁸

THEORETICAL BASES FOR EDUCATIONAL HOMOLOGY

In lieu of status-caste exchange, I argue that educational homogamy, along with some minor variations in homogamy that are not specific to black-white intermarriage, explain the educational patterns of black-white in-

⁸ The claim made by Elder (1969) and Taylor and Glenn (1976) is that high-status men marry women who are especially attractive. The classic articles by Elder and Taylor and Glenn both fail to take the husband’s attractiveness into account. Both Elder and Taylor and Glenn note that attractiveness is correlated with social class. Therefore it is quite possible that the more prosperous young men were also the most dashing and “attractive,” and so what was supposed to have been an “exchange” between people of unequal “attractiveness” may have instead been relationships that were homogamous with respect to attractiveness; see Buston and Emlen (2003).

termarriage. It is important to consider, briefly, what might be the theoretical bases of educational homogamy (see also Kalmijn 1998).

Individual utility maximization or exchange.—It is ironic perhaps, but some of the most articulate explanations for status and educational homogamy have come from the exchange literature (see, e.g., Elder 1969; Goode 1951). According to this explanation, every individual seeks to make the best possible bargain or exchange by mating with the spouse that has the highest possible SES, or the greatest promise for future earnings.⁹ The desire of every individual to make the best possible match results in homogamy, as the highest-status man and woman mate with each other, and the second-highest man and woman mate with each other, and so on. People at the bottom of the status hierarchy mate with each other only because no better options remain. One prediction of the exchange theory is that individuals with higher educational attainments should always be more desirable mates, other things equal, than individuals with lower educational attainments. The exchange theories usually imply that the values of all potential spouses are knowable and can be scaled onto one dimension (England and Farkas 1986, chap. 3).¹⁰

Affinity.—Education implies certain kinds of tastes and lifestyles and cultural preferences that define a social circle that is closed to outsiders (Bourdieu [1979] 1984). Assuming that marriage is more than a unit for the division of labor and for profit maximization, but also a bond of solidarity and empathy and compassion, then it seems natural that people should seek as mates persons with whom they have a strong personal affinity (Buston and Emlen 2003). According to affinity theory, adults with high school educations marry each other because they enjoy each other's company, not because they have been rejected by the lawyers and doctors. Although William Goode (1951, 1970, 1971) was an energetic promoter of exchange theories of homogamy, in his later work (1971, p. 21) he recognized the importance of affinity as well: "The talented young

⁹ Status-caste exchange theory is consistent with the spirit of Gary Becker's (1991, chap. 4) discussion of assortative mating. Becker assumes that assortative mating will take place when attributes of the spouses are complementary, but as Ben-Porath (1982) notes, Becker's production function of family goods is rather vague.

¹⁰ Ellis and Kelley (1999) describe a simple experiment which they call "the pairing game." In the experiment subjects are given a card with a number on it. Subjects can see others' numbers, but not their own. Subjects are then asked to find the partner with the highest possible number, and pair off with them. The experiment very quickly results in assortative pairing, as the people learn to estimate their own number from others' reactions. The experiment shows how bargaining or exchange can lead to assortative mating, but only if potential mates can be easily scaled on one ordinal dimension, and only if everyone places the same value on every other potential mate in the society.

assistant professor . . . may seem attractive to his female students, but he may appear pretentious, unmanly, and boring to a lower-class woman.”

Proximity and exposure.—Education is also a physical reality taking place in actual classrooms and on campuses (Mare 1991). The educational system creates educational homogamy by grouping young people together based on educational level and taking them away from their family’s supervision. Social theorists (Blau 1977;¹¹ Blau and Schwartz 1984; Feld 1981) argue that personal and intimate social networks are built around social structures (like education) which divide and stratify us. The college experience, and to a lesser extent the high school experience, creates educational homogamy not only among the general class of similarly educated young people, but also within each individual campus and classroom.

My empirical analyses do not distinguish between different possible sources of educational homogamy. I present the different sources here in order to indicate that exchange is not the only explanation for educational homogamy. Educational homogamy theory, like other forms of homogamy and endogamy, are not deterministic; in other words, they do not assume that all couples marry homogamously.

THE DATA

I use many different census samples derived from the coherent U.S. census microdata files from the Integrated Public Use Microdata Series (IPUMS; Ruggles et al. 2004), which allow much easier cross-census comparisons than was previously possible. I will explain the particulars of the different samples as they are introduced in the text below. Following convention, black and white categories will include only non-Hispanic blacks and non-Hispanic whites, except for the analysis that includes data from before 1970 when Hispanic self-identification was introduced in the census (Bean and Tienda 1987).

Census data record prevalence in the population at time of each decennial census survey. Observers who have written about black-white intermarriage, such as Davis (1941) and Merton (1941), who have not had access to computerized census records, would have most likely based their

¹¹ Blau’s (1977) *Inequality and Heterogeneity* emphasizes the role of homogamy (by race and by status) in human affairs, which perhaps should have made Blau suspicious of status-caste exchange, but Blau’s work is also fundamentally rooted in what Ekeh (1974) refers to as dyadic exchange theory, which predisposed him to assume status-caste exchange was correct. In subsequent work that was less influenced by exchange theory, Blau and Schwartz (1984) studied mate selection without making any mention of status-caste exchange.

observations on the couples they could observe; this would correspond to a prevalence sample of couples. Nonetheless, prevalence data are potentially problematic because different rates of marital dissolution could lead the prevalence sample to be a biased estimate of marital incidence. There is some evidence that intermarried blacks and whites have higher rates of divorce than racially endogamous whites (Kreider 1999). Researchers have addressed this problem by relying on young married couples, who presumably have had less exposure to marital dissolution bias (Qian 1997; Rosenfeld 2001; Fu 2001). The problem with relying on young couples, however, is that their educational attainment (the master variable that authors have used as a proxy for status) is potentially unfinished. A better proxy for marital incidence is to use recently married couples of all ages. Because age at first marriage is available in the 1980 but not the 1990 or 2000 censuses, my analysis will rely heavily on the 1980 census.

STATUS COMPARISONS BASED ON SUMMARY STATISTICS

Table 1 presents summary statistics on the relative educational attainment of spouses in black-white racial intermarriages from the U.S. census and from the published data of Kalmijn (1993), Qian (1997), and Fu (2001). Table 1 divides the black-white intermarried couples into three categories, by the relative education of the spouses. The first category contains couples with the same levels of education, the second category includes the couples whose black spouse has more education, and the third category includes couples whose white spouse has more education. In each of the three cited cases about half of the racially intermarried couples had the same level of education. Of the remaining half, the percentage of couples whose black spouse had more education is slightly larger than the percentage of couples whose white spouse had more education: 24.5% to 22.7% in Kalmijn (difference of 4.8%), 27.5% to 23.1% in Qian (difference of 4.4%), and 26.5% to 23.4% in Fu (difference of 3.1%). In each case the advantage of black spouses is small but statistically significant, and the differences all favor the hypothesis of status-caste exchange.

In every one of the data samples in table 1, the number of black-white couples is less than 1% of the total number of couples (sample size of all couples is not shown on table 1). The data published by Kalmijn, Fu, and Qian (table 1) offer *prima facie* evidence for status-caste exchange, not as a dominant force, but rather as a potentially important secondary force.¹²

¹² Merton's (1941, pp. 372–73) predictions about the relative frequency of different status patterns in interracial couples were that couples whose black spouse had more education or status (Merton's type 14) should be the largest group, and couples whose

TABLE 1
AGE AND APPARENT STATUS-CASTE EXCHANGE

SOURCE, YEARS OF DATA AND TIME OF MARRIAGE, NO. OF EDUCATIONAL CATEGORIES	AGE RANGE	RELATIVE EDUCATION OF SPOUSES			N OF COUPLES	% STATUS- CASTE EXCHANGE
		Equal	Black Spouse More	White Spouse More		
Published data that support status-caste exchange:						
Kalmijn (1993), 1970–86, 4 categories	16–34	49.8	27.5	22.7	7,107	4.8***
Qian (1997), 1980–90, 4 categories	20–29	49.4	27.5	23.1	2,083	4.4**
Fu (2001), 1990, 4 categories	< 35	50.1	26.5	23.4	2,449	3.1*
Young couples with the maximum number of educational categories:						
1980, 23 categories	20–29	33.9	37.6	28.5	1,126	9.1***
1990, 17 categories	20–29	41.9	29.9	28.2	1,084	1.7
2000, 17 categories	20–29	42.4	29.9	27.6	1,570	2.3
All ages census data showing no support for status-caste exchange:						
1980, 23 categories	All ages	28.6	35.0	36.5	4,527	-1.5
1990, 17 categories	All ages	33.1	31.7	35.2	6,907	-3.5**
2000, 17 categories	All ages	34.8	31.0	34.2	11,298	-3.2***
Status-caste exchange for young couples declines as cohorts age:						
1980, 9 categories	20–29	43.5	32.1	24.4	1,126	7.7***
1990, 9 categories	30–39	48.0	26.6	25.4	1,580	1.2
Duration of marriage has little effect on status-caste exchange:						
1980, 23 categories	All ages	28.6	35.0	36.5	4,527	-1.5
1980, married before 1970, 23 categories	All ages	26.0	34.8	39.2	1,920	-4.4*
1980, married 1970–80, 23 categories	All ages	30.5	35.1	34.5	2,607	.6
1980, married 1979–80, 23 categories	All ages	33.3	32.8	33.9	345	-1.2

NOTE.—Support for status-caste exchange in *italic*. % status-caste exchange here is simply defined as the difference between “% black more” and “% white more.” Except for Kalmijn, all data are from U.S.-born persons from U.S. census microdata (unweighted), and black is non-Hispanic black, and white is non-Hispanic white. Kalmijn’s sample is all ages standardized to 16–34 age group, selected states, data from the National Center for Health Statistics.

