Predicting College Success of the Educationally Disadvantaged

Admission to selective colleges should be based substantially on test scores and high school grades.

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Because children of the poor tend to score considerably lower on the Scholastic Aptitude Test (SAT) and other standardized ability and achievement tests than do children of the affluent, one can say that in this descriptive sense such tests are "biased against" or "discriminate against" or "penalize" the former. Besides their descriptive denotations, however, these expressions have value connotations. Whether such tests are "unfair" to youth from educationally disadvantaging environments depends on what is meant in this context by the words "unfair" and "disadvantaging."

From the standpoint of an admissions officer, the educationally disadvantaged applicants to his college could be simply those who, on the basis of all available information, including high school grades, test scores, socioeconomic status, race, ethnic origin, and available financial support, are likely to have appreciably more academic difficulty than the typical minimally admissible student. Thus, the son of a distinguished alumnus is educationally disadvantaged for his father's college if it is predicted that he will fail most of his courses and not persist to graduation. The valedictorian of a large high school, who has a sizable national scholarship but whose parents are illiterate and penniless, cannot, by this criterion, be considered greatly disadvantaged educationally.

This definition of educational disadvantage is not in accord with the varied use in the professional literature of expressions such as "culturally deprived," "culturally disadvantaged," and "socially disadvantaged." It is not consonant with tacit assumptions that all persons of a given race, ethnic group, or regional group are educationally disadvantaged. According to this definition, not all blacks or Chicanos or Appalachian whites will have academic difficulties in any particular college. The individual differences in developed academic abilities of high school seniors within each group will be great.

Defining disadvantagement in terms of low predicted grade-point average or low persistence within a specified college, based on all available antecedent information, makes the expression "educationally disadvantaged" or "high-risk applicant" more than a euphemism for "member of a minority group." It involves assessing the educational assets and handicaps of the applicant and estimating his achievement if some of the handicaps can be lessened or removed.

Most published research concerning presumably educationally disadvantaged college students has appeared during the past 8 years. Nearly all of it involved comparisons of black students with a group that might be called "predominantly nonblack students." Many of the black students had good high school grades and test scores; thus according to my definition, they were not educationally disadvantaged (that is, not greatly underqualified academically) for most colleges. That these academically able students tended to do well in college should not be surprising.

In many studies, however, black students of variously developed abilities were lumped together, as though having black skin caused college applicants to be poor academic risks. This practice has made interpretation of the results of such studies difficult, since one often cannot determine from a research report how the black students who had poor high school grades and low test scores performed in relation to those who had good grades and high test scores.

More special programs for educationally disadvantaged Chicanos, American Indians, Puerto Ricans on the mainland, Appalachian whites, and integrated socioeconomic groups are being started. Soon there should be research reports concerning such projects, making it unnecessary to rely as much as before on studies of blacks. Generalized conclusions will increase, and the erroneous identification of nearly all blacks as academically underqualified for most colleges should decrease.

Predicting School Grades

During the first half of the past decade, a number of writers have questioned the validity of standardized tests for ascertaining the developed abilities of children from lower socioeconomic groups. One of these writers, M. D. Jenkins, who was longtime president of predominantly black Morgan State College in Baltimore, stated in 1964: ". . . it is well known that standardized examinations have low validity for individuals and groups of restricted experimental background" (*1*). That same year Fishman and others (*2*), presenting the "Guidelines for Testing Minority Group Children" of the Society for the Psychological Study of Social Issues, wrote that the "predictive validity [of standardized tests currently in use] for minority groups may be quite different from that for the standardization and validation groups. . . ."

A year earlier, Clark and Plotkin (*3*) had reported results of a study based on "alumni" classes of the National Scholarship Service and Fund for Negro Students in which they concluded that:

> . . . scholastic aptitude test scores are not clearly associated with college grades. It is suggested that college admissions officers weigh test scores less, since they do not predict the college success of Negro students in the same way they do for whites.

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This study indicates that motivational factors are probably more important than test scores in the demonstrated superiority of Negro students in completing college.

In 1965 Green and Farquhar (*4*) reported a correlation coefficient of only .01 between School and College Ability Test scores (level not specified) and high school grade-point averages for 104 black males, compared with .62 for the differential aptitude test verbal-reasoning scores of 254 white males.

These four reports do not prove standardized tests to have lower predictive validity for educationally disadvantaged college students. Only the Clark and Plotkin (*3*) and the Green and Farquhar (*4*) studies, of the four excerpted above, dealt with data. Cleary (*5, 6*) tried to replicate the findings of Clark and Plotkin with a better controlled design, but failed (*7*). The conclusions of Green and Farquhar were questioned in some detail by Stanley and Porter (*8*). For black students, especially, the differential-validity hypothesis has been found untenable; indeed, test scores sometimes overpredict the academic achievement of blacks (*9, 10*).

