Errata

We regret several typographical errors in the article 'Network Games' by Barry Markovsky, in Volume 9 Number 1, which may have altered the intended meaning of the text. These are corrected as follows:

Page 74, middle of the page. 'This spurred Skvoretz and Willer's (1993) contention . . .' should be 'This was spurred by Skvoretz and Willer's (1993) contention . . .'.

Page 80. Following the first quotation that is set apart from the text, the paragraph should continue as follows:

and in a footnote, 'Markovsky et al. appear to believe that actors will use all the information provided', and elsewhere, 'Markovsky et al. provided subjects with complete information, because they felt that lack of information might impede rational decisions.' None of these attributions is true.

Page 81. Within the first full paragraph, the expression 'it is based on this measure that individuals are supposed to evaluate what offers to make' should have been in quotes.

EXPLAINING EDUCATIONAL DIFFERENTIALS

TOWARDS A FORMAL RATIONAL ACTION THEORY

Richard Breen and John H. Goldthorpe

ABSTRACT

In this paper we seek to provide an explanation of three widely documented empirical phenomena. These are: (i) increasing educational participation rates; (ii) little change in class differentials in these rates; and (iii) a recent and very rapid erosion of gender differentials in educational attainment levels. We develop a formal mathematical model, using a rational action approach and drawing on earlier work that seeks to explain these three trends as the product of individual decisions made in the light of the resources available to, and the constraints facing, individual pupils and their families. The model represents children and their families as acting rationally, i.e. as choosing among the different educational options available to them on the basis of evaluations of their costs and benefits and of the perceived probabilities of more or less successful outcomes. It then accounts for stability, or change, in the educational differentials that ensue by reference to a quite limited range of situational features. So, both class and gender differences in patterns of educational decisions are explained as the consequence of differences in resources and constraints. We do not, therefore, invoke 'cultural' or 'normative' differences between classes or genders to account for why they differ in their typical educational decisions (though we have something to say about the role of norms in such an account). Because the model is presented mathematically, testable corollaries are easy to derive as are other implications of our model for patterns of relevant behaviour.

KEY WORDS class • gender • educational inequality • educational expansion • odds-ratios

Introduction

In the light of recent research in the sociology of education, which has involved extensive over-time and cross-national analyses (see esp. Shavit and Blossfeld 1993; Erikson and Jonsson 1996b), it would seem

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that the following empirical generalizations can reliably be made and constitute *explananda* that pose an evident theoretical challenge.

Over the last half-century at least, all economically advanced societies have experienced a process of educational expansion. Increasing numbers of young people have stayed on in full-time education beyond the minimum school leaving age, have taken up more academic secondary courses, and have entered into some form of tertiary education.

Over this same period, *class* differentials in educational attainment, considered net of all effects of expansion per se, have tended to display a high degree of stability, i.e. while children of all class backgrounds have alike participated in the process of expansion, the pattern of association between class origins and the relative chances of children staying on in education, taking more academic courses or entering higher education has, in most societies, been rather little altered. Children of less advantaged class origins have not brought their take-up rates of more ambitious educational options closer to those of their more advantaged counterparts.

It has, though, to be recognized that this latter generalization is not entirely without exception. In one national case at least, that of Sweden, there can be little doubt that class differentials in educational attainment have indeed declined over several decades (Erikson and Jonsson 1993); and, while some conflict of evidence remains, a similar decline has been claimed for The Netherlands (De Graaf and Ganzeboom 1993) and for Germany (Müller and Haun 1994; Jonsson, Mills and Müller 1996). Thus, any theory that is put forward in order to explain the more typical persistence of class differentials should be one that can at the same time be applied *mutatis mutandis* to such 'deviant' cases.

It would in addition be desirable that such a theory should be capable of yet further extension in order to account for a third regularity that has emerged from the research referred to.

Over a relatively short period—in effect, from the 1970s onwards—*gender* differentials in levels of educational attainment, favouring males over females, have in nearly all advanced societies declined sharply and, in some instances, have been virtually eliminated or even reversed. In other words, while the process of educational expansion has not in the main led to children from less advantaged family backgrounds catching up those from more advantaged backgrounds in their average levels of attainment, in families across the class structures of contemporary societies daughters have tended rather rapidly to catch up with sons.

In an earlier paper (Goldthorpe 1996), a theory of persisting class differentials in educational attainment, sensitive to the further requirements previously indicated, was developed from a 'rational action' standpoint. In the present paper, our aim is to refine this theory and to express it in a formal model. In this way we would hope to clarify its central arguments and in turn the wider implications that it carries. Since such attempts at the formalization of theory are still not very common in sociology, the paper may also serve to stimulate discussion of the merits or demerits of this kind of endeavour. Readers interested in the more general *problematik* in the context of which the theory was initially conceived are referred to the earlier paper. In the remainder of this introductory section we set out certain 'background' assumptions of our subsequent exposition that will not be further discussed. The more specific assumptions on which our model rests will be introduced, and their significance considered, as the paper proceeds.

We assume, to begin with, that class differentials in educational attainment come about through the operation of two different kinds of effect which, following Boudon (1974), we label as 'primary' and 'secondary'. Primary effects are all those that are expressed in the association that exists between children's class origins and their average levels of demonstrated academic ability. Children of more advantaged backgrounds are in fact known to perform better, on average, than children of less advantaged backgrounds on standard tests, in examinations, etc. Primary effects, as will be seen, enter into our model but, fortunately, in such a way that we need not take up the vexed and complex question of the extent to which they are genetic, psychological or cultural in character. It is, rather, secondary effects that for us play the crucial role. These are effects that are expressed in the actual choices that children, together perhaps with their parents,[1] make in the course of their careers within the educational system—including the choice of exit. Some educational choices may of course be precluded to some children through the operation of primary effects: i.e. because these children lack the required level of demonstrated ability. But, typically, a set of other choices remains, and it is further known that the overall patterns of choice that are made, are in themselves—over and above primary effects—an important source of class differentials in attainment.

We then further assume that, *in their central tendencies*, these patterns of educational choice reflect action on the part of children and their parents that can be understood as rational, i.e. they reflect evaluations made of the costs and benefits of possible alternatives—e.g. to leave school or to stay on, to take a more academic or a more

vocational course—and of the probabilities of different outcomes, such as educational success or failure. These evaluations, we further suppose, will be in turn conditioned by differences in the typical constraints and opportunities that actors in different class positions face and in the level of resources that they command. However, what we seek to dispense with is any assumption that these actors will also be subject to systematic influences of a (sub)cultural kind, whether operating through class differences in values, norms or beliefs regarding education or through more obscure 'subintentional' processes. Not only do we thus gain in theoretical parsimony, but we would in any event regard the 'culturalist' accounts of class differentials in educational attainment that have so far been advanced, as in various ways unsatisfactory (see further Goldthorpe 1996).

Finally, two other assumptions, regarding the structural context of action, should also be spelled out. On the one hand, we do of course suppose the existence of a class structure, i.e. a structure of positions defined by relations in labour markets and production units. And, in addition, we need to assume that within this structure classes are in some degree hierarchically ordered in terms of the resources associated with, and the general desirability of the positions they comprise.[2] On the other hand, we suppose an educational system—i.e. a set of educational institutions that serve to define the various options that are open to individuals at successive stages in their educational careers. And here, too, we have a more specific requirement. That is, that this system should possess a diversified structure that provides options not just for more or less education but also for education of differing kinds, and that in turn entails individuals making choices at certain 'branching points' that they may not be able later to modify, or at least not in a costless way. It might be thought that this latter requirement will tend to limit the applicability of our model to educational systems of the more traditional European, rather than, say, the American variety, i.e. to ones where the type of school attended is likely to be more consequential than the total number of years spent in education. However, we would argue that, on examination, that educational systems such as that of the USA, turn out to be more diversified than is often supposed, so that children do in fact face educational choices that involve considerations that go beyond simply 'more' or 'less': for example, in the American case, with the choice at secondary level between academic and vocational tracks.[3] It is further of interest to note how two American authors have specified in this regard the divergence between assumptions that we and they would share and those of most economists working within the 'human capital'

paradigm. While for the latter education appears as a 'fungible linear accumulation, like a financial investment', a more realistic view would be that educational systems, the American included, 'offer an array of choices and constraints that defy ... simple linear formulations' (Arum and Hout 1995, 1).

