The Institutional Logic of Occupational Prestige Ranking: Reconceptualization and Reanalyses[1]

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Departing from the earlier literature that emphasizes power and resources as sources of occupational prestige, the author proposes to explain the phenomenon of occupational prestige ranking from an institutional logic of social recognition that is centered on the principle of legitimacy and appropriateness. The author develops theoretical arguments to explicate the mechanisms that generate the intersubjective evaluation of the "social standings" of occupations and that give deference to occupations that can make legitimate claims on the bases of nature and reason. The proposed theoretical ideas are tested by examining patterns of occupational prestige ranking reported in 1989 GSS data. The findings are consistent with the hypotheses derived from the institutional logic that motivates this study.

> Quite generally, "mere economic" power, and especially "naked" money power, is by no means a recognized basis of social honor. Nor is power the only basis of social honor. Indeed, social honor, or prestige, may even be the basis of political or economic power, and very frequently has been.—Max Weber (1946, p. 180)

Occupational prestige has been one of the most fascinating and puzzling social facts in sociological inquiries. On the one hand, it has been widely observed that there is a high consensus in occupational prestige ranking

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among individuals located in different social positions, across different societal contexts, and over time (Blau and Duncan 1967; Hodge, Siegel, and Rossi 1964; Hodge, Treiman, and Rossi 1966; Treiman 1977). On the other hand, there has been an equally enduring debate on the meaning, measurement, and use of occupational prestige in social stratification research. Unfortunately, research in this area has not led to satisfactory explanations and definitive conclusions; instead, the role of occupational prestige is often found to be at odds with other measures of socioeconomic status (see Wegener [1992] for a review). Featherman and Hauser (1976, p. 405) concluded that "prestige scores are 'error-prone' estimates of the socioeconomic attributes of occupations" in research on intergenerational mobility. Since the 1980s, debates in this area have erupted occasionally (Balkwell, Bates, and Garbin 1980; Guppy 1982; Guppy and Goyder 1984; Hodge 1981; Hodge, Kraus, and Schild 1982; Jencks, Perman, and Rainwater 1988). But, by and large, researchers have turned their attention to other research agendas, and important issues surrounding the occupational prestige phenomenon have been abandoned rather than resolved.

The marked stability in occupational prestige raises fundamental issues about core sociological explanations that are centered on variations in structural positions, social institutions, and cultural contexts. How does one reconcile the apparent high stability and consensus in occupational prestige ranking, on the one hand, with noticeable differences among social classes or groups, on the other? In this study I revisit this puzzle and develop an institutional logic of explanation to address this unsolved problem.

My theoretical focus and analytical strategies differ from earlier studies. Much of the earlier debate on occupational prestige is located within the framework of social stratification processes, especially the importance of *authority relationships* and *economic resources* that affect either the perceptions of those who rate occupations or the perceived status of the occupations being rated. In contrast, I begin with the recognition that the processes that generate social recognition of occupational prestige belong to the institutional realm of values and beliefs. Theoretically, I develop an institutional logic of social recognition to explain how the role of legitimacy and appropriateness governs intersubjective processes of eval-

any responsibility for the analyses or interpretations presented here. Earlier versions of this article were presented in seminars at Academia Sinica, Duke University, MIT, Stanford University, and the Academy of Management meeting in 2000. I thank Glenn Carroll, Roberto Fernandez, Mark Granovetter, James March, John Meyer, Hayagreeva Rao, Arthur Stinchcombe, Tony Tam, John Wilson, Wei Zhao, Ezra Zuckerman, and seminar participants for their helpful comments, and Ann-Walton Garrison for her assistance in collecting information on occupational associations. Direct correspondence to Xueguang Zhou, Department of Sociology, Duke University, Durham, North Carolina 27708. E-mail: xzhou@soc.duke.edu

uation and generates observed empirical regularities in occupational prestige ranking; on this basis, I derive a set of theoretical propositions and their empirical implications. Empirically, I test these ideas in an analysis of occupational prestige ranking patterns in the 1989 GSS module of occupational prestige data. Methodologically, I adopt statistical models for ranked data that allow me to model directly patterns of ordinal rank scores in the occupational prestige ranking data and to incorporate in analyses both occupation-level job attributes and individual-level socioeconomic (SES) characteristics of the raters.

THE OCCUPATIONAL PRESTIGE PHENOMENON: UNSOLVED PROBLEMS

Building on a series of earlier studies (Hodge et al. 1964; Hodge, Treiman, and Rossi 1966), Treiman (1977) is the most comprehensive study of the occupational prestige phenomenon, which established the remarkable empirical regularity that occupational prestige has been stable and consistent over time and across societies. Influenced by the dominant functionalist theory of the time, Treiman's explanation identified as the major sources of occupational prestige the importance of differential authority relationships and resources associated with occupations. That is, the division of labor through occupational differentiation reflects the "functional imperatives" of a society and is associated with differential allocation of resources and privileges. At the center of this argument is the role of power. As Treiman (1977, pp. 5–6) put it: "Thus, since the division of labor gives rise to characteristic differences in power, and power begets privilege, and power and privilege begets prestige, there should be a single, worldwide occupational prestige hierarchy." The marked regularities in occupational prestige ranking over time and across social groups "bolster a conception of occupational prestige ratings as peculiarly collective perceptions of social reality rather than expressions of personal values" (Treiman 1977, p. 59).

The recognition of occupation ranking as "collective perceptions" points to intersubjective processes of social judgment that generate the prestige phenomenon. I concur with this observation and take it as the starting point of my inquiry. However, I depart from Treiman's argument on the causal relationship between power and occupational prestige; instead, I see the relationship between power (and privilege) and prestige as unresolved and problematic. A fundamental sociological insight is that prestige, like other social statuses or social honors, is related to but distinctive from one's economic resources or structural positions. This distinction was carefully drawn in Weber's writing: "In contrast to the purely eco-

nomically determined 'class situation' we wish to designate as 'status situation' every typical component of the life fate of men that is determined by a specific, positive or negative, social estimation of honor" (1946, pp. 186–87). Moreover, "'mere economic' power, and especially 'naked' money power, is by no means a recognized basis of social honor. Nor is power the only basis of social honor. Indeed social honor, or prestige, may even be the basis of political or economic power, and very frequently has been" (1946, p. 180). It is true that, as Weber observed, economic power and prestige often go hand in hand in everyday life, but the mechanisms that generate power and prestige may differ and need to be explained rather than assumed. Indeed, the relationship between power and prestige and the role of legitimacy in this relationship have long been the focus of discussion in social science literatures (Douglas 1986; Goldthorpe and Hope 1972; Heinz and Laumann 1994).

The apparent stability in occupational prestige was also a methodological construct involving two aggregation problems (for discussions of aggregation problems in sociological research, see Blalock [1964] and Hannan [1971]). First, an occupation's prestige score is a weighted average of aggregated ranking scores over all raters, which reduces all information into one statistic of central tendency (Siegel 1971, pp. 21–22; Nakao and Treas 1994). As a result, the prestige score thus computed ignores, by definition, information on within-occupation ranking variations among the raters. Note that my critique is not directed at the statistical measure of prestige score per se, but at the use of this measure to gauge evidence of consensus and stability in occupational prestige order. Second, in Treiman's (1977) analytical framework, variations in prestige scores across occupations were then explained by broadly construed causal factors such as power and education: for instance, noting that the level of education required for performing jobs in an occupation is closely related to occupational prestige, Treiman uses education/skill as an indicator of "power." But educational requirements associated with an occupation may be generated by distinct mechanisms, such as legitimacy on the basis of formal knowledge in an occupation (a doctoral degree or a long-term apprenticeship) or authority positions (e.g., educational credentials for managers and administrators such as MBA degrees). The second aggregation problem then confounds multiple, and potentially competing, mechanisms that generate prestige rating behavior.

I argue that the two aggregation problems—aggregation over occupational prestige ranking and over causal mechanisms—have inadvertently masked important sources of variation in the prestige ranking phenomenon and fostered the image of stability and uniformity in the status order of occupations. I propose to overcome these problems in two ways: First, I develop an institutional logic to reconceptualize the research issues

and to identify distinct mechanisms that may generate variations in occupational prestige ranking. Second, I adopt appropriate analytical strategies to model variations in both occupational rating and in distinct generating mechanisms.

THE INSTITUTIONAL LOGIC OF SOCIAL RECOGNITION IN OCCUPATIONAL PRESTIGE RANKING

I begin this inquiry by noting a central characteristic, indeed a salient paradox, of the prestige phenomenon. That is, prestige as social distinction is based on persistent differences in social positions; at the same time, it must transcend these social boundaries and be accepted by a broad audience. This observation seems self-evident: prestige is necessarily a *status-ordering* phenomenon. If all occupations have the same esteem, there is no need for the notion of prestige to emerge. On the other hand, prestige must go beyond immediate interacting parties and be recognized by third parties outside the transaction. If professors are appreciated only by those who attend their classes, if judges are esteemed only by those who appear in their courtrooms, then occupational prestige loses much of its sociological significance. As Goode (1978, p. 18) put it, prestige acquisition "is structurally different from contracts or even many social exchanges because the essential relationship is not dyadic, but triadic. Prestige is thus the outcome of interaction between one person, another, and significant third parties."

In this light, the making of occupational prestige is a dual process of *differentiation* and *incorporation*. The emergence of occupational prestige is above all a process of differentiation among occupations along some hierarchical order. However, such a hierarchical order must be recognized through a meaning system shared by the members of the same community. That is, prestige making must be, at the same time, an incorporation process through which the audience comes to accept and share the criteria, taste, and manner of those prestige makers or holders. Weber (1946, pp. 188–90) offered a most striking example in this regard: ethnic groups are merely ethnically segregated groups that are *horizontally* distributed in a population. They become *vertically* ordered into a status hierarchy (e.g., the caste system) only when the logic of social recognition infuses meanings such as social honor and privileges into the relationships among these groups. Similarly, occupations are types of jobs associated with a variety of job attributes. A prestige order arises among occupations only when certain attributes are interpreted through value judgments and organized into a hierarchical order.

To elaborate these ideas, the imagery of an "institutional order" in Shils's

writing is a useful illustrative device. Shils argues that, in any society, there is an institutional order of values and beliefs—an "official religion," as Shils put it—that is taken for granted and serves as the basis to confer legitimacy and appropriateness to social artifacts and behaviors. In this light, *an institutional order also confers a hierarchical order:* those social positions or behaviors that are located closer to, or positioned higher in, the institutional order are seen as more appropriate or legitimate and receive deference, prestige, or social status. Following this logic, Shils argued that "occupational roles are ranked in a sequence which appears approximately to correspond with the extent to which each role possesses these properties" (1968, p. 279). That is, variations in the prestige of occupations are a function of their locations in the institutional order.