Hypothetical Example

Let us try to examine the implied logic that leads to assertions such as those made by Jenkins (*1*), Fishman *et al.* (*2*), and Clark and Plotkin (*3*). Suppose that one has two large groups of U.S. high school seniors and that the Scholastic Aptitude Test Verbal (SATV) score of every person in each group is 400 (*11, 12*). Suppose further that one group is composed of students from inner-city slums: their parents are poorly educated, and most middle-class educational influences are missing from their homes. The students who make up the other group are from affluent suburbs, and most of their parents are college graduates. (To keep the argument uncluttered, assume that each student's 400 is essentially his true score, the average of six SAT scores. Thus, regression toward population means due to errors of measurement will not complicate the discussion. Also, let us assume that both groups had plenty of experience taking tests prior to the SAT.)

One might expect that the SATV scores of the students from the slum group could be increased more easily than the scores of those from the affluent group. This, however, is an empirical issue. Even assuming that the disadvantaged youth had greater SAT potential at the time of conception, it does not follow that this potential persists undiminished to age 17 or 18. Perhaps many of the disadvantaged seniors are so stunted intellectually that massive coaching, tutoring, remediation, and enrichment won't raise their SAT scores much. Such efforts may work, but one has to specify the methods to be used and actually try them out. Not enough has been done yet in a rigorous way and reported adequately (*13*).

Alternative Coping Skills

Even when it is recognized that psychologists do not know how to increase the tested SATV ability of disadvantaged high school juniors or seniors appreciably, it is often contended that in order to succeed in college those students need less of this ability than more advantaged ones do. Seldom is it asked why they would need less ability. The contender seems to imply that students who have come up the rough way will study harder and more effectively than advantaged students, or perhaps even that by having survived in the ghetto they have developed coping techniques useful also in schools. Of course, these speculations do not square well with the many other disadvantages besides test-score deficit that most slum-bred students have, nor with the facts of their usual academic difficulties in elementary and high school.

If strong motivation to achieve academically is there, it must in most instances be dormant, ready to awaken in college. One might expect, or at least hope for, satisfactory college work from a person who has either earned fairly good grades in college-preparatory courses at high school or has adequate test scores. However, to expect satisfactory college grades from most students who have neither is asking for a minor academic miracle unless sufficiently massive compensatory education intervenes. Such miracles do happen from time to time, but there does not seem to be any credible evidence that they occur frequently for students who are greatly underqualified, in both respects, relative to other students in the same college.

Persistence to Graduation

A number of academically selective colleges are now more concerned with the disadvantaged student's persistence to graduation than with his grades. For example, preliminary data at Cornell University show that the 56 students who scored below the 5th percentile "of all entering Cornell students for the undergraduate division in question" on two out of three of SATV, SATM, and secondary school class rank "are doing extremely well with regards to academic status, and if the trend continues, about ninety percent (90%) will graduate and less than five percent (5%) will be academically dismissed" (*14, 15*).

In another part of the report (*14*), Tetlow shows that the average grades of the group of presumably high-risk students at Cornell were rather low and that "about half of all students in the program have received *at least* a warning for poor performance. Several students have received a 'warning,' a 'final warning,' and a 'post-final warning.'" Of course, more than just persistence to graduation must be demonstrated if such a program is to be considered a success. What have these students learned by the time they graduate, as measured, for example, by achievement, area, and aptitude tests of the Graduate Record Examination? Perhaps they would have learned more if they had attended a less academically demanding college where with the same amount of effort they could have made better grades. However, no objective evidence of this sort seems available for the Cornell graduates or for 19 recent black graduates of Stanford University (*16*).

In an important study, Astin (*17*) has used a persistence argument too, though his pooling of grades across 180 colleges of various selectivity levels makes some of his conclusions difficult to interpret. He matched ingeniously, but analyses within each college would have been more convincing. His findings may have little necessary relevance to disadvantaged students recruited into selective colleges, but they do suggest considerable persistence in college by many students with weak academic backgrounds.

A large study of persistence to graduation at Brown University was reported by Nicholson (*18*). His data and conclusions are interesting, although his definition of a high-risk student (one whose SATV score is less

than 620 and who is therefore in the lower third of the freshman class at Brown) screens out most really educationally disadvantaged persons.

Not many systematic studies of differential persistence between blacks and whites have yet been completed, but the evidence from Tetlow (*14*), Black (*16*), Nicholson (*18*), Clark and Plotkin (*19*), Borgen (*20*), and Astin (*21*) suggests that reasonably able black students from high socioeconomic backgrounds who attend selective colleges persist well to graduation, even though many of them make mediocre or poor grades. Most of these students chose their respective colleges, however, rather than being recruited. Also, they had few black classmates with whom to isolate themselves from the whites or with whom to seek black courses, curricula, departments, and colleges. This situation has changed rapidly within the last few years, so the older data can be suggestive only and apply just to blacks. We know virtually nothing yet concerning the persistence of other disadvantaged minority groups.

The relationship of parental socioeconomic level to academic persistence transcends the race issue. For example, at the University of Illinois Eckland (*22, 23*) found that, for persistence to college graduation somewhere within 10 years after initial enrollment, "social class is an important determinant . . . for students from the lower rank of their high-school classes but relatively unimportant for those from the higher rank. . . ." Boys who had poor high school records and who came from families of low socioeconomic status tended to persist to graduation less often than did academically mediocre boys from families of a higher status. Also, giving up pursuit of the degree did not seem closely related to lack of money; those persons who dropped out for what they said were financial reasons tended to return and graduate. Lack of money is a real handicap, but at least in principle a remediable one (*22, 23*).