* $P < .05$, two-tailed tests.

** $P < .01$.

*** $P < .001$.

The data samples from Kalmijn, Fu, and Qian understate somewhat the extent of educational differences such as status-caste exchange because they rely on a reduced set of educational categories. The smaller the number of categories, the more likely any two people are to be in the same category. The reduced set of educational categories are a requisite for estimating log-linear models (Agresti 1990). For the purposes of table 1, no such restrictions are necessary, and so I use the 5% census samples from 1980, 1990, and 2000 with the maximum number of educational categories available in each census (17 categories in the 1990 and 2000 censuses, 23 categories in the 1980 census, 9 categories when comparing 1980 and 1990¹³) so as to maximize the sensitivity with which status-caste exchange is measured. Using the maximum number of educational categories for young couples in 1980, table 1 shows a 9.1 percentage gap favoring status-caste exchange. The educational gaps between young blacks and their young white spouses were not statistically significant in 1990 or 2000.¹⁴

Among the data sets that are restricted to or are weighted to younger couples, the results associated with Kalmijn, Fu, and Qian and the 1980 census support status-caste exchange. In the all-ages samples the educational balance slightly favors the white spouses and rejects status-caste exchange. What could explain why young couples appear to show some evidence for status-caste exchange, but the wider group of couples of all ages shows no such evidence?

People in their twenties are problematic for studies of educational attainment and educational inequality because many are still in school. The research on education and intermarriage generally assumes that educational attainment is a fixed measure of status that predates the wedding, and usually it is, with the exception of young couples.

Husbands tend to be a year or two older than their wives. In black-white intermarriage in the post-1960 era, most of the couples have black husbands and white wives. Of the 1,126 young non-Hispanic black-non-Hispanic white couples from the 1980 census (see table 1), 900 of the couples were non-Hispanic black husbands married to non-Hispanic

white spouse had more education or status (Merton's type 16) should be the smallest group.

¹³ The IPUMS variable for education for 1980 is HIGRADEG. For 1990 and 2000, the variable is EDUC99, and for comparisons between 1980 and 1990 I use EDUCREC. Table 1 includes unweighted census data to preserve consistency with Qian (1997) and Fu (2001); household weighted data yield the same results.

¹⁴ One of the reasons that there appears to be more educational inequality in the 1980 census than in the 1990 census (table 1) is that the 1980 census educational categories are based on years of education, so that college seniors and college juniors are different categories, while the 1990 census education categories were based on degrees (such as the associates' or bachelor's).

white wives. Since the husbands tend to be a little bit older (1.4 years older on average) and since some of the couples are still in school, it is not surprising that the husbands would tend to be further along in school. A college senior marrying a college junior would be an educationally unequal couple at the time of marriage, but if both spouses finish their college degrees the educational inequality is rather temporary.

One may certainly take the inequality between young spouses seriously, even if that inequality is temporary. After all, inequality at the time of marriage may be the most salient and proximate kind of inequality for young couples. The problem is that the gender- and age-based inequalities observed in young couples are not specific to black-white couples. In table 1, for young couples with the maximum number of educational categories from 1980 census data, 37.6% of the black spouses have more education, compared to 28.5% of the white spouses. If we examine the education gap between white husbands and their white wives, we find a similar gap: 34.7% of the white husbands had more education, whereas only 24.2% of the white wives had more education than their white husbands. What at first appears to be an inequality that is specific to black-white intermarriage is actually an artifact of age and gender. One may legitimately wonder why husbands are so commonly older than their wives, or why most black-white intermarried couples have black husbands, but those questions are beyond the scope of this article.

With prevalence data such as the census, one must guard against the possibility of marital dissolution bias. At the bottom of table 1, I present samples of interracial couples from the 1980 census that vary in the duration of their marriage from more than 10 years to less than one year. None of the samples shows any evidence for status-caste exchange. The shorter duration is especially important because this comes as close to marital incidence data as is possible with the U.S. census.¹⁵

Educational Homogamy and Status Homogamy throughout the Century

If status-caste exchange has ever been a factor in black-white marriages in the United States, the force of status-caste exchange should have been strongest and easiest to measure in the past, when the racial caste barriers in the United States were more powerful.

¹⁵ Since age at marriage is only reported in the 1980 census for first marriages, at least one of the spouses must be in their first marriage in order to determine the duration of the marriage. Couples in the last row of table 1 had at least one spouse who was not previously married, and who reported their age at the time of the census and their age at marriage to be the same.

Although the literature on status homogamy and status-caste exchange has relied (for good reasons) almost exclusively on formal education as a measure of social status, the U.S. census provides other measures of status which I present in table 2 for the census years in which they are available. Table 2 contains the summary statistics from 1910–2000 for various measures of the status gap between spouses in black-white intermarriages. In table 2 the “black” and “white” categories include Hispanics to preserve consistency with pre-1970 data; the inclusion of Hispanics increases the number of black-white couples relative to table 1. The couples are U.S.-born married couples of all ages. The measures of social status are years of formal education (available for both spouses in 1940 and 1960–2000), literacy (1910–20), and occupational status (1910–2000 but applies only to the reduced number of couples both of whose partners reported an occupation). In all cases, the “gap” in status is defined as the black spouse’s level minus the white spouse’s level. The educational measure employs the maximum number of educational categories available in each census to allow for maximum sensitivity to differences.

Status-caste exchange theory predicts that black spouses will have higher status than their white partners. Contrary to the expectations of status-caste exchange theory, and regardless of the measure of status used, black-white intermarried couples have had levels of status that were usually indistinguishable. Where small but significant mean status gaps emerge, these have usually favored the white spouse (literacy in 1920; occupational status in 1960, 1980, 1990, and 2000; education in 1960, 1990, and 2000). The only case of significant black advantage compared to their white spouses is occupational status in 1910, for a sample of only 44 couples. Although the data in table 2 include couples of all ages, the absence of status-caste exchange is not an artifact of marital duration or marital dissolution bias. The same results are obtained with 1970 and 1980 data if the sample is limited to recently married couples (available from the author). For older couples who have been out of school for many years, educational attainment might seem to be an ancient and out-of-date measure of status, but the occupational attainment that couples report at the time of the census yields consistent results, that is, no pattern of support for status-caste exchange. Even in the pre-civil rights era when the inequalities between blacks and whites were far greater, there is little evidence of black status advantage in interracial marriages.

The Validity of Different Measures of Status

How much of the actual status inequality between blacks and whites is captured in the census statistics of educational attainment, occupational status, and literacy? If the available statistics do not capture the funda-

TABLE 2
STATUS COMPARISONS FOR BLACK-WHITE MARRIED COUPLES, U.S. CENSUS, 1910–2000

	CENSUS YEAR								
	1910	1920	1940	1950	1960	1970	1980	1990	2000
Census sample <i>N</i>	108	95	469	481	467	530	5,089	7,878	12,208
Mean education gap, years (black spouse – white spouse)			–.09		–.05	–.28*	–.04	–.14***	–.09***
% both spouses have same education			27		21	25	29	33	35
% black spouse has more education			37		41	36	36	33	32
% white spouse has more education			37		39	38	35	34	34
Total			100		100	100	100	100	100
Mean literacy gap (1–4 scale, black – white)	–.1	–.2*							
% both spouses equally literate	80	88							
% black spouse more literate	7	2							
% white spouse more literate	12	9							
Total	100	100							
Mean occupational status gap (1–100 scale, black – white)	4.8**	–2.0	–2.10	1.99	–4.43***	–2.27	–5.17***	–5.59***	–5.21***
<i>N</i> both spouses report an occupation	44	14	68	116	270	395	4,086	6,766	10,389
% both spouses have same status (within 2 points)	30	43	38	28	28	16	15	15	13
% black spouse has higher status (by more than 2 points)	50	36	22	36	29	41	36	35	36
% white spouse has higher status (by more than 2 points)	20	21	40	35	43	44	50	50	51
Total	100	100	100	100	100	100	100	100	100

NOTE.—Support for status-caste exchange is shown in italic. Percentages may not sum to 100 because of rounding. “White” and “black” categories include Hispanics, to preserve consistency with pre-1970 data. Black-white couples include couples of all ages born in the U.S. 1980, 1990, and 2000 samples are 5% samples, prior samples are 1% samples. SES comparisons presented for all available census years; see text.

* $P < .05$, two-tailed tests, null hypothesis of status gap = 0.

** $P < .01$.

*** $P < .001$.

mental status gaps along race lines, then the lack of findings of status-caste exchange might be because of a lack of sensitivity of the measures rather than an absence of exchanges.

For the black-white status gap, the crucial status gap under consideration in this article, the census statistics *do* capture the essential reality of status inequality. Figure 3 shows box plots of the educational attainment of black adults and white adults from the 1940 and 1960–2000 censuses. The boxes describe the educational distributions of white and black adults, regardless of marital status. The lines inside the boxes represent the median educational attainments for the group. The arrows between the boxes show the mean educational attainments of black and white spouses in racial intermarriages.

In 1940, U.S.-born black adults had a median educational attainment of fifth grade and an interquartile range of three to eight, whereas whites had a median educational attainment of ninth grade and an interquartile range of eight to twelve. The educational distributions of whites and blacks were almost disjoint in 1940. And yet, among the 469 cases of blacks married to whites in the 1940 census, 1% microdata (see table 2), the spouses had very similar levels of education: 7.26 years on average for the black spouses and 7.35 years for the white spouses (yielding the -0.09 education gap reported in table 2 for 1940). The nearly horizontal arrows for educational attainment of intermarried couples is the pattern that we would expect to see for homogamy under conditions of inequality; note the similarity to figure 2. Between 1940 and 2000 the educational gap between black and white adults narrowed, but the educational homogamy of black-white intermarried couples remained the same.