I propose an *institutional logic of social recognition* to explicate the casual mechanisms. The core idea is that, to acquire prestige or status, all social positions, roles, and behavior must justify their claims on the basis of legitimacy and appropriateness in reference to the institutional realm of shared values and beliefs, a theme emphasized in the institutional theories of organizations (DiMaggio and Powell 1983; Meyer and Rowan 1977; March 1994; Scott 2001; Zucker 1977). Moreover, what is appropriate and legitimate must be seen as transcending self-interests and group boundaries, and be accepted by a large audience. In contemporary societies, claims of legitimacy and appropriateness tend to rest on nature and reason, which are seen as providing "objective" bases immune from artificial manipulation motivated by self-interests. Douglas made this point explicitly: "Most established institutions, if challenged, are able to rest their claims to legitimacy or their fit with the nature of the universe. . . . In response to further questioning the final answer refers to the way the planets are fixed in the sky or the way that plants or humans or animals naturally behave" (1986, pp. 46–47). Stinchcombe developed a similar line of argument, emphasizing the role of reason and its relatives as "norms governing a body of thoughts recognized as authoritative in a culture" and providing "socially instituted protections of decision processes from corruption by passions or interests" (1986, pp. 152–53). In this light, the *naturalization* of social categories is a powerful mechanism of differentiation among occupational statuses. Once social differences can be justified on the basis of a "natural order"—be it genetic makeup, a taken-for-granted social inheritance system, or innate IQ—they are easily accepted by all social groups. Social recognition involves (or presumes) the acceptance of both the evaluative criteria and the process of linking certain attributes of performances or behaviors with the established hierarchical order. As Parkin (1971, p. 42) put it: "Thus it is not the ranking of occupations as such which is formally upheld by the socialization process; rather it is the criteria by which positions are to be ranked. That is to

say, certain criteria become institutionalized as 'relevant' for ranking purposes, while other criteria are excluded or defined as 'irrelevant.' Once a given set of rank criteria has been successfully legitimized throughout society, then the main lines of the status order will have been laid down." By this logic, if an occupation can make claims and justify its status on the basis of nature or reason, it is placed higher in the institutional order and can more effectively acquire deference and prestige.

The capacity to make legitimate claims successfully is not equally distributed. Compliance to legitimacy and appropriateness can be manipulated through the use of symbolic and other resources (Bourdieu 1991). However, such manipulation is not arbitrary. It must be consistent with, and justified through, the shared social reality. Therefore, the logic of social recognition points to those distinct mechanisms that affect both differentiation and incorporation processes. Consider the role of interest politics in occupational status attainment. As is well recognized in the sociology of occupations, interest politics serve as an important mechanism in promoting occupation-based SES. Occupational groups provide organizational bases for collective action in interest articulation (Grusky and Sørensen 1998) and help gain sponsorship from state regulation (Zhou 1993). They actively engage in a "collective mobility project" (Larson 1977, p. 66), "carving out a labor-market shelter, a social closure, or a sinecure for its members in the labor market" (Freidson 1986, p. 59). The resulting social closures deliver considerable economic benefits to these organized interests (Weeden 2002).

Yet all interest groups exercise their political and economic power to pursue self-interest; what, then, distinguishes those professions' deliberate pursuit of status from other interest politics in everyday life? "The key question for the professions," as Freidson (1986, p. 225) observed, "is whether the exercise of those powers also advances or imposes the formal knowledge by which they distinguish themselves from other occupations. Is professional power the special power of knowledge or merely the ordinary power of vested economic, political and bureaucratic interest? That is the critical question." It is a well-established finding in the sociology of professions that profession-based interest groups devoted an enormous amount of resources not to collective bargaining for immediate economic gains, but to develop a formal knowledge basis. The creation of formal knowledge, which tends to be "depersonalized" and "objectified," provides a link to "the dominant system of cognitive legitimation" (Larson 1977, pp. 40–41). The cultural control of professional jurisdictions, as Abbott (1988, p. 86) argued, "is legitimated by formal knowledge that is rooted in fundamental values," which provides a critical condition for competing professionals to make claims on overlapping jurisdictions. The pursuit of knowledge, or "intellectual challenge," provides an important source of

prestige even among those power-conscious, highly competitive legal practitioners (Heinz and Laumann 1994, chap. 4; Sandefur 2001). In this regard, it is instructive to note that the once-powerful labor unions have not been successful in creating or maintaining the prestige of those occupations in which their members concentrate. These studies reveal the subtle dynamics in which cultural meanings were shaped and transformed and in which the intersubjective processes of institutional building took place. Conflicts over occupational status can be seen as symbolic struggles over the basis, such as formal knowledge, on which different fields can make legitimate claims to be placed higher in the institutional order.

So far, my discussion has focused on the role of the differentiation process in providing the basis for legitimate claims in differential access to the institutional order. Equally important to this line of argument is my proposition that social recognition must also be based on the effectiveness of incorporating different social groups into the institutional realm of shared values and beliefs. The very logic of social recognition may generate divergence and contention, rather than consensus, in social judgment among groups. For example, actions based on naked power or economic resources do not confer prestige or status so long as they are *perceived* as inconsistent with prevalent expectations or norms (Goldthorpe and Hope 1972). By the logic of social recognition, such behaviors are seen as inappropriate and, as a result, their prestige is undermined. These considerations imply that the incorporation processes may vary across contexts and evolve over time. For example, as Treiman (1977, p. 59) reported, the rating of religious denominations in the United States reveals a pattern of "social distance" as a result of social differences resting on distinctive and competing religious bases. It is one of the key tasks of the proposed theory to recognize and examine those social processes that may generate alternative bases of legitimate claims among social groups and undermine shared values and beliefs in the "official" institutional order, thereby calling into question the existing status order. In emphasizing variations in incorporation processes, I seek to move beyond the focus of taken-for-grantedness in the institutional analysis and to understand how the logic of social recognition and interest politics interact in constructing the social reality of occupational prestige.

These arguments anticipate that the rating of occupational prestige differs in important ways from the conception of SES in the social stratification literature. Whereas most SES measures (e.g., income and education) capture the overt social distance and resource inequality among social groups, occupational prestige ranking follows a logic of social recognition that transcends group boundaries. For an occupation to receive higher prestige than another, it must gain recognition and deference on the basis of commonly recognized attributes that crosscut group bound-

aries. In other words, processes of intersubjective evaluation of social positions must be based on shared criteria that transcend the very socioeconomic boundaries created by resource-based variations in education and income. In this light, the fact that prestige scores are "error-prone" measures of the socioeconomic attributes of occupations, as observed by Featherman and Hauser (1976), is a logical consequence of the institutional mechanisms in conferring social recognition.

These considerations highlight significant differences between functionalist arguments and the institutional logic proposed in this study. Both recognize the central role of an institutional order as the basis for occupational prestige. A functionalist logic sees power and privileges as neutral phenomena reflecting the functional importance of social positions; as a result, differences in social positions are *naturally* accepted by all members of a society. For example, consistent with a functionalist logic, human capital theory predicts that investment in education will have positive returns (including prestige) because higher educational credentials are associated with "functionally important" jobs and are rewarded accordingly. In contrast, in developing the institutional logic, I see the occupational hierarchy as socially constructed and follow an institutional logic of social recognition. As a result, occupational prestige should vary systematically with the bases for making legitimate claims and with group membership as a function of their incorporation into the institutional realm of shared values.

EMPIRICAL IMPLICATIONS OF THE THEORY FOR OCCUPATIONAL PRESTIGE RANKING

The proposed institutional logic points to distinct generating mechanisms that govern how deference and social recognition are conferred and subjects them to sociological analysis. As a baseline of comparison, I note two key empirical implications in the functionalist logic (see Treiman 1977): first, those occupations associated with power or authority positions are likely to receive high prestige because of their functional importance and associated privileges; second, there should be a high consensus (or no systematic dissensus) among social groups in their evaluation of occupational status. As I demonstrate below, the proposed institutional logic leads us to a different set of empirical implications.

Differentiation Processes

The presence of an occupational prestige hierarchy depends on the effectiveness of differentiation processes that distribute occupations into

different positions within a status order. As I argued earlier, the key mechanism of differentiation is an occupation's capacity to make legitimate claims in the realm of shared values and beliefs. My preceding discussions highlight the important role of "nature and reason" in providing the basis for making legitimate claims. But what constitutes "nature" and "reason" is socially constructed and therefore historically contingent. This observation leads to the following theoretical proposition: *Those occupations that can effectively associate their attributes with the socially constructed images of nature and reason are more likely to receive high prestige ranking.* In contemporary societies, access to nature and reason is closely related to rational, abstract knowledge and science. The depersonalized and objectified characteristics of formal knowledge imply a successful "naturalization" process. We come to appreciate natural orders through priests, doctors, and scientists, whose work is in turn legitimated by abstract knowledge (Abbott 1988). Therefore, if an occupation can base its legitimate claims on formal knowledge and science, it is likely to demonstrate those qualities that place the occupation higher in the institutional order relative to other occupations. As a result, such an occupation is likely to be seen as appropriate and legitimate and to receive high prestige ranking. Hodge et al. (1964) observed the historical trend that "scientific occupations were increasing in prestige" since the early 20th century. Thus, I derive the following empirical implication:

HYPOTHESIS 1.—*The more salient the attributes of formal knowledge and science in an occupation, the higher its prestige ranking.*

The proposed institutional logic calls for a careful distinction between power and prestige and treats the relationship between the two as problematic. Naked power and social conflicts may be at odds with the logic of social recognition and undermine the institutional order and therefore the basis for making legitimate claims. Political conflicts and competing claims on overlapping jurisdictions among professional groups may create "status strain" and reveal the arbitrariness of the competing claims and behaviors, making it difficult to naturalize claims in that arena (Abbott 1981). For example, the publicity of conflicting standards in legal proceedings (such as those in Court TV, the O. J. Simpson trial, or the Bush-Gore presidential election controversies) may convey a sense of arbitrariness and self-interest in the function of the legal profession (Sheerwin 2000), making it difficult to make claims on the basis of nature and reason. This argument is summarized in the second proposition: *The more an occupation is exposed to social conflicts, the more difficult it is for the occupation to make legitimate claims, and the less likely that occupation is to receive high prestige ranking.*

Empirically, in contrast to the image of objectivity and disinterestedness that formal knowledge and science project, those occupations that involve

frequent human interaction, especially those having authority positions, are likely to be exposed to social tensions that undermine their basis of legitimacy or appropriateness. These considerations give us the following hypothesis:

HYPOTHESIS 2.—*The more an occupation is involved in human interaction or has advantages in authority relationships, the more likely that it experiences social tensions and that its authority is contested and challenged, hence the less likely that its claims can be "naturalized" and that it receives higher prestige rating compared with those knowledge-based occupations.*

Note that hypothesis 1 can be derived from both the functionalist logic and the institutional logic, but that hypothesis 1 and hypothesis 2 jointly provide a test of the empirical implications of the institutional logic.

Following the same logic, my third theoretical proposition is that *the more organizing capacities an occupation has, the more likely it is to receive higher occupational prestige ranking.* As I noted before, it is well documented that professional organizations have been actively involved in developing their knowledge basis, in protecting their labor market boundaries, and in competing for claims in overlapping jurisdictions. From the institutional perspective, it is the *organizing capacities* in constructing appropriate (knowledge-based) claims, rather than the exercise of naked power, that enable those occupations to enhance their prestige. The sociology of profession literature shows that the establishment of associations and rationalization of formal knowledge (often organized by professional associations) are important markers of the professionalization processes. Empirically, I use the age of an association and the number of publications in that association to indicate the associational power of the occupation, and hypothesize that

HYPOTHESIS 3.—*The greater the associational power of an occupation, the more likely that it will receive a higher rating. Specifically, the longer the association exists in an occupation, or the more publications the association has, the more likely that the occupation has higher prestige.*

The effectiveness of the institutional order depends on social acceptance. In the mass politics of contemporary societies, the perception of having equal access to the institutional order (i.e., based on objectified criteria) is an important prerequisite for the acceptance of such an order. On the other hand, if access is too lax, knowledge-based claims and social closure cannot be maintained. There are similar parallels in social stratification: some mobility across social strata increases the legitimacy and acceptance of the stratification order, but a high rate of mobility undermines such an order. On this basis, my fourth proposition is, *The availability of access to an occupation increases its visibility and acceptability, but too much accessibility reduces its effectiveness in making legitimate*

claims. Therefore, I hypothesize a nonlinear relationship between the size of the occupation and its prestige rating:

HYPOTHESIS 4.—*There is an inverted U-shaped relationship between an occupation's accessibility and its prestige. An initial increase in accessibility (occupational size) increases prestige, but beyond a certain threshold, greater accessibility decreases occupational prestige.*

Incorporation Processes

The acceptance of the institutional order, on which intersubjective evaluation is based, is a consequence of how various social groups are *incorporated* into the institutional realm. Since institutionalization is an evolving process, there are inevitably considerable variations in the extent to which different social groups are incorporated into the institutional order. This idea leads us to examine mechanisms of incorporation. Earlier studies of occupational prestige ranking have emphasized intersubjective processes and group-based differences (Balkwell et al. 1980; Guppy 1982; Guppy and Goyder 1984; Hodge et al. 1982). I emphasize the link between the raters' SES and incorporation processes governed by the logic of social recognition.