A Model of Educational Decisions

The model that we present is intended to be generic: that is, as one applicable in principle to the entire range of decisions that young people may be required to make over the course of their educational careers as regards leaving or staying on or as regards which educational option to pursue. However, in the interests of simplicity, we will here set out the model as it would apply just to the choice of leaving or continuing in education. The salient elements of the exposition are shown in Figure 1 by means of a decision tree. Here we assume that pupils must choose whether to continue in education—i.e. follow the 'stay' branch of the tree—to the completion of a further level (as, say, in the decision of whether or not to continue to A-level after GCSE) or to leave and enter the labour market, i.e. follow the 'leave' branch. Continuing in education has two possible outcomes, which we take to be success or failure. Because remaining at school often leads to an examination, we equate success with passing such an examination. This is indicated by the node labelled P in Figure 1, while failing the examination is indicated by the node labelled F. Leaving is then the third educational outcome in our model, that is, in addition to those of staying in education and passing and staying and failing, and is indicated by node L.

In deciding whether to continue in education or leave, parents and their children, we suppose, take into account three factors. The first of these is the cost of remaining at school. Continuing in full-time education will impose costs on a family which they would not have to meet were their child to leave school: these include the direct costs of education and earnings forgone. We can therefore express these costs relative to the costs of leaving by setting the latter to be zero and the former as $c > 0$. The second factor is the likelihood of success if a pupil continues in education. Since we distinguish only between success and failure, subjective beliefs about the chances of success at the next stage of education can be captured in our model by a single parameter, which we label π. This parameter measures the subjective conditional probability of passing the relevant examination given continuation. The third

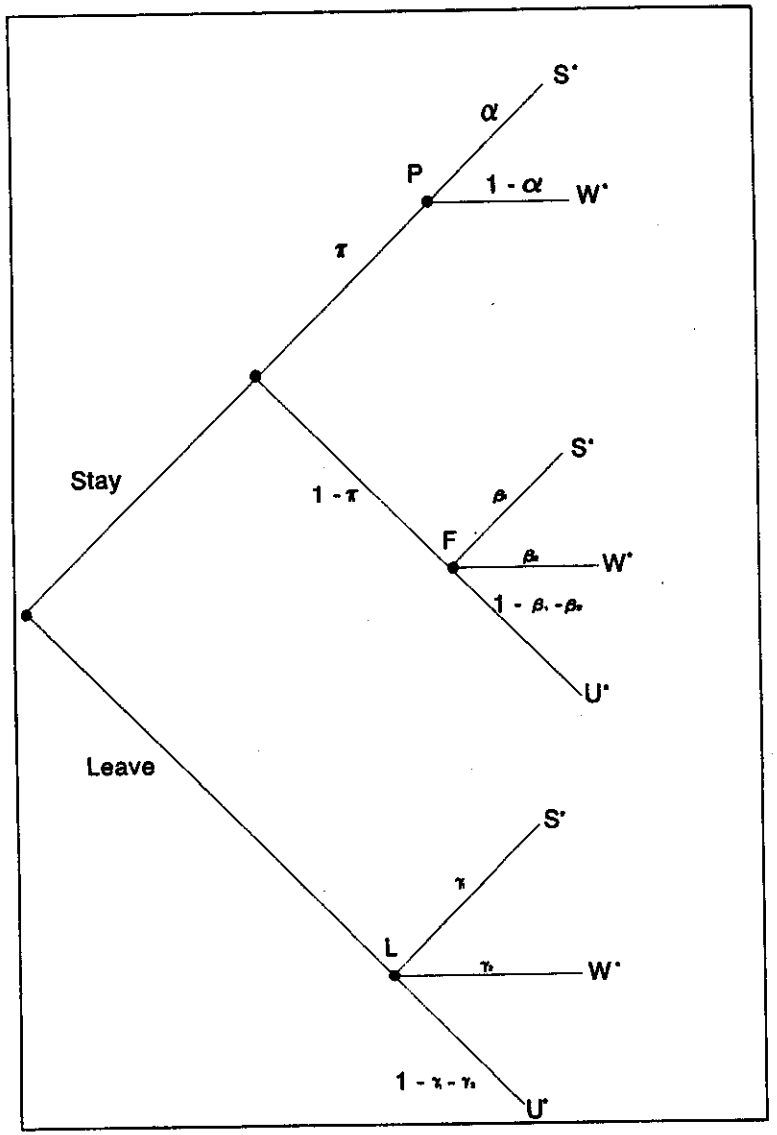

Figure 1. Single decision tree

factor is then the value or utility that children and their families attach to the three educational outcomes represented by P, F and L in Figure 1. In our model this factor is expressed in terms of beliefs about the chances of access that each outcome affords to three possible destination classes.

For the purposes of our exposition, we take these classes as being the service class or salariat of professionals, administrators and managers (S^* in Figure 1), the working class (W^*) and the underclass, (U^*)—the class, say, of those with only a precarious place in the labour market and in only the lowest grades of employment if not unemployed. However, it should be emphasized that nothing of significance attaches to this choice of classes, except that, as earlier noted, we need to have a hierarchical ordering. Thus, the service class is regarded as comprising the most advantaged and most desirable positions and the underclass the least advantaged and least desirable, with the working class falling in-between. This ranking of classes is, moreover, assumed to be universally recognized or, at all events, not to vary across the population in any socially structured way.[4]

As we have said, each of the three possible educational outcomes in our model has attached to it subjective probabilities of access to each of the three possible destination classes. So, as Figure 1 shows, for pupils who remain at school and pass their examination, node P, the probability of access to the service class is given by α. There is no path linking this educational outcome to the underclass. This means that anyone who reaches this particular outcome is believed to be certain to avoid this class. It follows, therefore, that the probability of entering the working class, conditional on having been educationally successful, is given by $1 - \alpha$. At the other two outcome nodes, F and L, there is a positive probability of entering all three destination classes. So, for the outcome F (remaining at school and failing) the probability of access to the service class is given by β_1, the probability of access to the working class by β_2 and the probability of access to the underclass by $1 - \beta_1 - \beta_2$. For the L outcome the corresponding probabilities are then given by the γ parameters.