ANALYSIS OF 1980 CENSUS DATA USING LOG-LINEAR MODELS AND NEGATIVE BINOMIAL MODELS

Tables 1 and 2 demonstrate that the spouses in black-white intermarried couples have comparable levels of SES; this, I have argued, bolsters a theory of status homogamy and undermines the theory of status-caste exchange. The literature that has endorsed status-caste exchange has generally eschewed this kind of simple tabular analysis and has argued directly from the results of complex multivariate models (chiefly log-linear models). This section evaluates the evidence from more complex models.

The data analyzed in tables 3–5 are the restricted subsample of U.S.-born couples married for the first time (first marriage for at least one spouse) within 10 years of the 1980 census. The data in this section are a cross-classified set of husband's race \times wife's race \times husband's education \times wife's education. There are three categories for each spouse's

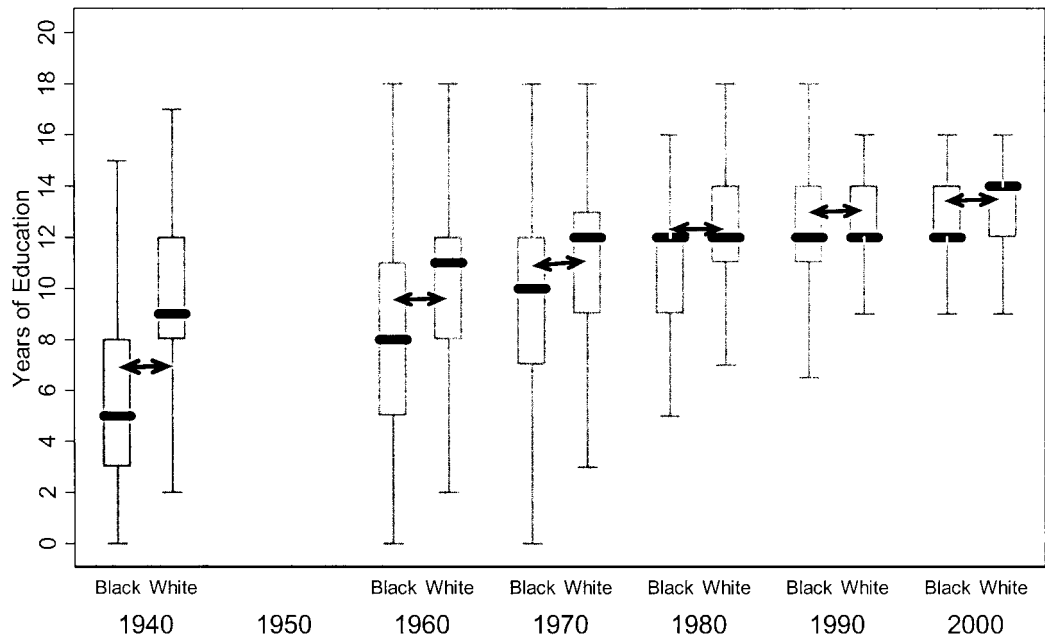


FIG. 3.—Educational homogamy despite inequality between blacks and whites. Boxes represent interquartile range of educational distributions for U.S.-born blacks and whites ages 18 and greater. Dark line inside the box is median educational level. Dark arrows between the boxes represent the mean educational attainments of intermarried blacks and whites. Horizontal arrows indicate educational homogamy. Status-caste exchange theory predicts downward sloping arrows, that is, blacks should have higher education in intermarried couples. Source: U.S. census data from IPUMS, 1% files for 1940, 1960, and 1970, 5% files for 1980–2000.

race (non-Hispanic white, non-Hispanic black, and other). “Other” race is a residual category that includes all Asians, Hispanics, and Native Americans.¹⁶ Education levels are reduced to six categories: (1) less than 10 years, (2) 10 or 11 years, (3) 12 years (high school diploma), (4) some college, (5) bachelor’s degree, (6) greater than bachelor’s (i.e., graduate school). Information is lost when the educational categories are collapsed from 23 to 6 levels, but the reduction in categories and the resulting reduction in the sparseness of the data is necessary in order to fit the models (Agresti 1990). Kalmijn (1993), Fu (2001), and Qian (1997) all used four educational categories in their analysis, so this data set with six educational categories should be at least as sensitive to patterns of educational intermarriage as theirs. There are $6 \times 6 \times 3 \times 3 = 324$ cells, and the number of couples equals 578,994 (the full data set is presented in app. table A1).¹⁷

Table 3 contains the results of five different log-linear models. Each model has a different set of controls, and each model includes terms for status-caste exchange between non-Hispanic blacks and non-Hispanic whites, along with a parallel measure of status-caste exchange, Kalmijn’s hypergamy ratio, which yields similar results.¹⁸ In simplified hierarchical terms, models 1–5 are described below.

$$\begin{aligned} \text{model 1} = \log(U) = & \text{constant} + \text{HRace} \times \text{HEd} + \text{WRace} \times \text{WEd} \\ & + \text{racial endogamy} + \text{black endogamy} + \text{black} \times \text{white} \\ & + \text{black-white status-caste exchange.} \end{aligned}$$

¹⁶ Fu’s (2001) analysis of black-white status-caste exchange excludes the Hispanics and Asians from the analysis, whereas Qian (1997) includes all the racial groups in his analysis. My analysis includes married couples of all races following Qian, but if one excludes the “other” racial category from the analysis, the results are substantively the same.

¹⁷ In this data set there are 2,607 black-white couples, of whom 1,059 (40.6%) have the same level of education, 776 (29.8%) have a black spouse with more education, and 772 (29.6%) have a white spouse with more education. This is consistent with my reports in the bottom portion of table 1, with the difference that the educational categories have been condensed. A general note about census weights is germane here. The 1980 data contain household weights, and in theory the failure to consider these weights in the modeling process could bias the results. In actuality, the mean household weights vary only slightly across the 324 cells, from a minimum of 20 to a maximum of 20.3, so the weights have no substantial effect on the results.

¹⁸ The hypergamy ratio was introduced by Kalmijn (1993) and was used by Qian (1997). The observed hypergamy is the ratio $H_o = N^+/N^-$, where N^+ is the number of couples whose husband has more education and N^- is the number of couples whose wife has more formal education. The hypergamy ratio is H_o/H_e , where H_o is the hypergamy ratio from the actual data, and H_e is the expected hypergamy ratio based on predicted values of a model. For black women married to white men, $H_o/H_e < 1$ is evidence for status-caste exchange, and for white women married to black men,

TABLE 3
STATUS-CASTE EXCHANGE FOR U.S.-BORN COUPLES MARRIED IN THE 1970S: COEFFICIENTS FROM LOG-LINEAR MODELS

	Model 1	Model 2	Model 3	Model 4	Model 5
Summary statistics:					
L^2	277,491.9	2,372.3	1,569.7	948.8	130.96
df	285	260	200	140	103
P	0	0	0	0	.033
BIC	273,710.2	-1,079.7	-1,085.8	-910.0	-1,236.6
Key model parameters:					
Black-white	-.55***	-.54***	-.56***	-.56***	-.99***
Black-white status-caste exchange .....	.14***	.07***	.018	-.05	-.06
Educational homogamy		1.74***	1.73***	1.71***	1.71***
General racial endogamy	2.29***	2.26***	2.26***	2.24***	3.02***
Black endogamy	4.20***	4.32***	4.27***	4.30***	4.06***
Hypergamy ratio:					
Black women-white men .....	.90	1.03	1.35	1.44	1.14
White women-black men	1.82	1.32	1.09	1.04	.98

SOURCE.—1980 U.S. census 5% microdata via IPUMS.org.

NOTE.—Support for status-caste exchange in italic. 324 cells. $N = 578,994$. df is the residual degrees of freedom. L^2 is the likelihood ratio chi-square for goodness of fit. P is the probability $P(\chi_{df}^2 \geq L^2)$. White and black are non-Hispanic white and non-Hispanic black.

* $P < .05$, two-tailed tests.

** $P < .01$.

*** $P < .001$.

$$\text{model 2} = \text{model 1} + \text{HEd} \times \text{WEd}.$$

$$\begin{aligned} \text{model 3} = \text{model 1} + \text{HBlack} \times \text{HEd} \times \text{WEd} \\ + \text{WBlack} \times \text{HEd} \times \text{WEd}. \end{aligned}$$

$$\begin{aligned} \text{model 4} = \text{model 1} + \text{HRace} \times \text{HEd} \times \text{WEd} \\ + \text{WRace} \times \text{HEd} \times \text{WEd}. \end{aligned}$$

$$\begin{aligned} \text{model 5} = \text{model 1} + \text{HRace} \times \text{HEd} \times \text{WEd} + \text{WRace} \times \text{HEd} \\ \times \text{WEd} + \text{racial endogamy} \times \text{HEd} \times \text{WEd} \\ + \text{HBlack} \times \text{WWhite} + \text{black} \times \text{white} \times \text{BlackEd}. \end{aligned}$$

Here, U represent the predicted values of the model; HRace and WRace are husband's race and wife's race, respectively; HEd and WEd are husband's education and wife's education, respectively; HBlack means husband is black; WBlack means wife is black; and BlackEd is the black spouse's education.¹⁹ Furthermore

$$\text{racial endogamy} = \begin{cases} 1 & \text{if HRace} = \text{WRace} \\ 0 & \text{otherwise;} \end{cases}$$

$$\text{black endogamy} = \begin{cases} 1 & \text{if HRace} = \text{WRace} = \text{non-Hispanic black} \\ 0 & \text{otherwise.} \end{cases}$$

Black \times white is the gender-symmetric black-white interaction equal to one for black-white couples and equal to zero for other couples. HBlack \times WWhite is the gender-specific interaction, equal to one for black men married to white women, and equal to zero otherwise.