Specifically, I argue that the raters' SES group membership is especially pertinent because it reveals their distance from the institutional order, which affects their evaluation of different occupations. Research on social stratification has long examined the relationship between SES and class identification (Centers 1953; Coleman and Rainwater 1978; Curtis and Jackson 1977; Hodge and Treiman 1968). More recently, Yamaguchi and Wang (2002) found evidence that gender, ethnicity, and occupational location contribute to one's class identification. Based on these considerations, one can expect systematic variations in the effects of group membership (identity) on rankings of occupational prestige. Take racial group membership for example. Because of racial discrimination and the resulting economic disparity, African-Americans as a group are less likely to have access to key social institutions. Such life experiences are likely to lead them to resist the "official" institutional order and develop their competing values and beliefs. As a result, one can expect that there are significant differences between whites and African-Americans in their evaluation of types of occupational attributes. On this basis, I develop my fifth proposition: *Those social groups that are less incorporated in the official institutional realm or those that are peripheral to the institutional order are more likely to deviate from the dominant occupational prestige ranking pattern.* I postulate that minority groups and women are two social groups located in peripheral positions to the institutional order because of the discrimination and inequality they experience in labor

markets, in work organizations, and in the broader cultural context (England 1992; Reskin and Roos 1990). In contrast, those with higher educational levels (e.g., a college degree or above) or those in advantageous occupations (e.g., professional and managerial occupations) are more likely to be incorporated into the institutional realm. One should note that, among these group categories, scholars especially diverge on the role of gender in class identification (Goldthorpe 1983; Sørensen 1994). Yamaguchi and Wang (2002) also cautioned about the conditional nature of these group identities. These qualifications notwithstanding, I suspect that group-based differences are especially salient with regard to authority relationship, which is the basis of social contentions and social conflicts. Therefore, I propose

HYPOTHESIS 5.—*Minority groups and women are less likely to give high prestige ranking to those occupations that have advantages in authority relationships. Conversely, those groups with higher educational credentials or managerial/professional occupations tend to give higher prestige ranking to those occupations that have advantages in authority relationships.*

As I argued before, affinity to nature and reason provides a more robust basis for acquiring legitimacy and appropriateness, because naturalization processes conceal self-interested behaviors and mask potential conflicts that may undermine the legitimate basis for intersubjective evaluation. This line of reasoning leads me to an additional hypothesis:

HYPOTHESIS 6.—*Differences in occupational ranking among social groups are less pronounced with regard to the attributes of science and knowledge bases than with regard to the attributes of authority relationships.*

RESEARCH DESIGN

Analytical Issues and Strategies

The proposed institutional logic identifies distinct mechanisms in conferring social recognition, but I do not claim that institutional mechanisms alone can explain all variations in occupational prestige ranking. Instead, I explicitly acknowledge that the rating of occupational prestige involves multiple processes. For example, when asked to evaluate "the social standing" of an occupation, a rater's response may be influenced not only by the institutional logic proposed here, but also by other attributes (e.g., income) related to the social desirability of the occupation to him or her. What I do claim is that, even after controlling for other sources, the proposed institutional logic should have significant explanatory power for the observed patterns of prestige ranking. Therefore, it is a critical task

to develop appropriate analytical strategies and research designs to control for other processes before I test the implications of the theoretical ideas proposed in this study.

One analytical problem is distinguishing between authority positions and resources associated with these positions. This is important for constructing a critical test of competing arguments derived from the functionalist theory. Resources associated with an occupation may be a result of its functional importance (as conceptualized in the functionalist theory), or it may be based on power in the class structure of a society (e.g., property-based power). A respondent's ranking of an occupation associated with higher income may reflect the confounding effects of its desirability with respect to economic resources *and* the deference that occupation commands. Therefore, an observation that higher income (associated with an occupation) increases the prestige ranking of that occupation does not help identify the different mechanisms that generated this empirical association. To examine the effect of authority relationships on occupational prestige, I propose to control for the effects of resources (e.g., income) in the model estimation.

Similarly, one also needs to devise measures of occupational attributes that can capture multiple mechanisms in making legitimate claims. In particular, one needs to distinguish between two types of occupational attributes—those related to knowledge-based versus authority-based claims. For this purpose, I make use of detailed measures of occupational attributes in the *Dictionary of Occupational Titles* (*DOT*) (U.S. Department of Labor 1991). My strategy is to adopt *DOT* measures of specific occupation attributes that explicitly capture the two distinct mechanisms identified in my preceding discussions so as to decompose the effects of multiple processes underlying occupational prestige ranking.

Previous research has used *DOT* information to study various aspects of occupations, from occupational segregation to inequality in resource distribution and privileges (England 1992; Kilbourne et al. 1994; Weeden 2002). The *DOT* measures are criticized as biased in gender and other sociological dimensions (Miller et al. 1980). For my research purposes, however, these features should *not* affect my analyses and conclusions, so long as these characteristics reflect the instituted occupational hierarchies as the intersubjective basis for prestige ranking. Note that, if this assumption is not satisfied, there should be less or no systematic variation between the *DOT* measures and patterns of occupational prestige ranking in the empirical data, resulting in findings that would weaken rather than strengthen my theoretical arguments.

Another empirical issue that deserves careful consideration is the role of educational requirement or qualification associated with an occupa-

tion.[2] In sociological and economic literatures, several theoretical arguments (e.g., functionalist and human capital theories) treat educational requirements as an indicator of the "functional importance" of the occupation. But there are also other alternative, competing arguments that conceptualize educational qualifications as signals or sorting mechanisms that may not be associated with productivity (see Bourdieu and Passerson 1990; Spence 1973; Weiss 1995). There are large, diverse literatures associated with these competing theoretical arguments. For this reason, it is difficult to give a substantive interpretation of this variable based on a single theoretical logic alone, so I adopt the strategy of treating "educational qualifications" for an occupation as a statistical control. If the institutional logic makes a distinctive contribution, the proposed theoretical model should have good explanatory power even after controlling for the effect of educational requirements. Otherwise, the institutional logic would not be distinguishable, on empirical grounds, from alternative explanations based on educational requirements. I will revisit this set of issues in the discussion section of this article.

Finally, the recent development of statistical models for analyzing ranked (ordinal) data makes it possible to model ranking scores of occupational prestige rating directly. Moreover, one can link these patterns with the disaggregated information of both the attributes of the occupations being ranked and raters' attributes in an appropriate statistical framework.

Data

Data from this study are drawn from several sources. The occupational prestige rating information is obtained from the 1989 General Social Survey (GSS) module on occupational prestige. The 1,500 respondents in the GSS sample were divided into 12 subsamples of 125 respondents each. Of 12 subsamples, 10 rated occupational prestige ($N = 1{,}166$). Each subsample was presented with a common core of 40 occupational titles (from the benchmark 1964 survey) and a randomly assigned set of an additional 70 titles unique to the subsample (see Nakao and Treas [1994] for details). That is, each subsample rated 110 occupational titles; a total of 740 occupations were rated.

To examine sources of prestige ranking patterns, I linked the GSS module on occupational prestige with several other data sets. First, to obtain information on the attributes of occupations, I matched the prestige data with "Occupational Measures from the *Dictionary of Occupational Titles* for 1980 Census Detailed Occupations," a data set prepared by England

[2] I thank a reviewer who called my attention to this set of issues.

and Kilbourne (1988). These data contain information on the prevalence of selected *DOT* measures in the Current Population Survey (CPS) sample for 1980 census-detailed occupational categories, allowing me to include selected occupational attributes associated with these occupations in the empirical study. Second, I linked the prestige data with the 1989 GSS survey data so as to incorporate information on selected individual attributes (e.g., race, gender) of the raters in my analyses. Finally, I collected information on occupational associations from the *Encyclopedia of Associations* (Gale Group 2000). As a result of these efforts, I am able to include in my analysis information that measures several potential sources of occupational prestige as postulated in my preceding discussions.

The occupational categories in the 1989 GSS occupational prestige ranking do not match perfectly with the 1980 census-detailed occupations. As a result, a small number of occupations that do not match in these two data sets are omitted from analyses.[3] For the purpose of testing the goodness of model fit across analyses, I kept only those cases with no missing values on any of the variables in the analyses. This decision results in deleting an additional small number of cases in the sample. The analyses reported in this study cover 671 occupations whose "social standings" are rated by 1,122 GSS respondents (see app. A for more information).

Dependent Variable

The dependent variable is the rank score on an ordinal (one to nine) scale given to occupations by the GSS respondents (raters). The respondents were asked to rank the "social standing" of occupations on a one-to-nine scale. I use the raw ranking score given by the raters rather than the transformed prestige score as my dependent variable, because the raw rank score directly measures the actual outcome of the evaluation (and variations therein) by the respondents in the GSS survey.

Independent Variables

Our theoretical discussions identified multiple sources of occupational prestige. Accordingly, I include several sets of variables in order to measure these sources, as well as for statistical control.

DOT *measures*.—As I argued before, occupational attributes provide the basis for making legitimate claims to deference and prestige. I adopt measures of occupational attributes based on the *DOT* data. These at-

[3] Of the 740 occupations rated in the GSS rating data, 54 occupational titles did not have matching codes in the 1980 census-detailed occupational categories; I omitted this group from my analysis.

tributes are linked to occupational measures for the 1980 occupational categories in a sample of individuals from the 1970 census (England and Kilbourne 1988). These variables measure the *proportion of employees in an occupation* who have attributes along these dimensions. Therefore, variations in these variables can be interpreted as the *salience* of these occupational attributes in the labor force that might affect raters' perception of occupations' social standing.

I adopted two alternative sets of *DOT* measures. The first set includes four variables that measure occupational attributes drawn from the *DOT*. The four variables are chosen based on my reading of the descriptions of the *DOT* variables to identify those that most closely fit two distinct sources of prestige. The first two variables measure an occupation's proximity to "nature and reason," and the next two measure an occupation's authority position. (The quoted descriptions below are drawn from the *Handbook for Analyzing Jobs*, an instructional manual for the coding of *DOT* attributes, prepared by the Manpower Administration in the U.S. Department of Labor [1972]. I included the original variable names [as in the data prepared by England and Kilbourne (1988)] in parentheses for the reader's reference.)[4]

> *Salience in knowledge/science (SCINPREF).*—Percentage of workers in an occupation who have "a preference for activities of a scientific and technical nature" (p. 317).
>
> *Salience in creativity* (FIF).—Percentage of employees in an occupation where "the worker is called upon to use creativity, self-expression, or imagination" (p. 298).
>
> *Salience in authority* (DCP).—Percentage of workers in an occupation in which "the worker is in a position to negotiate, organize, direct, supervise, formulate practices, or make final decisions" (p. 297).
>
> *Salience in influence* (INFLU).—Percentage of workers in an occupation where "the worker is in a position to motivate, convince, or negotiate" (p. 299).

