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Are There Social Classes? An Empirical Test of the Sociologist's Favorite Concept

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E M B A R G O

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An Empirical Test of the Sociologist's Favorite Concept

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The study of inequality is plagued by a surplus of measurement paradigms based variously on socioeconomic or prestige scales, income or earnings reports, and Weberian, neo-Marxian, or Durkheimian class schemes. For the most part, the measurement approach that scholars choose is simply a badge of affiliation with a particular discipline or theoretical tradition (e.g., neoclassical economics, neo-marxism), and relatively little effort is made to choose or adjudicate between these measurement approaches on meaningfully scientific grounds. We seek to develop here an empirical foundation for inequality measurement by describing a modeling framework that may be used to (a) determine whether conventional measurements of income, socioeconomic status, or social class can adequately characterize the multidimensional space of inequality, and (b) specify the effects of poverty and inequality (once it is adequately characterized) on basic demographic and health outcomes. For now, our objective is merely to describe this framework, but of course we hope ultimately to deploy it.

The intellectual backdrop for this project is the increasing dissatisfaction among economists with an "income paradigm" that simplistically equates inequality with income inequality (e.g., Sen 1997), a corresponding dissatisfaction among sociologists with a "socioeconomic paradigm" that reduces the multidimensional space of inequality to a synthetic unidimensional scale (e.g., Hauser and Warren 1997), and growing skepticism among some inequality scholars about the usefulness of the conventional "class paradigm" in characterizing contemporary inequality and poverty (e.g., Pakulski forthcoming). This disarray on matters of inequality measurement comes at a time when unprecedented increases in some types of inequality (especially income inequality) are generating much interest in assessing the effects of inequality on basic demographic and health outcomes. The premise of this paper is that the current crisis of measurement should be confronted directly by empirically evaluating the utility of conventional measurement approaches (e.g., income, socioeconomic status, social class) and by developing, as necessary, a new approach founded on an explicitly multidimensional understanding of inequality. Although we focus on inequality measurement more generally, much of our commentary applies to poverty measurement as well; and we shall attempt to draw out these implications for poverty measurement at various points in our paper.

The multidimensional approach proceeds by identifying a core set of indicators (e.g., education, income, authority, wealth) that, taken together, constitute the inequality space. The many available measurement "paradigms" can, in this context, be understood as different ways of simplifying the multidimensional space defined by these indicators. Increasingly, economists and sociologists share an interest in explicitly multidimensional representations of inequality, yet this interest has to date been thwarted largely for lack of viable methods for characterizing such a multidimensional space. We will exploit recent developments in latent class modeling to develop a framework for describing the underlying structure of a multivariate space comprising endowments and investments (e.g., education), working conditions (e.g., nature of employment contract, self-employment status), and rewards (e.g., income, wealth).

The multidimensional models that we develop will allow us to distinguish between gradational, class-based, and disorganized forms of inequality. If a class form emerges, we can further determine how many classes are necessary to adequately characterize the space and whether those classes correspond to detailed occupations (i.e., the micro-class solution), aggregations of detailed occupations (i.e., the big-class solution), or more heterogeneous constellations of positions at the site of production (i.e., the "postmodern" solution). Furthermore, one can ask whether the classes so defined have true emergent effects on behaviors and attitudes, where this refers to effects that cannot be reductively explained in terms of the underlying variables that are used to define classes (i.e., endowments, working conditions, rewards). That is, just as social scientists now routinely ask whether true "neighborhood effects" can be found (see, e.g., Sampson et al. 2002), so too the class principle should be subjected to a similarly stringent test. We intend to convert discipline-specific

preferences for particular measurement approaches (e.g., the income paradigm, class models, socioeconomic scales) from purely metaphysical commitments to testable claims about the structure of the inequality space.

The main impact of this research will be the development of a new social indicators system that makes it possible to monitor not just the extent of inequality but also its shape and form. Initially, we will build this monitoring framework within an existing statistical package (i.e., LATENT GOLD), but we will ultimately develop a new stand-alone package that simplifies analysis. The development of a comprehensive framework for monitoring inequality is long overdue. Although we know much about trends in the amount of (mainly income) inequality, we know rather less about trends in the form and structure of inequality within the context of a multidimensional inequality space. Despite decades of debate about social class, we still lack basic empirical measurements on the extent to which real classes are detectable now and in the past. We don't know, for example, whether a true underclass is emerging and whether some cities or regions may have an especially well-developed underclass. Likewise, we don't know whether the middle class may be breaking down, whether the professional-managerial class is growing ever more organized, or whether a true working class is developing in the late industrial context. We also don't know whether inequality is increasingly assuming a gradational form of the sort that income, earnings, or socioeconomic scales might well capture. These quite fundamental gaps in our knowledge can only be addressed by developing a multidimensional monitoring system that moves beyond simplistic measurements of income inequality and treats distributional issues of inequality with the same seriousness that is currently accorded measurements of total economic activity and output (e.g., GNP).

The resulting social indicators framework is usefully developed for the simple purpose of documenting the structure of inequality, how it is changing, and how it differs across countries, regions, or cities. At the same time, an important subsidiary output of our research will be a more rigorously empirical framework for modeling the effects of inequality on core micro-level outcomes, such as health, mortality, marriage, fertility, and divorce. It is of course common practice to allow for effects of inequality on such outcomes, yet scholars typically represent these effects in terms of operationalizations (e.g., socioeconomic status, class, income) that are chosen by virtue of disciplinary affiliation or analytic convenience rather than theoretical or empirical considerations. We seek to put measurement choices back on a more solid empirical footing.

Background and Significance

There are, then, two main rationales for improving how we measure inequality. First, a new social indicators framework will allow social scientists, government and non-governmental agencies, and policy makers to better monitor how the form of poverty and inequality is changing or differs across contexts, a crucial descriptive task that has been given short shrift. Second, such a framework will allow social scientists to develop better models of the effects of inequality on individual-level outcomes, such as health, mortality, marriage, fertility, and divorce. In virtually all models of demographic outcomes, one is obliged to include measures of social class, income, or socioeconomic status as covariates, either because of an intrinsic interest in how such variables affect the outcome of interest or merely as a means of securing unbiased estimates of other effects on which the research more directly focuses. These types of inequality variables routinely appear, for example, in demographic models of health (e.g., Krieger, Williams, & Moss 1997), mortality (e.g., Martikainen et al, 2001; Hart, Smith, & Blane 1998), marriage and cohabitation (e.g., White & Rogers 2000; for reviews, see Kalmijn 1998; Smock 2000), fertility (see Bollen et al. 2001), divorce (e.g., White & Rogers 2000), and migration (e.g., Iceland et al. 2003). Within many of these subfields, there are well-developed literatures on the strength of class or income effects, on trends in these effects, or on cross-

group differences in the extent of class effects. Moreover, measures of class, income, and socioeconomic status not only appear routinely in models of demographic outcomes, but they are additionally featured in quantitative analyses of many non-demographic outcomes as well, such as political behavior (e.g., Evans 1999), attitudes (see DiMaggio 2001), and lifestyles and consumption practices (e.g., Goldthorpe & Chan 2005). The ubiquity of the class control within sociology has led DiMaggio (2001, p. 542) to conclude that measures of social class are modern-day "crack troops in the war on unexplained variance."[1]

It is striking in this context that scholars typically choose from among various conventional approaches to measuring inequality without justifying the choice or demonstrating that it is empirically superior to alternatives. In some cases, the availability of particular inequality measures (within the survey being used) may dictate such decisions, but clearly there are also large and seemingly unjustifiable effects of discipline, type of dependent variable, and research camp (e.g., Marxist, rational choice) on the preferred operational measure of inequality. Most obviously, the long-standing measure of choice among economists remains income or earnings, whereas the preferred measure among sociologists is either a social class scheme (e.g., Erikson and Goldthorpe 1992; Wright 1997) or a socioeconomic scale (e.g., Hauser and Warren 1997).

There has of course been some research on the relative merits of different types of socioeconomic scales (e.g., Hauser and Warren 1997). Likewise, putative tests of the class concept are occasionally offered (e.g., Evans & Mills 1998, 2000; Hout et al. 1993; Hauser and Warren 1997), but such tests fall well short, we will argue, of a convincing demonstration that these approaches truly capture extra-individual processes and hence properly substitute for direct measurements of income, education, and other individual-level resources (cf. Halaby & Weakliem 1993). In all cases, there has been rather little interest in adjudicating among the competing traditions themselves, almost as if matters of operationalization were inconsequential or are legitimately treated as non-empirical matters of taste or theoretical commitment (for a similar critique, see Bollen et al. 2001, p. 163; see also Hout & Hauser 1992; Davey Smith et al. 1998; Duncan et al. 2002). For the most part, sociologists appear to have been quite satisfied to accept the socioeconomic or class concepts on faith alone, defending them either by referring to their long provenance in both the theoretical and empirical literatures or by simply rehearsing long-standing claims that socioeconomic scales or social classes represent the underlying variables that define interests or life chances.

The presumption that issues of measurement should be settled by theoretical fiat is nowhere more apparent than among scholars committed to class-based measurement approaches. For all its popularity, the class concept remains a largely metaphysical commitment, a conventional approach to inequality measurement that sociologists reflexively adopt with little in the way of substantiating evidence. In recent years, a small contingent of postmodernists have begun to criticize class-based approaches (e.g., Pakulski forthcoming; also, Kingston 2000), yet these critics have for the most part simply asserted that class models are predicated on problematic assumptions; and such assertions are no more or less convincing than the equally unsubstantiated presumption in favor of the class concept. We propose to break the impasse by specifying the first comprehensive set of tests designed to determine whether particular types of class schemes perform especially well in explaining health and other demographic outcomes, whether non-class measurement approaches (i.e., income, socioeconomic status) can outperform class models, and whether any type of reductive approach (e.g., class, income, socioeconomic) can outperform multidimensional, individual-level models.