Black-white status-caste exchange equals black spouse's education on a scale of one to six minus white spouse's education (and it equals zero for other couples). Black-white status-caste exchange, in other words, measures the increased log odds ratio for black-white intermarriage for each category of educational advantage the non-Hispanic black spouse has over the non-Hispanic white spouse. A positive and significant coefficient is evidence *for* status-caste exchange. If the black-white status-

$H_o/H_e > 1$ is evidence of status-caste exchange. The predicted values that are used to generate H_e come from the models that are reestimated without the status-caste exchange term. In tables 3–6 I have indicated hypergamy ratios that differ from one by more than 10% in the direction that is consistent with status-caste exchange, in lieu of hypothesis testing (since the distribution of the hypergamy index is unknown).

¹⁹ Education is a categorical variable with six levels. BlackEd takes one degree of freedom and treats education as a continuous variable with values 1–6, because black-white status-caste exchange treats education in a similar way; see below.

caste exchange coefficient is statistically indistinguishable from zero, this means that the black and white couples have exactly the educational balance that the general rules of the marriage market would lead one to expect, and this is evidence against status-caste exchange. If black-white status-caste exchange is negative, this implies that in interracial marriages the white partners tend to have a bit more education compared to their black spouses than one would otherwise expect, and this would also be evidence *against* status-caste exchange. This measure of status-caste exchange is adapted from Fu (2001), with the difference that both spouses' educations are taken into account.²⁰ If status-caste exchange theory were correct, the black-white status-caste exchange term should be positive and significant in every model.

From model 1 to model 5, each successive model is strongly preferred over its predecessor by the likelihood ratio test (LRT). The L^2 statistic (referred to in some sources as G^2) is an LRT statistic comparing each model to the saturated model. The difference in L^2 between models is also an LRT statistic for nested models such as these. For instance the LRT statistic for the comparison of model 3 and model 2 is 802.7 ($2,372.4 - 1,569.7$) on 60 additional degrees of freedom ($260 - 200 = 60$). The improvement in goodness of fit of 802.7 from model 2 to model 3 is very large in comparison to what one would expect from a chi-square distribution with 60 degrees of freedom,²¹ so this comparison strongly favors model 3 over model 2.

The reason that each successive model improves the fit significantly (with model 5 fitting the best) is that each model adds new controls for the *general* pattern of educational intermarriage. Status-caste exchange, as hypothesized, is a *specific* deviation from educational endogamy that depends on the races of *both* spouses.

Model 2 introduces the saturated HEd \times WEd interactions, which accounts for the full general pattern of educational intermarriage regardless of the race of either spouse. Model 3 allows the HEd \times WEd to vary from the normal educational intermarriage pattern if either spouse is black, regardless of the race of the partner. It turns out that blacks are slightly more likely than other groups to marry someone whose education differs from their own, higher or lower, regardless of the race of the spouse (and 95% of blacks in the sample are married to other blacks). Model 4

²⁰ Following Fu (2001), the measure of status-caste exchange I use here is graduated, but is treated as a continuous variable and accounts for one degree of freedom. One could use, instead, a simpler dummy variable approach to status-caste exchange which would code black-white intermarried couples as "1" if the black spouse had more education (regardless of how much more), and code all other couples "0." This different operationalization yields the same substantive results, available from the author.

²¹ The expected value of chi-square with n degrees of freedom is n .

extends model 3 so that each of the three racial categories in the data set has its own pattern of educational intermarriage, regardless of the race of the spouse. Finally, model 5 allows general racial endogamy to vary by the education of both spouses, and model 5 adds a single term to account for the gender imbalance in black-white intermarriage.²²

Assessing the Evidence for Status-Caste Exchange from the Log-linear Models

As the goodness of fit of the models improves from model 1 to model 5, there is a corresponding decline in the influence of status-caste exchange. Status-caste exchange is clearly not robust across these five models; the question is how to interpret these divergent findings.

The first point is that the other forces measured in these log-linear models (educational homogamy, general racial endogamy, and the additional force of black endogamy along with the special black-white distance in the marriage market)²³ are strong and robust across this set of models. It is only status-caste exchange whose significance and direction varies.

The status-caste exchange coefficient is most strongly positive in model 1. Model 1 fits so poorly by both the traditional LRT and the Bayesian Information Criterion (BIC; Raftery 1986; but see also Weakliem 1999) goodness-of-fit tests that model 1 is easy to dismiss. Model 1 fits poorly because it takes no account of any of the general patterns of educational homogamy. While model 1 can be easily discarded, model 2 is more interesting.

Model 2 fits very poorly compared to the saturated model by the traditional LRT (goodness-of-fit chi-square of 2,372.4 on 260 residual degrees of freedom), but it fits well under the parsimony favoring BIC (−1,079.7 would be preferred to the saturated model). Model 2 is, at least by the BIC standard, a reasonable model. Model 2 has the important advantages of simplicity and parsimony over models 3–5. The trade-off for simplicity is that model 2 lacks the three-way interactions (introduced in models 3–

²² Because model 5 squeezes nearly all of the variance out of this data set, and because the data set is sparse in the off-diagonal cells, model 5 converges slowly. In Stata 7SE, on a 866 MHz Pentium III PC, the likelihood maximization of model 5 takes 378 iterations and about two minutes. If one specifies the “difficult” maximization option, the likelihood function is maximized in 18 steps, taking about 10 seconds. In all cases the likelihood function is appropriately concave at the maximum.

²³ In models 2–5 I include the saturated interactions for husband’s and wife’s education. I have chosen one of this full set of contrasts (HEd,WEd) = (BA,BA) compared to (BA, some college) as the typical contrast for educational endogamy. This educational endogamy term understates the real force of educational endogamy because it compares educational endogamy to educational difference of only one category.

5) between husband's education, wife's education, and the race of one spouse. Status-caste exchange is a four-way interaction between the education and race of both spouses. Estimating the four-way interaction without controlling for the underlying three-way interactions is a violation of the hierarchical rule for building log-linear models (Agresti 1990, p. 144), akin to measuring an interaction without including the main effects. The support of status-caste exchange in models 1 and 2 is nonhierarchical, and therefore problematic.

In model 2, the coefficient for status-caste exchange, though positive (0.07) and apparently significant, is small. The status-caste exchange coefficient of 0.07 indicates that the odds of black-white intermarriage increase by about 7% ($e^{0.07} = 1.07$) if the black spouse has one level more education than his or her white partner. A 7% increase in the odds of black-white intermarriage (for black spouses who had an educational advantage of one category) might be enough to salvage status-caste exchange theory if the finding were robust and consistent across different models and data sets. The problem with secondary forces, however, is that they often turn out to be anything but robust (Freedman 1991).

Selective evidence from the models in table 3 could be used to convince the reader that status-caste exchange was either positive (using only model 2 and ignoring the problem of nonhierarchy) or zero (models 3, 4, and 5). Are both conclusions equally valid? If one admits all five models into evidence, one would conclude that status-caste cannot reliably be distinguished from zero in this particular data set. If one were forced to choose a single model from table 3, one would probably have to choose model 5 (which soundly rejects status-caste exchange), since that is the model that fits the data the best by both LRT and BIC and also measures status-caste exchange hierarchically, but limiting oneself to a single model would be to ignore the sensitivity of the results to different specifications (Leamer 1978, 1983).

Table 3's evidence for status-caste exchange is mixed. In the next two sections I use alternatives to the usual log-linear models to reexamine these findings. These alternative analyses are presented in the spirit of an exploratory sensitivity analysis (Leamer 1983).

Revisiting the Log-linear Models, Part 1: Robust Standard Errors

Model 2 seems to support status-caste exchange, but how robust is this support? The ordinary standard errors produced by the log-linear model are estimated with the assumption that the model is a reasonable description of the data. The worse the model fits, the more unreliable the ordinary standard errors are. Huber (1967) and White (1980, 1981, 1982) have described a method for producing robust standard errors, also known

as heteroskedastic consistent standard errors.²⁴ The formula for the robust variance-covariance matrix is

$$\hat{V}_{\text{robust}} = \left(\frac{n}{n-1} \right) \hat{V}_{\text{ordinary}} [X^T \text{diag}(e_i^2) X] \hat{V}_{\text{ordinary}}, \quad (1)$$

where, for the case of log-linear models (Agresti 1990, p. 179)

$$\hat{V}_{\text{ordinary}} = (-\partial^2 L / \partial \beta^2)^{-1} = [X^T \text{diag}(u_i) X]^{-1}. \quad (2)$$

In the general case,

$$e_i = \partial L_i(x_i, \beta) / \partial(x_i \beta), \quad (3)$$

where L_i is the log-likelihood function evaluated at the i th cell, and β is the vector of estimated parameters. Here e_i is simply the model residual for the i th cell. X is the $n \times k$ design matrix where n is the number of cells in the data set (here $n = 324$) and k is the number of parameters in the model (including the constant term), and u_i are the predicted cell counts from the model.

Table 4 reproduces the five log-linear models from table 3, with robust standard errors beneath the ordinary standard errors. The difference is striking. In models 1 and 2, the robust standard errors are far larger than the usual standard errors. In model 2 the coefficient for status-caste exchange is 0.07, and the ordinary estimated standard error is 0.018. This results in a Z -score of nearly four ($0.07/0.018 = 3.89$), which was the basis for the claim that model 2 provided evidence for status-caste exchange. The robust standard error for status-caste exchange in model 2 is 0.044, and the resulting Z -score of $0.7/0.044 = 1.6$ means that model 2 no longer supports status-caste exchange if one uses robust standard errors.