Of the four *DOT* measures, the variables of salience in knowledge and salience in authority are most closely related to my theoretical concepts of knowledge-based versus authority-based claims, respectively. In my view, salience in creativity is closely related to knowledge-based claims,

[4] There are some discrepancies in the variable names used in England and Kilbourne (1988) and the data file provided by the ICPSR. In such cases, I followed the former.

whereas salience in influence is related to human interaction. Therefore, I include them as multiple indicators of the respective concepts.

I also adopted a second, alternative set of *DOT* variables based on factor analysis of eight *DOT* measures. I selected these eight *DOT* variables based on their relevance to knowledge/science, creative activities, or human interactions and authority relationship. The factor analysis identified three distinct factors associated with knowledge, creativity, and authority relation. I conducted statistical analyses using this set of *DOT* factors instead of the four *DOT* variables above. These two alternative sets of *DOT* measures allow me to check the reliability of the *DOT*-based variables (see app. A for more information on the choice of the *DOT* variables and the factor analysis).

To take into consideration and to control for the role of educational requirements in the ranking process, I include another *DOT* variable on training time in model estimation:

> *Training time* (TRAIN).—"The amount of general educational development and specific vocational preparation required of a worker to acquire the knowledge and abilities necessary for average performance in a particular job-worker situation" (p. 209).

The training time variable combines information on both general educational development (GED) and special vocational preparation (SVP), and provides a more refined measure of required training time (ranging from one to 105 months) than broad categories used by GED (six levels along three dimensions) and SVP (nine categories). Not surprisingly, the training time variable is highly correlated with the GED variable ($R = .84$) and the SVP variable ($R = .90$).

Organizing capacity.—I collected information on associations in each of the occupations as an indicator of organizing capacities. For each occupation in my study, I used the *Encyclopedia of Associations* (Gale Group 2000) to collect information on the two variables below (see app. A for information on the data collection of these two variables).[5]

> *Age of association*.—I use the age of the association in an occupation to indicate the organizing capacities of that occupation.
>
> *Number of publications*.—I use the number of publications by an association to indicate the extent of professionalization and knowledge basis in that occupation.

For those occupations with no identifiable associations ($N = 69$), I as-

[5] The association data was collected via the Gale Group's Web site (http://www.galegroup.com) in 2000–2001.

sume that there were no associations for these occupations and coded their association age and number of publications to be zero. Among the 69 occupational titles with no association information, 54 of them did not have matching codes in the 1980 census-detailed occupational categories; hence they were excluded from the data analysis.

To test hypothesis 4 on the role of occupation size for prestige ranking, I drew information from England and Kilbourne (1988) and constructed the following variables:

> *Occupational size and size*^{2}.—I use the number of practitioners in an occupation to measure the first-order and second-order effects of occupational size, and to detect the possible nonlinear relationship between size and prestige ranking.[6]

Attributes of raters.—To examine the influence of raters' attributes, I use the following variables from the 1989 GSS data to measure the identity or group membership of the raters:

> *Black*.—A dummy variable to indicate the race of the respondent (black = 1); "white" is the reference category.[7]
>
> *Female*.—A dummy variable to indicate the respondent's gender (female = 1).
>
> *College education*.—A dummy variable to indicate whether the respondent has a college-level or higher education (college or higher education = 1), with high school or lower education as the reference category.
>
> *Occupational status*.—A dummy variable to indicate whether the respondent works in a managerial or professional occupation (professional/managerial = 1), with other (nonmanagerial, nonprofessional) occupations as the reference category.

Control variables.—Occupational prestige ranking is generated by multiple processes. This study focuses on the institutional logic, but there is a need to control for other confounding factors. For this purpose, I include a set of variables for statistical control: (1) the mean wage of an occupation (in logarithm form) to control for the perceived economic benefits (resources) associated with that occupation, and (2) a variable on percentage

[6] For those occupations with missing information (because of their negligible size in the original CPS data), I added a minimum number of one to these occupations so as to include them in data analyses.

[7] To avoid potential complications, I included only whites and blacks in my analyses and omitted respondents with other ethnic backgrounds. This decision excludes about 4% of the sample.

of male employees in an occupation to control for the effect of gender composition. Information on these variables is drawn from England and Kilbourne (1988).

Table 1 reports the descriptive statistics of these variables. Because some variables are related to occupation-level attributes and others to individual rater-level attributes, the sample size (or N) for these variables varies accordingly. The final data set is constructed based on rater occupation records for the statistical analysis of ranked data (see below). The correlation matrix among the variables (table 2) reports Pearson's correlation matrix among the *DOT* variables and other variables of occupational attributes.

Statistical Models

My task in the statistical analyses is to model patterns of occupational prestige ranking on an ordinal scale (one to nine) and to estimate how both the attributes of the occupations being rated and those of the raters affect these patterns. To accomplish these goals, I adopt a set of conditional logistic models for ranked items. McFadden (1974) first developed the conditional logit model to incorporate both choice attributes and individual attributes in the analysis of qualitative choices. This model was later generalized to models of ordinal variables involving an incomplete set of choices or tied rankings (see Punj and Staelin 1978; Beggs, Cardell, and Hausman 1981). Allison and Christakis (1994) introduced this class of models to the sociology community.

Following Allison and Christakis's (1994) notation, let Y_{ij} be the rank given to an item (occupation) j by respondent i, in occupational rating. Based on an underlying random utility model, I assume that respondent i has a certainty utility U_{ij} for each item j. Each U_{ij} is the sum of a systematic component μ_{ij} and a random component ε_{ij}:

$$U_{ij} = \mu_{ij} + \varepsilon_{ij},$$

where ε_{ij} is identically and independently distributed with an extreme-value distribution. The component μ_{ij} can be decomposed into a linear function of a set of explanatory variables

$$\mu_{ij} = \beta_j \mathbf{x}_i + \gamma \mathbf{z}_j + \theta \mathbf{w}_{ij,}$$

where the $\mathbf{x}_i$ vector contains variables that describe the attributes of the respondents, and the $\mathbf{z}_j$ vector contains variables for the attributes of the occupation; $\mathbf{w}_{ij}$ is a vector of variables that describe possible relations between i and j, which are not specified in my model. For my research purposes, the effects of the raters' attributes on prestige ranking as moderated by the attributes of those occupations being rated needs to be

TABLE 1
DESCRIPTIVE STATISTICS OF THE COVARIATES

Covariates	*N*	Mean/%	SD
DOT measures:*			
Salience in knowledge/science	671	13.8	25.8
Salience in creativity	671	3.3	12.9
Salience in authority	671	25.9	30.9
Salience in influence	671	12.9	23.6
Training time	671	27.4	20.5
Occupational attributes:			
Log(wage)	671	9.7	.3
Size (in 100,000s)	671	4.1	9.7
Association age	671	58.3	38.3
No. association publications	671	3.0	3.8
% male in occupation	671	.7	.3
Rater attributes in GSS 1989:†			
Female	1,122	56.7	
Black	1,122	10.2	
Managerial/professional occupation	1,122	37.2	
College education	1,122	20.1	

* Cases with missing values on any of the *DOT* measures and occupational attributes in the table are excluded.

† Only raters with white or black ethnicity are included in the sample.

assessed. To accomplish this goal, I include in the model estimation interaction terms between the raters' attributes (e.g., race, gender, etc.) and the attributes of the occupation in the $\mathbf{z}_j$ vector (see Allison and Christakis 1994 for a discussion of the procedures to accommodate different types of variables in the model). The proposed model also has the advantage of dealing with tied ranking scores as well as variable choice sets for different respondents—both are the distinctive features of the 1989 GSS occupational prestige ranking data (see Nakao and Treas 1994). The data are organized into respondent–occupational title records to facilitate statistical analysis. The models reported in this study are estimated using the SAS program; similar statistical procedures are also available in STATA 8.0.

RESULTS

A Baseline Model: Analyses Based on Aggregate Information

I begin with a baseline model that examines patterns of occupational prestige ranking at the aggregate occupational level. Specifically, I examine how the overall *mean rank score* of an occupation, aggregated from all respondents' rank scores for that occupation, is related to the occu-

TABLE 2
PEARSON'S CORRELATION MATRIX OF THE COVARIATES IN OCCUPATIONAL ATTRIBUTES

	1	2	3	4	5	6	7	8	9	10
1. Salience in science	. . .									
2. Salience in creativity	.08									
3. Salience in authority	.30	.02								
4. Salience in influence	−.02	.18	.18							
5. Training time	.46	.31	.59	.23						
6. Log(wage)	.31	.02	.55	.16	.60					
7. Size (in 100,000s)	−.06	−.04	.43	−.05	.10	.34				
8. Association age	.13	.00	.12	.05	.16	.15	.02			
9. No. association publications	.23	.01	.37	.26	.40	.32	.13	.28		
10. % male in occupation	.11	.01	.11	−.06	.27	.55	.06	.06	.02	. . .

pational attributes of theoretical interest. This set of analyses serves several purposes: first, earlier work (e.g., empirical studies reported in Treiman [1977]) examined sources of occupational prestige mainly at this aggregate level. It is important to replicate these analyses and to establish a baseline to assess new contributions from the subsequent analyses based on alternative modeling of disaggregated information. Second, these preliminary analyses allow me to assess the reliability of the choice of covariates in the model. Since I use the functionalist arguments as the baseline for comparison, I need to ascertain that these selected variables have the expected explanatory power on occupational prestige ranking at the familiar aggregated level before I use these variables in more complicated models for ranked data. For the purpose of validity analysis, I also examine the effects of these occupational attributes on the general educational level (GED) and on the logarithm of mean wage (log[wage]) for that occupation.

For this set of analyses, I used the conventional linear regression model and regressed the mean rank scores of occupational prestige, GED, and log(wage) on a set of covariates of occupational attributes, respectively. I estimated three nested models for each dependent variable: the first one includes only the four *DOT* measures, the second one adds the "training time" variable, and the third one includes other occupational attributes in the model. The results are reported in table 3. I report standardized regression coefficients so as to compare directly the magnitudes of effects among these variables.

Panel 1 of table 3 reports the parameter estimates from the regression of mean rank score on occupational attributes. In model 1, all four *DOT* variables show significant and positive effects on mean occupation prestige. The variables salience in knowledge and salience in authority have comparable effects. In model 2, after controlling for the effect of training time, both salience in knowledge and salience in authority position have

TABLE 3

PARAMETER ESTIMATES OF OLS REGRESSION OF OCCUPATIONAL OUTCOMES ON *DOT* MEASURES AND OTHER OCCUPATIONAL ATTRIBUTES

	MEAN OCCUPATION RANKING SCORE			GED			LOG(WAGE)		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
DOT measures:									
Salience in science	.338**	.193**	.149**	.388**	.204**	.179**	.167**	.024	.081**
Salience in creativity	.092**	−.031	.030	.176**	.019	.045*	−.021	−.143**	−.107**
Salience in authority	.394**	.161**	.024	.425**	.130**	.024	.489**	.260**	.178**
Salience in influence	.117**	.068*	−.011	.276**	.214**	.162**	.083*	.035	.110**
Training time		.481**	.319**		.611**	.561**		.475**	.311**
Occupational attributes:									
Log(wage)			.509**			.328**			. . .
Association age			−.010			−.032			.014
No. association publications			.097**			.029			.035
Size			.066			.124			−.137
Size^2			−.136			−.146			.357**
% male in occupation			−.273**			−.265**			.427**
Adjusted R^2	.39	.50	.60	.60	.78	.83	.33	.44	.65

NOTE.—Parameter estimates are standardized β. $N = 671$.

* $P < .05$.