It is high time to ask whether entrenched sociological convention about measuring poverty

[1] Also, there has long been suspicion that inequality has equally profound effects on macro-level outcomes (e.g., economic output, terrorism, revolution), but here the evidence is more mixed and the debates more contentious (e.g., Krueger and Maleckova 2002).

and inequality can be empirically defended, not just because the dramatic increase in some forms of inequality (esp. income) calls out for renewed attention to issues of measurement, but also because the sociological convention is becoming ever more peripheral to the bulk of demographic and health outcomes research. Indeed, scholars in other disciplines, especially economics, now routinely ignore class schemes and instead default to individualistic representations of inequality (e.g., income reports). If sociological models are to survive this incursion, it is doubtful that it will happen because economists and other social scientists suddenly decide to mimic the research practices of sociologists or to read the famous treatises on class or status provided by Marx, Weber, and their followers. Rather, a compelling *empirical* defense of the payoff to class or socioeconomic models is required, without which we can expect economists and other social scientists to continue to privilege individualistic models and thereby dismiss or ignore the sociological legacy.

This is an opportune time to intervene in such measurement debates because many economists are themselves coming to doubt the adequacy of the "income paradigm" and are actively shopping for multidimensional or categorical alternatives to conventional income reports (e.g., Sen forthcoming; Bourguignon forthcoming; Sahn & Younger, forthcoming; Ray, Duclos, & Esteban forthcoming). Are class models the alternative that the new multi-dimensionalists seek? We think they might be, but a turn to class models is unlikely without an active intervention demonstrating just what they can deliver. Obviously, it would be harmful to the discipline of sociology if its premier measurement choice were superseded by other approaches, but of course the only legitimate *scientific* question is whether such a loss would lead to less powerful accounts of the structure of inequality. There is, to be sure, no guarantee that class or socioeconomic models will pass this empirical test. If they do fail, sociologists had best face up to this result now and jettison that part of the discipline's intellectual history that proves to be an empirical dead-end. It is no longer tenable to duck the question.

We describe below two lines of analysis that will provide a more rigorously empirical foundation to inequality and poverty measurement. First, our analyses of "dimensionality" will examine how complicated the multidimensional space of inequality is, a question that will be addressed not just with exploratory models but also with confirmatory models that test whether conventional income, socioeconomic, or class schemes can adequately represent the structure of this multidimensional space. Second, our "class effects" analyses will examine whether class categories have a net effect on outcomes of all kinds after controlling for selection (i.e., non-random recruitment of individuals into classes), job conditions (e.g., class-specific profiles of authority, type of employment contract), and rewards (e.g., class-specific profiles of income, on-the-job training). The first line of analysis represents the structure of inequality without taking into account its effects on dependent variables (i.e., "pure" operationalizations), whereas the second line of analysis develops representations that do take into account such effects (i.e., "effect-calibrated" operationalizations).

Preliminary Studies

It is reasonable to ask whether conventional approaches to measuring inequality require the major retooling that we propose. In our earlier research, we have provided preliminary evidence relevant to the claim that conventional class and socioeconomic models are poor operationalizations of the structure of inequality, although this line of research has not been embedded in a comprehensive, multidimensional framework of the sort outlined above. We have mainly focused on the simpler task of developing, testing, and applying "micro-class" models of inequality that capitalize on the institutionalized social groupings (i.e., "occupations") that emerge around functional niches in the division of labor. This line of research has been oriented toward demonstrating that conventional class schemes that seek to characterize inequality with such big-class categories as "professional," "manager," "sales and clerical

worker," "craft worker," "laborer," and "farmer" fail to exploit much of the explanatory power that is available within the division of labor. We show that big-class categories of this type, which have of course long been the mainstay of quantitative sociological and demographic research, are only shallowly institutionalized in the labor market and hence poorly suited for the task of explaining demographic and other outcomes.

By contrast, detailed occupations (or "micro-classes") are deeply institutionalized in modern labor markets, and they are accordingly powerful in explaining social and demographic behaviors. (We are referring here to such categories as sociologist, economist, accountant, secretary, plumber, carpenter, and truck driver.) There are three mechanisms, in particular, through which these institutionalized categories come to be filled with workers who are similar to one another. First, many occupations have preexisting stereotypes (about the skills, proclivities, and personalities of incumbents) that attract workers who find those stereotypes appealing and repel those who don't, thereby converting the stereotypes into self-fulfilling prophecies (i.e., self-selection). Second, such recruits are often subjected to explicit training in the form of vocational programs, apprenticeships, or graduate or professional school, all of which generate occupation-specific homogeneity in behaviors and attitudes (i.e., training). Third, social interaction occurs disproportionately within occupational boundaries even after the formal training period is completed, thus preserving and reinforcing occupation-specific practices (i.e., interactional closure). These three processes combine to convert technical categories into socially meaningful ones and to generate relatively closed groupings at the occupation level.[2]

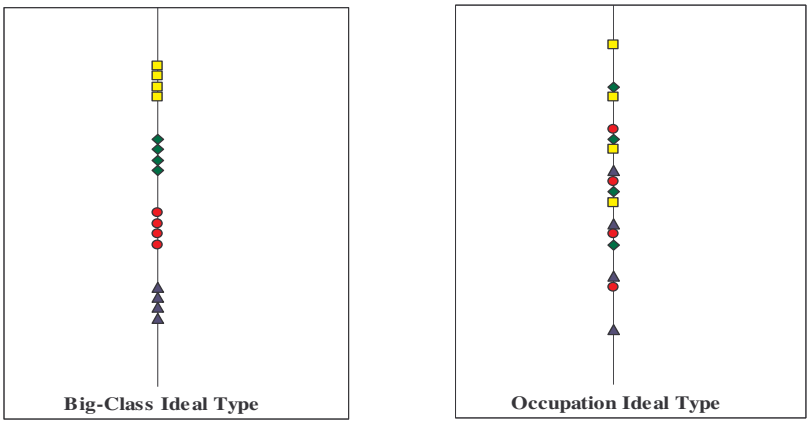


Figure 1. Ideal-typical class regimes

If this line of reasoning is on the mark, big-class incumbents should be quite heterogeneous in their social behaviors because they fall into many different detailed occupations, each of which is a relatively closed grouping in which distinctive practices may be generated and sustained. For illustrative purposes, consider a hypothetical class regime with four big classes and four detailed occupations nested within each of these big classes, as represented in Figure 1. We might then calculate the mean score on some outcome of interest (e.g., smoking, obesity) for each of the 16 occupations. The big-class assumption, as represented by the left side of Figure 1, implies that these occupation-specific means do not vary much within big classes and that aggregate categories can therefore be safely relied upon for explanatory purposes. If within-class variability is instead substantial (see "occupation ideal type"), then big-class categories provide a poor signal of life conditions and fail to adequately represent the geography of social structure (Sørensen 2000, pp. 1526-27; Giddens 1973, pp. 171-72; Goldthorpe 2000, p. 206).

[2] In some cases, such closure-generating processes also operate at the big-class level, but typically in weakened form. For example, post-secondary schools provide generalized socialization for members of a broadly defined professional class, thereby generating some cultural homogeneity at the big-class level through training and ongoing interactional closure.

When U.S. data from the 1972-2002 Current Population Survey (CPS) and 1972-2002 General Social Survey (GSS) are analyzed, the results are indeed largely consistent with the "occupation ideal type" of Figure 1. We have carried out analyses that incorporate 55 CPS and GSS variables from several topical domains: (a) life chances (e.g., income, education, working conditions); (b) lifestyles (e.g., consumption practices, institutional participation); (c) culture (e.g., political preferences, social attitudes), and (d) demographic composition (e.g., race, ethnicity). After forming 55 cross-classifications of detailed occupation by outcome, we calculate the percentage of the total occupation-by-outcome association within each such cross-classification that is unexplained by big classes or by scales, thereby giving us a measure of the relative cost, in terms of explanatory power foregone, of aggregation or scaling.[3] We summarize these results in Table 1 by presenting, for all variables falling within each of the six topical domains, the average percentage of the total association that remains after big classes (columns 1-2) or vertical scales (columns 3-6) are fit. This table reports results for the Erikson-Goldthorpe (EG) and Featherman-Hauser (FH) class schemes and for the Hauser-Warren and Nakao-Treas gradational scales (see Erikson & Goldthorpe; Hauser & Warren 1997; Nakao & Treas 1994).[4]

Table 1: Average Percentage of Association Remaining after Classes or Vertical Scales are Fit

Domain	*EG*	*FH*	*SEI*	*Prest.*
Life chances	53.2	38.2	49.2	53.4
Lifestyles				
Consumption practices	69.5	56.8	69.4	72.0
Institutional participation	68.1	60.9	84.5	85.9
Class-based sentiments				
Political attitudes	65.7	53.8	71.9	77.1
Social attitudes	54.3	46.3	55.7	65.2
Demographic structuration	50.0	40.9	58.6	63.7
All domains	**60.9**	**50.7**	**64.4**	**69.7**

The results of Table 1 make it clear that the conventional practice of aggregating or scaling occupations conceals much of the structure in the division of labor. Depending on the domain, big-class maps leave between 38 and 70 percent of the total association in the occupation-by-outcome tabulations unexplained, whereas gradational representations of class fare slightly worse, leaving between 49 and 86 percent of the total association unexplained. When averages are calculated across all domains (see bottom row), the unexplained association ranges from 51 to 70 percent, meaning that none of the conventional approaches accounts for more than half of the structure at the site of production and some account for as little as a third of that structure. The same general conclusions obtain when the parameter estimates (rather than fit statistics) are examined, when classical significance tests are used to assess whether big-class models fit, and when the BIC statistic is used to determine whether big-class models fit (see Weeden & Grusky 2005a). In all cases, variation among the various aggregate and gradational approaches pales in comparison to the costs of aggregating or scaling in the first place, suggesting that the long-standing competition between advocates of particular big-class or gradational models is

[3] These analyses are carried out after smoothing the data to eliminate interactions with gender and employment status (see Weeden & Grusky 2005a).

[4] The EG class categories are service workers, routine nonmanuals, petty bourgeoisie, skilled craft workers, unskilled manual workers, farmers, and agricultural workers (see Erikson and Goldthorpe 1992, pp. 35-47). The FH class categories are self-employed professionals, employed professionals, employed managers, self-employed managers, sales workers, clerical workers, craft workers, operatives, service workers, laborers, farmers, and farm laborers (Featherman & Hauser 1978). We compare these two conventional class schemes against a detailed occupational scheme that comprises some 126 categories (see Weeden & Grusky 2005a,b,c).

misplaced. We should instead ask whether *any* form of aggregation or scaling is warranted.

