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SOME METHODOLOGICAL PROBLEMS IN EXPLAINING SOCIAL MOBILITY *

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It is argued and illustrated that conceiving and measuring social mobility in the conventional way, as a difference between two statuses, may lead to gross misinterpretations of evidence. These difficulties may be avoided by considering individual status measures and their causal relationships.

Introduction

TRADITIONALLY, the study of the social mobility of individuals has conceived of mobility as the difference between an initial and subsequent status. Measures have been formed either by directly subtracting the two variables or by similarly reducing the property space formed by the two measures' cross-classification, as by classifying into upward, stable and downward or into some finer set of ordinal gradations. Explaining social mobility, is taken as explaining the difference between earlier and later statuses. For example, intergenerational mobility is viewed as the difference between father's status and son's eventual status. Examples of this approach abound in sociological literature.[1] The problem of explaining intergenerational occupational mobility is conceived as the problem of explaining that difference.

Blau and Duncan take a new approach (1967). Rather than seeking to explain the difference between father's and son's statuses, they try to explain the son's status, and include the father's status among the explanatory variables.

At first glance, the two approaches seem to differ merely in style and taste. However, the authors (1967, 194–199) show that when mobilities are measured as differences and mobility measure correlations are analyzed, some strange and misleading things begin to happen. Mobility measure correlations are composed of individual status measure correlations and, since the mobility measures are formed by subtraction, some correlations are weighted negatively into the total. The authors show that correlations

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[1] For example, Coleman and Neugarten (1970) categorize mobility as upward, stable and downward and seek to assess its causes. Another recent example is Thompson (1971) who compares working class "stables" with "upward mobiles."

between mobility measures involve things true by definition which make substantive interpretations of these correlations nearly impossible. In another place, Duncan (1966) shows that in examining consequences of social mobility, individual status variable effects are confounded with the effects of their differences when they are not explicitly controlled for.

This paper develops some of these points and shows that if mobility is measured as a difference between statuses or in some equivalent way, our interpretations will most likely be egregiously in error. The problem will be illustrated first by a mathematical argument with a simple formal model of the stratification process, and, second, by some simple dichotomous contingency tables which show that the problems are not simply an esoteric property of equations.

A Model of the Stratification Process

Let us invent a simple model of the stratification process, measure mobility in the traditional ways and point out the errors of interpretation which occur. The model will include father's and son's statuses. Whether we are talking about education, occupational prestige or some other status variable is not relevant to the discussion since we are concerned with the logical problems involved in the analysis rather than the substance. Let us only imagine that the statuses are measured in some meaningful sense. Next, we introduce a variable that intervenes between the two statuses, like "achievement orientation," defined loosely as the son's psychological need and motivations to achieve status and position.[2] A plausible model of variable interrelations is that father's status causes achievement orientation in the son and that son's status is caused by achievement orientation and also directly, or at least not through another explicit variable, by father's status. We further conceive that father's status, son's status and achievement orientation have numerous other causes than the model's variables and that these non-model variables may be considered statistically independent. Further, we consider a social mobility measure which is the difference between father's and son's statuses.

The variable symbols are as follows:

F = Father's status
S = Son's status
A = 'Achievement orientation'
M = Social Mobility
ζ_f, ζ_s, ζ_a = Independent exogenous variables affecting F, S, and A respectively
α, β, γ = Slope parameters relating the variables

The above model may be stated in equations as:

$$F = \zeta_f$$
$$S = \alpha F + \gamma A + \zeta_s$$
$$A = \beta F + \zeta_a$$
$$M = S - F$$