However, persistence to graduation can hardly be the primary criterion. The persister must, in the process, get at least as good an education as he could secure elsewhere for the same effort and cost. Careful objective evaluation of the educational attainments of the students as they progress seems imperative.

Ignoring Test Scores

Recently, many selective institutions have decided to waive test scores (and sometimes high school grades too) in admitting disadvantaged applicants. If the rationale for this is that academic-aptitude and achievement tests lower prediction of criteria such as freshman grade-point average or persistence to graduation, it is a foolish procedure, since in a linear multiple-regression equation a predictor variable cannot lower validity, but only increase it or leave it unchanged. Substituting principals' and teachers' ratings of probable college success for test scores and high school grades appears to me an unfortunate step backward into the subjectivity, invalidity, and social class biases of the 19th century. It would seem more sensible to predict the criterion for each applicant from all available predictors and then, if desired, to set up predictive lists separately for disadvantaged and nondisadvantaged. Those disadvantaged applicants who seem on the basis of all evidence most promising, academically and otherwise, can be accepted, offered financial aid, and, where needed, given massive educational remediation and tutoring.

I would urge a reversal of the current trend. The more disadvantaged a college applicant seems to be socioeconomically, the more objective information one needs about him. For example, one should know such things as how he scores on achievement tests in several specific subjects, such as chemistry and English composition, and what special developed academic ability or other relevant aptitude the student has. It is well to consider noncognitive measures also, but not in lieu of the cognitive ones.

The recent tendency to ignore test scores and rely mainly on the high school academic record may lower predictive validity. As Thomas and Stanley have reported (*10*, p. 203), ". . . high school grades do not consistently make the greatest contribution in predicting college grades of black students, perhaps particularly of men, whereas they do for whites. Unreliability of grade reporting, invalidity of grades in high school, restriction in range due to selection processes, and intergroup differences in personality characteristics [are] advanced to explain this phenomenon."

Predictive Validity

As noted earlier, aptitude test scores and high school grades, when employed together, usually predict college grades at least as accurately for disadvantaged applicants as they do for regular applicants. This is a carefully verified general finding, but if correlation coefficients are used, it depends on the relative range of talent in the two groups. At Cornell, for instance, first-semester correlations for students in a special program tended to be lower than for all freshmen in the College of Arts and Sciences. However, data for the former were from a pooled 4-year period, whereas for the latter they were for a single year. Heterogeneity of grading practices across the years may have lowered the correlation coefficients (*14*, table 5). Also, although there is no way to tell from the report how comparatively homogeneous the two groups are, it seems quite likely that test scores and perhaps high school grades of the special-program students (virtually all of whom were black) were considerably less variable than were those of the regularly admitted students (most of whom were not black). If so, much of the difference in correlation coefficients between the two groups was probably due to restriction of range rather than to invalidity of the tests. A single regression equation might predict college grades with equal accuracy for the two groups there (*24*).

Many claims are made that test scores have little or no value for predicting the success of disadvantaged applicants to colleges. Anecdotes are abundant (*25*), but upon investigation they are usually found to be atypical or cannot be verified. An admissions officer ignores test scores at his institution's peril. They are certainly useful most of the time in helping to predict college grades, and may also help to identify those students who, persisting through a highly permissive, selective college, will come out with an education rather than a quickly discredited union card.

Biased Items?

The issue of "biased" items was attacked vigorously but largely unsuccessfully in the early 1950's by Eells and others (*26*). Investigators worked

to devise a "culturally fair" test—one that would still be predictively valid but that would not discriminate as sharply between socioeconomic classes as, for example, the Otis test of mental ability did. The situations and items of the Davis-Eells "Games" were slanted toward urban slum cultures. Nevertheless, the new test differentiated among socioeconomic classes almost as much as its culturally "unfair" predecessors had (*27*).

A more recent study by Cleary and Hilton (*6*) revealed a small but statistically significant interaction of race (black and white) with the items of two forms of the Preliminary Scholastic Aptitude Test (PSAT). As Stanley (*28*) showed later, a considerable amount of this interaction was due to a few items that were too difficult for both races and hence did not separate them much. There seemed little likelihood that one could find in either subtest (verbal or mathematical) of the PSAT a subset of item types especially favorable or unfavorable to the blacks, who scored rather uniformly lower than the whites on most of the items.

For a long time it has been well known to specialists that blacks score relatively higher on verbal items than on most nonverbal items (*29*). Hence, attempts to create valid, culturally fair tests by reducing their verbal content have slight chance of being successful. Tests such as speed of tapping may not differentiate socioeconomic levels or races much, but they probably will not predict desired academic criteria adequately. Where the criteria are loaded in certain ways, the predictors must be loaded similarly if they are to correlate well with those criteria. If the criteria change (for example, from grades to persistence), the predictors may need to be changed.