We repeat that these are all subjective probabilities. Just as with π, the values for our various α, β and γ parameters reflect people's beliefs, in this case, about the returns to various educational outcomes conceptualized in terms of access to more or less desirable locations in the class structure. In principle, therefore, these parameters could vary widely across individuals and families. Again, though, we assume a societal consensus in regard to a set of beliefs that then serve as

conditions on the parameters in question and that may be stated as follows:

i. $\alpha > \beta_1$ and $\alpha > \gamma_1$. It is generally believed that remaining at school and succeeding affords a better chance of access to the service class than does remaining at school and failing or leaving school. Our model does not require that we make any assumptions about the relative magnitude of β_1 and γ_1. It could, for example, be the case that a young person's chances of access to the service class are improved simply by acquiring more years of education, even if this does not lead to examination success. Alternatively, such time spent in education may be wasted in the sense that leaving school and embarking earlier on a career will yield a better chance of access to the service class.

ii. $\gamma_1 + \gamma_2 > \beta_1 + \beta_2$. Remaining at school and failing increases the chances of entering the underclass. This means that there is a risk involved in choosing to continue to the next level of education.

iii. $\gamma_2/\gamma_1 > 1$; $(\gamma_2/\gamma_1) \geq (\beta_2/\beta_1)$. Those who leave school immediately have a better chance of entry to the working class than to the service class. This may or may not be the case among those who remain at school and fail though, if it is, their odds of entering the working class rather than the service class are no greater than for those who leave school immediately.

iv. $\alpha > 0.5$. Staying on at school and passing the examination makes entry to the service class more likely than entry to the working class.[5]

In the interests of realism, especially as regards (ii) and (iii) above, it ought to be noted that 'leaving' and entering the labour market need not in most educational systems be equated with a definitive ending of the individual's educational career. Taking this option could in fact lead to further vocational courses pursued in conjunction with employment.

The Generation of Class Differentials

Given the model previously outlined, we can now turn to the question of explaining why differences exist across classes in the proportions of young people who make one kind of educational decision rather than another. For ease of exposition here we consider only two classes of origin, the service class, *S*, and the working class, *W*. In all of what follows we assume that these classes differ in only two ways. First (and

it is here that we give recognition to 'primary' effects) children of the two classes differ in their average ability. Ability is taken to be normally distributed within each class with means $a_s > a_w$ and variance given by σ_a^2. Secondly, the two classes have different levels of resources, *r*, which they can use to meet *c*, the costs of education. Resources are taken to have a logistic distribution with mean values $r_s > r_w$ for the two classes and a common dispersion parameter, σ_r^2. Throughout, we make no other assumptions about differences between the classes. In particular, and as earlier noted, we do not suppose any class-specific cultural values or social norms nor any class differences in the subjective α, β and γ parameters of our model.

We then propose three mechanisms through which class differentials in educational attainment may arise at the level of 'secondary' effects. Of these three, we would wish to stress the particular importance of the first, since this provides an account of how these differentials may be created and sustained through the apparently 'free' choices made by those in less advantaged classes. Our second and third mechanisms can be understood as accentuating the differing patterns of choice that derive from this initial source.

Relative Risk Aversion

We begin with an assumption regarding aspirations: that is, that families in both classes alike seek to ensure, so far as they can, that their children acquire a class position at least as advantageous as that from which they originate or, in other words, they seek to avoid downward social mobility. This means that the educational strategy pursued by parents in the service class is to maximize the chances of their children acquiring a position in this class. In terms of our model their strategy is to maximize the probability of access to S^*. For working-class parents the implication is that they should seek for their children a place in either the working or the service class, since either meets the criterion of being at least as good as the class from which they originate. In terms of our model their strategy is then to maximize the probability of access to S^* or W^*, which is the same as minimizing the probability of access to U^*. This establishes families in both classes as having identical *relative* risk aversion: they want to avoid, for their children, any position in life that is worse than the one from which they start.

To see the consequence of these two strategies, maximize $pr(S^*)$ for those of service-class origins and minimize $pr(U^*)$ for those of working-class origins—assume, for the moment, that continuing in education

is costless ($c = 0$). Then we find that whether or not a pupil believes it to be in his or her best interests to continue in education rather than leave depends on the value p_i (where i indicates the i^{th} pupil) given by

$$p_{is} = \frac{\pi_i\alpha + (1 - \pi_i)\beta_1}{\pi_i\alpha + (1 - \pi_i)\beta_1 + \gamma_1} \quad (1)$$

for the i^{th} service class pupil and

$$p_{iw} = \frac{\pi_i + (1 - \pi_i)(\beta_1 + \beta_2)}{\pi_i + (1 - \pi_i)(\beta_1 + \beta_2) + (\gamma_1 + \gamma_2)} \quad (2)$$

for the i^{th} working class pupil. Here we have allowed π to vary between pupils but we have assumed the values of α, β and γ to be common to all. If p takes a value greater than one-half this indicates that the expected returns to remaining at school exceed those of leaving. Thus, without taking account, as yet, of the costs of pursuing the former strategy, pupils for whom $p_i > 0.5$, can be said to prefer to remain in education. Even if subjective expectations of future success, as captured by π, do not differ between the two classes it will nevertheless be the case that, given conditions (1) to (4), $p_{is} > p_{iw}$ for any value of π less than one.[6]

Proof: $p_{is} > p_{iw} \; \forall \; \pi \leq 1$ if and only if

$$\frac{\pi\alpha + (1 - \pi)\beta_1}{\gamma_1} > \frac{\pi + (1 - \pi)(\beta_1 + \beta_2)}{(\gamma_1 + \gamma_2)} \quad (3)$$

Taking the first term on the left hand side of (3) we have

$$\frac{\pi\alpha}{\gamma_1} = \frac{\pi}{\frac{1}{\alpha}\gamma_1} > \frac{\pi}{\gamma_1 + \gamma_2} \quad (3a)$$

by conditions (3) and (4). Taking the second term on the left hand side of (3) we have

$$\frac{(1 - \pi)\beta_1}{\gamma_1} \geq \frac{(1 - \pi)(\beta_1 + \beta_2)}{(\gamma_1 + \gamma_2)} \quad (3b)$$

by conditions (ii) and (iii). Together (3a) and (3b) imply (3) which in turn implies $p_s > p_w$ as required.

This result establishes that if continuing in education is costless and there are no class differences in the subjective probability parameters α, β, γ and π, children from middle-class backgrounds will more strongly

'prefer' (in the sense of perceiving it to be in their best interests) to remain in school to a further level of education rather than leave.

The proportions in each class who prefer to stay are derived as follows. Assume that p has an unspecified distribution with means in each class p_s and p_w and dispersion parameters σ_{ps} and σ_{pw}. Because $p_{is} > p_{iw}$ for any common value of π_i, and assuming, for the moment, no class difference in the distribution of π, it follows that $p_s > p_w$. Then, given that only those pupils for whom p exceeds one-half prefer to stay at school, the proportions in each class preferring this outcome are given by the area under the unspecified distribution function above the point

$$z_s = \frac{\frac{1}{2} - p_s}{\sigma_{ps}}$$

for the service class and analogously for the working class.

Differences in Ability and Expectations of Success

Thus far we have been assuming that the option of continuing in education is open to all pupils. But, of course, this is often not the case and successive levels of education may only be open to those who meet some criterion, such as a given level of performance in a previous examination. Let us assume, for the sake of simplicity, that this criterion can be expressed directly in terms of ability, so that, for example, a pupil may only continue in education if his or her ability level exceeds some threshold, k: i.e. we impose the condition that a_i must be greater than k. Recalling our assumption regarding primary effects that the mean level of ability is higher in the service class than in the working class but that both have the same variance in ability, it follows that the proportion of service-class children who meet this condition exceeds the proportion of working-class children.

However, we might also suppose that pupils' own knowledge of their ability helps shape the subjective probability they attach to being successful in the next stage of education, which we labelled π_i. So we can write $\pi_i = g(a_i)$, where g indicates that π is a function of a. If we then denote by π_s^* and π_w^* the required minimum subjective probabilities compatible with continuing in education (these are the smallest values of π_i for which $p_i > 0.5$) we can write the probability of continuing in education as

$$\begin{aligned} &pr(a_i > k)pr(\pi_i > \pi^* | a_i > k) \\ &\quad = pr(a_i > k, \pi_i > \pi^*) \\ &\quad = pr(a_i > k, g(a_i) > \pi^* \end{aligned} \quad (4)$$

If

$$pr(g(a_i) > \pi^*) \leq pr(a_i > k)$$

then (4) reduces to

$$pr(\pi_i > \pi^*)$$

If pupils' expectations about how well they will perform at the next level of education are upwardly bounded by how well they have performed in their most recent examination—for example, if there are no pupils who, although they have failed to exceed the threshold k are nevertheless sufficiently optimistic about their future examination performance to wish to continue in education—then ability differences will be wholly captured in differences in the subjective parameter π. This will cause the average value of π to be lower among working- than service-class pupils because of the class difference in average ability levels.