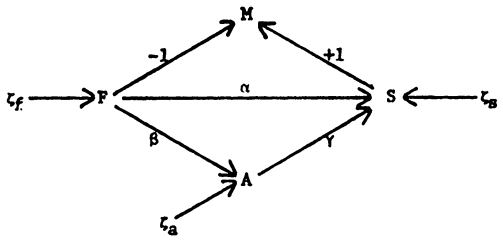
The model may also be expressed by the causal diagram[3] shown in Figure I. This mathematical model defines son's status as a linear function of achievement orientation and of father's status with parameters γ and α respectively and of other causes external to the model. Achievement orientation is a linear function of father's status with parameter β and of causes outside the model. Father's status is determined by variables not included in the model. Mobility is defined as the arithmetic difference of son's and father's statuses. There are no other inputs to the mobility measure since its value (with the possible exception of measurement error) is caused only by those two variables. Again, the model's realism and sensibility except in a broad and loose sense is not at issue. It is intended to broadly represent the process which links these kinds of variables and will serve to demonstrate the logic of our argument.

Now, the model relates achievement motivation to son's status through the parameter γ and within the model an appropriate

[2] The use of the variable *achievement orientation* is intended only to lend intellectually plausible substance to the logical form of the argument. We do not intend to contribute to nor criticize the literature involving that concept.

[3] The conventions used in constructing diagrams are the same as those used by Stinchcombe (1968) and the sources he cites, and by econometricians such as Johnston (1963). They are intended to correspond exactly to the equations defining the model and to mean neither more nor less than the equations.

Figure I. A Model of the Stratification Process*



*See the text for a discussion of the meanings of the various symbols used.

solution to the relationship of achievement motivation to status attainment will involve estimating the parameter γ and the proportion of variation in son's status accounted for by achievement motivation. The traditional approach would inquire into the relationship between achievement orientation and social mobility as measured by the difference between the father's and son's statuses.

Some Consequences of the Model

To investigate the kind of answers the traditional method will yield, let us delete reference in the model to the two status variables and focus on achievement motivation and mobility expressed as functions of the exogenous causes. Substituting expressions for S and F for their occurrences in the expressions for A and M yields:

$$A = \beta\zeta_f + \zeta_a$$
$$M = \zeta_s + (-1 + \alpha)\,\zeta_f + \gamma A = \zeta_s + (-1 + \gamma\beta + \alpha)\,\zeta_f + \gamma\zeta_a$$

As above, the equations may be represented as the causal diagram shown in Figure II. The equations and the diagram, with reference to son's and father's statuses deleted, show mobility to be a linear function of achievement orientation with parameter γ and of the exogenous causes of father's status with parameter $-1 + \alpha$. The negative *one* results from the original contribution of father's status to the mobility measure and the positive α results from the indirect effect of father's status on mobility through son's status. Achievement orientation is a linear function of the external causes of father's status with parameter β.

At this point we may observe that any technique which examines the relationship between achievement orientation and mobility will reveal not just the relationship between them due to γ, the effect of achievement orientation on son's status attainment, but also a spurious component of association which derives from the joint dependence of achievement orientation and mobility on father's status.

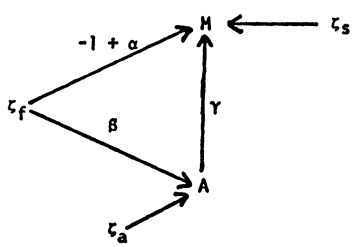
To explore the nature of misinterpretations which may arise, let us formally analyze the sources of association between mobility and achievement orientation. This association is most conveniently expressed as the covariance of the two variables. This covariance will be the numerator of both the correlation coefficient and the regression coefficient between the two.

Let us assume that the variables ζ_s, ζ_f, and ζ_a are uncorrelated and have means of zero and variances σ_s^2, σ_f^2, and σ_a^2 respectively. The covariance will then be the expected value of the product of M and A. Its expression may be generated by multiplying the equations for M and A and taking expected values yielding:

$$\mathrm{COV}(M,A) = \beta(-1 + \alpha + \beta\gamma)\sigma_f^2 + \gamma\sigma_a^2$$

With this expression for the covariance of mobility and achievement we may experiment conceptually with the model to investigate the behavior of the covariance. If we know the covariance behavior, we know the correlation coefficient behavior, since the covariance is its numerator. If we further assume that all measured variables are scaled to have variances of one, the covariance becomes the correlation coefficient.