Tacitly Different Criteria

If the correlation of certain fixed predictors with a criterion were different for one group as opposed to another, the criterion itself might well be different for each group, even though it is called the same thing by both groups (for example, grade-point average or receiving a diploma). Also, to predict persistence to graduation of high-risk applicants to a college may require considerable knowledge of the special probation policies, financial aid, grading practices, remedial courses, easy regular courses, and fail-safe curricula within the institution. The equation for predicting persistence to graduation from a given college may be quite different from the equation for predicting achievement-test scores of students who entered there quite underqualified academically.

Enrollees Quite Underqualified Academically

A considerable number of minority-group students with weak academic preparation are being recruited into the most selective colleges and universities in the country. There the academic-aptitude and achievement-test scores of many such recruits may be several standard deviations below the average, nonspecial student, and even far below the minimum level for regular admission to the institution. Most colleges do not publish figures for special compared to regularly admitted students, but one can get a few statistics such as the following:

Kendrick (*30*) infers from the Coleman report (*31*) that *"not more than 15 percent and perhaps as few as 10 percent of . . . Negro high school seniors would score 400 or more on the verbal section of the SAT. Only 1 or 2 percent would be likely to score 500 or more."* The percentages for all high school seniors in the country are approximately 45 and 20, respectively (*15*). Thus the number of black high school graduates each year who have well-developed verbal ability is quite small. As noted earlier (*14*), the 5th percentile of SATV scores for freshmen in the College of Arts and Sciences at Cornell University is 535. Brown University uses a cutoff of 620 on SATV to define those students who are considered academic risks: "Such a point defines approximately the lower one-third of currently admitted students . . ." (*18*, p. 3), but only about 4 percent of all high school seniors would exceed it (*15*).

Cornell University may have the ablest large group of black students in the country if SAT scores are used as the criterion. The verbal means of entering freshmen in the special program (composed almost entirely of black students) for 1965–66 through 1968–69 ranged from 530 to 570, whereas the means of the freshmen in the College of Arts and Sciences ranged from 660 to 703. The average difference between the students in the special program and the entire arts and sciences group was 137 points (*32*). No standard deviations are given, but this difference seems likely to be at least two of the standard deviations of the special group. The lowest SATV scores for the 247 students in the special program were reported by year as 430, 340, 400, and 383, respectively.

In the fall of 1967, Michigan State University enrolled "66 not normally-admissible Negro freshmen . . . [m]ore than half [of whom] had combined Scholastic Aptitude Test scores [that is, SATV + SATM] of under 789" (*33*). No comparative figures for regularly admitted freshmen are given, but the following remarks indicate the discrepancy (*33*, p. 13):

> May 28 [1968]: Lunch with four faculty members who want to "do something," meaning tutor Negro freshmen next fall. Their ideas are good, and all went well until they started saying how high the students' grades and test scores should be. They had a hard time believing we haven't even one that high in our special-admission group.

For the University of Illinois during the academic year 1968–69 Humphreys (*34*) reported "a difference between the means of the two races that was 2.4 times the standard deviation of the Caucasian distribution." Bowers (*35*) provides detailed comparisons of the 111 men and 152 women in the Special Educational Opportunities Program (SEOP) with the regular Illinois freshmen on eight test variables and high school rank. The SEOP students were considerably below the regular students in both respects. Admissions officers have known for many years that a double handicap of this kind (that is, ranking low within the entering class on both aptitude and high school record) makes for pessimistic academic prognosis.

Humphreys forcefully stated the dilemma Illinois faced (*34*):

> There will be an intolerable level of dropping of Negro students on academic grounds during the first year unless there is massive intervention. A desirable form of intervention is to establish special sections and special remedial courses. An undesirable form is for the faculty to assign grades in regular racially mixed classes on the basis of skin color rather

than performance. In the present emotional climate, if more desirable forms of intervention are not sufficiently massive, this second type becomes inevitable.

There is another effect of bringing in Negro students who are far below their fellow students in readiness to do academic work. A group of young people who are newly imbued with pride in race are placed in a situation in which they are, by and large, obviously inferior. A scientist qualifies this inferiority by adding "at their present stage of development," but this is slight consolation to the student involved. The causal chain from frustration to aggression is well established. A large ability difference as a source of aggression cannot be ignored. The universities are damned if they don't admit more Negroes, but they are also damned in another sense if they do.

It seems likely that trying to compete far above their comfortable level would confine to the easier courses and curricula most students who are quite underqualified academically, thereby limiting their choice. Also, though such students may pass most of their courses with C's and D's, one wonders what they will be learning, relative to what they might learn in another college where their relative level of ability is average or better. In addition, the negative concept of themselves which they may develop as low men on the academic totem pole must be considered. Perhaps they should be encouraged to attend colleges more geared to their level of academic competence. Not many colleges in the United States are highly selective: at least 2000 others of all sorts can accommodate most levels of developed ability and achievement.

Does Academic Frustration Increase Demands for Relevance?