Differences in Resources

Thus far we have assumed education to be costless. If we relax this assumption we need to take account of class differences in the resources that families in different locations in the class structure can devote to their children's education. Assume, therefore, that pupils can continue in education if and only if $r_i > c$ where r_i is the level of resources available for children's education in the i^{th} family. Given that service-class families have, on average, greater resources than working-class families ($r_s > r_w$) and that resources have the same dispersion within each class, it follows that the proportion of service-class pupils for whom this resource requirement is met will exceed the proportion of working-class pupils.

We have now suggested three mechanisms which, taken together, give rise to class differentials in the proportions of children who choose to stay on in education. Our first mechanism shows how, solely because of the relative risk aversion that is seen as being common across classes, there will be a stronger preference among service- than working-class pupils for remaining in education given that no costs attach to doing so. Our second mechanism then allows for class differences in average ability levels and in turn in expectations of success. The effect of this is to introduce class differences in the values of π (the subjective probability of future educational success), which further widen class differences in the value of p and thus in the strength of the preference

for staying on in education. Finally, our third mechanism takes account of the costs of continuing in education and allows for a further source of class differentials, the average resource levels available to meet these costs. The effect of this is to promote class differences via the proportion of families in each class whose resources exceed the costs of their children continuing in education or, more simply, who can afford to allow their children to continue.

How Important are our Assumptions?

Throughout the foregoing exposition of our model we have made assumptions of two distinct kinds. First, there are assumptions that serve to restrict differences between classes, for which we have theoretical reasons; and second, there are assumptions that we have introduced just to make our model more tractable. As regards the latter, it might reasonably be asked: how far are our results dependent upon on these simplifying assumptions?

The assumption that the educational decision problem has three possible outcomes, each of which results in direct entry to the labour market, is innocuous. In reality, the decision about whether or not to continue to educational level n may well be made with a view to gaining access to level $n + 1$: for example, a decision about whether to remain at school to sit certain examinations might be made in the light of possible entry to university. Such a situation could be represented through a decision tree such as that shown in Figure 2 in which there are two branching points, labelled 'Choice 1' and 'Choice 2', both referring to decisions on whether or not to continue in education. Note that the second choice is open only to those who reach the node labelled P1, that is, who pass the examination at the end of the previous level of education. In this model there are five educational outcome nodes, labelled L1 (immediate leaving), F1 (staying at the lower level but failing the examination) and, correspondingly, L2, F2 and P2. These five nodes have associated probabilities β, γ, δ, ϵ and ϕ and there are two parameters measuring subjective beliefs about the chance of success at each level: π_1 relating to level one and π_2 relating to educational level two. Recall that anyone who passes the examination at the end of level 1 is assumed to have a zero probability of entering the underclass. This implies that for any outcome consequent on passing this examination there will only be one identified probability: that is, there will only be one value of δ of ϵ and of ϕ.

In this set-up the decision analysed in Figure 1 could now be seen as

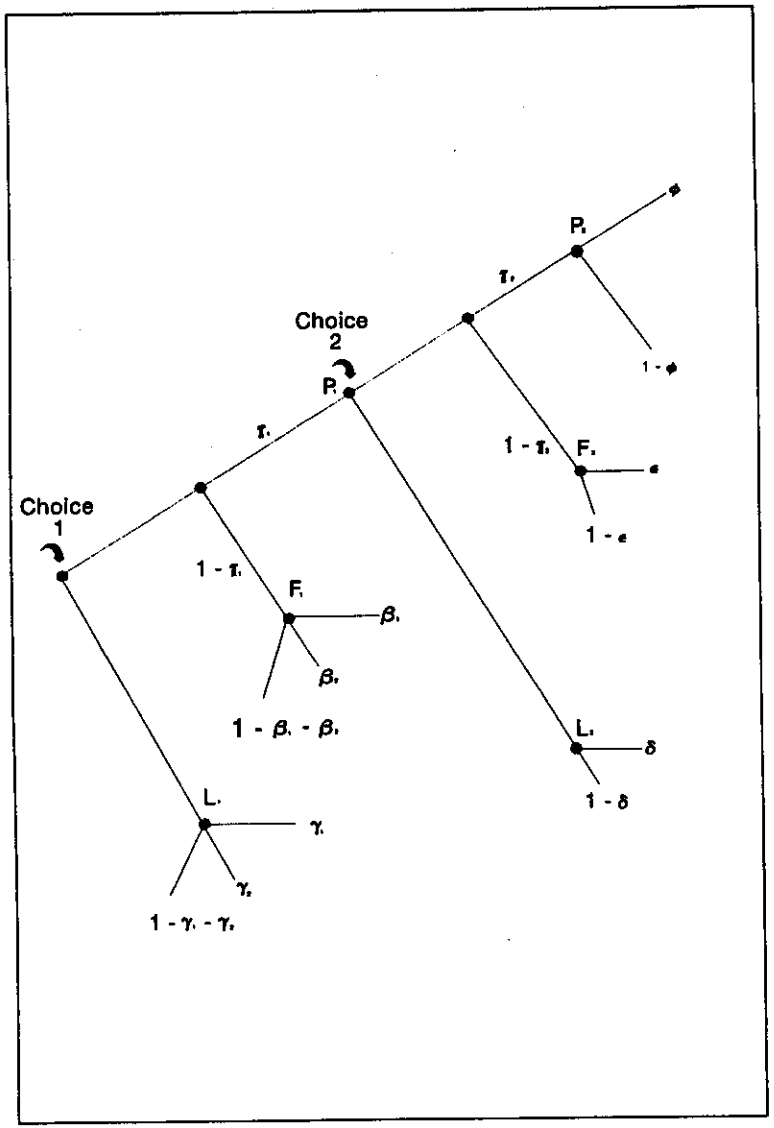

Figure 2. Multiple decision tree

Choice 1 embedded in a more realistic sequence of educational decisions. However, it is readily analysed using backward induction: we first solve the final decision in Figure 2 (that is, the decision at point 2) in the same way as we analysed the decision in Figure 1. This yields

$$p_{iS2} = \frac{\pi_{i2}\phi + (1 - \pi_{i2})\epsilon}{\pi_{i2}\phi + (1 - \pi_{i2})\epsilon + \delta} \tag{5}$$

which is the value of p for the i^{th} service class pupil at Choice 2. If we assume that at the time at which decision 1 is made pupils and their parents have formed the subjective expectation π_{i2} then we can solve for p_{iS2} in equation (5), and similarly for p_{iw2}. Having done this we solve for α in equations (1) and (2) which, for pupils of either service or working class origins is

$$\alpha_i = q_{i2}(\pi_{i2}\phi + (1 - \pi_{i2})\epsilon) + (1 - q_{i2})\delta$$

Here q_{i2}, which is a function of p_{i2}, is the expected probability of remaining in education at Choice 2.