Figure II. A Reduced Form of the Model*



*See the text for a discussion of the meanings of the various symbols used.

Imagine that γ equals zero. That is, assume that the world is such that achievement orientation depends on socioeconomic background but is not a cause of eventual status attainment. If γ equals zero, then the covariance of mobility and achievement orientation becomes:

$$\mathrm{COV}(M,A) = (-1 + \alpha).$$

Since we are assuming that the measured variables are standardized, the parameters α and β may be assumed to be less than one. Then $-1 + \alpha$ will be a negative number and the expression for the covariance will be negative and hence the association between achievement orientation and social mobility will be negative.

If the world is as we assume, that is, if achievement orientation is unrelated to the son's eventual status achievement, and if social mobility is measured as the difference between the two status variables, we will conclude that achievement orientation is negatively correlated with social mobility. This will be technically correct but our substantive interpretation would be much at variance with the substantively correct conclusion. We should conclude that achievement orientation is unrelated to "social mobility" in the sense that we intended the question, but by measuring mobility as the differences between father's and son's statuses, we will generate a wrong and probably seriously misleading answer, and we will foster the policy prescription that to ensure upward mobility, achievement orientation should be minimized.

One way to view the problem is to recognize that in *subtracting* father's status in constructing the mobility measure, we have ensured that by definition a negative component will be present in the association between mobility and any variable positively associated with father's status. It is this negative component which leads to the substantively wrong conclusion.

A second difficulty may be illustrated by assuming that α equals zero, that is, that the world is such that there is no direct link between father's status and son's eventual status attainment. The entire effect of father's status on son's derives from the intervening variable, achievement orientation. In the tradition of survey analysis we may say that the relationship between father's and son's statuses is *interpreted* by achievement orientation.

The equation for the covariance of mobility and achievement which results from this assumption is

$$\mathrm{COV}(M, A) = (-1 + \beta\gamma) + \gamma$$

The first term in the equation has both a positive component, $(\beta\gamma)$, and a negative component, (-1). We can imagine a situation in which the first term in the equation will be negative and the second positive. Moreover, we can imagine a case in which the two terms are equal except for their signs and hence sum to zero. It is plausible, then, that in the case where achievement orientation is the whole link between father's and son's statuses, the covariance and hence the correlation between son's status and achievement orientation may be zero. The proper substantive conclusion would be that achievement orientation is the single crucial key to the relationship between the statuses of father and son. Our substantive conclusion would be that achievement is unrelated to mobility. Simply by measuring mobility as a difference between father's and son's statuses, we are likely to come to substantively wrong conclusions.

The proper way to ask the substantive question is to estimate the parameter γ or some other measure of association between son's status and achievement orientation with father's status held constant. Blau and Duncan (1967) asked the question this way and in doing so made a major intellectual departure from traditional methods of inquiry in the area.

Some Examples

These conclusions are more than esoteric consequences of using equations to represent the models. Some simple examples show that the logical problems are inherent in any mode of analysis. I have invented two which simply dichotomize father's and son's statuses and achievement orientation. In these examples, mobility has been defined as upward, stable or downward according to whether son's status is higher than, equal to or lower than father's status.

This measure is logically similar to subtracting continuous status variables. The

EXAMPLE I.

A. Hypothetical Example of Son's Status by Father's Status and Achievement and Resulting Types of Mobility.*

Father's Status	High		Low	
Achievement Orientation	Yes	No	Yes	No
Son's Status				
High	56 (stable)	24 (stable)	6 (upward)	14 (upward)
Low	14 (down)	6 (down)	24 (stable)	56 (stable)
Total	70	30	30	70
Percent High on Son's Status	80%	80%	20%	20%

B. Type of Mobility by Achievement Orientation Resulting from the Relationships Above.*

Achievement Orientation	Yes	No
Mobility		
Upward	6	14
Stable	80	80
Down	14	6
Total	100	100

* Numbers in the tables are raw frequencies except where percents are indicated.

mobility classification is noted for each cell of each table in the examples.