I am pessimistic about the efficacy of remediation, tutoring, and coaching during the freshman year for overcoming large gaps. Also, I suspect that demands for many "relevant" minority-group courses and instructors are to a considerable extent probably unconscious rationalizations of the pressures of competition with regular students who are much better qualified academically. If the available curricula are too difficult, students must either demand easier curricula, fail, or leave. One's pride is saved, however, by not admitting (even to oneself) how almost impossibly difficult the regular courses and curricula are (*36*). Some statements by a black assistant dean of students at Cornell University and her assistant are applicable to the above conjecture (*37*):

> [The black students'] interest in making sure that their course work is relevant—a word they use with even more frequency than white students—has the fervor of a religious cause. It is not, however, a "white" relevance they seek . . . [A black student] commented, "Most courses aren't interesting to me. I find it difficult to study them. They are relevant to white students, but not to black students." . . . They define relevant courses as those taught by Negroes . . . or by professors who understand and take account of the Negro contribution and point of view . . . [B]y far the largest number are in the College of Arts and Sciences. And there it is courses in economics, sociology, psychology, and the humanities that arouse their passions most.

It is not easy to assess the contribution of academic unreadiness to demands for segregated curricula, departments, and colleges. However, recent events at a number of colleges seem consonant with the interpretation that academic unreadiness plays more than a minor role in activities which effectively reduce the competition with better-prepared students.

Less Selective Colleges Need Assistance

A major dilemma is that power, resources, and goodwill seem to reside chiefly with the academically difficult institutions, whereas the most suitable institutions for many of the disadvantaged are state colleges, certain private colleges, community colleges, and the less selective state universities. Over the years of this century, the principle that a high school graduate would usually be wise to attend a college neither extremely difficult nor extremely easy for him seems to have been validated rather thoroughly. The educationally disadvantaged should be treated as individuals, not as a species apart from the advantaged. They deserve special consideration and special treatment: adequate financial aid, remediation and tutoring, reduced course loads, extended probation, counseling, and so on. There is, however, no magic in a degree from a usually selective college if it is not in one's preferred field, if it represents little real educational attainment, or if the recipient has falsely convinced himself that he is stupid and convinced others that his entire racial, ethnic, or regional group is vastly inferior to the typical students in the college.

We need massive federal and local aid to put resources such as scholarships, loans, and counselors where they are most likely to yield the greatest educational increments. A number of persons are devising model federal scholarship programs that will include the disadvantaged (*38*). It should be unnecessary for those educationally disadvantaged students who prefer not to major in racial or ethnic politics or social studies to attend a prestigious, highly selective college simply because a less selective college cannot give them enough financial aid.

Admission and Facilitation

Nothing in this article should be taken to mean that I believe no persons from disadvantaging backgrounds should be in selective colleges. Clearly, some of them will be well served academically, socially, and emotionally there, if, despite their origins, they are not too underqualified academically. I advocate treating each college applicant primarily as an individual, rather than as a member of a group. Logically, that leads to essentially "color blind," "ethnic blind," and "region blind" admission to college, though students from disadvantaging backgrounds who are at the low end of the normally admissible applicant group can be given special consideration for admission and much educational remediation if enrolled. Admitting applicants who are quite academically underqualified for a particular college will necessitate new, easier curricula for that college, not just massive remediation and tutoring for the students.

Rank in high school graduating class, academic-aptitude test scores, and achievement test scores are still the best predictors of grades that an applicant would earn in a particular college and, probably, of his fruitful persistence there. I do not know of any convincing evidence that different predictors or even differently weighted predictors of current criteria of academic success are needed for the disadvantaged.

For the public schools, McPartland (*39*) has concluded that the presence of a high percentage of academic and value pacesetters within the individual classroom is essential for stimulating

the disadvantaged to greater achievement. If his findings generalize to colleges, many pacesetters seem to be needed in classes, but the disadvantaged students should not be almost hopelessly outclassed.

However, McPartland does not think that a mixture of whites and blacks is, in principle, crucial to education (*39*).

There is no question but that the desegregated Negro students could have experienced the same kinds of rewards and gains had they switched from the usual segregated school to another all-black school which enrolled students from highly educated and economically advantaged families. In practical terms, though, there simply are not presently enough advantaged black families to accomplish social class desegregation without racial desegregation.

Predicting Occupational Level

It is rather easy to be persuaded that, even if school grades and test scores predict success in school fairly well, they do not predict "life success" and therefore should be ignored. There is a basic flaw in such an argument, as a few examples will illustrate. Suppose one knows the Stanford-Binet IQ scores of a group of children, as Lewis Terman did in his famed "genius" study (*40*). If their IQ's range from 140 upward, averaging 150, one would predict their adult occupational level to be higher than that of typical adults. Analogously, what is the probability that out of 1000 carefully tested 8-year-old boys who have IQ's of 90 there will emerge even one mathematician or Shakespearian scholar on the Ph.D. level?

Suppose that for the 1950 high school graduating classes of 100 students or more one knew the names and present addresses of three males in each class—the top-ranking one, the one who ranked nearest the middle, and the lowest-ranking one. Subsequent education, occupational level, and even income would quite likely be found to differ considerably among the three groups. Of course, since school grades correlate positively with socioeconomic status, intelligence, and other variables, it is hazardous to ascribe causation to academic achievements. Nevertheless, the predictive value of school grades is considerable.