** $P < .01$.

smaller, but still significant, positive effects on the mean rank score, with salience in influence having a much smaller effect. The effect of the salience in creativity variable is no longer significant, suggesting that the effect of this variable is confounded with the training time variable, which has a strong, positive effect. Moreover, I note that the training time variable may have captured the confluence of several mechanisms and hence defies a clear theoretical interpretation.

Model 3 in the "mean rank score" column adds several variables measuring occupation attributes in the model. Among the four *DOT* variables, only salience in knowledge has a significant, positive effect on mean rank score, net of the effects of these occupational attributes. Overall, mean wage (in logarithm) and number of publications in an occupation increase an occupation's mean rank score, but an increase in the proportion of male workers in an occupation reduces the prestige score (see also England 1979). Occupation size has no statistically discernible effect.

All three models in panel 1 show good explanatory power. The four *DOT* variables in model 1 explain 39% of the variation in mean rank scores among occupations being rated ($R^2 = .39$), whereas models 2 and 3 explain 50% and 60% of the variations, respectively. Given the multifaceted processes involved in occupational prestige ranking, these results show that the selected *DOT* variables have reasonably good explanatory power for variations in the mean rank scores.

The second panel in table 3 reports analyses of the effects of occupational attributes on GED. GED is a measure of general education needed to perform jobs in a particular occupation. Previous research shows that GED is one of the most influential factors for predicting mean rank score in occupational prestige. If my choice of the four *DOT* measures of occupational attributes is sensible, they should be closely related to variations in GED across occupations. Indeed, as model 1 shows, all four *DOT* variables contribute significantly to GED requirement, accounting for 60% of the variations in GED. This finding is especially important for my purposes, because I intend for these variables to capture occupational attributes related to knowledge-based versus authority-based claims, thus allowing me to decompose and disentangle distinct mechanisms behind educational credentials. Adding the training time variable in model 2 accounts for 78% of the variations in GED, but the variable on salience in creativity is no longer statistically significant. In model 3, the inclusion of other occupation attributes shows that, net of the effects of these occupational attributes, the effect of salience in creativity becomes statistically significant, but salience in authority is no longer statistically significant.

Finally, I estimate the effects of these occupation attributes on mean wage (in logarithm form) in an occupation. These covariates also show

a good model fit, accounting for 33% to 65% of the variations in log(wage) in the three models. I focus on model 3 to highlight some interesting patterns. First, among the four *DOT* variables, salience in authority has the largest effect on mean wage among the other four *DOT* variables, with salience in influence having the second-largest effect. In contrast, salience in knowledge has a positive but much smaller effect. Salience in creativity has a negative, significant effect. Second, in model 2, percent of male workers is positively associated with mean wage. Recall that the proportion of male composition significantly lowers mean occupational prestige in the earlier analysis (see column 1 of table 3). These patterns suggest that those processes that increase income may be different from those that generate higher prestige.

To summarize, the four *DOT* variables in the model estimation show good explanatory power for the main characteristics of occupations—mean rank score, general education required, as well as the mean income in the occupation, and they show significant effects independent of one another. Some of these effects are reduced or become statistically insignificant after I control for other occupational attributes in the model, reflecting the confluence of several mechanisms affecting occupational prestige and resources. In particular, variables related to authority relationship are noticeably more sensitive to resources associated with an occupation than those knowledge-based variables are. The patterns of these findings are largely consistent with Treiman's general conclusion that an authority position begets privileges, which in turn lead to higher occupational prestige. However, these analyses are only the starting point of my research: first, one must recognize that the use of aggregated mean rank scores, as the property of the central tendency measure implies, ignores variations in prestige ranking at the individual level. Second, we have not considered nor controlled for other sources of occupational prestige, especially with regard to the role of raters' attributes. Below, I turn to statistical analyses that explicitly address these issues.

Sources of Occupational Prestige: A Model for Disaggregated Data

To test the hypotheses drawn from the proposed institutional theory, one needs to consider distinctive attributes of occupations as well as those of individual raters. As noted before, I also want to model the ordinal rank score directly so as to retain all variations in prestige score ranking among the raters. For this purpose, I estimated a set of conditional logit models for ranked data to examine the contribution of sets of covariates that are related to my theoretical interest.[8] Table 4 reports the parameter estimates of these statistical analyses.

[8] As the descriptive statistics in table 1 show, although the four *DOT* variables are

Occupational attributes.—Our first set of analyses (models 1–4) focuses on the effects of the *DOT* measures and other occupation-level attributes on variations in prestige rank scores. That is, I specified the following model:

$$\mu_{ij} = \gamma \mathbf{z}_j,$$

where μ_{ij}, the rank score given by respondent i for occupation j, is a function of occupation-level characteristics, $\mathbf{z}_j$. In my statistical analyses, the $\mathbf{z}$-vector consists of three sets of covariates: (1) the four *DOT* measures of occupational attributes used in the earlier analyses, (2) variables related to organizing capacities, and (3) control variables such as training time, income, size, and gender composition of the occupations. I estimated a set of nested models to examine the contribution of these sets of covariates.

In model 1, I include only the four *DOT* covariates of occupational attributes. Recall that these occupational attributes measure the proportion of workers in that occupation who share the respective occupational attributes. I interpret the parameter estimate associated with a *DOT* variable as the effect of the salience of the corresponding occupational attribute on the rating of occupational prestige. As one can see, the patterns of effects for these covariates are similar to those in the aggregated model in table 3: all four covariates contribute significantly and positively to occupational prestige ranking, with salience in authority positions and in knowledge having the largest magnitudes of effects. Salience in creativity has a distant third-largest contribution, and salience in influence the smallest contribution of all four covariates.

Model 2 adds the training time variable, which has a significant and positive effect on occupational prestige ranking. If one interprets training time as an indicator of human capital, then this finding renders support for the functionalist argument that the "functional importance" of an occupation increases its prestige. But, as I noted before, the training time variable is highly correlated with the educational/training requirement variables (GED and SVP) and reflects the confluence of several distinctive mechanisms. Its relevance to knowledge-based mechanisms is obvious; positions involving authority and human interactions also require extensive educational training (e.g., the MBA programs). For this reason, I

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measured on the same scale, their distributions vary considerably, making it difficult to compare the effects of these variables directly. (This was not a problem in the OLS regression in table 3 because standardized coefficients were reported there.) To facilitate the comparison of the effects of the four *DOT* variables in this set of analyses, I first standardized these four *DOT* variables. Let x_i' be the standardized *DOT* variable x associated with occupation i; then the standardization formula can be expressed as follows: $x_i' = (x_i - \bar{x})/\sigma_x$. (Parameter estimates based on unstandardized *DOT* variables are available upon request.)

TABLE 4
PARAMETER ESTIMATES OF CONDITIONAL LOGISTIC MODELS FOR RANKED DATA

Covariates	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
DOT measures:								
Salience in science	.298**	.164**	.187**	.172**	.182**	.172**	.157**	.155**
Salience in creativity	.106**	−.075**	−.020**	.061**	.067**	.058**	.039**	.040**
Salience in authority	.354**	.105**	.034**	.014*	.027**	.036**	−.020**	−.022**
Salience in influence	.046**	.019**	−.005	−.108**	−.109**	−.145**	−.116**	−.125*
Training time		.027**	.020**	.016**	.016**	.016**	.016**	.016**
Rater attributes:								
Black × science					−.095*			
Black × creativity					−.060**			
Black × authority					−.127**			
Black × influence					.011			
Black × log(wage)					.037			
Female × science						−.001		
Female × creativity						.004		
Female × authority						−.038**		
Female × influence						.064**		
Female × log(wage)						.052		
College × science							.079**	

College × creativity							.118**	
College × authority							.173**	
College × influence							.036**	
College × log(wage)							.237**	
Occupation × science								.047**
Occupation × creativity								.058**
Occupation × authority								.096**
Occupation × influence								.044**
Occupation × log(wage)								.076**
Occupational attributes:								
Log(wage)			.753**	1.551**	1.549**	1.582**	1.506**	1.534**
Association age/100				.005	.004	.005	.006	.005
No. association publications				.026**	.027**	.026**	.026**	.026**
Size				.035**	.035**	.035**	.035**	.035**
Size^2				−.113**	−.113**	−.113**	−.113**	−.113*
% male in occupation				−1.268**	−1.269**	−1.268**	−1.271**	−1.268**
χ^2/df	15,790.1	23,193.0	25,075.7	30,109.7	30,278.1	30,193.3	30,786.9	30,408.6
df	4	5	6	11	16	16	16	16
Improvement in χ^2/df		7,402.9/1	1,882.7/1	5,034.0/5	168.4/5	83.6/5	677.2/5	298.9/5

NOTE.—White is the reference category for black interaction terms; nonprofessional, nonmanagerial occupations for occupation interaction terms; and high school or lower education for college interaction terms. The four *DOT* variables are standardized to facilitate comparisons.

* $P < .05$.

** $P < .01$.

include this variable mainly for the purpose of statistical control. I expect that main effects of the four *DOT* variables will be consistent with my theoretical predictions, even after I control for the training time variable. Indeed, as one can see in model 2, measures of knowledge and authority as well as influence still have significant contributions to occupational prestige, after controlling for the training time variable. But the confounding effect of training time on other *DOT* attributes can be readily seen: the effects of salience in knowledge, authority, and influence are noticeably smaller; salience in creativity now has a negative, significant effect.

Model 3 includes the log(wage) variable. This analysis examines a critical question underlying the institutional logic of prestige ranking. Although the respondents were asked to rank an occupation's "social standing," I suspect that respondents' ranking decisions may in part reflect the general desirability of the occupation being rated. In particular, economic benefits (e.g., income) associated with an occupation may significantly influence a respondent's perception of job "desirability" (Jencks, Perman, and Rainwater 1988). Theoretically, the proposed institutional logic makes a careful distinction between prestige acquired on the basis of appropriateness and that acquired on the basis of resource desirability. By controlling for the effect of mean income in model estimation, one can assess the role of relevant occupational attributes, after the resource-induced job desirability is removed from consideration. If deference and prestige are derived from the logic of social recognition, as I argued here, their effects on an occupation's social standing should remain above and beyond the effects of resources associated with that position.

There are several interesting findings from this model estimation. First, the finding that resources, as measured by log(wage), significantly increase an occupation's prestige confirms my suspicion that respondents do give higher prestige ranking to those occupations that are associated with more resources. However, the empirical patterns also render support to my hypotheses, after controlling for the role of resources. First, the effect of salience in knowledge has increased, after resources are controlled for, suggesting that knowledge-based claims are even more effective, net of considerations of resources. Second, the effects on prestige ranking of the two variables on authority relationships change drastically, once the role of resources is controlled for. Salience in authority position is still positive and statistically significant, but its magnitude is reduced by nearly two-thirds ($\gamma_{\text{authority}} = 0.105$ in model 2, but $\gamma_{\text{authority}} = 0.034$ in model 3); salience in influence now has no significant effect. Third, the negative effect of salience in creativity was also greatly reduced, net of resource considerations. Clearly, in rating occupational prestige, those occupations involving human interactions and authority relationships benefited greatly

from the resources associated with their positions; in contrast, occupations related to knowledge and creativity receive higher ratings when the effects of resources are controlled for. These findings are consistent with hypotheses 1 and 2 that occupational attributes salient in knowledge and science increase occupational prestige, whereas those salient in authority relationships are likely to be contested, and their legitimate claim for prestige undermined. These patterns are especially prominent when resource considerations are removed from rating decisions.