Figure 2 shows that if we assume no class differences in the parameters δ, ϵ and ϕ then, holding constant class differences in ability and resources, class differences in choices at a lower educational level will be influenced by expectations about choices that will be made at higher levels of the system. However, these higher level choices will, again net of class differences in resources, show less variation according to social class than will earlier ones. Not only will successive choices have reduced class differences in ability among those making these later choices, but the riskiness of making more ambitious educational choices will have been reduced or even eliminated. So, for example, in looking at Choice 2 in Figure 2, we see that there is now no risk of demotion to the underclass: all the educational outcomes will serve to secure for children of working-class parents a position at least as good as that from which they originated. Under these circumstances it seems reasonable to assume that, although service-class pupils will still be more likely than their working-class counterparts to choose to continue in education, the class difference should be lessened because this more ambitious educational option now carries with it no risk of downward mobility for working-class pupils. Indeed, were we to make finer distinctions in the labour-market outcomes in our model, we might find that, as we move to higher educational levels, the riskiness in choice comes to affect successively more advantaged classes.

The fact that our model only allows for a pass or fail outcome at the end of each educational level is similarly trivial. It would be easy to

allow for three outcomes (e.g. do well / do modestly / fail) or, indeed, for a continuum of outcomes, without doing any violence to the model. Again, we have presented the choice to be made as staying in education versus leaving, but the basic approach represented by our model would apply equally well to other educational decisions that might be no less important, as for example, the choice between following an academic or a vocational educational track. We could then consider four possible outcomes, defined as pass or fail in each track; and, in turn, there would be no difficulty in embedding this choice in a more complex set of sequential decisions such as that shown in Figure 2.

One might also consider the possibility that the α, β and γ parameters in the model of Figure 1 should differ according to class origins, so reflecting class differences in beliefs about the returns to education. Although we have sought to minimize the extent of class differences in subjective parameters, there would be no difficulty in incorporating this modification into our model. In this case the results would depend upon the exact nature of such differences since what is important here is the pattern of relativities in the values of these parameters both within and between different class origins. For example, if we suppose that $\alpha_S > \alpha_W$ (the returns to staying in education and succeeding are believed greater among service- than working-class families) and/or that $\beta_{1S} > \beta_{1W}$ (the chances of access to the service class among those who fail are believed to be better for service- than for working-class children) then, referring to equation (3), it is clear that class differences in the proportions of pupils who prefer to stay on in education will be greater. On the other hand, if $\gamma_{1S} > \gamma_{1W}$ the effect will be indeterminate, depending upon the size of this difference relative to the extent of class differences in the α and β parameters. For example, if $\gamma_{1S} > \gamma_{2W}$ (among those who leave school, service-class children have a better chance of access to the service class than have working-class children to the working class) then class differences in preferences will be less marked. However, perhaps the most plausible class difference in assumptions about returns to education is that concerning access to the service class among young people whose chances would otherwise be diminished by educational failure. Here, service-class families may be in a better position to compensate for such failure than working-class families by providing other channels through which their children can gain access to a service-class destination. If this were the case, it would be reflected in our model in a class difference in β_1, which, as we have seen, will tend to exaggerate the extent of class differences in choice.

Finally, our assumptions that service-class families seek to maximize

$pr(S^*)$ while working-class families seek to minimize $pr(U^*)$ imply that the former do not differentiate between downward mobility to the working class and to the underclass, while the latter attach no more positive weight to upward mobility (into the service class) than to immobility. If, however, we do suppose that such distinctions are drawn, does the basic result, namely that the preference for remaining in education rather than leaving is stronger among service- than working-class pupils, still hold? As an example, assume that service-class pupils attach weights $-x$, 0 and 1 to destinations in the underclass, working class and service class, respectively, and that working-class pupils attach weights 0, 1 and x^* to these three destination classes, with $x > 0$ and $x^* \geq 1$. In this case, the service class considers U^* to be less preferable than W^*, while the working class considers S^* to be preferable to W^*. In this case $p_{iS} > p_{iW}$ holds only if

$$\frac{\pi\alpha + (1 - \pi)\beta_1 - x(1 - \pi)(1 - \beta_1 - \beta_2)}{\gamma_1 - x(1 - \gamma_1 - \gamma_2)} > \frac{\pi + (1 - \pi)(\beta_1 + \beta_2) + (x^* - 1)(\pi(\alpha - \beta_1) + \beta_1)}{\gamma_1 + \gamma_2 + (x^* - 1)\gamma_1} \quad (6)$$

Compared with (3) there is an extra term in both the numerator and denominator for both classes in (6). In the case of the service class (the left-hand side of equation (6)), the greater penalty attached to U^* makes both the numerator (the pay-offs to choosing to stay) and denominator (pay-off to choosing to leave) smaller, because both alternatives carry some possibility of ending up in U^*. However, providing that π is not small, the overall effect will be to increase the probability of staying in education because this option provides a more advantageous trade-off between S^* and U^* than does leaving. For the working class the extra terms in the equation will increase the pay-offs to both staying and leaving, because in all cases there is at least one path that leads to S^*, which now carries a greater reward. But, assuming $\beta_1 > \gamma_1$, the net effect will be to make staying more attractive than hitherto. For both classes the larger the value of π the greater the increase in the attractiveness of staying rather than leaving. Whether the effect will be a narrowing of class differences in p then depends on the actual configurations of the expected pay-offs to S^*, W^* and U^*. The important considerations are the extent to which the chances of the extra return x^* counterbalance the risk associated with choosing to stay among the working class; and the extent to which the penalty of $-x$ attached to U^* makes the service class susceptible to the same kinds of risk associated with choosing to stay.

One situation in which class differences in p will narrow (though not necessarily be eliminated) is when $\pi < 1 - \gamma_3/\beta_3$ (where $\gamma_3 = 1 - \gamma_1 - \gamma_2$ and similarly for β_3). In this case the risk of entering U^* and receiving the very low pay-off of $-x$ will come to reduce p_{iS} compared with its value under our earlier assumptions that the pay-offs to U^* and W^* were the same. But the extent to which this will reduce class differences in p is limited. This is because, under this new set-up, the increase in the probability of working-class pupils remaining at school depends upon the extent to which they benefit more from the extra return to S^* through remaining at school rather than leaving (so offsetting the riskiness of choice). Yet precisely when π is small the degree to which this is so is limited, so that, as π gets very small, their advantage arises solely because of our assumption that $\beta_1 > \gamma_1$.

The upshot of this is that, under these alternative assumptions about the weights attached to the various destination classes, there will exist a threshold value of π, say π^*, such that among young people for whom $\pi_i < \pi^*$, $p_{iS} < p_{iW}$. For values of $\pi > \pi^*$, we find $p_{iS} > p_{iW}$ as before, with the difference widening as we move to larger values of π. At the low values of π there is a very high expectation of failure should young people continue in education. But now, failure is more costly for service-class pupils than working-class because of the extra penalty associated with the greater downward mobility they risk experiencing. However, for parameter values that meet conditions (i) to (iv) given before, together with the assumption that $\beta_1 > \gamma_1$, it transpires that for any reasonable values of x^* and x, p^* will be less than zero. By reasonable we mean values of x^* that are less than 2 (so that, for members of the working class, the cost of downward mobility into U^* is greater than the benefits of upward mobility) and of x that are marginally greater than $x^* - 1$ (meaning that the cost of extra downward mobility into U^* for the service class is greater than the perceived desirability of the extra upward mobility into S^* on the part of the working class). These conditions on x and x^* are, in fact, further risk-aversion assumptions, albeit weaker than the ones with which we began this paper. Young people and their families value upward mobility less than they fear downward.

Our original choice of pay-offs reflects our belief that educational decisions are driven by the desire of families to ensure that their children do not experience downward mobility. However, the central result of our risk-aversion assumption, namely that children from middle class backgrounds will more strongly prefer to continue in education, is robust to other choices of pay-off, which seek to capture

distinctions in the attractiveness of upward mobility rather than immobility and in the aversion to the amount of downward mobility.