The usual fallacy of an argument against grades as predictors of success in life comes about because it seems to be true that among those persons who, for instance, exactly complete high school—no more and no less—it is difficult to find strong correlations of grades or test scores with measures of life success. Reflect though, that, by eliminating those persons who drop out before high school graduation and those who attend college, one homogenizes the group considerably with respect to motivation, socioeconomic status, intellectual ability, and many other characteristics. That restricts predictive possibilities greatly. Grades and test scores are rather potent predictors of continuation in school which, in turn, leads to increased occupational level and, usually, to increased lifetime earnings (but not invariably, of course, because, for example, a plumber may have a larger annual income than a physicist and may begin drawing it four or more years earlier). For other references and discussion, see Jensen (*12*, p. 13), Duncan (*41*), Witmer (*42*), Stanley (*43*), Lindgren (*44*), and Claudy (*45*).

Increasing Educational Mobility

Viewing the central problem more broadly, one must determine how children of the uneducated poor of any race or ethnic background can be given a better educational chance than they would usually get if not aided. Many such children suffer compound disadvantages: educationally unstimulating homes, poorly developing academic abilities, lack of financial resources, and community influences (especially peers) that are educationally disabling. Our nation is struggling with the problems of helping such youngsters develop their abilities and school motivation more effectively. Much more must be done far earlier than the 11th or 12th grade if efforts then are to be successful. A current dilemma is that present knowledge and funds are so limited that we do not often get to the really disadvantaged. They present so many problems of finance, motivation, and curriculum that nearly everyone tends to work with the more malleable, slightly disadvantaged instead. On the other hand, as Sowell (*46*) emphasizes, it is dangerous to ignore the abler members of a minority group while concentrating resources on the least promising ones.

Concluding Remarks

This article covers a complex area, and current practice often seems to me unwise. The many open-admissions programs can be informative, though perhaps often traumatically or even chaotically so. Because of delicate political considerations, objective evidence from most of them will be ruled out for all except a few concerned insiders. If we can devise ways to collect and share information from the many special programs without jeopardizing the positions of the perhaps insecurely placed persons who administer them, it may hasten needed corrective measures (*47*). Meanwhile, we must rely mainly on news media, within-college reports, public relations releases, and occasional articles in journals (such as the *College Board Review*) or papers read at professional meetings to discern even vaguely how effective the special programs are.

Summary

Test scores predict the college grades of educationally disadvantaged students at least as well as they do those of the advantaged. High school grades considerably augment the prediction for both groups. Regardless of socioeconomic level, students who are predicted to earn quite low grades within a particular college will tend to have academic difficulties if enrolled in it. There are social and educational justifications for admitting to a particular college some minority-group students who are marginally qualified for it academically, provided that the students are given adequate financial aid and effective remedial courses, tutoring, and coaching. However, if entrants are greatly underqualified academically, new curricula will be required. These may tend to segregate the specially admitted students from the regular student body, thereby diminishing the pacesetter role of the latter. Also, a degree from a special curriculum may not be viewed by employers, graduate schools, and alumni as equivalent to the other degrees awarded by the institution. Thus, admitting students who are seriously underqualified academically for the particular college seems likely to cause frustrations that may be difficult to resolve. Current demands by minority groups for "relevant" courses may re-

flect the academic difficulties many of their members encounter in present courses more than the educational unsuitability for them of such courses.