Model 4 adds variables measuring "organizing capacities" of the occupation as well as other control variables. There are interesting patterns in the effects of the *DOT* variables. Change is relatively small in the effect of salience in knowledge but is much larger in the variable of salience in authority. Salience in creativity now has a positive and significant effect on prestige ranking, controlling for the effects of organizing capacities. In contrast, salience in influence has a significant, negative effect. These patterns indicate that the effects of variables on authority and influence in previous models benefit greatly from the organizing capacities of these occupations, whereas the opposite is true for the variable of salience in creativity.

I use number of publications to indicate the extent of professionalization or the establishment of knowledge basis, and the finding shows that prestige ranking increases with the number of publications in the professional association, as consistent with hypothesis 3. But contrary to my expectation, association age does not have a significant effect. One plausible explanation is that many occupations (hence their associations) that emerged recently tend to be more professionally oriented (e.g., computer technicians). As a result, the historical timing of the establishment of the occupational associations, as measured by association age, may no longer be positively associated with the extent of professionalization in an occupation. I suspect that this finding reflects the limitation of the chosen variable rather than a refutation of my hypothesis on the importance of associational power. For example, in my exploratory analyses of the 40 occupations (in the benchmark 1964 survey) that all GSS respondents rated, association age has a significant, positive effect on prestige ranking.

Occupational size shows an inverted U-shape, as I predicted in hypothesis 4. I plotted the nonlinear pattern of the size effect in figure 1, in which a multiplier of one indicates that occupational size has no effect on prestige ranking. A multiplier greater than one increases the prestige ranking, and a multiplier less than one decreases prestige ranking, net of the effects of other covariates in the model. As I predicted in hypothesis 4, an initial increase in an occupation's size increases prestige because of the visibility and legitimacy in access to the institutional order. But excess

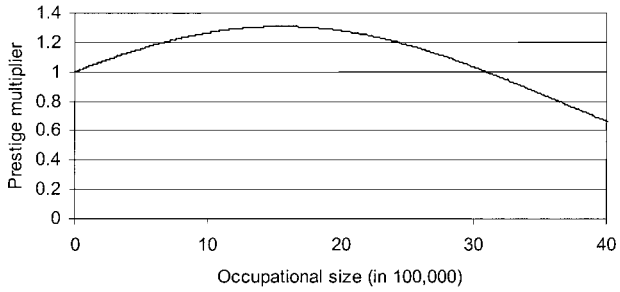

FIG. 1.—Effect of occupational size on prestige ranking

increase in size eventually undermines the effectiveness of social closure and leads to a lower prestige rating, other things being equal.

Rater attributes.—The analyses reported in models 1–4 focus on how the characteristics of an occupation being rated provide the basis for legitimate claims and thus affect individual-level variations in the rank scores. I now extend the model to examine the effect of raters' group membership on occupational prestige ranking. This set of analyses addresses issues of incorporation into the realm of shared values and beliefs. As I argued before, the extent to which different social groups are incorporated into the institutional realm may vary considerably; as a result, I expect to observe significant variations in shared values and beliefs in different social groups, leading to group-based behavioral differences in conferring prestige.

To address this set of issues, in models 5–8, I introduce the attributes of the raters into the model. I focus on the following four dimensions: (1) racial difference between whites and blacks, (2) gender difference, (3) occupational groups—those in managerial/professional occupations versus those in other occupations, and finally (4) educational difference—the group with college or higher education versus those with high school or lower education. Because these four dimensions are likely to overlap considerably, I estimated their effects in separate models. That is, I estimated a model as follows:

$$\mu_{ij} = \beta_j \mathbf{x}_i + \gamma \mathbf{z}_j,$$

where $\mathbf{x}_i$ is a set of variables of rater attributes associated with respondent i. In the implementation of model estimation, I entered this set of variables through interaction terms between these group indicator variables and occupational attributes to detect variations of groups in their response to different dimensions of occupational attributes (see Allison and Christakis [1994] for details). For control purposes, I also included interaction terms of these indicator variables with log(wage). The χ^2 statistic associated

with model improvement in models 5–8 (reported in the last row of table 4) is based on the likelihood ratio statistics of comparison between the current model and model 4.

Model 5 examines the role of ethnic background (black vs. white) in raters' ranking of occupational prestige. I include a set of interaction terms between "black" and the four *DOT* job attributes. Thus, the interaction terms measure the additional contribution of the "black" group to prestige score, relative to (and in addition to) the main effects in the model, as a result of this group's response to that particular occupational attribute. For instance, the coefficient of −0.095 associated with the interaction of black and knowledge (black × knowledge) means that the occupational attribute of salience in knowledge contributes to the rank score of occupational prestige by only 0.087 (0.182 − 0.095) for the African-American group as a whole, compared with 0.182 (the main effect) for whites, net of the effects of other variables in the model. This finding shows that, in occupational prestige ranking, African-Americans as a group give less weight to the prevalence of knowledge. Overall, the African-American group gives less weight to attributes of salience in knowledge, in creativity, and *especially* in authority relationship ($\beta_{\text{black} \times \text{authority}} = -0.127$), relative to the "main effects" for whites in the model. But the African-American group shows no significant difference in the ranking of those occupations that are in "influence" position, as indicated by the insignificant interaction effect with the variable of salience in influence.

I estimated gender differences in these four *DOT* job attributes, as shown in model 6. There is no significant difference between men and women in their ranking along the dimension of salience in knowledge or in creativity. However, women show a pattern similar to blacks in that they give less weight to those occupational attributes that are associated with authority positions, but they give more favorable ranking of those occupations that are salient in "influence," relative to the main effects for men.

Models 6 and 7 examine the effects of social positions associated with the rater's occupation (managerial/professional occupations vs. other occupations) and education (college or higher education vs. high school or lower education). Because both groups have higher SES, I speculate that they are more incorporated into the institutional order relative to their respective reference groups; hence, these groups are more likely to give an occupational prestige rating that reinforces the "main effects." The findings are consistent with this hypothesis: raters in high-status occupations or with higher educational levels give considerably higher scores to those occupations that are salient in authority positions ($\beta_{\text{college} \times \text{authority}} = 0.173$, $\beta_{\text{occ} \times \text{authority}} = 0.096$).

This set of analyses reveals several important patterns that are consis-

tent with my core theoretical arguments. First, as predicted in hypothesis 5, groups that are more distant from the institutional order (blacks and women) tend to give noticeably lower prestige ratings to those occupations that occupy authority positions, relative to the main effects, whereas the opposite is true for those groups that are closer to the institutional order (the group with college or higher education and the managerial/professional group). Second, consistent with hypothesis 6, group differences with regard to the job attribute of salience in knowledge are less pronounced than those with regard to authority relationship: the magnitudes of the coefficients associated with salience in authority relationship are the largest among three of the four groups and in the predicted directions, whereas the magnitudes of coefficients for salience in knowledge are relatively small. Third, it appears that responses toward occupational attributes salient in creativity and in influence are less systematic among the four groups. I suspect that this is because attributes along these two dimensions are less institutionalized and subject to multiple interpretations among the raters; hence, these findings may reflect the lack of shared values and beliefs concerning these dimensions. I will revisit this set of issues in the discussion section.

Finally, I note that the parameter estimates of the variables measuring occupation size and gender composition are stable across models 5–8. I will not discuss their effects further.

Assessment of Goodness of Model Fits

To what extent do these proposed models explain the observed empirical patterns of occupational prestige ranking? To address this issue, I now turn to the assessment of goodness of model fits using likelihood ratio statistics; see table 5. I note that, in the realm of nonlinear models involving maximum likelihood estimation, there is no absolute baseline for assessing the goodness of model fit, and the likelihood ratio statistic varies with sample size.

In the first set of model fit statistics in table 5, I estimated the model fits for four sets of covariates—the four *DOT* variables, the training time variable, the log(wage) variable, and the five variables on organizing capacities and control variables—separately. The contribution of the training time variable is especially salient, relative to other sets of covariates. As I noted before, this variable may have captured several distinctive mechanisms in prestige ranking. The model statistic also shows that the four *DOT* variables have good explanatory power, comparable to that of log(wage).

The second set of models estimated various combinations of these sets

TABLE 5
LOG-LIKELIHOOD TEST OF GOODNESS OF MODEL FITS

Models	Test Statistic	*df*
Models for separate sets of covariates	$\Delta\chi^2$ over null model	
Model 1: four *DOT* measures	15,790.1	4
Model 2: training time	20,732.2	1
Model 3: log(wage)	14,761.3	1
Model 4: organizing capacities/control variables	9,059.6	5
Models for combination of covariates:		
Model 5: M1 + M2 + M4	25,167.6	10
Model 6: M1 + M2 + M3	25,075.7	6
Model 7: M2 + M3 + M4	28,210.5	7
Model 8: M1 + M3 + M4	28,527.3	10
Model 9: M1 + M2 + M3 + M4	30,109.7	11
Test of nested models	$\Delta\chi^2$ over model 9	
Model 10: M5 vs. M9—log(wage)	4,942.1	1
Model 11: M6 vs. M9—organizing capacity	5,034.0	5
Model 12: M7 vs. M9—four *DOT* variables	1,899.2	4
Model 13: M8 vs. M9—training time ...	1,582.4	1

NOTE.—Test statistic is calculated as −2 log-likelihood statistic between models. M stands for model.

of covariates. Model 9 is the full model that includes all four sets of covariates in the model.

I also tested the model fits between the full model (model 9) and the models that restrict each of the four sets of covariates to zero (models 5–8). If my operationalization of the key concepts is valid, these sets of variables should have a significant and sizeable contribution to model fit even after controlling for other covariates in the model. The test results under the heading "test of nested models" in table 5 show that all four sets of covariates make a significant and large contribution to the model fit, *after* controlling for other covariates in the model. In particular, the *DOT* measures for the two distinct (knowledge-based and authority-based) claims—the core of my theoretical arguments—show significant explanatory power for patterns of occupational prestige ranking, even after controlling for resources, training time, and other aspects of occupational attributes.

Among the four sets of variables measuring GSS raters' group identity, the model statistics (see the bottom row of table 4) show that African-Americans as a social group are more distant than women from the "official" institutional order, and that, among the four group dimensions considered here, educational level (college education or above) is perhaps

the most important dividing line in respondents' rating of occupational prestige.

Further Exploration: An Alternative Measure of *DOT* Attributes

At the core of the institutional logic is my argument about the importance of distinct bases for making legitimate claims. On this basis I used a set of four *DOT* measures to distinguish knowledge-based versus authority-based mechanisms. One may question whether the four *DOT* variables have adequately measured distinct sources of occupational prestige and whether findings based on the four *DOT* measures are robust compared with alternative *DOT* variables. To address this question, I developed a set of alternative *DOT* measures based on a factor analysis of eight *DOT* variables. The factor analysis reveals three distinct factors that are closely related to my conceptions of knowledge, creativity, and authority relationship (see appendix A for further information on the factor analysis). Consistent with my choice of *DOT* variables in previous analyses, the factor analyses indicate two distinctive factors for salience in knowledge and in creativity, respectively. But salience in authority positions and in influence belong to the same dimension. I constructed three factor scores along these three dimensions for each occupation that was rated in my data. I replicated previous analyses using the three factor scores instead of the four *DOT* variables.

Table 6 reports analyses that replicated those reported in table 3. Note that, as a conventional practice of factor score construction, all three factor variables are standardized with a mean of zero and a standard deviation of one. In panel 1, mean occupational score is regressed on *DOT* factors and occupational attributes. All three factor variables show positive and statistically significant effects on mean rank score. The inclusion of variables on organizing capacities greatly reduces the effect of the "authority" factor, but its effect on knowledge and creativity factors is relatively small. In panel 2 for the analysis of GED, the three *DOT* factors have impressive explanatory power on variations in GED ($R^2 = 0.73$ in model 1). In panel 3, I regressed log(wage) on the set of *DOT* factors and other occupational attributes. Again, a similar pattern results, in that the "authority" factor has the largest contribution to average income in an occupation, whereas the "creativity" factor has a negative effect, controlling for the effects of variables of organizing capacities. In sum, this set of results is largely consistent with those findings reported in table 3, suggesting that these three *DOT* factors provide a good operationalization of the theoretical concepts that they are intended to measure.