Robust standard errors are widely used in the economics literature in all sorts of models (Greene 2002). White's (1980) article has more than 3,000 citations in the Social Science Citation Index, but the approach is not widely used in sociology, so I offer a few comments. First, the coefficients and hence the fit statistics are the same regardless of which kind of standard errors are used (though some caution must be exercised in interpreting the fit statistics if one uses the robust standard errors and hence discards the assumption that the model is true). Second, if the model

²⁴ Robust SEs were produced by Stata, ver. 7 and 8. See Long and Ervin (2000) for a comparison of how different software packages estimate robust SEs. Other data-driven methods for calculating the SEs of parameters without making assumptions about the underlying model include the bootstrap and its predecessor the jackknife (Efron 1979). Bootstrap SEs (available from the author) were similar to robust SEs of the White (1980) type (see Weber [1986] for a note on the reasons for this similarity). See Long and Ervin (2000) for a discussion of alternative finite sample adjustments for robust SEs. Here the finite sample adjustment is $n/(n-1) = 324/323$.

Exchange Theory in Mate Selection

TABLE 4
SUBJECTING THE COEFFICIENTS FROM TABLE 3 TO MORE SCRUTINY

	SAME MODELS AS TABLE 3				
	Model 1	Model 2	Model 3	Model 4	Model 5
L^2	277,491.9	2,372.3	1,569.7	948.8	130.96
df	285	260	200	140	103
Black-white	-.55*** (.039) [.144]	-.54*** (.039) [.105]	-.56*** (.040) [.063]	-.56*** (.040) [.062]	-.99*** (.11) [.14]
Black-white status-caste exchange	<i>.14*</i> (.012) [.066]	<i>.070</i> (.018) [.044]	<i>.018</i> (.033) [.044]	<i>-.05</i> (.034) [.042]	<i>-.06</i> (.035) [.032]
Educational homogamy		1.74*** (.049)	1.73*** (.055)	1.71*** (.057)	1.71*** (.353)
General racial endogamy	2.29*** (.008) [.121]	2.26*** (.008) [.034]	2.26*** (.008) [.034]	2.24*** (.008) [.027]	3.02*** (.050) [.033]
Black endogamy	4.20*** (.073) [.294]	4.32*** (.073) [.184]	4.27*** (.073) [.136]	4.30*** (.074) [.132]	4.06*** (.075) [.082]

SOURCE.—1980 U.S. census 5% microdata via IPUMS.org.

NOTE.—Support for status-caste exchange in italic. 324 cells. $N = 578,994$. White and black are non-Hispanic white and non-Hispanic black. Nos. in parentheses are ordinary SEs; nos. in square brackets are robust SEs.

* $P < 0.1$, two-tailed tests; significance pertains to robust, rather than ordinary SEs.

* $P < .05$.

** $P < .01$.

*** $P < .001$.

fits well, it does not matter as much which kind of standard error one uses. In model 5 (the best-fitting model), the robust and the ordinary standard errors are different but not nearly as different as in model 1. Third, the worse the model fits, the more the ordinary standard errors tend to be underestimates, yielding inflated and potentially misleading T statistics and Z -scores (White 1981).

Revisiting the Log-linear Models, Part 2: Negative Binomial Regression

The log-linear model, a form of Poisson regression, is the most restrictive member of a broad family of models that deal with count data (King 1989; Cameron and Trivedi 1986; Greene 2002; Hannan 1991). Poisson regression is the most restrictive of the count models because the Poisson model constrains the predicted variance to equal the predicted mean. In many situations, this restriction on the variance is unreasonable, and the data are overdispersed with respect to the Poisson distribution. Negative

binomial regression corrects for overdispersion by introducing an overdispersion parameter (Cameron and Trivedi 1986; Long 1997; Greene 2002; King 1989). The resulting model is a mix of Poisson and gamma distributions.²⁵ Log-linear models are a special case of negative binomial regression, when the overdispersion parameter is zero (Hannan 1991; King 1989). In the negative binomial model

$$\text{var}(u_i) = (1 + \alpha u_i)u_i, \quad (4)$$

where α is the overdispersion parameter, and u_i are the predicted cell counts.²⁶

Overdispersion is a common cause of poor fit in log-linear models. The worst overdispersion is usually found where the predicted values (and hence predicted variances) are small, that is, where the actual data are sparse (Long 1997; Greene 2002). Despite the large sample size of the data set as a whole (578,994 cases on 324 cells), the data contain fewer than 3,000 black-white intermarriages. These black-white intermarriages are concentrated on or near the educational endogamy diagonal. Because the educationally disparate black-white intermarriages are few, 29 out of the 72 black-white intermarriage cells have fewer than 10 cases. The cells that are of the most interest (the black-white intermarriages with disparate educational attainment) are the very cells whose small counts make the usual log-linear models suspect.

The top of table 5 presents the summary statistics and coefficients from the log-linear models with ordinary standard errors, repeated from tables 3 and 4. The bottom half of table 5 has the same set of coefficients, plus the overdispersion parameter, for the negative binomial version of each of the models (the negative binomial models in table 5 also have the ordinary, rather than the robust, SEs). The main difference between the log-linear coefficients on the top half and the negative binomial coefficients on the bottom half of the table is that while status-caste exchange is positive and significant in log-linear models 1 and 2, none of the negative binomial models support status-caste exchange. The negative binomial models can be tested against the log-linear models with an LRT. This LRT takes a chi-square distribution with one degree of freedom (one degree of freedom because of the overdispersion parameter; see Cameron

²⁵ The gamma distribution is selected for convenience, not for prior theoretical reasons.

²⁶ This what Cameron and Trivedi (1986) refer to as negative binomial II. Negative binomial I models yield the same substantive results.

TABLE 5
SUBJECTING THE COEFFICIENTS TO MORE SCRUTINY: LOG-LINEAR VS. NEGATIVE BINOMIAL MODELS

	Model 1	Model 2	Model 3	Model 4	Model 5
Summary statistics for log-linear models:					
L^2	277,491.9	2,372.3	1,569.7	948.8	130.96
df	285	260	200	140	103
Black-white	-.55***	-.54***	-.56***	.56***	-0.99***
Black-white status-caste exchange	<i>.14***</i>	<i>.07***</i>	.018	-.05	-.06
Educational homogamy		1.74***	1.73***	1.71***	1.71***
General racial endogamy	2.29***	2.26***	2.26***	2.24***	3.02***
Black endogamy	4.20***	4.32***	4.27***	4.30***	4.06***
The same key model parameters, plus the overdispersion parameter alpha, from negative binomial regression:					
Black-white	-.65***	-.61***	-.61***	-.60***	-.99***
Black-white status-caste exchange .....	.045	.015	.0034	-.059	-.06
	(.084)	(.025)	(.039)	(.037)	(.035)
Educational homogamy		1.67***	1.71***	1.58***	1.71***
General racial endogamy	2.27***	2.20***	2.22***	2.22***	3.02***
Black endogamy	4.07***	4.16***	4.15***	4.19***	4.06***
Overdispersion parameter alpha .....	.90***	.039***	.021***	.010***	0 ^a
Likelihood ratio χ^2 test compared to log-linear model (one df)	275,721.1	1,451.7	776.1	279.2	0

SOURCE.—1980 U.S. Census 5% microdata via IPUMS.org.

NOTE.—Support for status-caste exchange in italic. SEs in parentheses. 324 cells. $N = 578,994$. Log-linear and negative binomial models coincide exactly in model

5.

^a Actual value of alpha in model 5 is reported by Stata as 0.00000000179, i.e., a positive but small number. White and black are non-Hispanic white and non-Hispanic black.

⁺ $P < .10$, two-tailed tests.

* $P < .05$.

** $P < .01$.

*** $P < .001$.

and Trivedi 1986, p. 43).²⁷ The LRT significantly favors the negative binomial over the log-linear specification in models 1–4.

Model 5 is unaffected by the change in functional form from Poisson regression (i.e., log-linear models) to negative binomial regression since model 5 accounts for almost all the variation in the data to begin with. The overdispersion parameter is nearly exactly zero in model 5, and the negative binomial model converges to the log-linear form in such a case (see King 1989). The negative binomial models reproduce all the classic and very significant findings about educational homogamy, general endogamy, black endogamy, and black-white distance in the marriage market.²⁸ Only status-caste exchange is rejected by the negative binomial models.

What does the proliferation of models in tables 3–5 demonstrate? Varying the functional form and the method of estimating the errors may seem only to muddy the waters, since the chance of discrepant findings rises with the increasing variety of tests. My intention is not to endorse one model or test as “best” from this rather small subset of the infinite dimensional space of possible assumptions and models. Rather, my intention is to subject the key hypothesis to a broad enough range of tests to suggest that the status-caste exchange parameter is fragile with respect to changes in basic modeling assumptions.

REANALYSIS OF QIAN (1997) AND FU (2001)

Both Qian (1997) and Fu (2001) use data sets that rely on younger couples only, an approach that tends to magnify the apparent effects of status-caste exchange. In this section, I use the same data and measures of status-caste exchange that Qian and Fu each use. For simplicity and consistency with Qian and Fu, the models I introduce in this section will all be of the traditional variety—log-linear models with ordinary standard errors.

²⁷ Because the overdispersion parameter α can only be positive, Gutierrez, Carter, and Drukker (2001) suggest a one-sided test which is equivalent to an even mixture of χ_1^2 and χ_0^2 . P -values are half of what they would be under the χ_1^2 . In this case because the negative binomial form is so strongly preferred to the Poisson form in models 1–4, two-sided and one-sided tests yield the same substantive results.