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7. For an excellent analysis of technical problems in studying prediction for different groups see R. L. Thorndike, "The Definition of Culture-Fairness," *J. Educ. Meas.*, in press.
8. J. C. Stanley and A. C. Porter, *ibid.* **4**, 199 (1967).
9. Other reviews are by Thomas and Stanley (*10*); S. A. Kendrick and C. L. Thomas, *Rev. Educ. Res.* **40**, 151 (1970); A. R. Jensen, *Toledo Law Rev.* **1970**, Nos. 2–3, 403 (1970); S. H. Cramer and R. R. Sevic, *College Board Rev.*, No. 78 (Winter 1970–71), p. 22. Other pertinent articles include: V. H. Hewer, *Pers. Guid. J.* **43**, 764 (1965); J. D. Boney, *ibid.* **44**, 700 (1966); J. R. Hills and J. C. Stanley, in *Proceedings of the 76th Annual Convention of the American Psychological Association* (San Francisco, 1968), p. 241; *J. Negro Educ.* **39**, 320 (1970). K. M. Wilson [*Research Memo. 69–1* (15 April 1969)] College Research Center, Vassar College, Poughkeepsie, New York, writes (p. 20) that "traditional admissions criteria tend to be at least as correlationally valid for [female] black students as for [female] entering students generally. There is moreover some evidence that predictions made on the basis of standard formulae may tend to *over*estimate the first-year performance of black students in the several colleges studied." An unpublished report by J. A. Davis (personal communication, 5 November 1970) shows similar overprediction in the integrated state colleges of North Carolina, as does an unpublished study by W. E. Sedlacek at the University of Maryland in 1969. B. C. Mitchell [*Educ. Psychol. Meas.* **27**, 1047 (1967)] and T. M. Goolsby, Jr., and R. B. Frary [*ibid.* **30**, 443 (1970)] have found that tests given in the first grade predicted school achievement of blacks at least as accurately as that of whites. A similar result for Mexican-American children was found by M. Hurt, Jr., and S. P. Mishra [*ibid.*, p. 989]. See S. Messick and S. B. Anderson, "Educational Testing, Individual Development, and Social Responsibility" (the authors, Educational Testing Service, Princeton, N.J., 1970). Also see *Testimony of Dr. Roger T. Lennon as Expert Witness on Psychological Testing in the Case of Hobson et al. vs. Hansen et al. (Washington, D.C. Schools)* (Harcourt, Brace & World, New York, n.d., circa 1968). Related to the prediction of academic grades is the prediction of job success. The considerable literature on the latter is in somewhat less agreement than that on the former. Few large, rigorous studies exist, and often the criteria are quite subjective. Some researchers seem convinced that the job success of blacks and whites is predicted equally well by employment tests without regard to race or socioeconomic level, whereas others either conclude that blacks are underpredicted (that is, achieve better than the test scores predict they will) or that they are overpredicted. Some relevant reports and studies are American Psychological Association Task Force on Employment Testing of Minority Groups, *Amer. Psychol.* **24**, 637 (1969); J. T. Campbell, L. W. Pike, R. L. Flaugher, *PR–69–6* (Educational Testing Service, Princeton, N.J., April 1969), summarized in *ETS Develop.* **17**, 2 (October 1969); F. L. Ruch, *Ind. Psychol.* **7**, 13 (April 1970).
10. C. L. Thomas and J. C. Stanley, *J. Educ. Meas.* **6**, 203 (1969); also see A. N. Cherdack, thesis, University of California, Los Angeles (1970).
11. The Scholastic Aptitude Test (SAT) of the College Entrance Examination Board and its junior version, the Preliminary SAT (PSAT), are taken by millions of high school juniors and seniors each year. The SAT consists of 150 five-option multiple-choice items and yields two scores: verbal (SATV), based on 90 of the items; and mathematical (SATM), based on the other 60. The verbal portion is made up of antonym, reading comprehension, verbal analogy, and sentence completion items. It may be thought of as a very general verbal achievement test, a measure of the verbal abilities the examinee has developed at home, in his community, and at school during his first 16 to 18 years of living. A great debate is going on among many people, especially psychologists, sociologists, geneticists, educationists, and anthropologists, about the extent to which scores such as SATV reflect the hereditary intellectual endowment of the examinee.
12. See A. R. Jensen, *Harvard Educ. Rev.* **39**, 1 (1969) and critiques of his article in the subsequent quarterly issues of that journal in 1969, especially pp. 273–356.
13. S. O. Roberts and D. B. Oppenheim [*Research Bulletin 66–36* (Educational Testing Service, Princeton, New Jersey, July 1966)] coached on the PSAT 720 students in the 11th grade in 18 Southern high schools which enrolled few nonblacks. They concluded: "The outcome of this study, like those of earlier studies investigating whether coaching can raise aptitude test scores [see *Effects of Coaching on Scholastic Aptitude Test Scores* (College Entrance Examination Board, 475 Riverside Drive, New York, 1968)], is essentially negative."
14. W. L. Tetlow, Jr., *Cornell Chron.*, "The Official Weekly Record for Cornell University" **1**, 6 (16 October 1969). At Cornell the 5th percentile on SATV in the College of Arts and Sciences is about 535, so most students who score in the lowest 5 percent there are far above the national median SATV score of high school graduates (which is less than 400).
15. Only about 14 percent of all high school seniors would score 535 or more [*College Board Score Reports* (1969–70), p. 23].
16. According to a personal communication from J. D. Black, director of the Counseling and Testing Center at Stanford, of the 21 specially recruited black freshmen who entered there in the fall of 1965, 19 had been graduated by June of 1970. As a group they scored well on SATV (mean of 571) and SATM (mean of 571), though they averaged lower than the Stanford freshman class (640 and 660, respectively). The lowest SATV score of the 21 was 442, which exceeds 66 percent of high school seniors. Their high school grade-point averages were high: six had 3.84 or more on a 4 = A scale; only one was below 3.05 (2.78), and his scores were SATV 442 and SATM 511. He was graduated in 5 years with an overall grade-point average not far above the minimum 2.00. The successful persistence of this group of able blacks at a highly selective university is encouraging, but it cannot be generalized automatically to include students (black or not) who have considerably lower test scores and poor high school grades. Also, in the absence of achievement-test data comparing these graduates with their fellow degree recipients, one cannot know how much they actually learned while persisting. Dr. Black has written me, "We do not have access to the performance of this group on the GRE [this is, Graduate Record Examinations] or other advanced achievement tests." This type of information is crucially needed as an objective supplement to the subjective criteria of college grade-point average and persistence to graduation. For further details about these students, see Dr. Black's mimeographed memorandum to "Interested Parties," dated 6 November 1970.
17. A. W. Astin, in *The Campus and the Racial Crisis*, D. C. Nichols and O. Mills, Eds. (American Council on Education, Washington, D.C., 1970).
18. E. Nicholson, *Final Report* [to the Ford Foundation] *of the Study of Success and Admission Criteria for Potentially Successful Risks* (Brown Univ., Providence, R.I., 1970).
19. Clark and Plotkin (*3*) note that for 1278 black students who entered interracial colleges during the years 1952–56 after having "sought some type of aid, counseling, or financial assistance from NSSFNS [the National Scholarship Service and Fund for Negro Students]," 66.6 percent had received a baccalaureate by the time their study was conducted. The mean SATV score of these students was 490. This persistence to graduation rate would probably have risen appreciably had they conducted another follow-up 5 or 10 years later; see Eckland (*22*).
20. F. H. Borgen, *Res. Rep. Nat. Merit Sch. Corp.* **6**, 2 (1970). Borgen obtained follow-up data on the first year of 1744 black males and females who began college in 1965; they had "reached the Commended state of competition in the first National Achievement Scholarship Program," and were therefore a select group. "Nearly all students in this sample completed the freshman year, and nine out of ten planned to return to the same college for the sophomore year" (pp. 16–17). Because of a nonresponse rate of 27 percent and the fact that these results are based on self-reports, the degree of persistence may be somewhat overestimated. Also, returning to the same college is not necessarily a desirable step for all students.
21. H. Astin, *Educational Progress of Disadvantaged Students* (Human Service Press, Washington, D.C., 1970).
22. B. K. Eckland, *Harvard Educ. Rev.* **34**, 402 (1954).
23. ———, *Amer. J. Sociol.* **70**, 36 (1964). Also see T. Husén, *Int. J. Educ. Sci.* **1**, 17 (1966) for the similar way that such influences work in Sweden.
24. Psychologists often compute correlation coefficients rather than regression slopes and intercepts, which are more appropriate for the type of comparison Tetlow (*14*) endeavored to make. Cleary (*5*) tested statistically at each of three colleges the hypothesis that the regression line for blacks had the same slope and the same intercept as the regression line for whites—that is, that a common regression line could be used to predict college grades fom the best-weighted linear composite of SATV, SATM, and high school grades (or rank in high school graduating class, which is often a better predictor than high school grades).
25. For example, B. Somerville, *College Board Rev.*, No. 65 (Fall 1967), p. 5. For letters by T. W. Sutton and J. C. Stanley concerning this article, and a reply by Somerville, see *ibid.*, No. 66 (Winter 1967–68), p. 39.
26. K. Eells, A. Davis, R. J. Havighurst, V. E. Herrick, R. W. Tyler, *Intelligence and Cultural Differences* (Univ. of Chicago Press, Chicago, 1951).
27. For example, H. G. Ludlow, *Sch. Soc.* **84**, 146 (1956). Relevant to the question of cultural bias is the finding by H. Bornstein and K. Chamberlain [*Amer. Educ. Res. J.* **7**, 597 (1970)] that "In spite of what appears to be a marked simplification of syntax and a considerable reduction in level of vocabulary, the social studies items function psychometrically the same as items which were couched in more difficult language" (p. 604).
28. J. C. Stanley, *Educ. Psychol. Meas.* **29**, 793 (1969).
29. For example, G. S. Lesser, G. Fifer, D. H. Clark, *Monogr. Soc. Res. Child Dev.* **30**, 4 (1965); S. S. Stodolsky and G. S. Lesser, *Harvard Educ. Rev.* **37**, 546 (1967); and Jensen (*12*, p. 109), who said, "Some of the least culturally loaded tests show the largest differences between lower- and middle-class children." But read further for an exception to that statement.
30. S. A. Kendrick, *College Board Rev.*, No. 66 (Winter 1967–68), p. 8.
31. J. S. Coleman, E. Q. Campbell, C. J. Hobson, J. McPartland, A. M. Mood, F. D. Wein-