Given this list of what is not essential to the model, it may then be asked what are those features of it that need to be preserved. We have in fact already indicated the answer to this question in noting that it is mechanism (i) above—that of relative risk aversion—which basically drives the model and leads to its most novel and, perhaps, counter-intuitive results. More specifically, we may say that what the model crucially depends on is the general structure of the educational decision problem that we have set up, as this is constituted by our initial conditions (i) to (iv). What *is* essential is that there should be some measure of risk, in terms of eventual class of destination, that is attached to continuing in education or, more generally, to making certain more ambitious educational choices, relative to leaving education or taking less ambitious options. And then further, in order for the model to provide an explanation of class differences in the probabilities of the choices made, risk has in this respect to be unequally distributed across origin classes. Thus, in our model, riskiness is a cost imposed on the working class, but not the service class, through the possibility of their dropping into the underclass. This is why, with only two origin classes, we still have three destination classes, although it should be stressed that the notion of an underclass is not here of any particular importance in itself. All that is required is that there should be some outcome that can be considered as implying an inferior position to that from which children begin and that, for children of some class origins, this outcome should be less likely if they opt for less ambitious but 'safer' educational careers.[7]

Explaining Empirical Generalizations

We may now seek to apply our model to the explanation of the empirical generalizations that were set out in the Introduction, beginning with that of the widely observed persistence of class differentials in educational attainment in the context of an overall increase in educational participation rates. To account for the latter trend is fairly easy: the relative costs of education have declined over time in all economically advanced countries. As the period of compulsory schooling has been extended, the costs of successively higher levels of education have been reduced through the abolition of fees, the introduction of maintenance grants, soft loans, etc. In our model this change is treated via

mechanism (iii)—class differences in resources—and is captured in a decline in the size of the parameter c. This will lead to an increase in the proportions of children from both service- and working-class origins continuing in education, providing, of course, that the preference for continuing (given by our p parameter) does not decline. However, far from p_i declining over time it is more plausible to believe that there is a widespread increase in the desire to remain in full-time education as educational credentials come to take on increasing importance in the labour market and in securing a relatively advantaged class position. Indeed, in so far as education is regarded as a 'positional' good, p_i could be expected to rise steadily simply as a consequence of educational expansion itself.

At the same time our model can provide an explanation of how, within a context of educational expansion, class differentials may none the less persist. To see this, recall that class differences in educational attainment are usually measured by odds ratios which compare the odds of continuing in education versus leaving for pairs of origin classes. Under our model, the odds ratio between the service and the working class is equal to

$$\frac{\Phi_S / (1 - \Phi_S)}{\Phi_W / (1 - \Phi_W)}$$

where we use Φ_S to mean the proportion of service class pupils who remain in education and similarly for Φ_W. It is then possible to show (see Appendix) that, given a decline over time in c, together with an increase in the proportion of both service- and working-class pupils who consider it in their best interests to remain in education, the odds of continuing in education increase by a roughly constant amount for each class, and so preserve a similar constancy in the odds ratio. This tells us that, under these circumstances, a uniform decline in the costs of education, i.e. uniform across classes, will result in the odds for children of all classes choosing to continue being multiplied by something like a common factor. So if, for example, some level of education is made free of charge (in the sense that fees are no longer levied) class differences in participation (as measured by odds ratios) at this level will remain more or less unchanged even though the overall participation rate will increase.

Our model also sheds some new light on the concept of 'maximally maintained inequality' in education (Raftery and Hout 1990; Hout, Raftery and Bell 1993). These authors argue that class differences in educational attainment will only begin to decline when participation in a

given level of education of children of more advantaged backgrounds reaches saturation. In our model, such a reduction will occur once c declines to the value at which all members of the service class have resources that exceed it. At this point, all service-class families will possess resources that exceed the costs of remaining in education and thus the proportion in this class who choose to continue in education will be equal to the proportion who perceive it to be in their interests (i.e. for whom $p_i > 0.5$). *Further* reductions in c will then have no influence on the numbers of service-class children who choose to continue but will still increase the proportion of working-class children who do so. Under these conditions, the relevant odds ratio could be expected to move towards unity.[8] However, it should be recognized that, as understood in terms of our model, maximally maintained inequality does not imply that a decline in class differentials can only commence at the point at which all children of more advantaged class origins continue in education. Rather, this effect occurs once all such children whose p_i is greater than one-half continue, in other words, once all those who perceive it to be in their best interests to continue are able to act accordingly. It is true that in some instances the achievement of this latter condition will, in fact, give rise to 100 percent continuation among children of more advantaged classes.[9] But further declines in c, even if they lead to $r_{iW} > c$ for all members of the working class, will not lead to equality in the proportions continuing in education in each class so long as there still remains a class difference in the proportion who prefer to continue.

It further follows from our model that class differentials in educational attainment will also respond to changes in the costs of education which, rather than being uniform, have a variable impact across classes. Such changes could be brought about directly through the selective subsidization of young people according to their class of origin, as occurred, for example, in some post-war Communist societies. However, essentially the same effect could follow from a general reduction in inequality of condition between classes. Specifically, if class differences in resources, r, become smaller, our model would predict that differentials in educational attainment, as measured by odds-ratios, would in turn decline.

It is then in this way that the model may be seen as applying to the national case that most obviously deviates from the typical pattern of persisting class inequalities in education, i.e. that of Sweden, in which, as earlier noted, a narrowing of such inequalities over the post-war decades is well attested. There is indeed further extensive evidence (for

reviews, see Erikson and Jonsson 1996a; Goldthorpe 1996) that in this same period the average income levels of different classes in Sweden became more equal, while the degree of economic insecurity experienced by members of the working class was steadily reduced. And through time-series analysis, correlations can in fact be established between these latter tendencies and the growing equality in educational outcomes that are at all events consistent with the hypothesis of a causal influence (Erikson 1996).

As against the constancy in class differentials in educational attainment, to which exceptions are few, the decline in gender differentials that has occurred in virtually all advanced societies since the 1970s must appear as rather dramatic. Because gender differentials arise within, rather than between, families, neither changes in the costs of education nor in inequalities in resources among families are appropriate to explaining their reduction. In the light of our model, this may rather be seen as resulting from shifts in the perception of educational returns that have been prompted by changes in women's labour market participation. It would be fair comment to say that the pattern of returns to different educational decisions that we have thus far envisaged would, for most of the 20th century, be more applicable to young men than to young women. Until quite recently, it is likely that educational decisions in the case of girls were shaped in the main by the expectation that their primary social roles would be those of wife and mother, and that their class positions would therefore be determined more by whom they married than by how they themselves fared in the labour market. In so far as this were the case, then the relative returns to education for women would be somewhat different to those we have supposed in the exposition of our model: at all events, the returns associated with any particular educational decision would be less highly differentiated than for men. So, for example, young women of service-class origins could be thought best able to retain their position in this class through marriage; but to meet young service-class men did not necessitate that they themselves should acquire the educational qualifications that led to a service-class occupation. Rather, their qualifications had to be such as to provide them with employment that would bring them into contact with potential service-class husbands, and this requirement might be met through only relatively modest levels of educational attainment, leading to a job as, say, a secretary or nurse. And within both the home and the educational system alike, as much emphasis was indeed placed on the acquisition of social and domestic skills as on skills that would have value in the labour market.