²⁸ Note that the model parameters for educational homogamy, racial endogamy, black endogamy, and black-white intermarriage are not dramatically affected by the inclusion of the overdispersion parameter in any of the models, while the status-caste exchange parameter shrinks dramatically in models 1–3 when the overdispersion parameter is added. The special shrinkage of the status-caste exchange term in models 1–3 is a result of the fact that the status-caste exchange term is uniquely dependent on sparse cells (i.e., the black-white intermarriage cells with discrepant educational attainments) where overdispersion is especially problematic.

Status-caste exchange is inherently a four-way interaction between the race and status of both spouses. Qian measures status-caste exchange with the hypergamy index, calculated from the predicted values of the model. The hypergamy index is a four-way interaction, but Qian's model does not control for all the lower-order three-way interactions which may be necessary to get a true measure of the four-way interaction (Agresti 1990, p. 144). My models include the three-way interactions, improve the fit of the models relative to Qian's model, and find no support for status-caste exchange. The three-way interactions account for the different educational mating patterns of blacks and whites, without regard to the race of the spouse.

In table 6, the first column reports summary statistics from the model Qian used to test status-caste exchange and the hypergamy ratios that Qian (1997, p. 273) derived from the model.²⁹ Qian's model supports status-caste exchange theory. Model Q2 rejects status-caste exchange and outperforms Qian's model by both LRT and BIC standards. Model Q3 is the best fitting among these models by the BIC, and (like model Q2) model Q3 rejects status-caste exchange.

Table 7 revisits the analysis of Fu (2001). Fu attempts to measure status-caste exchange with three-way rather than four-way interactions. Fu's interactions capture the race of both partners but the educational attainment of only one partner. Fu's models show, for instance, that white women who marry black men have less education than white women who marry white men. This claim could be consistent with status-caste exchange, but it could also be consistent with educational homogamy in a context of racial inequality (see figures 1–3). Even though Fu's three-way interactions risk conflating status-caste exchange with status homogamy or with other forces, the inclusion of the full set of three-way interactions into the models reduces Fu's interactions to insignificance.

The first column of table 7 reports the summary statistics from Fu's model, which is consistent with status-caste exchange (Fu interprets his coefficients as supporting status-caste exchange when they are significantly negative). Model F2 allows blacks and whites to have different patterns of educational intermarriage, regardless of the race of the spouse.

²⁹ This model is not described in formal detail in Qian (1997), nor are summary statistics or parameters reported, so I appreciate Professor Qian's help in allowing me to reconstruct the model. The model is a quasi-symmetry model (Clogg and Shihadeh 1994) in education and race, with interactions formed by all the off-diagonal associations, and with interactions between the education and race parameters. Square tables have a unique quasi-symmetry solution. Multidimensional tables have many kinds of potential symmetry and therefore many possible quasi-symmetry models (cf. Clogg and Shihadeh 1994, p. 78; Bishop, Fienberg, and Holland 1975, pp. 303–6; Agresti 1990, p. 388).

TABLE 6
REVISITING QIAN (1997): LOG-LINEAR MODELS WITH ORDINARY SES

	Model Q1	Model Q2	Model Q3
Summary statistics:			
L^2	1,954.4	278.13	632.8
df	354	251	372
P	0	.115	0
BIC	-2,707.2	-3,027.1	-4,265.8
Key parameters:			
Coefficient for black endogamy		6.36***	6.42***
Coefficient for black-white interaction	-5.30***	-1.75***	-1.67***
Hypergamy ratios (a measure of status-caste exchange):			
Black men, white women 1980	<i>1.56^{a,b}</i>	.94	.95
Black men, white women 1990	<i>1.57^a</i>	1.06	1.01
White men, black women 1980	<i>.81^a</i>	1.02	.99
White men, black women 1990 .....	.97	1.25	1.21

NOTE. —Support for status-caste exchange in italic. $N = 523,542$. Black and white are non-Hispanic black and non-Hispanic white. Racial endogamy (each) = 0 for racially nonendogamous marriage, and takes on a different nominal value for each of the four kinds of racial endogamy. Full specification of Qian's model: HRace \times HEd \times year, WRace \times WEd \times year, raceQS \times edQS \times year. RaceQS is defined as all symmetric off-diagonal racial interactions, and edQS is defined as all symmetric off-diagonal educational interactions. Full specification of Q2: HRace \times HEd \times WEd \times year, WRace \times HEd \times WEd \times year, RaceEndogamy (each) \times Year. RaceEndogamy (each) \times HEd, RaceEndogamy (each) \times WEd, black \times white \times year, HBlack \times WWhite, Hispanic \times white, HHispanic \times WWhite. Model Q2 converges with difficulty. Full specification of Q3: HRace \times HEd \times year, WRace \times WEd \times year, HEd \times WEd \times year, HBlack \times HEd \times WEd, WBlack \times HEd \times WEd, RaceEndogamy (each) \times year, RaceEndogamy (each) \times HEd, RaceEndogamy (each) \times WEd, black \times white \times year, HBlack \times WWhite, Hispanic \times white.

^a Differs from one by more than 10% in the direction consistent with status-caste exchange, in lieu of hypothesis testing.

^b Differs from Qian (1997, p. 273) because of typo in original.

⁺ $P < .10$, two-tailed tests.

* $P < .05$.

** $P < .01$.

*** $P < .001$.

TABLE 7
 REVISITING THE MODELS OF FU (2001): LOG-LINEAR MODELS WITH ORDINARY SES

	Model F1	Model F2	Model F3	Model F4
Summary statistics:				
L^2	215.6	50.7	14.6	14.6
df	35	13	9	9
P	0	0	.10	.10
BIC	-241.9	-119.3	-103.1	-103.1
Key model parameters:				
Black-white interaction	-5.08***	-5.10***	-4.86***	-4.88***
Fu's interaction terms:				
Interaction 1 .....	.021	.110	-.044	
Interaction 2	-.293***	-.194	-.070	
Interaction 3	-.105***	-.042	-.071	
Interaction 4	-.117*	-.079	-.008	
Black-white status-caste exchange .....				.14

NOTE.—Support for status-caste exchange in *italic*. $N = 476,718$. Fu's interactions are three-way interactions, subsets of HRace \times WRace \times HEd or HRace \times WRace \times WEd.

Model F1: HRace \times HEd + WRace \times WEd + HEd \times WEd + black \times white + Fu's interactions. Model F2: HRace \times HEd \times WEd + WRace \times HEd \times WEd + black \times white + Fu's interactions. Model F3:

HRace \times HEd \times WEd + WRace \times HEd \times WEd + black \times white \times HEd + black \times white \times WEd + Fu's interactions. Model F4: model F3 + black-white status-caste exchange.

* $P < .05$,
 ** $P < .01$,
 *** $P < .001$.

In model F2, all four of Fu's interactions are statistically indistinguishable from zero. Model F3 adds further interactions between racial intermarriage and educational intermarriage to achieve a good fit by the LRT (though Fu's model fits better by the BIC), and once again Fu's four interaction terms are statistically indistinguishable from zero. Model F4 measures status-caste exchange as a four-way interaction as in tables 3–5, with the presence of the full set of underlying three-way interactions.³⁰ In model F4, status-caste exchange is indistinguishable from zero.

Qian and Fu present their findings as evidence in favor of status-caste exchange theory. My point in this reanalysis is simply to show that a different choice of models (with an emphasis on goodness of fit and hierarchical model design) can lead to a different conclusion about status-caste exchange.

CONCLUSION

Status-caste exchange theory has an exalted pedigree that comes from its introduction by sociological giants Kingsley Davis and Robert Merton. Davis's (1941) and Merton's (1941) articles were self-consciously theoretical and contained no data on racial intermarriages in the United States, so the empirical basis of status-caste exchange theory rests on a series of more recent articles by other authors. Some of these empirical studies have used simple tables to cast doubt on status-caste exchange theory, while other authors have used sophisticated models to defend status-caste exchange theory.

The simple tabular analyses have pointed out that racially intermarried individuals and their partners have always had similar levels of status, even in the first half of the 20th century, when racial barriers in the United States were nearly impermeable. The fact of status homogamy among interracial couples contradicts status-caste exchange theory, but these simple tabular results have been marginalized precisely because of their simplicity.

The recent empirical literature that has endorsed status-caste exchange has relied on the population of young married couples. Whereas the all-ages married population shows no aggregate signs of status-caste exchange, the statistics for young couples show a small but distinct educational advantage for intermarried blacks compared to their white spouses. This educational difference among young couples has been interpreted as evidence for status-caste exchange, but it turns out to be a

³⁰ If one substitutes the simpler dichotomous status-caste exchange parameter in model F4, the substantive result is the same but the residual *df* of the model are reduced by one, to eight (further models and results available from the author).

function of the fact that some of these couples are still in school. Because husbands are about one year older than their wives, young husbands tend to be further along in school than their young wives. The gender imbalance (most black-white couples have black husbands) tips the educational scales to black spouses when the interracial couples are still in school, but eventually this artifact of youth and gender disappears.

The findings from complex models which have been used to endorse status-caste exchange theory are not robust. In my own analysis of recently married couples from the 1980 census and in my reanalysis of the samples of young couples studied by Qian (1997) and Fu (2001), I show that changes in the assumptions or the design of the models can reverse the results that were supposed to provide support for status-caste exchange. Apparent support for status-caste exchange in log-linear models can be overturned by choosing better-fitting models, by correcting problems of model nonhierarchy, by using robust standard errors, or by using negative binomial models to correct for problems of overdispersion. Unlike status-caste exchange, other key predictions of the literature such as racial endogamy and educational homogamy are robust and statistically significant across a wide variety of models.