Example I is constructed by assuming that achievement orientation is unrelated to son's status, but related to father's status. That is, in causal terms, father's status is a cause of son's status and of achievement orientation, but there is no direct causal link between achievement orientation and son's status.

The pattern of the relationship may be seen by examining the percentages on the dependent variable. Among persons whose father's status is high, 80 percent of sons have high status whatever their level of achievement orientation. Among persons whose father's status is low, 20 percent of sons have high status whatever their level of achievement orientation. On the other hand the strong relationship between father's and son's statuses is shown by the differences between 80 percent and 20 percent in each case when achievement orientation is held constant.

The relationship between mobility and achievement orientation which results from these assumptions is shown in panel B of Example I. Achievement oriented sons tend to be more downwardly mobile than those who are not. Among the one hundred achievement oriented people, six are upwardly mobile and fourteen are downwardly mobile; while among those not achievement oriented, the situation is reversed. Hence achievement orientation and mobility are negatively related. This same result is generated by the mathematical model above; *if there is no causal relationship between*

achievement orientation and status attainment, the observed relationship between achievement orientation and mobility may be negative.

Example II illustrates the other point made above. In it, achievement orientation accounts entirely for the relationship between father's and son's statuses. That is, the relationship between father's and son's statuses disappears when achievement orientation is held constant. Where achievement orientation is classified *yes,* 80 percent of sons have high status whatever the father's status; and where achievement orientation is classified *no,* 20 percent of sons are high in status whatever their father's status.

Again, if we classify the eight cells into mobility types and view the relationship between mobility and achievement orientation, we find, in panel B of Example II, identical distributions of mobility types for the two classifications of achievement orientation. Thus, we may imagine a case where we should substantively conclude that achievement orientation is the sole and crucial link between statuses from one generation to the next and where we actually conclude that achievement orientation and mobility are unrelated. The last conclusion while technically correct, is an artifact of our way of conceiving and measuring mobility. This example corresponds to the second problem discussed with the mathematical model above; *if achievement orientation is the sole causal link between sta-*

EXAMPLE II.

A. Hypothetical Example of Son's Status by Father's Status and Achievement and Resulting Types of Mobility.*

Father's Status	High		Low	
Achievement Orientation	Yes	No	Yes	No
Son's Status				
High	64 (stable)	4 (stable)	16 (upward)	16 (upward)
Low	16 (down)	16 (down)	4 (stable)	64 (stable)
Total	80	20	20	80
Percent High on Son's Status	80%	20%	80%	20%

B. Type of Mobility by Achievement Orientation Resulting from the Relationships Above.*

Achievement Orientation	Yes	No
Mobility		
Upward	16	16
Stable	68	68
Down	16	16
Total	100	100

* Numbers in the tables are raw frequencies except where percents are indicated.

tuses, the observed relationship between achievement orientation and mobility may be zero.

Again, conceiving mobility as a difference of statuses rather than viewing the causal links between statuses may lead to egregiously wrong substantive conclusions.

Conclusions and Implications

The methodological difficulties presented here make apparent that substantive problems in social mobility should not be conceived as requiring an explanation of status differences. The problem should be to assess the antecedents of present status, which will include earlier status. Blau and Duncan took this approach and should be emulated in future research.

Though the present discussion has focused on the problem of explaining mobility, similar methodological problems will emerge in studies of the consequences of mobility. Here too, it would be wise to use the component mobility statuses explicitly in explanatory models rather than simply using the difference between them.

In general, we should be warned that investigating the causes or effects of differences of variables is likely to divert us from the truth.

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