Such a flatter 'gradient' in the returns to different educational pathways would, if incorporated into our model, have two consequences. First, the proportion of women choosing to remain in education at each decision point would be smaller than the proportion of men; and, second, class differentials would tend to be less among women than among men. The former result follows from the lesser incentive to continue in successively higher levels of education that would be held out to women of all class origins alike; the latter comes about because the magnitude of the class differences among those choosing to remain in education (for given values of ability and resources) is directly proportional to the differences in returns associated with the various possible educational outcomes. If we consider equations (1) and (2) shown earlier, then as the difference between, say, α_1, β_1 and γ_1 diminishes, so the difference between p_{iS} and p_{iW} will also diminish.

Over the past 20 years, we would suggest, the pattern of returns to education for women has drawn closer to that for men, as rates of women's labour market participation and, especially rates for married women, have increased and as a woman's own employment has taken on greater significance in determining the standard of living enjoyed by her family and further, perhaps, her own class position. In other words, our model as expressed in Figure 1 has come increasingly to apply to women: the 'gradient' in their returns to education has steepened. According to our model, then, such a change should have two effects: gender differentials in educational attainment should decline, as indeed they have,[10] and at the same time the magnitude of class differences among women should increase.

Conclusions: Empirical and Theoretical Implications of the Model

It was in order to account for the empirical regularities that we have just addressed, in particular, that of persisting class inequalities in education, that our model was developed. However, we earlier remarked that an advantage of the formal approach that we have adopted is that, as well as serving to clarify theoretical arguments that are advanced with explanatory intent, it also helps to bring out the wider implications that these arguments carry. In this concluding section, we consider a number of implications, both empirical and theoretical, that stem from our model.

The chief importance of empirical implications is that they provide opportunity for further testing of the model. In so far as the explanation that we have advanced of certain established empirical regularities would in turn lead to the expectation of other regularities, the possibility thus arises of further enquiry that could corroborate or undermine the model. In the course of the foregoing, at least three such implications of our model have emerged that would seem worthy of restatement here on account both of their apparent openness to test and of their own substantive interest.

First, before they go on to a further level of education, children of less advantaged class backgrounds will require a higher expectation of success at that level—as indicated, say, by previous academic performance—than will children of more advantaged backgrounds.

Second, as children proceed from lower to higher levels of the educational system, the pattern of choices that they make will (in addition to any continuing primary effects) lead to class differentials in participation becoming smaller.

Third, as gender differentials in educational participation and attainment diminish over time, class differentials among women will increase from a level initially lower than that among men so as to approximate the male level or, in cases where class differentials are in general decline, will decline less than among men.

A good deal of evidence would in fact appear already available to lend support to at least the first two of these propositions.[11] However, it is not our concern in this paper to enter into these empirical issues, and we would in any event hope that they are ones that others, including those who find our theoretical arguments unpersuasive, will be prompted to take up. We would also hope that others will seek to derive further empirical implications of our model than those we have ourselves identified, and in this way provide a still wider basis on which its testing can proceed.

As regards the theoretical implications of our model, we would see these as being of main significance in their bearing on explanatory strategy. The model represents children and their families as acting in a (subjectively) rational way, i.e. as choosing among the different educational options available to them on the basis of evaluations of their costs and benefits and of the perceived probabilities of more or less successful outcomes. It then accounts for stability, or change, in the educational differentials that ensue by reference to a quite limited range of situational features. For example, in the case of persisting class differentials, the explanatory emphasis falls on similarly persisting

inequalities in the resources that members of different classes can command in the face of the constraints and opportunities that their class positions typically entail. Class differences in demonstrated academic ability are also recognized, but not—as we have emphasized—class differences of a (sub)cultural character.

To the extent, then, that our model holds good, i.e. that it can provide an adequate account of the regularities we have considered and that its further empirical implications are not rejected—the relatively parsimonious strategy of the rational action approach is supported; and, we might add, in an area in which 'culturalist' theories of one kind or another have hitherto enjoyed great popularity—even if not great explanatory success (see Goldthorpe 1996). In turn, the case for attempting to pursue this strategy in other areas of sociological enquiry is strengthened.

Finally, though, we would wish to allude to certain theoretical implications that might be regarded as following from our model but that do not in fact do so. To begin with, we are not required to suppose that, in making educational choices, children and their parents in fact go through the processes of ratiocination that the model might appear to attribute to them. We do take it to be the case that the actors in question have some knowledge of how their society works, have some concern for their own, or for family interests, and seek to use the former to promote the latter. But we can at the same time accept that the decisions they make may only rarely result from any entirely explicit procedures, rather than, say, 'emerging' over a period of time and, in all probability, reflecting also various non-rational influences. What underlies our approach is the idea that it is rational considerations that are, not the only, but the main common factor at work across individual instances, and that will therefore shape patterns of educational choices in aggregate and, in turn, the regularities that constitute our *explananda*. Our model then aims to represent these considerations in an 'idealized' way, so as to capture the key generative processes involved, rather than to represent decision-making as it actually occurs at the level of particular families.

Further, while we do not in explaining class differentials in education invoke systematic variation in values or derived norms, this does not mean that we have to deny their very existence. Thus, in so far as class-specific norms may be identified—which is an empirical issue—we could recognize them as serving as *guides* to rational action that have evolved over time out of distinctive class experience and that may substitute for detailed calculation when educational choices arise.

Understood in this way, such norms could conceivably be of some explanatory significance as inertial forces in cases where the structure of constraints and opportunities or the distribution of resources is changing. But what we would in fact expect, and the decline in gender differentials would, at least by analogy, lend support, is that norms, in being essentially epiphenomenal, would rather quickly come into line with patterns of action that display a rational adaptation to the new circumstances that have come into being.

In sum, our model implies an explanatory strategy that is undoubtedly 'reductionist' so far as the relation of norms to rational action is concerned (see Elster 1991). However, we do not in this regard seek what Popper (1972: Ch. 8) has criticized as reduction by fiat, but only reduction in so far as it is warranted by the empirical support that our theoretical arguments can obtain in the particular area in which they have been applied.[12]

APPENDIX

Constancy of Class Differentials Over Time

In this appendix we show how our model can account for the widely observed approximate constancy of class differentials in educational participation rates in the context of increasing overall levels of participation.

Let Φ_{St} be the proportion of service class pupils continuing in education at time t, given costs c_t, and Φ_{St+1} the proportion at time $t+1$ (given costs c_{t+1}), and similarly for the working class. Then we require that

$$\Phi_{St+1} > \Phi_{St} \tag{A1a}$$
$$\Phi_{Wt+1} > \Phi_{Wt} \tag{A1b}$$

and

$$\frac{\Phi_{St+1}/(1-\Phi_{St+1})}{\Phi_{Wt+1}/(1-\Phi_{Wt+1})} \approx \frac{\Phi_{St}/(1-\Phi_{St})}{\Phi_{Wt}/(1-\Phi_{Wt})} \tag{A2}$$

(A1a) and (A1b) say that overall participation rates increase in both classes over time; (A2) says that inequalities between them (measured as odds ratios) remain unchanged.

Our model posits two conditions that must be met if a pupil is to continue in education: family resources must exceed the costs ($r_i > c$); and it must be perceived as in the pupil's best interests to continue in education ($p_i > 0.5$). If the costs of education decline over time from c_t to c_{t+1} ($c_t > c_{t+1} > 0$) this leads to an increase in the probability of resources exceeding costs. Given the reasonable assumption that the values of p_i do not decline over time, (A1a) and (A1b) then follow immediately.