I reestimated the conditional logit model using the three *DOT* factor scores, and the parameter estimates are reported in table 7. I summarize

TABLE 6

PARAMETER ESTIMATES OF THE OLS REGRESSION OF OCCUPATIONAL OUTCOMES ON *DOT* FACTOR SCORES AND OTHER OCCUPATIONAL ATTRIBUTES

	MEAN OCCUPATION RANKING SCORE			GED			LOG(WAGE)		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
DOT measures:									
Knowledge factor	.462**	.239**	.174**	.510**	.246**	.237**	.454**	.249**	.154**
Creativity factor	.208**	.064*	.084**	.341**	.171**	.171**	.033	−.100**	−.051**
Authority factor	.436**	.274**	.077**	.583**	.392**	.299**	.466**	.318**	.322**
Training time		.391**	.255**		.462**	.416**		.360**	.239**
Occupational attributes:									
Log(wage)			.495**			.262**			
Association age			.000			−.021			.023
No. association publications			.096**			.031			.035
Size			.054			−.024			−.234*
Size^2			−.137			−.071			.409**
% male in occupation			−.286**			−.245**			.429**
Adjusted R^2	.46	.51	.60	.73	.81	.85	.43	.48	.68

NOTE.—Parameter estimates are standardized β. $N = 671$.

* $P < .05$.

** $P < .01$.

TABLE 7
PARAMETER ESTIMATES OF CONDITIONAL LOGISTIC MODELS FOR RANKED DATA (with *DOT* Factor Scores)

Covariates	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
DOT measures:								
Knowledge factor	.468**	.214**	.183**	.238**	.253**	.267**	.212**	.213**
Creativity factor	.198**	.017**	.048**	.092**	.100**	.077**	.066**	.064**
Authority factor	.358**	.209**	.146**	.012	.023**	−.005**	−.024**	−.033**
Training time		.023**	.018**	.013**	.013**	.013**	.013**	.013**
Rater attributes:								
Black × science					−.140**			
Black × creativity					−.075**			
Black × authority					−.111**			
Black × log(wage)					.114*			
Female × science						−.051**		
Female × creativity						.026**		
Female × authority						.030**		
Female × log(wage)						−.049		
College × science							.133**	

College × creativity							.135**	
College × authority							.179**	
College × log(wage)							.169**	
Occupation × science								.067**
Occupation × creativity								.076**
Occupation × authority								.119**
Occupation × log(wage)								.037
Occupational attributes:								
Log(wage)			.592**	1.428**	1.418**	1.456**	1.398**	1.416**
Association age/100				.020	.020	.021	.022	.021
No. association publications				.021**	.021**	.021**	.021**	.021**
Size				.038**	.038**	.038**	.038**	.038**
Size^2				−.114**	−.114**	−.114**	−.114**	−.114**
% male in occupation				−1.366**	−1.367**	−1.365**	−1.371**	−1.366**
χ^2/df	19,607.4	23,450.2	24,605.1	29,720.2	29,861.6	29,787.8	30,357.5	30,021.1
	3	4	5	10	14	14	14	14
Improvement in χ^2/df		3,842.8/1	1,154.9/1	5,115.1/5	141.4/4	67.6/4	637.3/4	300.9/4

NOTE.—White is the reference category for black interaction terms; nonprofessional, nonmanagerial occupations for occupation interaction terms; and high school or lower education for college interaction terms.

* $P < .05$.

** $P < .01$.

the main findings below. First, the effects of the three *DOT* factor variables are highly consistent with, and even more salient than, the patterns revealed in the previous analyses: the "knowledge" factor has the largest positive effect on prestige score in all models. The "creativity" factor also has a significant and positive effect on prestige ranking, but the magnitude of its effect is much smaller. Second, the factor involving "authority relations" has the smallest effect on prestige ranking, after taking into consideration the resources associated with these occupations (model 3). Its effect becomes statistically insignificant when the effects of organizing capacities are controlled for (model 4).

Finally, with some exceptions, patterns of the effects of the GSS rater characteristics are largely consistent with my theoretical hypotheses and previous findings (models 5–8). Those groups peripheral to the official institutional order (blacks) give a lower prestige ranking for occupations involving authority relations than their reference groups, whereas the opposite pattern can be observed for managerial/professional groups and for the group with college education. These patterns are consistent with hypothesis 5. The exception is for women, who have a positive effect on the rating of authority-based attributes. In view of the findings in the previous analyses, this pattern is not difficult to interpret. Note that the "authority" factor (table A1 in app. A) includes both variables that measure authority positions (DCP) and influence (INFLU). My previous findings (table 4) show that women have opposite responses to these two attributes. As a result, the effect of the "authority" factor in table 7 reflects the confounding and opposite effects of the composite variables. Similarly, hypothesis 6 is partially supported in that, as hypothesized, the managerial/professional group and college-educated group have the largest discrepancy regarding the authority-based *DOT* factor compared with their reference groups. But this is not the case for blacks and women, who show a larger discrepancy for the "knowledge" factor among the three *DOT* factors. Again, this is caused by the fact that the "authority" factor is composed of the two variables (DCP and INFLU), to which African-Americans and women have different responses (see table 4). After unpacking the "authority" factor, it is reasonable to conclude that the findings reported in table 7 are essentially the same as those in table 4.[9]

Overall, patterns of these findings using the three alternative *DOT* factors are consistent with those reported in the previous analyses using the four *DOT* variables. The tests of goodness of model fit (not reported) also show similar patterns to those in table 5. These results increase one's

[9] Our interpretation is on the basis that the "factor score" is calculated as a weighted linear combination ("load") of the composite variables.

confidence in the validity of the *DOT* measures developed here and in the robustness of the findings reported in this study.

DISCUSSION AND CONCLUSION

Departing from the earlier studies that emphasize the role of authority and resources for occupational prestige, in this study, I proposed an institutional logic of social recognition to identify and explain variations in occupational prestige ranking. My core theoretical arguments are centered on the role of legitimacy and appropriateness in conferring deference and social status, and in differential access to the institutional order. This theoretical logic led me to highlight the dual processes of differentiation and incorporation in the making of occupational prestige. First, I identified those differentiation mechanisms—knowledge-based versus authority-based claims—associated with occupational attributes that generate different bases for making legitimate claims for deference and prestige. Second, I considered variations in the incorporation processes of differential social groups and the implications for their ranking of occupational prestige. On this basis, I derived a set of hypotheses and tested these ideas using the most recent and comprehensive occupational prestige ranking data collected in the 1989 GSS. I also improved the research design in important ways: first, I adopted statistical models that allow me to model disaggregated information of both occupation-level and individual-level attributes and to analyze variations of ranking scores among the raters; second, I devised empirical measures that distinguish knowledge-based versus authority-based occupational attributes to test competing theoretical ideas properly. Below, I first assess the empirical findings and then discuss the implications of my study in comparison with alternative theoretical explanations. I conclude this study with a discussion of the emerging agenda for future research.

Before discussing the findings in this study, we first need to ask this basic question: Are the observed "occupational prestige" patterns a "social fact" that is subject to sociological investigation, or are they merely a statistical construct resultant from years of "operationalism" by the research community (Blalock 1968, 1982)? I think that there is indeed a status order among occupations as an instituted social reality. In everyday observations such as choices of careers and of educational training (e.g., college majors), government forecasts on occupation outlook, as well as in surveys of job desirability (Jencks, Perman, and Rainwater 1988), the evidence points to an implicit and often explicit status order of occupations. The large sociological literature on occupations and professions has also revealed conscious efforts by professional practioners to pursue the

collective conquest for status as well as status changes among occupations over time (Abbott 1988; Heinz and Laumann 1994; Larson 1977; Starr 1982; Reskin and Roos 1990). Moreover, the findings in this study indicate that the patterns of occupational prestige ranking are not randomly distributed and are subject to sociological explanations.

The findings reported in this study are largely consistent with the hypotheses derived from the institutional logic developed in this study. First of all, I find two distinctive mechanisms of occupational prestige as measured by the two sets of occupational attributes: those occupations whose work is salient in their "science and technical nature" tend to receive higher prestige than those occupations that are less salient in this respect. In contrast, although occupations associated with authority positions also contribute to higher prestige, the contribution of "authority position" is greatly reduced after controlling for the resources, measured by mean income and training time associated with these occupations. These patterns are consistent with the hypotheses derived from the institutional logic: the prevalence of knowledge in an occupation attribute makes it much easier to "naturalize" the claims for deference on the basis of legitimacy, whereas occupations salient in authority positions are likely to encounter social tensions and conflicts, making it more difficult to naturalize their claims. This is reflected in the systematic, diverse ranking of occupations that are salient in authority positions. As a result, the apparent high prestige associated with occupations with authority positions is less derived from the logic of social recognition than from the resources they command, which requires a different logic of explanation.

Second, the logic of social recognition also points to the importance of incorporation of social groups into the institutional realm of shared values and beliefs. The recognition of variations in incorporation processes led me to consider the effect of group membership on the ranking of occupational prestige. I examined four group bases: race, gender, educational credential, and occupational status. The empirical patterns are largely consistent with the proposed institutional logic. Those groups who are more remote from the institutional order (e.g., African-Americans and women) tend to give lower prestige ratings to those occupations that involve authority positions than their reference groups, whereas those groups who are close to the institutional order (e.g., those with a college education or those in managerial/professional occupations) tend to reinforce the main patterns (as captured by the main effects in the models in table 4). Although it is possible to imagine ad hoc explanations for these observed patterns, the institutional logic developed in this study provides a logically coherent theoretical explanation, and the empirical patterns are largely consistent with the derived hypotheses.

It appears that group differences with regard to occupational attributes

of "creativity" and "influence" are less systematic than I hypothesized. My interpretation is that these patterns may have resulted in the ambiguity of such occupations in the institutional order of the society. For example, an occupation salient in influence (e.g., counseling) may be seen partly as having an authority position but partly as helping people, which projects a sense of appropriateness. Similarly, occupations salient in creativity are likely to project multiple, conflicting images to different groups. Therefore, the inconsistent effects of salience in creativity and in influence may reflect variations in the institutionalization of these occupational traits, rather than the effectiveness of the mechanisms they are intended to measure. This set of issues remains to be examined in future studies that can better specify the institutional conditions associated with these occupational traits.

I recognize that there are other mechanisms in operation that are not conceptualized in my theoretical arguments; hence, I do not claim that the proposed institutional logic accounts for all variations in the occupational prestige phenomenon. I used the functionalist theory of occupational prestige as the comparative framework. Some empirical implications derived from the institutional logic coincide with those in the functionalist theory of occupational prestige. For instance, both theories predict that the prevalence of formal knowledge as an occupational attribute increases prestige ranking. However, the logics of explanation are different. In the institutional logic, the role of formal knowledge and science firmly belongs to the realm of values and beliefs and results from intersubjective processes. I emphasize the role of formal knowledge in the naturalization of social categories and in acquiring legitimacy and deference. In contrast, the functionalist theory argues for the functional importance of these occupations in a society (see my discussions around hypothesis 1). Both theories recognize group differences in the rating of occupational prestige. But the functionalist theory sees such differences as largely accidental and provides ad hoc explanations, whereas the institutional logic provides a more logically consistent explanation (see discussions with regard to hypotheses 5 and 6). Finally, whereas the functionalist argument sees educational qualification as indicating a job's functional importance, the institutional logic leads us to unpack this theoretical concept and reveal distinct underlying mechanisms (i.e., knowledge-based, authority-based, and resource-based claims).