A broad literature critical of quantitative social science has emerged in recent years (Berk 1991; Blalock 1989, 1991; Freedman 1983, 1987, 1991; Leamer 1978, 1983, 1985; Lieberman 1985). One of the preoccupations of this critical literature is that persuasive empirical findings must be robust with respect to a broad set of assumptions. As Leamer (1983, p. 38) puts it, "An inference is not believable if it is fragile, if it can be reversed by minor changes in assumptions."

One of the reasons that status-caste exchange theory has been so enduring and so influential in the theoretical and popular literature during the six decades since its introduction is that actual marriage patterns can easily be misconstrued to support the theory. As figures 2 and 3 show, the fundamental status inequality between blacks and whites ensures that the same level of status that is perceived as "low" among whites may be perceived as "high" when compared to other blacks. Given the fog of misinformation that has characterized race relations in the United States, and given the special social isolation imposed on interracial couples by both racial groups, it is not surprising that the actual status homogamy of interracial couples should have remained unacknowledged for so long.

Status-caste exchange theory as originally proposed by Davis (1941) and Merton (1941) predicts that black spouses would have to have higher status than their white partner to make the union worthwhile for the white partner. The ethnographic evidence (DuBois 1996; Porterfield 1978; Root 2001; Spickard 1989) indicates that interracial unions are formed

along a basis of solidarity and affection and personal choice, not a basis of exchanges.

Status-caste exchange is a venerable theory that has been influential for 60 years. The question is whether the empirical support for the theory is strong enough to justify the theory's continued use.

APPENDIX

TABLE A1
DATA USED IN TABLES 3-5: U.S.-BORN COUPLES MARRIED WITHIN 10 YEARS OF THE 1980 CENSUS.

WIFE'S EDUCATION	HUSBAND'S EDUCATION					
	< 10	10, 11	High School	Some College	BA	> BA
Wife white, husband white:						
< 10	10,063	5,809	9,755	1,835	338	224
10, 11	6,649	9,265	18,337	4,074	592	274
High school	12,893	17,880	123,886	46,357	15,312	6,944
Some college	1,849	2,907	28,409	38,997	20,536	13,410
BA	378	435	6,832	12,373	23,208	17,740
> BA	168	199	2,367	4,517	7,120	17,315
Wife white, husband black:						
< 10	46	28	54	15	0	1
10, 11	33	65	103	29	9	1
High school	50	127	457	209	47	22
Some college	22	36	136	188	58	35
BA	6	7	45	49	35	54
> BA	3	2	16	45	23	52
Wife white, husband other:						
< 10	229	162	257	75	7	3
10, 11	169	341	537	155	16	9
High school	309	521	2,240	999	203	122
Some college	59	99	545	903	298	189
BA	9	8	95	196	237	235
> BA	9	2	44	99	76	265
Wife other, husband white:						
< 10	164	133	288	81	17	12
10, 11	122	219	488	160	27	9
High school	211	369	2,200	1,006	268	171
Some college	33	96	591	864	343	272
BA	4	10	77	169	250	203
> BA	5	3	28	84	108	284
Wife other, husband other:						
< 10	1,689	732	819	212	19	19
10, 11	635	863	1,190	330	23	15
High school	791	1,019	3,959	1,432	249	118

Exchange Theory in Mate Selection

TABLE A1 (Continued)

WIFE'S EDUCATION	HUSBAND'S EDUCATION					
	< 10	10, 11	High School	Some College	BA	> BA
Some college	134	187	825	1,209	292	185
BA	13	17	99	213	226	165
> BA	10	6	45	98	96	235
Wife black, husband white:						
< 10	12	7	9	2	0	1
10, 11	10	9	23	5	3	0
High school	11	20	104	36	18	6
Some college	7	3	33	46	20	25
BA	0	1	8	7	13	17
> BA	1	0	0	5	5	32
Wife black, husband black:						
< 10	2,064	996	1,172	266	41	29
10, 11	1,416	1,878	2,570	659	60	31
High school	2,032	3,286	11,989	3,629	650	215
Some college	551	951	3,640	3,920	921	497
BA	94	140	775	1,093	1,059	459
> BA	61	54	284	507	363	646
Wife black, husband other:						
< 10	8	6	4	2	1	0
10, 11	11	10	13	8	1	1
High school	10	14	46	30	2	3
Some college	4	6	25	27	5	4
BA	0	0	3	5	4	3
> BA	0	0	1	1	1	6
Wife other, husband black:						
< 10	16	19	19	13	0	1
10, 11	14	26	35	16	1	0
High school	11	26	124	59	13	10
Some college	6	12	44	57	23	10
BA	0	4	10	12	7	10
> BA	0	0	1	6	5	7

NOTE.—324 cells, $N = 578,994$.

REFERENCES

- Abbott, Andrew. 1988. "Transcending General Linear Reality." *Sociological Theory* 6: 169–86.
- Agresti, Alan. 1990. *Categorical Data Analysis*. New York: John Wiley.
- Bean, Frank D., and Marta Tienda. 1987. *The Hispanic Population of the United States*. New York: Russell Sage.
- Bearman, Peter. 1997. "Generalized Exchange." *American Journal of Sociology* 102 (5): 1383–1415.
- Becker, Gary S. 1991. *A Treatise on the Family*, expanded ed. Cambridge, Mass.: Harvard University Press.

American Journal of Sociology

- Begg, Colin B., and Jesse A. Berlin. 1988. "Publication Bias: A Problem in Interpreting Medical Data." *Journal of the Royal Statistical Society*, ser. a, 151 (3): 419–63.
- Ben-Porath, Yoram. 1982. "Economics and the Family—Match or Mismatch? A Review of Becker's *A Treatise on the Family*." *Journal of Economic Literature* 20 (1): 52–64.
- Berk, Richard A. 1991. "Toward a Methodology for Mere Mortals." *Sociological Methodology* 21:315–24.
- Bernard, Jessie. 1966. "Note on Educational Homogamy in Negro-White and White-Negro Marriages, 1960." *Journal of Marriage and the Family* 28:274–76.
- Bishop, Yvonne M. M., Stephen E. Fienberg, and Paul Holland. 1975. *Discrete Multivariate Analysis: Theory and Practice*. Cambridge, Mass.: MIT Press.
- Blalock, Hubert M., Jr. 1989. "The Real and Unrealized Contributions of Quantitative Sociology." *American Sociological Review* 54 (3): 447–60.
- . 1991. "Are There Really Any Constructive Alternatives to Causal Modeling?" *Sociological Methodology* 21:325–35.
- Blau, Peter M. (1964) 1986. *Exchange and Power in Social Life*. New Brunswick, N.J.: Transaction Books.
- . 1977. *Inequality and Heterogeneity: A Primitive Theory of Social Structure*. New York: Free Press.
- Blau, Peter M., and Joseph E. Schwartz. 1984. *Crosscutting Social Circles: Testing a Macrostructural Theory of Intergroup Relations*. Orlando, Fla.: Academic Press.
- Botev, Nikolai. 1994. "Where East Meets West: Ethnic Inter-marriage in the Former Yugoslavia." *American Sociological Review* 59:461–80.
- Bourdieu, Pierre. (1979) 1984. *Distinction: A Social Critique of the Judgment of Taste*, translated by Richard Nice. Cambridge, Mass.: Harvard University Press.
- Buston, Peter M., and Stephen T. Emlen. 2003. "Cognitive Processes Underlying Human Mate Choice: The Relationship between Self-Perception and Mate Preference in Western Society." *Proceedings of the National Academy of Sciences* 100 (15): 8805–10.
- Cameron, A. Colin, and Pravin K. Trivedi. 1986. "Econometric Models Based on Count Data: Comparisons and Applications of Some Estimators and Tests." *Journal of Applied Econometrics* 1 (1): 29–53.
- Card, David, and Alan B. Krueger. 1995. "Time Series Minimum Wage Studies: A Meta Analysis." *American Economic Review* 85 (2): 238–43.
- Clogg, Clifford C., and Edward S. Shihadeh. 1994. *Statistical Models for Ordinal Variables*. Thousand Oaks, Calif.: Sage.
- Collins, Randall. 1984. "Statistics versus Words." *Sociological Theory* 2:329–62.
- Davis, Kingsley. 1941. "Inter-marriage in Caste Societies." *American Anthropologist* 43: 376–95.
- Drake, St. Clair, and Horace Cayton. (1945) 1993. *Black Metropolis: A Study of Negro Life in a Northern City*, rev. ed. Chicago: University of Chicago Press.
- DuBois, W. E. B. (1899) 1996. *The Philadelphia Negro: A Social Study*, rep. ed. Philadelphia: University of Pennsylvania Press.
- Efron, Bradley. 1979. "Bootstrap Methods: Another Look at the Jackknife." *Annals of Statistics* 7 (1): 1–26.
- Ekeh, Peter P. 1974. *Social Exchange Theory: The Two Traditions*. London: Heinemann Educational Books.
- Elder, Glen. 1969. "Appearance and Education in Marriage Mobility." *American Sociological Review* 34:519–33.
- Ellis, Bruce J., and Harold H. Kelley. 1999. "The Pairing Game: A Classroom Demonstration of the Matching Phenomenon." *Teaching of Psychology* 26 (2): 118–21.
- England, Paula, and George Farkas. 1986. *Households, Employment and Gender*. New York: Aldine.