Under the assumption that r has a logistic distribution the probability of resources exceeding costs is given by

$$L(S,c_i) = \frac{\exp[-(c_i - r_s)/\sigma_r]}{1 + \exp[-(c_i - r_s)/\sigma_r]}$$

It is easy to demonstrate that the odds-ratio as between the service and working classes

$$\frac{L(S,c_i)/(1-L(S,c_i))}{L(W,c_i))/(1-L(W,c_i))} \tag{A4}$$

is equal to

$$\exp[-(r_S - r_W)]$$

and thus does not depend upon the value of c_t (under the assumption that the dispersion parameter, σ, is common to both classes). It follows that if the distribution of resources does not change over time neither will the odds-ratio (A4). However, the overall odds-ratio between the two classes is equal to

$$\frac{\dfrac{p_{St}\,x_{St}}{1-p_{St}\,x_{St}}}{\dfrac{p_{Wt}\,x_{Wt}}{1-p_{Wt}\,x_{Wt}}} \tag{A5}$$

and similarly at time $t+1$. Here, for convenience, we use the abbreviations

$$p_{St} = pr(p_{St} > \tfrac{1}{2})$$
$$x_{St} = pr(r_s > c_i)$$

and similarly for the working class.

To show that (A5) will be approximately constant over time despite change in c, we first rewrite it as

$$\frac{\dfrac{x_{St}}{(e_{St}-x_{St})}}{\dfrac{x_{Wt}}{(e_{Wt}-x_{Wt})}} \tag{A6}$$

where

$$e_{St} = \frac{1}{p_{St}}$$

and likewise for e_{Wt}. Note that if $e_{St} = e_{Wt} = 1$ then (A6) reduces to (A4). But given $e_{Wt} \geq e_{St}$ a decline in c over time will cause the odds-ratio (A6) to decline rather than remain constant. However, recall our earlier argument that educational qualifications increase in importance over time and this is reflected in an increase in the values of p in both classes. Then if e_S grows proportionately smaller than e_W over the interval t to $t+1$, the tendency for (A6) to decline will be offset. In turn this will occur if

$$\frac{p_{St}/(1 - p_{St})}{p_{Wt}/(1 - p_{Wt})} > \frac{p_{St+1}/(1 - p_{St+1})}{p_{Wt+1}/(1 - p_{Wt+1})}$$

In words, the odds-ratio in preferences for remaining in education increases as educational qualifications take on more importance in the labour market.

To summarize: our argument is that, given a decline in the costs of education, the proportions continuing in education in each class will increase, provided that there is no decline in the strength of preferences for so continuing. Thus (A1a) and (A1b) will hold. We then argued that (A2) (approximate constancy in the between-class odds-ratios of continuing in education) has held as the result of two processes which have had offsetting effects. The decline in the costs of education has a tendency to cause odds-ratios to diminish but the increasing importance of education (leading to a widespread increase in the strength of preference for continuing in education) has a tendency to cause odds-ratios to widen. In the Swedish case, where odds-ratios have declined, this can be explained as being due to the reinforcing of those factors pushing in this direction through the diminishing of class inequalities in resources.

NOTES

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1. We do in fact treat children and their parents as a single decision-making entity, but there is nothing in the model that we shall go on to propose that need preclude the possibility of intrafamilial disagreements, bargaining, compromises, etc.
2. We need not, for present purposes, be committed to any particular theory of how different levels or kinds of resources derive from different class positions.
3. Arum and Shavit (1995) show that while opting for a vocational rather than an academic track in secondary education does reduce American students' chances of continuing into higher education, it also serves as an important 'safety net' for those who do not in fact continue. In particular, for 'non-college-bound' students, vocational education improves labour market prospects relative to those associated with other tracks by raising the chances for males of entering skilled manual work and for females of entering routine nonmanual work as against less favourable outcomes, notably unemployment.
4. Empirical support for the idea of such a consensus on the general desirability of different kinds of occupation (taken together with specific employment statuses) is provided in Goldthorpe and Hope (1974).
5. Strictly speaking the mathematics of our model require a slightly weaker condition, namely that $\alpha \geq \gamma_1 / (\gamma_1 + \gamma_2)$. This imposes a condition on the magnitude of the difference in the chances of access to the service class as between remaining at school and passing the examination and leaving immediately. The conditional probability of access to the service class for those who leave immediately should not be greater than $\gamma_1 + \gamma_2$ times the conditional probability of access to the service class for those who remain at school and pass the examination. However, because of condition (iii), condition (iv) will always be met if $\alpha > 0.5$.
6. Note that, whereas p_{iw} can take any value between zero and one depending on the value of π, if $\beta_1 \geq \gamma_1$ then p_{is} will exceed one-half for all values of π.
7. Of course, the risk of dropping into the underclass bears also on pupils of service-class origin. But, for these pupils, the more ambitious option of remaining at school entails no risk, relative to leaving, because their subjective probability of gaining access to the service class is greater even if they remain at school and fail than it would be if they left. This follows from condition (i) of our model. Put another way, the inferior outcome for service-class pupils is to end up in either the working class or the underclass; but, in contrast to the inferior outcome for working-class pupils, the risk of such an outcome is not reduced by taking the less ambitious educational option.
8. Though empirically this will be observed only if the proportion of service-class children who consider it in their best interests to remain in education does not change for other reasons. For example, given an increase over time in the importance of educational qualifications in obtaining jobs we might see changes in the relative values of the α, β and γ parameters causing the proportion for whom $p_i > 0.5$ to increase in both classes. Under these conditions a narrowing of the odds-ratio will not necessarily follow.
9. In our model this will be the case for the service class if (in addition to conditions (i) to (iv)) $\beta_1 \geq \gamma_1$ but it need not be so if this inequality does not hold.
10. One respect in which gender differentials in education have proved relatively resistant to change is that of patterns of subject choice, with girls remaining under-represented in mathematics and some of the applied sciences. An explanation of this in the spirit of our model would be that while women are nowadays much more likely to seek their own careers, they nevertheless anticipate quite lengthy breaks from the labour force or periods of part-time work arising for domestic reasons. They are therefore likely to choose those subjects that give access to careers that afford some flexibility in working arrangements or allow for career interruptions. So, secretarial work, which provides a great deal of flexibility, is likely to be more attractive to girls than is, say, skilled manual work, although there is little difference in the level of educational attainment required by, or in the general desirability of, the two kinds of employment. Similar arguments might be made in respect of the choice between teaching or the law, on the one hand, and engineering or management, on the other. If women were better enabled, say, through adequate childcare provision, to maintain their availability for full-time employment over the life-course, the expectation would then be that gender differences in subject choice would diminish far more rapidly than hitherto. Note that this explanation can again be set in contrast with one couched in terms of—in this case gender-specific—values and norms.
11. As regards the first point, there is clear evidence that, even when ability level is held constant, a strong association prevails between more advantaged class origins and children's choice of more ambitious educational options. This result has been obtained within a number of different educational systems, and appears little affected whether ability is determined by IQ or other 'scholastic aptitude' tests, by examination performance or by teacher evaluation. See e.g. for Britain, Micklewright (1989) and Wadsworth (1991); for the US, Sewell and Hauser (1976); for France, Duru-

Bellat and Mingat (1989) and Duru-Bellat et al. (1992); for Sweden, Erikson and Jonsson (1993). As regards the second point, supporting evidence from research in a range of different societies—and various explanatory hypotheses, to which ours might be added—are discussed by Blossfeld and Shavit (1993).

12. Elster (1991) criticizes several different versions of the argument that action taken in conformity with social norms is reducible to rational action. However, his efforts to show that no version entails that such a reduction is always possible are of greater philosophical than sociological interest. One could entirely agree with Elster, yet still wish to maintain that, in a particular instance of sociological explanation, a reductionist view could in fact be upheld; or, more generally, that it is good strategy to start from a reductionist position and to modify it only in so far as the evidence requires.

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