The preceding analyses speak to the gross heterogeneity of big-class categories, but of course it is possible that some of this heterogeneity is induced by selection effects and will therefore disappear in the context of full multivariate models that control the sources of selection. We have, however, found little evidence to suggest that big-class models become any more viable when we include a full set of controls. As an illustration of this result, consider an analysis of political beliefs based on the 1972-2002 GSS (N=23,260), an analysis that asks whether conventional big-classes remain heterogeneous even after individual-level controls are applied. In the contemporary literature, the empirical relationship between class and political behavior remains much analyzed, principally for the evidence it brings to bear on the "death of class" debates (e.g., Manza & Brooks 1999; Evans 1999; Clark & Lipset 2001). This literature thus provides a fitting context for determining whether conventional class effects are weak merely because class has been poorly operationalized or because, as postmodernists allege, the site of production is no longer the main stage on which political beliefs develop.

When micro-class categories are applied, we expect stronger effects to emerge not only because beliefs and attitudes are shaped by specialized occupational training (e.g., professional schools, apprenticeships), but also because they are maintained and reproduced within a "habitus" that can develop in institutionalized and socially closed categories (e.g., Bourdieu 1984). For example, professional sociologists come into constant contact with colleagues who are committed to liberal political beliefs, thus reducing exposure to alternative views and raising the costs of political straying. Although occupation-specific political cultures are probably most prominent in the professions, they may also emerge in the crafts (e.g., the political radicalism of printers) and in other relatively closed occupations.

We proceed by applying the standard causal model developed by Manza and Brooks (1999). This model can be specified as an ordered logit:

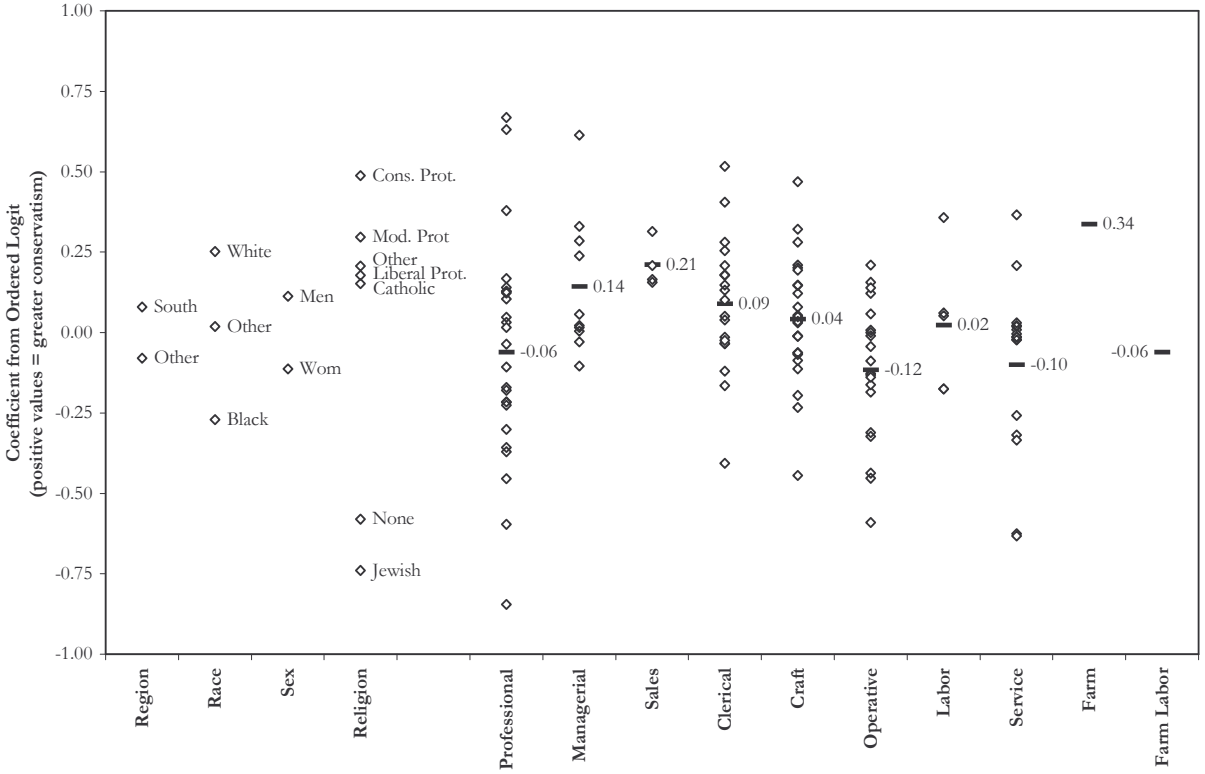
$$\Pr(y_i|X_i)=\begin{cases} F(\alpha_1 - X_i'\beta) & j=1, \\ F(\alpha_1 - X_i'\beta) - F(\alpha_{j-1} - X_i'\beta) & 1<j\leq J-1, \\ 1-F(\alpha_1 - X_i'\beta) & j=J, \end{cases} \qquad (1)$$

where *F* designates the cumulative logistic distribution, and the number of response categories, J, equals 5. The response variable, y_i, ranges from 1 (very liberal) to 5 (very conservative), while α_j refers to the J-1 estimated cut points for this variable. The vector $\mathbf{X}_i$ includes age, education, year, sex, race, religion, detailed occupation, and main effects of self-employment for the professional and managerial FH classes. The implicit claim, by contrast, of conventional class analysts is that the division of labor can be adequately represented by a trimmed model that replaces the 125 dummy variables for detailed occupations with 11 dummy variables for FH class (plus, possibly, an additional effect for socioeconomic status).

In Figure 2, we have graphed the partially normalized coefficients for selected demographic variables as well as detailed occupations (grouped by FH class), making it possible to compare the size of coefficients. The hatch marks on the right side of this figure pertain to the big-class means while the diamonds pertain to the effects of occupational dummy variables that absorb the within-class variability around these big-class means. We find that within-class occupation coefficients are just as dispersed as the coefficients for other major covariates of political beliefs (e.g., race, gender, region). In fact, FH classes account for only 16.7 percent of the total association at the site of production (i.e., the total association attributable to detailed occupational dummies), while residual socioeconomic effects within classes account for another 2.3 percent. Nominally, this result implies that scholars who represent social class with the

standard 12-category FH scheme will ignore over three-quarters of the story, although overfitting here does lead to a slightly inflated estimate.[5] By implication, scholars who deem it necessary to include measures of race, gender, or region in their models would seem obliged to include measures of detailed occupation as well. While big-class effects are significant, Figure 2 makes it clear that they fail to account for all that much of the structure at the site of production, leaving conventional class analysts open to the postmodernist critique that their star variable is rather weak.

Figure 2. Big-class and micro-class effects on political conservatism



[5] The critic of these results may point out that our decompositions capitalize on sampling variability. We have estimated the consequences of such "overfitting" by drawing five random samples of CPS respondents, each of which reflects the average sample size of the smaller GSS tables (N ≈ 15,000) that are especially vulnerable to overfitting, and then calculating the residual within-class association for all samples. The latter statistics may then be compared to those obtained for the full CPS sample. Across all CPS outcomes, the residual association calculated from the GSS-sized samples is, on average, less than 2 percent greater than that calculated from the full CPS samples. We conclude that a relatively small proportion of the occupational heterogeneity within big classes is due to parameterized noise.

Although we will not attempt to review our results any further here, it bears noting that we have carried out related analyses that demonstrate that conventional big-class and socioeconomic categories perform poorly in characterizing (a) the effects of social class and socioeconomic status on other outcomes (Weeden & Grusky 2005a,c; Weeden & Grusky forthcoming; Weeden 2005), (b) the structure of intergenerational mobility (Jonsson et al. 2005), (c) the structure of intragenerational mobility (Sørensen & Grusky 1996), and (d) the structure of recent trends in the effects of social class on demographic and social outcomes (Weeden & Grusky 2005b; Weeden 2005). In summary, this line of research implies that one would be well advised to drop analyses down to the micro-class level, at least insofar as a class scheme is adopted.

While most commentators regard this conclusion as sharply critical of the class analytic status quo (Goldthorpe 2002; Therborn 2002; Portes 2000), it may be understood as simply replacing one operational measure of the class concept with another that is empirically more defensible. That is, in developing a "micro-class" scheme that capitalizes on the explanatory power of institutionalized groupings, we have merely devised a new class map that operates at the level at which true closure occurs. Like all other sociologists, we have thus defaulted to the class concept, albeit now an empirically more powerful one. We have remained silent on the more fundamental and challenging question of whether *any* class-based scheme, however it is operationalized, is superior to individual-level approaches to measuring inequality, especially multidimensional ones that take into account not just income but a full panoply of investments, endowments, job conditions, and job rewards. The next, and far more fundamental, task is to embed all class models, both big-class and micro-class ones, within a multidimensional characterization of inequality. This will allow us to build a new social indicators framework that can specify the form of inequality and monitor the extent to which class-based or socioeconomic forms are in evidence. We outline below how this next step might be taken.

Research Design and Methods

The framework that we propose has two parts. The first part entails characterizing the structure of inequality without taking into account its effects on dependent variables of various kinds (i.e., "pure" operationalizations), and the second involves calibrating our characterization in ways that do take into account how the constituent variables (e.g., income, wealth) affect outcomes (i.e., "effect-calibrated" operationalizations). We review each approach in turn.

Pure Operationalizations

Ironically, just when sociology appears to be turning against class models (e.g., Pakulski forthcoming), recent developments in economics have provided an important, if still unexploited, opening that may breathe new life into the class concept. It is increasingly fashionable within the discipline to recognize that the "income paradigm," which treats income as the main indicator of wellbeing, fails to "take cognizance of other aspects of the quality of life that are not well correlated with economic advantage" (Nussbaum forthcoming, p. 4; Bourguignon forthcoming). This line of criticism has led to calls for multidimensional strategies for measuring and analyzing inequality and poverty. The most famous "multidimensional" measure, the Human Development Index (HDI), is closely monitored throughout the world (UNDP 2001), but has been widely criticized as simplistic and under-theorized (e.g., Kanbur 2001) and hence has spurred much revisionist work.[6]

The resulting industry of multidimensional index building is unsatisfying in various ways.

[6] Although the HDI is an aggregate index (measured at the country level), it could readily be recast as an individual-level index.