To what extent can these empirical patterns be explained by the functionalist logic? Examining the findings from the lens of the functionalist logic, one may interpret the training time variable as an indicator of human capital, and both knowledge-based and authority-based *DOT* variables as measures of functional importance. On this basis, the empirical patterns in this study—the significant, large contribution of training time

and the positive effects of both knowledge-based and authority-based *DOT* variables—show that the functionalist logic identifies an important mechanism in generating the observed patterns in occupational prestige ranking.

In my view, the institutional logic can better explain several salient findings revealed in my study. First, as table 3 shows, both the knowledge-based and authority-based attributes are highly associated with educational requirement (GED). If both are good indicators of human capital, the functionalist logic would predict similar effects of both sets on occupational prestige. But the two behave differently in their effects on occupational prestige, once we control for resource considerations (see table 4). The most striking finding in this study is that, after controlling for resources (e.g., mean wage), the contribution of authority positions is greatly diminished (or even reversed). At a minimum, this finding suggests that the main reason that authority positions confer prestige is not because of their functional importance, but because of the resources they command. Second, if the functional importance of an occupation (as indicated in the human capital requirement) is naturally accepted in the society, I should expect no systematic differences across social groups regarding their rating of occupational prestige. The empirical findings in patterns of group membership revealed systematic and significant differences, which are consistent with the empirical implications derived from the proposed institutional logic. Third, as I discussed before, in the social science literature, there are multiple, competing interpretations of educational requirements as human capital, as signals, or as sorting mechanisms for class closure. All these arguments predict a positive and significant association between educational qualification and status attainment (and occupational prestige), but they point to distinct and competing causal mechanisms. For this reason, I treated training time as a control variable and focused instead on those *DOT* variables that have a more concrete, substantive interpretation.

I recognize that there are limitations to my study in the operationalization of key concepts and in measurements of variables, and that some empirical findings are subject to multiple interpretations. Therefore, I do not see the empirical evidence presented here as conclusive in adjudicating between competing theoretical arguments. I do think that, even if we were to accept the human capital interpretation of training time, the proposed institutional logic arguably offers a more satisfactory and logically consistent explanation for the discrepancies in the effects of knowledge-based and authority-based occupational attributes and for the systematic variations in the role of group membership in prestige ranking, above and beyond the explanation offered by the functionalist logic.

The institutional logic proposed here raises a set of new research issues

in understanding occupational prestige phenomena. First, the recognition of distinct mechanisms of differentiation and incorporation points to the logical plausibility that the prestige of occupations associated with knowledge versus authority positions may vary considerably over historical periods because of the institutionalization of science and technology and the expansion of education. Second, one should also observe significant variations in group-based occupational ranking over time as a function of social tensions and social conflicts, or as a function of changes in group/identity consciousness. For example, the institutional logic would lead one to expect that, after the civil rights movement and the feminist revolution, the increased consciousness in group identity would lead to a stronger association than before between occupational prestige ranking and group membership of African-Americans and women, other things being equal. Similarly, better-conceptualized group identity (e.g., the class basis in Wright [1984]) may reveal more systematic variations in prestige ranking than the ones used in this study. Third, the institutional logic would further predict that there are systematic variations in prestige across societies as a function of variations in institutional arrangements and in bases for making legitimate claims in different societal contexts. These issues point to rich empirical ground for future research to adjudicate between competing theoretical logics.

To return to the puzzle identified at the beginning of this article, I have shown that the apparent uniformity and stability in occupational prestige order in the earlier studies were largely constructed through the lens of the functionalist logic and suffered from problems in methodological aggregation. The use of aggregated occupational prestige scores or aggregated group information for raters in the earlier studies may have inadvertently concealed those variations in the prestige ranking that need to be explained. The considerable and systematic variations in occupational prestige ranking reported in this study highlight the fact that the research issues in explaining occupational prestige ranking are far from resolved; instead, they demand further, more careful sociological inquiries. My study develops a logic of social recognition that has explanatory power distinctive from the role of functional importance, resources, and authority. Moreover, in my view, the logic of social recognition is a major organizing principle in everyday social and economic activities. Because prestige, honor, and deference are meaningful and important rewards for *homo sociologicus*, the logic of social recognition induces him or her to behave in ways that are not always consistent with those predicted by a logic of consequence (March 1994). Therefore, the institutional logic plays a central role not only in explaining occupational prestige, but also in other social phenomena that involve processes of intersubjective evaluation.

APPENDIX A

Explanation and Data Sources of *DOT* and Association Variables

Choice of the Four DOT *Variables*

The *Dictionary of Occupational Titles* provides a rich set of variables measuring various attributes of an occupation. Below I discuss the considerations on which I based my selection of the four *DOT* variables for the analyses reported in tables 3–5.

First, I want to select those *DOT* measures of occupational attributes that are salient in knowledge-based or authority-based claims, because these are two key theoretical concepts in this study. For this reason, I exclude those *DOT* variables that are not directly related to these two dimensions (e.g., those *DOT* variables that are related to physical work environment such as heat, physical strength, etc.).

Second, I want to select those *DOT* variables that provide reasonably good explanatory power on mean occupation score (as in Treiman's study) and GED at the aggregated occupation level. This is because I take the functionalist argument as my baseline for comparison, and I am interested in decomposing distinct mechanisms of prestige ranking behind educational qualification to address the aggregation problems discussed in the text. Several *DOT* variables (e.g., MVC) that have meanings similar to my theoretical concepts but that have poor explanatory power on mean prestige score or GED are not chosen for this reason.

Third, I choose those *DOT* variables whose meanings have a close fit to my concepts and that have intuitive interpretations. For this reason, I exclude those variables that are ambiguous in interpretation. For example, the *DOT* variable ADPTPPL measures "adaptability to dealing with people beyond giving and receiving instructions." This definition appears to be relevant to authority positions. But a close reading of the detailed *DOT* coding instructions (U.S. Department of Labor 1972) shows that the kinds of jobs prevalent on this work trait also include scheduling "appointments with employer or other employees for clients or customers by mail, phone, or in person; and records time and date of appointments in appointment book" (p. 304), which does not imply an authority position. Similarly, a *DOT* variable measuring "a preference for activities resulting in prestige or the esteem of others" (PRSTPREF) is not chosen because its meaning is not clearly interpretable with regard to either of the two mechanisms.

Finally, if several variables measured similar work traits, then I chose the ones that are not highly correlated with each other. The four *DOT* variables used in the text were selected based on these criteria.

Alternative DOT *Measures Based on Factor Analysis*

To further investigate the robustness of the chosen *DOT* measures and of the main findings, I also developed alternative *DOT* measures based on a factor analysis of additional *DOT* variables. I included eight *DOT* variables whose definitions (and detailed descriptions) are related to either knowledge/creativity, or authority relations/human interactions. In addition to the four *DOT* variables I identified before, I included the following four *DOT* variables:

> *Salience in jobs using verifiable criteria* (MVC).—Percentage of workers in an occupation whose jobs involve "making generalizations, judgments, or decisions based on measurable or verifiable criteria" (p. 302).
>
> *Salience in business relations* (BUSPREF).—Percentage of employees in an occupation who have "a preference for activities involving business contact with people" (p. 317).
>
> *Salience in jobs of "abstract and creative nature"* (ABSCREAT).—Percentage of workers in an occupation who have "a preference for activities of an abstract and creative nature" (p. 317).
>
> *Creative preference* (CREATPREF).—This variable is defined as related to "creative preference" in England and Kilbourne (1988).

I conducted a factor analysis to examine underlying dimensions among these eight *DOT* variables. Table A1 reports the factor loading statistics. The statistics are based on orthogonal rotation using varimax method, chosen for its simplicity in interpretation, but other methods (e.g., component analysis and oblique rotation method) show the same pattern.

The factor analysis reveals three distinctive factors: FIF and ABSCREAT have the highest loading on the first factor; MVC and SCITECH have the highest loading on the second factor; and DCP, INFLU, and BUSPREF have the highest loading on the third factor. Interestingly, CREATPREF has large loadings on all three factors. Thus, the three factors closely correspond to creativity, knowledge/science, and authority/human interaction dimensions. I labeled these three factors creativity, knowledge, and authority factors, respectively, and calculated the factor scores for each occupation in my sample.

Comparing these three factors with the four *DOT* variables I chose before, one can see that FIF and SCINPREF have high loadings on the first and second factors, respectively, and DCP and INFLU have high loadings on the third factor. Hence, my previous choice of the four *DOT* variables is consistent with the patterns revealed in the factor analysis. I

TABLE A1
FACTOR LOADING OF THE EIGHT *DOT* VARIABLES

	Factor 1	Factor 2	Factor 3
ABSCREAT	.922	.035	.085
FIF	.905	−.068	−.030
CREATPREF ...	.599	.440	.516
MVC	−.166	.836	−.177
SCINPREF	.166	.784	.088
DCP	−.021	.361	.781
INFLU	.194	−.259	.684
BUBSPREF	−.077	−.450	.589

NOTE.—The calculation is based on the varimax method for orthogonal rotation.

used the four *DOT* variables and the three *DOT* factors alternatively in my analyses reported in the text.

Data Sources and Coding of Association Variables

To measure organizing capacities of the occupations, I collected information on associations or unions of these occupations. I used the Gale Group's *Encyclopedia of Associations* (2000–2001) and its Web site (http://www.galegroup.com) as the main data sources and matched associations to their occupations based on the descriptions of these associations. I developed a procedure by first comparing the names of the occupations and associations, then checking the "descriptions" for these associations to make sure that they were matched. Wherever possible, I used association membership size and occupation size to see if the association was too broad or too narrow for the occupation. Once I matched an occupation and its association, I collected information on more than a dozen variables. But I used only two variables—association age and number of publications in an association—for their theoretical relevance and relatively fewer missing values.

There is an entry in the *Encyclopedia* on the founding year of associations. The variable "association age" is calculated as the difference between the year 2000 and the founding year. The *Encyclopedia* lists publications by the associations. The number of publications variable is constructed as a count of the number of publications listed for that association, excluding items such as newsletters or membership directories. For those occupations with missing values on these variables, I tried to search for their Web sites to collect additional information. In my analyses, if the associations had missing values on these two variables, I recoded them as having no associations (therefore, association age = 0 and number of publications = 0).

Sensitivity Analysis

In preparing the data for analyses and in operationalization, I made several decisions in the selection of variables and of the sample. I conducted sensitivity analyses to make sure that the findings are not sensitive to these decisions. I briefly summarize these analyses.

First, in those models that incorporate raters' group membership (tables 4 and 7), I removed the effects of resource considerations by controlling for the logarithm of mean wage in the occupation in my model estimation. One may wonder whether the patterns of results are artificial because of the statistical control of the mean wage variable. To explore this issue, I estimated the same set of models as in tables 4 and 7, but did not control for income (i.e., I removed interaction variables with log[wage] from model estimation). The patterns of parameter estimates are consistent with previous findings and do not affect my main conclusions.

Second, I included two variables measuring associational power (association age and number of publications) in my model estimation. Because I relied on a single data source (the Gale Group publication [2000–2001]), these variables may have measurement errors in reporting and recording. Also, the matching between occupational titles and association titles was not always perfect. To check on the sensitivity of the findings to these two variables, I estimated models without these two variables. The findings are robust in the absence of these two variables.

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