Exchange Theory in Mate Selection

- Feld, Scott L. 1981. "The Focused Organization of Social Ties." *American Journal of Sociology* 86 (5): 1015–35.
- Freedman, David A. 1983. "A Note on Screening Regression Equations." *The American Statistician* 37 (2): 152–55.
- . 1987. "As Others See Us: A Case Study in Path Analysis" (with discussion). *Journal of Educational Statistics* 12:101–223.
- . 1991. "Statistical Models and Shoe Leather." *Sociological Methodology* 21: 291–313.
- Fu, Vincent Kang. 2001. "Racial Inter-marriage Pairings." *Demography* 38:147–59.
- Gadberry, James H., and Richard Dodder. 1993. "Educational Homogamy in Interracial Marriages—An Update." *Journal of Social Behavior and Personality* 8 (6): 155–63.
- Goode, William J. 1951. "Family and Mobility." Pp. 582–601 in *Class, Status and Power: Social Stratification in Comparative Perspective*, 2d ed., edited by Reinhard Bendix and Seymour Martin Lipset. New York: Free Press.
- . 1970. *World Revolution and Family Patterns*, 2d ed. New York: Free Press.
- , ed. 1971. *The Contemporary American Family*. Chicago: Quadrangle Books.
- Greene, William H. 2002. *Econometric Analysis*, 5th ed. New York: Prentice Hall.
- Gutierrez, Roberto G., Shana Carter, and David M. Drukker. 2001. "On Boundary-Value Likelihood-Ratio Tests." *Stata Technical Bulletin* 60:15–18.
- Hannan, Michael T. 1991. "Theoretical and Methodological Issues in Analysis of Density-Dependent Legitimation in Organizational Evolution." *Sociological Methodology* 21:1–42.
- Heer, David. 1974. "The Prevalence of Black-White Marriage in the United States, 1960 and 1970." *Journal of Marriage and the Family* 36:246–58.
- Homans, George Caspar. 1961. *Social Behavior: Its Elementary Forms*. New York: Harcourt, Brace & World.
- Hout, Michael, and Joshua Goldstein. 1994. "How 4.5 Million Irish Immigrants Became 40 Million Irish Americans: Demographic and Subjective Aspects of Ethnic Composition of White Americans." *American Sociological Review* 59:64–82.
- Huber, Peter J. 1967. "The Behavior of Maximum Likelihood Estimates under Non-standard Conditions." Pp. 221–33 in *Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability*. Berkeley, Calif.: University of California Press.
- Hwang, Sean-Shon, Rogelio Saenz, and Benigno E. Aguirre. 1995. "The SES Selectivity of Interracially Married Asians." *International Migration Review* 29:469–91.
- Iyengar, Satish, and Joel B. Greenhouse. 1988. "Selection Models and the File Drawer Problem." *Statistical Science* 3 (1): 109–17.
- Johnson, Robert Alan. 1980. *Religious Assortative Marriage in the United States*. New York: Academic Press.
- Kalmijn, Matthijs. 1991a. "Shifting Boundaries: Trends in Religious and Educational Homogamy." *American Sociological Review* 56:786–800.
- . 1991b. "Status Homogamy in the United States." *American Journal of Sociology* 97:496–523.
- . 1993. "Trends in Black/White Inter-marriage." *Social Forces* 72:119–46.
- . 1998. "Inter-marriage and Homogamy: Causes, Patterns, Trends." *Annual Review of Sociology* 24:395–421.
- Kanarek, M. S., et al. 1980. "Asbestos in Drinking Water and Cancer Incidence in the San Francisco Bay Area." *American Journal of Epidemiology* 112:54–72.
- Kennedy, Ruby Jo Reeves. 1952. "Single or Triple Melting Pot? Inter-marriage in New Haven, 1870–1950." *American Journal of Sociology* 58:56–59.
- King, Gary. 1989. "Variance Specification in Event Count Models: From Restrictive Assumptions to a Generalized Estimator." *American Journal of Political Science* 33 (3): 762–84.

American Journal of Sociology

- Kreider, Rose Marie. 1999. "Interracial Marriage and Marital Instability." Ph.D. dissertation. University of Maryland, Department of Sociology.
- Leamer, Edward E. 1978. *Specification Searches: Ad Hoc Inferences with Non Experimental Data*. New York: Wiley and Sons.
- . 1983. "Let's Take the Con out of Econometrics." *American Economic Review* 73:31–43.
- . 1985. "Sensitivity Analyses Would Help." *American Economic Review* 75 (3): 308–13.
- Lévi-Strauss, Claude. (1949) 1969. *The Elementary Structures of Kinship*, rev. ed. Boston: Beacon Press.
- Liang, Zai, and Naomi Ito. 1999. "Intermarriage of Asian Americans in the New York City Region: Contemporary Patterns and Future Prospects." *International Migration Review* 33:876–900.
- Liebersohn, Stanley. 1985. *Making It Count: The Improvement of Social Research and Theory*. Berkeley and Los Angeles: University of California Press.
- Liebersohn, Stanley, and Mary C. Waters. 1988. *From Many Strands: Ethnic and Racial Groups in Contemporary America*. New York: Russell Sage.
- Long, J. Scott. 1997. *Regression Models for Categorical and Limited Dependent Variables*. Thousand Oaks, Calif.: Sage Press.
- Long, J. Scott, and Laurie H. Ervin. 2000. "Using Heteroscedasticity Consistent Standard Errors in the Linear Regression Model." *The American Statistician* 54: 217–24.
- Mare, Robert D. 1991. "Five Decades of Educational Assortative Mating." *American Sociological Review* 56:15–32.
- Mason, William M. 1991. "Freedman Is Right as Far as He Goes, but There Is More and It's Worse: Statisticians Could Help." *Sociological Methodology* 21:337–51.
- Massey, Douglas S., and Nancy Denton. 1993. *American Apartheid: Segregation and the Making of the Underclass*. Cambridge, Mass.: Harvard University Press.
- McAleer, Michael, Adrian R. Pagan, and Paul A. Volker. 1985. "What Will Take the Con Out of Econometrics?" *American Economic Review* 75 (3): 293–307.
- Merton, Robert K. 1941. "Intermarriage and the Social Structure: Fact and Theory." *Psychiatry* 4:361–74.
- Myrdal, Gunnar, Richard Sterner, and Arnold Rose. 1944. *An American Dilemma: The Negro Problem and Modern Democracy*. New York: Harper.
- Okun, Barbara. 2001. "The Effects of Ethnicity and Educational Attainment on Jewish Marriage Patterns: Changes in Israel, 1957–1995." *Population Studies—a Journal of Demography* 55:49–64.
- Pagnini, Deanna L., and S. Philip Morgan. 1990. "Intermarriage and Social Distance among U.S. Immigrants at the Turn of the Century." *American Journal of Sociology* 96 (2): 405–32.
- Porterfield, Ernest. 1978. *Black and White Mixed Marriages*. Chicago: Nelson-Hall.
- Qian, Zhenchao. 1997. "Breaking Racial Barriers: Variations in Interracial Marriage between 1980 and 1990." *Demography* 34:263–76.
- . 1999. "Who Intermarries? Education, Nativity, Region, and Interracial Marriage, 1980 and 1990." *Journal of Comparative Family Studies* 30:579–99.
- Raftery, Adrian. 1986. "Choosing Models for Cross-Classifications." *American Sociological Review* 51:145–46.
- Root, Maria P. P. 2001. *Love's Revolution: Interracial Marriage*. Philadelphia: Temple University Press.
- Rosenfeld, Michael J. 2001. "The Salience of Pan-national Hispanic and Asian Identities in U.S. Marriage Markets." *Demography* 38:161–75.
- Ruggles, Steven, et al. 2004. Integrated Public Use Microdata Series, ver. 3.0. Minneapolis: Historical Census Projects, University of Minnesota, <http://www.ipums.umn.edu>.

Exchange Theory in Mate Selection

- Sandefur, Gary, and Trudy McKinnell. 1986. "American Indian Inter-marriage." *Social Science Research* 15:347-71.
- Schoen, Robert. 1986. "A Methodological Analysis of Intergroup Marriage." *Sociological Methodology* 16:49-78.
- . 1988. *Modeling Multigroup Populations*. New York: Plenum Press.
- Schoen, Robert, and John Wooldredge. 1989. "Marriage Choices in North Carolina and Virginia 1969-71 and 1979-81." *Journal of Marriage and the Family* 51:465-81.
- Spickard, Paul. 1989. *Mixed Blood: Inter-marriage and Ethnic Identity in Twentieth-Century America*. Madison: University of Wisconsin Press.
- Taylor, Patricia Ann, and Norval Glenn. 1976. "The Utility of Education and Attractiveness for Females' Status Attainment through Marriage." *American Sociological Review* 41:484-98.
- Turner, Jonathan H. 1989. "The Disintegration of American Sociology: Pacific Sociological Association 1988 Presidential Address." *Sociological Perspectives* 32 (4): 419-33.
- Waller, Willard. 1937. "The Rating and Dating Complex." *American Sociological Review* 2:727-34.
- Weakliem, David L. 1999. "A Critique of the Bayesian Information Criterion for Model Selection." *Sociological Methods and Research* 27 (3): 359-97.
- Weber, Neville. 1986. "The Jackknife and Heteroskedasticity Consistent Variance Estimation for Regression Models." *Economics Letters* 20:161-63.
- White, Halbert. 1980. "A Heteroskedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroskedasticity." *Econometrica* 48:817-30.
- . 1981. "Consequences and Detection of Misspecified Nonlinear Regression Models." *Journal of the American Statistical Association* 76:419-33.
- . 1982. "Maximum Likelihood Estimation of Misspecified Models." *Econometrica* 50:1-25.
- White, Michael J. 1988. *American Neighborhoods and Residential Differentiation*. New York: Russell Sage.
- Wilson, William Julius. 1980. *The Declining Significance of Race*. Chicago: University of Chicago Press.
- Wirth, Louis, and Herbert Goldhamer. 1944. "The Hybrid and the Problem of Miscegenation." Pp. 249-370 in *Characteristics of the American Negro*, edited by Otto Klineberg. New York: Harper & Brothers.
- Yamagishi, Toshio, and Karen S. Cook. 1993. "Generalized Exchange and Social Dilemmas." *Social Psychology Quarterly* 56 (4): 235-48.