First, any attempt to reduce the multidimensional space of inequality into a single scale, such as HDI or any socioeconomic index, can be misleading insofar as the underlying dimensions are only poorly correlated with one another. When these correlations are weak, it may not be advisable to attempt to translate scores on each dimension into some aggregate, overarching score. This simple observation has led to much fretting among economists about the difficulty of parsimoniously characterizing the structure of inequality once multiple dimensions are allowed (Sen 1997). Moreover, there is growing concern that standard multidimensional scales are excessively abstract and fail to capture the social organization of inequality, especially the emergence of social networks, norms, and "adaptive preferences" (i.e., tastes, culture) among individuals in similar life situations and circumstances. The policy recommendations coming out of conventional analyses of HDI have, by virtue of this highly abstract orientation, been fundamentally individualistic (Grusky & Kanbur forthcoming).

These two lines of criticism within the economics literature provide an unprecedented opening for sociological models of class. After all, such models make multidimensionality tractable by characterizing it in terms of a relatively small number of classes, each comprising a distinctive combination of endowments (e.g., human capital), working conditions (e.g., level of authority), and rewards (e.g., earnings). The class of "craft workers," for example, has historically comprised individuals with moderate educational investments (i.e., secondary school credentials), considerable occupation-specific investments in human capital (i.e., vocational, on-the-job training), average income, relatively high job security, middling social honor and prestige, and quite limited authority and autonomy. By contrast, the underclass is characterized by a rather different package of endowments, conditions, and rewards, one that combines minimal educational investments (i.e., secondary school dropouts), limited opportunities for on-the-job training, intermittent labor force participation, low income, virtually no opportunities for authority or autonomy during (brief) bouts of employment, and much social denigration and exclusion. The other classes appearing in class schemes may likewise be understood as particular combinations of "scores" on the fundamental endowments, working conditions, and rewards of interest. The long-standing presumption, of course, is that social classes cannot be reduced to a unidimensional scale because the constituent endowments and outcomes do not necessarily covary perfectly, an inconvenience that makes it inadvisable to resort either to socioeconomic scales or income-based measures of social standing (e.g., Jencks et al. 1988).

In short, class analysts presume that the space of outcomes and capabilities has relatively low dimensionality, indeed a dimensionality no more nor less than the number of postulated classes. This simplifying assumption becomes possible because the social classes institutionalized in the labor market represent only a small subset of the logically possible "packages" of endowments, working conditions, and rewards. It follows that the task of reducing a potentially complicated multidimensional space to some manageable number of dimensions may be solved institutionally and will not require any complex econometric machinations.

If economists have appreciated the complications of multidimensional approaches but have not recognized that class models may solve them, sociologists have long been aware of the solution (i.e., class models) but haven't recognized the problem (i.e., multidimensionality) to which it may be the answer. Instead, sociologists continue to motivate class models in largely unidimensional terms by (a) nominating a particular variable (e.g., authority, employment relations) as especially useful in understanding the structure of the site of production, and (b) then defining class categories that capture differences across workers on that variable. For example, Goldthorpe (2000) argues that the "form of regulation of employment" (e.g., salaried, short-term contract) is analytically fundamental, and he then demonstrates that the categories of the Erikson-Goldthorpe (EG) scheme differ in their characteristic forms of regulation (Evans 1992; Evans & Mills 1998; Rose & O'Reilly 1997, 1998).

This unidimensional approach to motivating class models fails to appreciate that their main selling point is their intrinsically synthetic character. If sociologists truly believe that a single

variable, such as the “form of regulation of employment,” determines interests and life chances, then they would do well to measure that variable directly rather than operationalizing it indirectly through conventional classes. The logic of current research practice among sociologists thus eludes us: It is rather like an economist claiming that income is the master variable of interest, but then measuring it indirectly and imperfectly through a social class scheme.

If the usual sociological motivation for class analysis is unconvincing, is there some alternative rationale that salvages the practice? We think so. Namely, we suspect that sociologists have been instinctively drawn to class schemes because they provide a synthetic measure of “life conditions” that define the quality and character of our social lives, including the endowments we control, the organizational conditions under which we work, and the economic (e.g., wages) and non-economic implications of these endowments and organizational conditions. In textbook descriptions of class, a common rhetorical device is to contrast a “day in the life” of incumbents of different social classes, precisely because the assumption is that classes encapsulate organic social worlds that vary along many dimensions, not just one (e.g., Kerbo 2002; Rossides 1990). When understood in synthetic terms, class schemes would appear, therefore, to solve each of the two problems that multidimensionalist economists have identified. The potential complexity of multidimensional space is resolved by resorting to prepackaged “bundles” of structural conditions, and the social organization that emerges within this space is captured by institutionalized groupings rather than nominal statistical constructions.

Are class models as successful in solving these analytic problems as the foregoing account suggests they could be? This question can be answered by examining (a) whether the multidimensional space of inequality is indeed reducible to a relatively small number of characteristic combinations of endowments, working conditions, and job rewards, and (b) whether these prepackaged solutions are rooted in the division of labor and thus correspond either to big classes or micro-classes. As we have noted, some scholars (e.g., Evans 1992) have tried to validate their class map against a few preferred criteria, but such tests do not provide the comprehensive, synthetic assessment that an omnibus measure of life conditions demands.

The first step in carrying out tests of this sort is to develop a comprehensive list of life conditions that, taken together, adequately characterize the multidimensional space of inequality. The task of defining the variables of interest has in itself generated much debate, not just among sociologists (e.g., Bourdieu 1984; Grusky 2001), but also more recently among economists and philosophers (e.g., Nussbaum forthcoming). If these literatures are compared, one nonetheless finds considerable agreement on the following three classes of variables: (1) *investments and endowments (I)* refer to formal schooling, vocational schooling, literacy, occupation-specific experience, firm-specific experience, and total experience; (2) *working conditions (C)* refer to the type of employment contract (e.g., salary, wage, self-employed), unionization, labor market type (e.g., firm size), authority, autonomy, and substantive complexity; and (3) *job rewards (R)* refer to earnings, investment income, program income (i.e., “welfare”), and wealth. To be sure, this list omits some important variables that are not available in large-scale surveys (e.g., IQ), but we think it is comprehensive enough to shift the burden of proof to those skeptics who believe that adding more variables would lead to fundamental changes in the underlying multidimensional structure of inequality.

We can then ask whether conventional class schemes and scales (see Figure 3) can

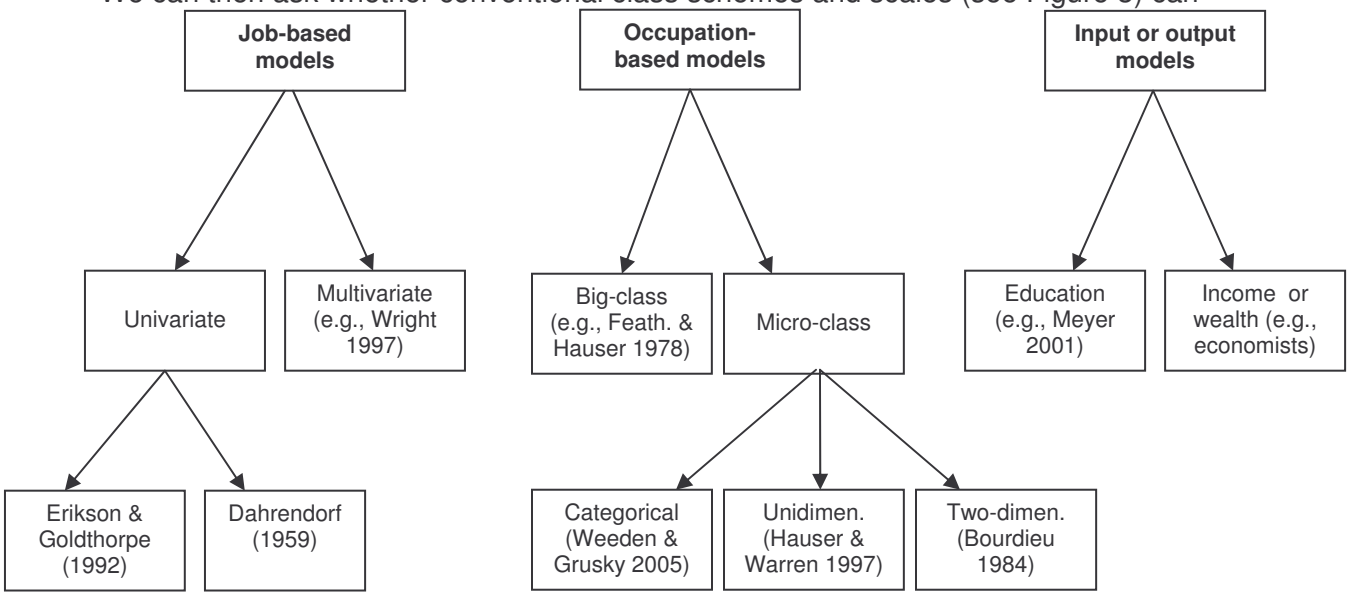


Figure 3. A classification of testable models of inequality

represent the structure of the multidimensional space defined by this list of conditions. The following types of questions may be posed:

Are simple job-based class schemes powerful enough to account for much of the structure in the inequality space? We wish, for example, to know whether the Erikson-Goldthorpe (1992) scheme, which has become the dominant approach to measuring inequality in sociology, can indeed capture much of the multidimensional structure of inequality. If the Erikson-Goldthorpe scheme proves not to be powerful, we might secondarily ask whether it can at least outperform other unidimensional schemes, such as the authority-based model of Dahrendorf (1959).[7]

Can multidimensional job-based schemes outperform simple unidimensional schemes? We have made much to this point of the surprising tendency of sociologists to justify their preferred class scheme in terms of a single variable that is nominated as fundamental. At the same time, a few sociologists have developed explicitly multidimensional classifications, with the work of Wright (1997) being an especially prominent example. The premise of Wright's model is that classes are formed as combinations of scores on three job-level variables: employment status (i.e., capitalist, petty bourgeoisie, worker), skill (high, medium, low), and authority (high, medium, low). We will consider whether this model, which has to date been defended largely on theoretical grounds (cf. Wright 1997), has the merit of capturing much of the structure of the inequality space.

Can either big-class or micro-class models capture the association in the inequality space? As noted above, big classes and micro classes may be understood as characteristic "packages" of conditions, thus implying that the inequality space may be usefully simplified by representing

[7] Although Erikson and Goldthorpe have operationalized their scheme using occupational data, we are proposing to test a simpler job-level specification on the argument that direct measurement should outperform measurement by proxy. We will also test the Erikson-Goldthorpe classification in its original form as an occupationally defined "big-class" model.

it in occupational terms. Although our NSF research suggests that micro-class models are likely to outperform big-class models in the bivariate context (using, for example, a *BIC* criterion), this research has not addressed their relative performance in representing the association among inequality dimensions.

Is the inequality space adequately represented by models that scale detailed occupations? Up to now, we have stressed the hegemony of big-class schemes within sociology, but other models of inequality obviously remain in play. In particular, gradational formulations have long been popular, both the "American" tradition of scaling occupations according to socioeconomic status or prestige (e.g., Hauser and Warren 1997; Nakao and Treas 1994) and the "French" tradition of treating occupations as subtle signals of the economic and cultural capital controlled by their incumbents (esp. Bourdieu 1984). We wish to ask now whether scaling occupations in terms of such variables (e.g., socioeconomic status, prestige, cultural capital) can capture much of the differentiation that may arise when social closure is secured at the detailed occupational level.

Does the division of labor remain the appropriate starting point in characterizing the structure of inequality? The long-standing presumption among sociologists has been that inequality is best measured at the "site of production" (see, e.g., Parkin 1979). Recently, Meyer (2001) has suggested that such conventional class models are quaint, 19th century artifacts and that "education classes" now capture the fundamental cleavages of contemporary inequality. Likewise, economists have long thought it acceptable to ignore the structure of jobs themselves, preferring instead to characterize inequality in terms of the earnings that accrue to jobs. We will ask to what extent either of these approaches succeed in capturing the inequality space.

The foregoing models of inequality, now construed as *hypotheses* about the structure of the inequality space, can be tested with exploratory and confirmatory latent class models. This approach, which we appreciate is ambitious, has been made possible by three statistical advances: the recent development of latent class models for mixed mode data that combine continuous and categorical indicators (e.g., Vermunt & Magidson 2002; Magidson & Vermunt 2002); the associated development of latent class models that constrain the underlying classes to be scaled or ordered (e.g., Croon 2002); and programming enhancements that make it possible to estimate models with more parameters than was before feasible (see Hagenaars & McCutcheon 2002, Appendix C). The analyses that we propose are tractable, in particular, because models for mixed mode data obviate the need to discretize continuous variables and thus allow them to be treated parsimoniously, an absolute necessity given the number of variables in our analyses.

Until relatively recently, latent class models for continuous and categorical indicators developed along quite separate tracks, making it difficult to carry out analyses that combined the two scale types. However, these two tracks have now joined (see Vermunt & Magidson 2002), with the resulting latent class model for mixed mode data represented as follows:

$$f\left(\mathbf{y}_i/\theta\right) = \sum_{k=1}^{K} \pi_k \prod_{j=1}^{J} f_k\left(y_{ij}/\theta_{jk}\right). \qquad (2)$$

In this model, $\mathbf{y}_i$ denotes the respondent's scores on the manifest variables, K is the number of latent classes, π_k refers to the probability of belonging to the k^{th} latent class (thus indexing latent class sizes), J denotes the total number of manifest variables, and j is a particular manifest variable. The distribution of $\mathbf{y}_i$ is a function of the model parameters of θ, a function that takes the form of a mixture of class-specific densities (i.e., $f_k(y_{ij}/\theta_{jk})$). We must of course specify the appropriate univariate distribution for each element y_{ij} of $\mathbf{y}_i$. For continuous y_{ij}, the natural choice is the univariate normal, whereas for discrete nominal or ordinal variables it is the (restricted) multinomial. We will assume that the manifest variables are independent within latent classes

and that all of the observed association between manifest variables is therefore attributable to the particular patterning of latent class membership. That is, we don't assume that all class members have identical scores on the manifest variables, but we do assume that, whenever a class member has a score that deviates from the class mean, this deviation doesn't convey any information on the likelihood of deviating on any of the other variables. The assumption of local independence can be relaxed, but we insist on it because it captures a main constraint embodied in the class hypothesis.

For the purpose of illustrating this approach, we consider a simplified case in which the multidimensional space comprises only three individual-level variables (e.g., income, education, wealth), thus allowing the hypotheses of interest to be graphed. In some of our examples, we further assume that the class structure is well defined by a mere six "micro-classes" (i.e., detailed occupations) and three "big classes" (i.e., aggregations of detailed occupations), as this simplification makes the figures more legible. Although we will use standard operationalizations of big classes (e.g., Erikson & Goldthorpe 1992) and micro-classes (e.g., Weeden & Grusky 2005) throughout our actual analyses, it is convenient for the purpose of constructing illustrative graphs to consider an example based on just a few big classes and micro-classes. In the graphs that follow, big-class membership is signified by three symbols (i.e., square, triangle, circle), while micro-class membership within each big class is signified by shades of these symbols (i.e., light, dark).

We can now illustrate in this simplified context how latent class models make it possible to develop a comprehensive system for characterizing the multidimensional structure of inequality. The following six types of "inequality regimes," each best understood as an ideal type, can be distinguished.

Non-sociological big-class regime: Although our analyses will focus on fitting confirmatory models that test the class schemes specified in Figure 3, we will also fit exploratory models that allow classes to freely emerge in ways that may be inconsistent with the implicit constraints of class analysis and Figure 3. As Figure 4 shows, the multidimensional space of inequality may resolve into a small number of big classes, each characterized by a different constellation of scores on the underlying individual-level variables. Within each of these big classes, the individual-level variables do not covary with one another, implying that there is no residual intra-class clustering into micro-classes. Because each class is populated by an assortment of symbols (i.e., square, triangle, circle), the solution of Figure 4 is inconsistent with the presumption that inequality is generated at the site of production; and we have accordingly labeled the classes as "non-sociological." It is of course possible that these classes are defined by other manifest variables. We could, for example, test Meyer's (2001) "education model" by forcing the latent classes of Figure 4 to be perfectly determined by educational categories (e.g., high school dropout, high school graduate, college attendance), thus rendering them manifest.

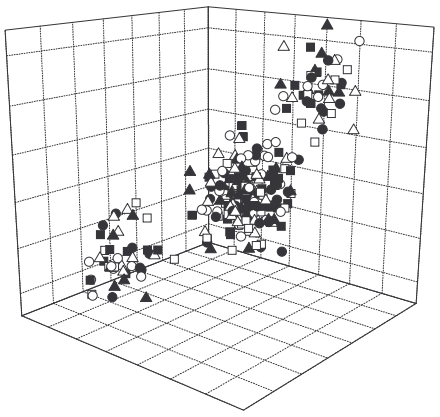


Figure 4. Non-sociological big-class regime

Sociological big-class regime: The class structure of Figure 5 takes on a more familiar sociological cast. Whereas the big classes of Figure 4 form outside the site of production and are accordingly "postmodern" in composition (Hall 2001), those of Figure 5 are rooted in the division of labor. Although class analysts have simply assumed that classes are "sociological" in this way, we will formally test this assumption by forcing latent classes to be perfectly defined by

big-class membership (again rendering them manifest). The contrast between the unconstrained latent class model in Figure 4 and the constrained model in Figure 5 speaks to the extent of sociological organization in the class structure.

Sociological micro-class regime: If the first line of attack on the sociological model of class rests on the claim that classes are not well defined at the site of production, the second line of attack focuses on the size of classes and asks whether they are as big as class analysts routinely assume (e.g., Grusky & Weeden 2002). While Figure 5 indicates that the individual-level variables are independent of one another within each big class and that subdividing into micro-classes is accordingly unwarranted, Figure 6 now shows that this independence constraint is violated and that further subdivision into micro-classes is necessary. Although such micro-classes are assumed here to be "sociological" (i.e., formed at the site of production), we could also represent the case of disorganized micro-classes, an ideal type that would contradict conventional measurement both in terms of the size of the classes and their composition.

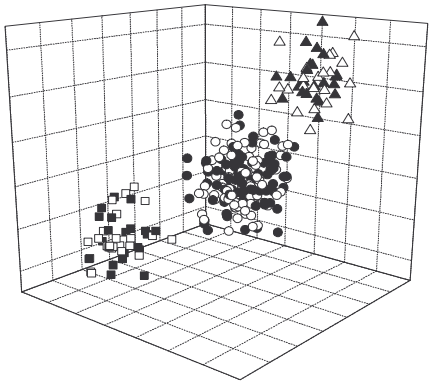


Figure 5. Sociological big-class regime

Gradational micro-class regime: In Figures 4-6, we have assumed that the class structure cannot be understood in simple gradational terms, meaning that at least some classes are formed by combining high values on one dimension with low values on another. The third line of attack on the conventional class model involves the claim that classes are largely gradational and that, by virtue of this structure, inequality can be adequately characterized with a simple unidimensional scale (see Figure 7). We can test for such a structure by estimating scale values for the latent classes or, less restrictively, by imposing ordinality constraints on them (see Rost 1991; Croon 2002). We can also test whether this estimated scale (for the latent classes) correlates well with a socioeconomic index, thereby allowing us to weigh in on the long-standing non-class tradition of inequality measurement. The socioeconomic index is in fact a particular type of class model that treats all occupations with the same socioeconomic score as a micro-class and that presumes that such socioeconomic scores adequately index inequality along a host of dimensions (not just income and education). If this very strong constraint fails, scholars who insist on a gradational solution can still fall back on the estimated (rather than constrained) scale values for the latent classes. These types of solutions therefore provide precisely the unidimensional index that economists have long sought in the context of multidimensional space.

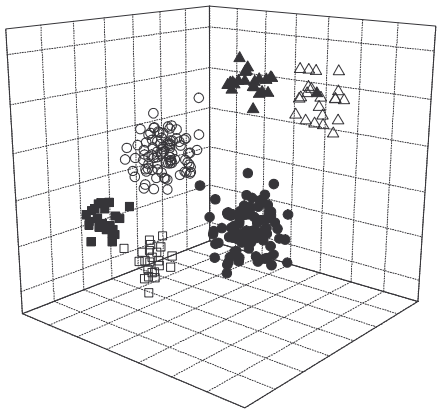


Figure 6. Sociological micro-class regime

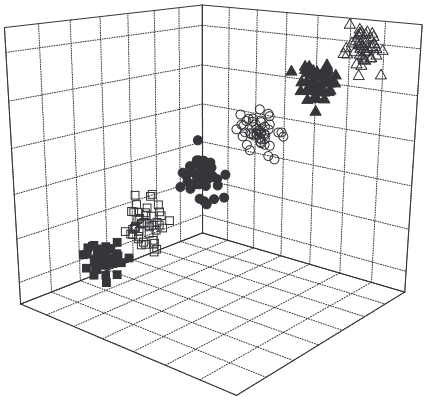


Figure 7. Gradational micro-class regime

However, rather than simply imposing an arbitrary unidimensional solution on the data, our approach lets us test existing scales, develop an alternative unconstrained scaling that may better account for the multidimensional structure of the data, and determine whether any scaling of the latent classes, even a freely estimated scaling, can adequately characterize the structure of multidimensional space.

Fractal individualized inequality: Although the regimes of Figures 4, 6, and 7 are inconsistent with conventional sociological class models, they nonetheless salvage the class concept in revised form by allowing for non-sociological classes (Figure 4), micro-classes (Figure 6), or gradational classes (Figure 7). By contrast, Figure 8 represents a case in which the class concept itself must be rejected because, no matter the level of disaggregation, the underlying inequality variables continue to covary with one another. This ideal type may be understood as an extreme micro-class solution in which the diagonal of Figure 7 thins out to the point where each individual becomes a class unto himself or herself. We refer to this solution as fractal because the same gradational solution is apparent at each and every level of disaggregation. The economist should recognize this solution as consistent with the claim that income is a master variable, that it perfectly signals all other individual-level measures of inequality, and that no higher-level class organization therefore appears. Obviously, this ideal type would never be empirically realized in such extreme form, but it is nonetheless important to ask whether the simple economic model comes closer to being realized in some societies or time periods than in others.

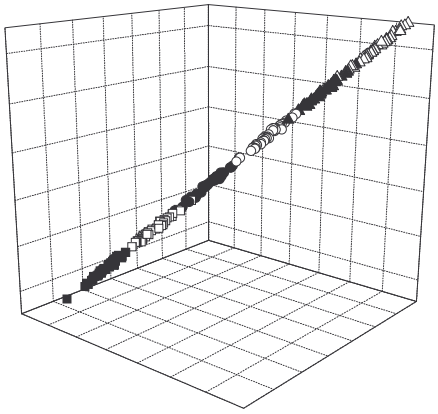


Figure 8. Fractal individualized inequality

Disorganized inequality: The regime of Figure 9, unlike that of Figure 8, doesn't allow the underlying individual-level variables to covary. This may be understood as a "one class" solution or, equivalently, a non-class regime. Although there is much inequality under this specification, it takes a uniquely structureless form in which the independence assumption holds throughout multidimensional space, not just within a given latent class. Again, it is unlikely that such extreme disorganization will ever be realized, but the ideal type does represent a form of inequality that some postmodernists (e.g., Pakulski forthcoming; Pakulski & Waters 2001) argue is emerging. If indeed this type of class structure is on the rise, it means that the growth in income inequality is at least counterbalanced by a decline in the association between income and other forms of inequality.

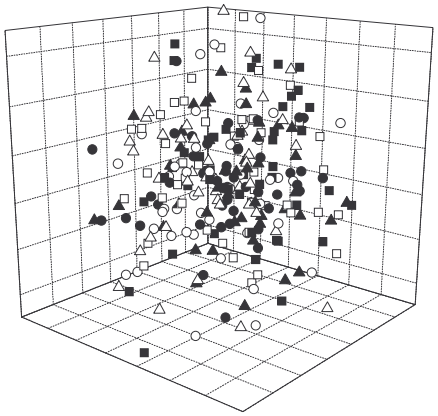


Figure 9. Disorganized inequality

We can't claim to have exhausted here the many ideal-typical forms that either class-based or classless inequality regimes might assume. Rather, we wish merely to stress the importance of developing a methodology for characterizing the form as well as extent of inequality, a task that takes on special importance once the multidimensionality of inequality is appreciated. If properly elaborated, an approach of this sort can provide a comprehensive framework for comparative multidimensional analyses of inequality, one that allows us to consider not just the

extent of inequality but also how that inequality is expressed and organized. Moreover, this approach allows us to explicitly test long-standing – and long untested – assumptions about the structure of inequality, assumptions that are in part embedded in disciplinary divides.

We may of course use this framework to examine the structure of the underclass. Again, we can proceed with both confirmatory and exploratory approaches, with the confirmatory models resting on the constraint that underclass members have weak labor force attachment (among those who are not retired, unpaid caregivers, or students). We can then examine whether and to what extent disadvantage of various kinds tends to come together to form a true underclass (as opposed to a fractal pattern), whether the underclass is especially large in some settings (e.g., particular cities, rural areas), and whether the underclass is formed in different ways in different settings.

It is especially important to examine whether all classes, including the "underclass," are weakening over time, just as some "postmodernist" commentators have claimed. Although there is much evidence on trends in the amount of income inequality, we know rather little about trends in the form and structure of inequality. By disaggregating by period, we can monitor changes in (a) the extent to which classes of particular types (e.g., Weberian, Durkheimian, Marxian) capture the structure of the inequality space, (b) the extent to which disadvantage is becoming more (or less) cumulative in ways that render unidimensional scales increasingly (or decreasingly) viable, and (c) the extent to which inequality is becoming non-sociological rather than rooted, as in the past, in the division of labor. We wish to develop in this way a multidimensional version of trend analysis that can build on the simpler unidimensional (i.e., income-based) analysis of the last 20 years.

These types of analyses may of course be carried out in countries throughout the world, but we propose to begin with the relatively simple case of the United States. We merely require data sets that are large, that represent as many of the important individual-level inequality variables as possible, that allow us to faithfully operationalize conventional big-class and micro-class schemes, that extend over a long enough time period to carry out meaningful trend analysis, and that can be disaggregated into the cities and regions of interest (mainly for the underclass analyses). These demands are best met in the United States with the Survey of Income and Program Participation (SIPP). Between 1984 and 2004, thirteen SIPP panels were drawn from the non-institutionalized civilian population, each entailing multiple waves of data based on an initial sample of between 33,000 and 95,000 household members, depending on the panel. By pooling across panels, we can obtain samples on the order of 300,000 cases (including members of the "underclass"), which will be large enough to generate stable estimates even for our least parsimonious specifications.

The SIPP data set provides core content on current employment and program participation as well as topical modules on employment history and wealth (i.e., "assets and liabilities"). We will represent the inequality space with the three categories of individual-level variables listed below.

(1) *Investments and endowments*: Highest degree obtained, amount and type of vocational training, total labor force experience, occupation-specific experience, short-term employer tenure, and labor force attachment (e.g., continuous, intermittent because of family care, intermittent for other reasons, or never continuously employed).

(2) *Working conditions*: Self-employment status (capitalist, petty bourgeoisie, employed), union membership and contract coverage, hours worked, periodicity of pay, and firm size.

(3) *Job rewards*: Earnings, investment income, means-tested income, net worth, and home ownership.

Although SIPP lacks a few measures of interest,[8] it is nonetheless far more comprehensive than the available alternatives. Moreover, because many of the items are collected for each month, the SIPP allows us to construct measures of key dimensions (e.g., earnings) that smooth out short-term fluctuations and minimize measurement error (Solon 1999).

We may complete trend analyses in the United States by treating each SIPP panel as a distinct context and testing for differences across such contexts in the conditional and latent class probabilities. We also wish to test for city and regional differences in the structure of the inequality space (especially when analyzing the underclass). When the most recent SIPP panels are pooled, five cities are potentially populous enough to be singled out for separate analysis: New York (N=12,380), Los Angeles (N=9,212), Chicago (N=5,792), San Francisco (N=4,301), and Philadelphia (N=4,084). By contrast, none of the smaller MSAs is large enough to be analyzed separately, but we can nonetheless combine them to characterize the structure of the underclass (and other classes) in "mid-sized cities." The remaining non-MSA sample will also be large enough to characterize the rural class structure separately within the major regions of the United States (North, South, Midwest, and West).

Effect-Calibrated Operationalizations

The preceding analyses will yield new insights into (a) the underlying structure of inequality and poverty and (b) the relative power of competing measurement paradigms in representing this structure. How might defenders of the income paradigm, the socioeconomic paradigm, or the class analytic paradigm react insofar as it is shown that their approaches cannot well represent the inequality space? As we see it, they would likely argue that their measurement approaches were never devised to represent the inequality space in its entirety, and that instead their main intent was merely to capture those features of that space that were most consequential for the outcomes or social behaviors of interest (see Goldthorpe & McKnight, forthcoming). If we wish, then, to convince the defenders of the status quo, we would be well advised to examine not merely the structure of the inequality space but also its effects on a range of dependent variables.

It follows that a convincing empirical case for any particular measurement approach must be forged on the twin claim that (a) it provides a parsimonious account of the multidimensional space of inequality, and (b) it has net effects on attitudes and practices that are not reducible to the effects of other constituents of the inequality space. The first claim is addressed with the latent class analyses described in the preceding section, whereas the second claim, to which we turn now, can be addressed by developing quantitative models of class, income, or socioeconomic effects based on more comprehensive controls and more convincing specifications than have heretofore been attempted. In this second line of analysis, we consider whether classes or socioeconomic scales have true emergent effects on behaviors and attitudes, where "emergent effects" refer to those that cannot be reductively explained in terms of the underlying variables used to define classes or socioeconomic scales (i.e., endowments, working conditions, rewards).[9]

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[8] The SIPP does not include direct measures of authority or autonomy, but we will be able to create occupation-level proxies for these variables with O*NET data (U.S. Department of Labor, 2005). Also, other smaller surveys (e.g., the GSS) provide direct measurements of these variables, meaning that we can validate our SIPP results with a GSS side analysis (see Davis, Smith, & Marsden 2004). The main disadvantages of the GSS are that it is relatively small (even when the 1972-2004 surveys are pooled) and lacks direct measures of wealth and labor market experience.

[9] It should be noted here that advocates of socioeconomic scales are, just like advocates of class analysis, implicitly claiming that there are contextual effects. In effect, socioeconomic

Although contemporary sociologists continue to routinely use class or socioeconomic models, they do so, it would seem, principally out of tradition and habit rather than any strong conviction that classes or socioeconomic scales have such emergent effects. There are two main lines of argument that appear to inform this contemporary loss of faith in the class realist position. First, some scholars argue that the net class effects that routinely appear in quantitative models are entirely attributable to selective processes (esp. Meyer 2001), with the implication that these effects would disappear if the variables on which selection occurs could be fully controlled. The "service class," for example, might show up as more tolerant of alternative lifestyles because its incumbents are especially likely to have attended elite colleges, and because exposure to elite colleges raises social tolerance. This line of argumentation is hardly innovative; to the contrary, selection-based arguments are nothing if not ubiquitous, but what has been lacking is a test of them that rests on comprehensive individual-level models that correct as convincingly as possible for selection effects. We will develop just such models here.

The second main line of anti-class argumentation comes from a more surprising source. Namely, Goldthorpe (2002, 2000) and Breen (forthcoming) have sought for some time to refashion class analysis on "modern" rational action foundations, yet their efforts have had the perverse and unintended effect of undermining all but a purely nominalist rationale for class analysis. These authors argue that classes should index the "form of regulation of employment" (e.g., salaried, short-term contract), with this underlying variable presumed to affect how workers understand their interests and thus settle on particular beliefs, practices, or courses of action. As we have argued elsewhere (Grusky & Weeden 2002), this interpretation implies that classes are superfluous, given that class analysis may be carried out by simply regressing an outcome variable on "form of regulation of employment" and any other working condition (e.g., substantive complexity) or job reward (e.g., income) that affects interests. The obvious question here is whether anything is gained by pushing a nominalist analysis through a class fulcrum. Why not abandon the pretense of class altogether and simply measure at the job level the working conditions that classes putatively signal? The class nominalism outlined by Goldthorpe is arguably consistent with a variable-centered approach in which the analyst codes the relevant job-level conditions that affect the calculation of interests, formulates a set of hypotheses about precisely how such conditions affect the likelihood of a particular course of behavior, and then evaluates these hypotheses by regressing the behavior of interest (e.g., voting) on the requisite job-level conditions (e.g., Breen forthcoming). Taken to its logical conclusion, Goldthorpian nominalism can work quite well without invoking classes at all (Kohn 2001).

The analytic implication is that a convincing realist case for classes requires us to estimate models that not only eliminate selection effects, but that also purge the effects of those working conditions (e.g., employment form) and job rewards (e.g., income) that may govern the calculation of interests. Given what is at stake, it is peculiar that such a rigorous test of the class concept has never been undertaken, nor has it even been identified by class theorists as the type of test to which we should aspire. It is possible that class analysts have lost faith and become fearful of the critical test. After all, if such an analysis reveals that classes have no net effects when selective forces and working conditions are controlled, it follows that the class

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scales imply that (a) occupations with the same status form a "class," and that (b) the contextual effects of such classes follow a simple socioeconomic gradient (see Hodge 1981). Although advocates of classes and socioeconomic scales must be prepared to defend the concept of contextual effects, advocates of income or earnings scales need not (because the latter scales are measured at the individual level). The main empirical test, then, of income or earnings measures merely involves showing that they have effects net of classes, scales, and correlated dimensions of the inequality space.

concept is superfluous and that the variables constituting the inequality space should be directly used in quantitative modeling.

We think that our tests may instead indicate that the class concept has merit and that class analysts accordingly have nothing to fear. Why might net effects of class be detected even with such rigorous controls? In addressing this question, what must first be stressed is that classes are organic "packages" of conditions, and the constituents of these packages may combine and interact in ways that lead to an *emergent* logic of the situation. The underclass, for instance, may be understood as a combination of negative conditions (e.g., intermittent labor force participation, limited education, low income) that, taken together, engender a sense of futility, despondency, or learned helplessness that is more profound than what would be expected from a model that simply allows for independent effects of each constituent class condition. To be sure, a committed reductionist might counter that one merely needs to include the appropriate set of interactions between the constituent variables, but insofar as classes define the relevant packages of interacting conditions the interactional approach only becomes an unduly complicated way of sidestepping the reality of classes.

The argument for a net class effect also rests on the claim that class-defined packages of conditions are associated with distinctive cultures that take on a life of their own and thus independently shape behavior and attitudes. At a minimum, class cultures may be understood as "rules of thumb" that encode best-practice behavioral responses to the working conditions that classes entail, rules that allow class members to forego optimizing calculations themselves and rely instead on cultural prescriptions that provide reliable and economical shortcuts to best practices (e.g., Goldthorpe 2000). At the same time, other theorists (e.g., Wilson forthcoming) allow for class cultures that are truly maladaptive, such as a "culture of poverty" that filters information in unduly cynical ways and that engenders an excessive sense of futility and despondency. In either case, the expectation is that classes will have net effects on a wide range of behaviors and attitudes, effects that are not reducible to mere selection or to constituent working conditions.

These effects may be especially strong whenever classes are deeply institutionalized. In accounting, for example, for the low prevalence of smoking among physicians (relative to other similarly educated and compensated professions), we would stress (a) the effects of being socialized into an anti-smoking and pro-health worldview within medical school, and (b) subsequent interaction in the workplace with predominantly non-smoking colleagues and the attendant social control that such interaction entails (e.g., Nelson et al. 1994; see also Ames & Janes 1992). By contrast, other occupations are associated with a devil-may-care bravado (e.g., race car drivers), a hedonistic lifestyle (e.g., bartenders), or a studied indifference to the long-term (e.g., actors), all of which are cultural formations that support relatively high rates of smoking. The latter examples suggest, of course, that class effects may well be strongest at the micro-level, where occupation-specific worldviews, training, and interactional closure are especially well developed (see Weeden & Grusky 2005; Weeden 2002).

The challenge, then, is to offer convincing evidence that class effects are not reducible either to (a) investments and endowments that drive selection into particular classes, or (b) job-level measures (e.g., form of regulation of employment) and rewards (e.g., income) that constitute a set of background conditions in terms of which interests are gauged and behaviors selected. At this early point, we will not attempt to tease out the particular mechanisms through which class effects might arise, given that the logically prior step is to determine whether there are any such effects to explain. Indeed, just as the neighborhood effects literature led off by testing for real contextual effects (before turning to mechanisms), so too should class analysis begin by testing for the existence of class effects and hence the viability of the class concept. It is striking that this concept, which is at least as fundamental to sociology as the neighborhood concept, has not yet been subjected to tests as stringent as those that are now routinely

implemented in the neighborhood effects literature (e.g., Sampson et al. 2002; Harding 2003; Sobel 2003).

We have assumed to this point that the main coefficients of interest are the net effects of contemporaneous class on attitudes, lifestyles, health, fertility, and the host of other demographic dependent variables that sociologists and other social scientists routinely analyze. Although much of quantitative sociology indeed relies on such measures of contemporaneous class, there is also continuing interest in treating class of origin as a "parental background" variable. This type of measurement allows scholars to assess the extent to which life chances vary by origins and hence opportunities are unequally distributed. Because many economists and philosophers now work within the "capabilities approach" (e.g., Sen 1997), the emerging fashion is to treat reward-based measures of inequality, such as income, as affected by differential tastes (e.g., tastes for leisure, consumption) and hence reflective of preferences as well as true inequality. Within this tradition, measures of opportunity or "capability" are featured because, by contrast, they speak to inequalities that preexist the operation of tastes or preferences. This line of reasoning implies that a comprehensive test of the class concept entails assessing its usefulness in representing origins as well as destinations.

Is there any reason to believe that the class concept will prove necessary in measuring origins? Although we think that there is, it is again the case that social scientists have simply defaulted to socioeconomic or class-based measurements of origins without providing even minimally satisfactory evidence that they add anything beyond a reductive model resting on separate measurements of parental endowments, working conditions, and job rewards (cf. Hauser 1973). The conventional, if untested, view is that such a reductive model falls short because parents transmit information, skills, networks, and tastes that reflect not just their education or income but also their class position (Grusky & Weeden 2002). The children of sociologists, for example, are more likely to themselves become sociologists because (a) they know about and aspire to such a role, (b) they have special access to high-quality information about how to train for such a role, (c) they have special access to the human capital that will assist them in preparing for such a role, and (d) they have special access to social networks that may also provide some small advantage in securing such a role. It will not suffice, therefore, to simply fit a "parental income" effect in models of income determination, given that the children of sociologists will disproportionately follow income trajectories that are specific to sociologists rather than the larger group of workers with sociology-sized incomes.

We face, then, the analytic task of estimating the net effects of class, income, or socioeconomic status in both the contemporaneous and intergenerational context. The obvious starting point for this task is the usual array of general linear models in which the link function (e.g., linear, logistic) differs by the type of measurement for the outcome variable. For the purpose of illustrating this approach, suppose that the outcome of interest is a risk behavior, such as smoking, that can be measured as a simple binary variable (i.e., smoker vs. nonsmoker). The following model can then be used to assess whether there are net effects of contemporaneous class, income, or socioeconomic status on this variable:

$$Y_i = \alpha + \mathbf{X_i}\boldsymbol{\beta} + \mathbf{I_i}\boldsymbol{\delta} + \mathbf{C_i}\boldsymbol{\varphi} + \mathbf{T_i}\boldsymbol{\lambda} + \varepsilon_i , \qquad (3)$$

where Y_i is the logit of whether or not the respondent currently smokes, $\mathbf{X}_i$ is a vector of variables measuring the social and demographic "causes" of smoking behavior (e.g., age, sex, race), $\mathbf{I}_i$ is a vector of endowments (i.e., education, degree, labor market experience), working conditions (i.e., firm and occupation tenure, salaried vs. nonsalaried, union membership, firm size, self-employment status, autonomy, authority), and job rewards (income, wealth) that together define the inequality space, $\mathbf{C}_i$ is a vector of dummy variables pertaining to the class categories (measured, where the data allow, at the micro-class level),$\mathbf{T}_i$ is a vector of dummy

variables indexing time (thus allowing for residual trend in the propensity to smoke), and ε_i is an error term. The analogous test of a socioeconomic index requires the further constraint that the effects of the class dummy variables (i.e., $\mathbf{C}_i$) are consistent with a simple socioeconomic gradient. This constraint can be embedded within a simple multilevel specification in which occupation-specific intercepts are included in the individual-level model and socioeconomic constraints on these intercepts constitute the macro-level model.

There are two ways in which such analyses might lead us to conclude that class or socioeconomic measurement (i.e., $\mathbf{C}_i$) should be preferred relative to a purely reductive strategy in which inequality is represented in terms of our individual-level vector of endowments, working conditions, and job rewards (i.e., $\mathbf{I}_i$). The "realist rationale" for macro-level measurement hinges on detecting true emergent effects of class or socioeconomic status, whereas the nominalist rationale for macro-level measurement has class or socioeconomic variables serving merely as parsimonious proxies for individual-level effects. We review each of these two possibilities below:

Realist rationale: First, it is possible that the effects of inequality are not fully captured by main effects for the variables in $\mathbf{I}_i$, implying that the fit statistic for the model of Eq. 3 will be superior to that for a trimmed model that eliminates $\mathbf{C}_i$. This result would not of course give license to the conventional sociological practice of using class or socioeconomic status alone as a measure of social origins. Rather, insofar as our models reveal that both class and reductive measures have net effects, a hybrid model of inequality would presumably be indicated.

Nominalist rationale: Second, even in the absence of such emergent effects, it is still possible to salvage a role for class or socioeconomic operationalizations on considerations of convenience. That is, insofar as our models reveal that simple class or socioeconomic measures can account for the vast majority of individual-level effects, one might still justify conventional sociological practice as a relatively inexpensive, albeit imperfect, approach to measuring inequality. We can assess whether conventional schemes can capture much of the effects of inequality by contrasting the fit statistic for the model of Eq. 3 against that of a model that eliminates elements of $\mathbf{X}_i$. If the trimmed model performs well (using, for example, a BIC criterion), we can conclude that class or socioeconomic measures are (potentially) justifiable for reasons of parsimony or convenience.

The foregoing discussion outlines the core structure and rationale of the analyses that we propose to carry out. Although this simple structure and rationale will underlie all of our "class effects" analyses, we will also build and extend the basic model of Eq. 2. We discuss below three main extensions of interest: (a) exploring the structure of non-sociological classes; (b) exploring the effects of family background (as opposed to contemporaneous measures of class); and (c) exploring the sensitivity of our results to unobserved heterogeneity and to assumptions of functional form. These three extensions are considered in turn.

Non-sociological classes: The model of Eq. 3 rests on the simplifying assumption that classes may be defined by occupations (micro classes) or aggregates of occupations (big classes). Convenient though this assumption is, it is of course possible that our first set of analyses (i.e., "pure operationalizations") will reveal that classes are formed outside the site of production, implying that an occupation-based operationalization is inadequate. If we indeed find evidence of non-sociological classes in our first round of analysis, we wouldn't then want to condition exclusively on sociological classes in our second round of effect-calibrated operationalizations. Rather, we should turn to examining the effects of such non-sociological classes on health and demographic variables, a task that would involve appending a causal model to the latent class measurement model of Eq. 2. This type of hybrid model is well developed in the literature on latent class modeling (e.g., Hagenaars 2002; also, Grusky and Weeden 2005).

Family background analyses: We also wish to assess the usefulness of class models in representing the effects of family background. These tests will be based on two specifications.

First, we will use models similar in structure to Eq. 3, except that $\mathbf{I}_i$ and $\mathbf{C}_i$ will refer to measurements for the parents rather than the children.[10] The resulting models will differ from conventional status attainment models because they contain far more measures of the inequality space and because they overlay class rather than socioeconomic status on this complement of background variables (see Hauser 1973). Second, we will use sibling models (e.g., Hauser & Mossel 1985; Solon 1999) to estimate the net contribution of parental class to the correlation in income between siblings, where the latter represents the proportion of variance in income due to shared family and community background.

Propensity score matching: It is well known that standard regression models of the sort represented by Eq. 3 can be affected by measurement error, omitted variable bias, misspecification of the functional form, multicollinearity, and extrapolating outside the common support. We wish to examine the sensitivity of our results by supplementing regression-based analyses with estimates secured through semi-parametric regression and, more specifically, propensity score matching ([PSM]; see Ruppert et al. 2003; Rosenbaum 2002; for sociological treatments, see Smith 1997; Winship & Morgan 1999).[11] Although PSM is obviously no panacea, it offers a relatively simple way to (a) evaluate the sensitivity of the observed class effects to unobserved heterogeneity, (b) relax assumptions about the functional form, and (c) optimally balance the observed covariates between the focal class and the comparison class.

The first step in using PSM is to estimate the probability of being in the focal class rather than the comparison class based on a logit model in which the variables of $\mathbf{I}_i$ are entered as regressors.[12] This model includes variables that are not causes of class membership (i.e., working conditions, job rewards) because doing so (a) purges the estimated class effect of the influence of those constituents of class, and (b) balances the working condition and output covariates across classes. After estimating the propensity score, we will then match members of the focal class with one or more members of the comparison class on the basis of this score; check for balance of the covariates across the focal class and comparison class (and revise the propensity score model if necessary); calculate means of the outcome variable for the focal and comparison classes; and calculate the difference in these means. This difference, which estimates the net effect of class on the outcome variable, allows us to assess whether class can safely be reduced to its constituent components, much as the reductionist logic of the rational action approach implies, or whether instead there are emergent effects of class that justify the class concept in realist terms.

We are proposing, then, to reach our conclusions carefully and deliberately on the basis of a host of specifications, all defensible but nonetheless differing somewhat in their assumptions. Because we are reexamining some of the most important variables in all of social science (i.e., social class, income, socioeconomic status), a high standard for the empirical analysis should be insisted upon, however tedious such an exercise may sometimes seem. We cannot expect to persuade scholars working within a field marked by especially entrenched tradition and deep precommitments without amassing evidence of the highest possible quality. There is an

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[10] We will rely primarily on measures of the "head of household's" class position that are based on the father's position (if he is present) or the mother's position (if he is not). We will, however, also consider models that include effects for both parents.

[11] This approach is closely tied to the counterfactual causality literature. We are well aware of the objections to the latter, but we still find PSM attractive because it offers alternative estimates of class effects that rest on weaker assumptions than those of parametric regression.

[12] This highly stylized discussion assumes a continuous outcome variable, but matching estimators have also been developed for categorical outcomes. Likewise, PSM has been recently extended to multinomial "treatment" categories (see Rosenbaum 2002), but because these methods remain underdeveloped we will adopt the safer strategy of comparing pairs of classes. This is obviously only feasible for estimating big-class effects.

accordingly strong obligation in this case to use the best data, the most defensible measures, and a wide range of plausible specifications that allows for careful comparison of results.

This second round of analysis requires not only measures of endowments, working conditions, and rewards, but also measures of the various health and demographic outcomes long assumed to be associated with class position. The SIPP data can again serve as one of our main U.S. data sources in the second round of "effect-based" operationalizations, but it will be useful to supplement it with the National Health Interview Survey (NHIS). The NHIS includes a substantial battery of items on physical and mental health, whereas the SIPP has a somewhat smaller roster of items relevant to our analyses, including self-reported health status, marital history, and fertility history. Unfortunately, the NHIS only codes occupations at the two-digit level, meaning that micro-classes cannot be operationalized at an optimal level of detail. We will therefore use the NHIS principally for the purpose of assessing net big-class effects.

The class-of-origin analyses likewise require data on a comprehensive array of endowments, working conditions, and job rewards, but in this case measured for the first rather than second generation. Eventually, we plan to expand our analysis to encompass the many second-generation outcomes of interest to inequality researchers (e.g., cognitive test scores, health, teenage childbearing, education), but the current phase of the project will concentrate on economic outcomes in the second generation, including wages, income, and family income. To this end, we will carry out a separate analysis of three longitudinal data samples, each of which represents a different cohort: National Longitudinal Survey (NLS), Panel Study of Income Dynamics (PSID), and Survey of Program Dynamics (SPD). The NLS sample consists of approximately 1,600 respondents in the Young Men's and Young Women's surveys whose parents were in the Older Men's or Mature Women's surveys; the PSID sample contains approximately 3,000 children of the core PSID who were 5-17 years old in 1968 and who later formed PSID households of their own; and the SPD sample consists of teenaged children of the 1992 and 1993 SIPP/SPD households who were interviewed at least once between 1997 and 2001. Because each of these surveys provide data at multiple time points for both parents and children, they allow us to average comparable measures across years, thereby reducing measurement error and eliminating the transitory component of income (e.g., Solon 1999). The NLS and PSID samples permit us to analyze the economic status of the second generation well into their adulthood, but with relatively small sample sizes.[13] The SPD sample, whose members are now entering their 30s, can only be used to assess economic status in early adulthood, but it is an invaluable source because it is the only intergenerational sample large enough to allow an analysis of (parental) micro-class effects.

[13] The NLS Young Men were last surveyed in 1981, when they were between ages 29 and 39. The NLS Young Women (age 14-24 in 1968) and the PSID children, by contrast, have been surveyed for more than three decades.

Conclusions

The purpose of this project is to develop a comprehensive social indicators framework for measuring and characterizing the structure of inequality. Although there is overwhelming evidence that the extent of inequality is increasing worldwide, we do not know whether equally revolutionary changes in the form and structure of inequality are also occurring. Is inequality increasingly taking on a class form? Or are social classes disappearing even as income inequality is increasing? Are particular social classes, such as the underclass, becoming more coherent even as other classes begin to fade? Is there a simple gradational structure to inequality? Or are many individuals in ambiguous class situations that combine advantage and disadvantage in complicated ways? These questions have conventionally been treated as matters best resolved by theoretical or disciplinary fiat: the class analyst, for example, presumes classes and studies inequality through class lens; the economist presumes gradationalism and studies inequality through gradational lens (i.e., income inequality); and the sociologist presumes "socioeconomic" inequality and studies inequality through socioeconomic lens. We propose to convert these disciplinary assumptions into testable hypotheses by building a latent class framework that identifies the form that inequality takes. This framework makes it possible not merely to characterize the structure of the inequality space but also to identify the dimensions of that space that govern health, demographic, and other outcomes. That is, we propose to test whether social classes, scales, and related representations of the inequality space have true emergent effects on health and demographic behaviors, where "emergent effects" refer to those that cannot be reductively explained in terms of the underlying variables that are used to define these conventional representations (i.e., endowments, working conditions, monetary rewards). The relevance of this line of research for public health is twofold: (1) the task of monitoring inequality in a comprehensive way is especially important in light of well-established effects of inequality on mortality, fertility, and mental and physical health; and (2) the results from our causal analyses will indicate how researchers should model the effects of inequality on both overt health outcomes (e.g., life expectancy, birth weight) as well as the myriad of demographic outcomes that are associated with health (e.g., marriage, religion, migration).

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