feld, R. L. York, *Equality of Educational Opportunities* (Government Printing Office, Washington, D.C., 1966).
32. *Expanding Opportunities for Minority Groups* (Committee on Special Educational Projects, Cornell University, Ithaca, N.Y., n.d., circa 1968), table 2. Also see Tetlow (*14*).
33. G. A. Sabine, *College Board Rev.*, No. 69 (Fall 1968), p. 11.
34. L. G. Humphreys, *Science* **166**, 167 (1969).
35. J. Bowers, "Factor Structures and Predictive Validities of College Ability Tests for Regularly Admitted and Disadvantaged Beginning Freshmen at the University of Illinois," paper read at the American Educational Research Association convention, Minneapolis, 3 March 1970. In *J. Educ. Meas.* **7**, 219 (1970) Bowers examines prediction equations for a larger group of such students and warns about difference in the college-grade criterion for special-program versus regular freshmen. For further comparison of black and white students at the University of Illinois, see S. C. Davis, J. W. Loeb, L. F. Robinson, *J. Negro Educ.* **39**, 359 (1970).
36. This is a highly unpopular point of view, labeled illiberal or worse by many blacks and whites, as I have learned from reactions to several of my letters which state this viewpoint. See (*25*); J. C. Stanley, *Harvard Educ. Rev.* **37**, 475 (1967); *ibid.* **38**, 346 (1968); W. F. Brazziel, *ibid.* **37**, 646 (1967); *ibid.* **38**, 346 (1968); J. C. Stanley, *Science* **163**, 622 (1969); *ibid.* **167**, 123 (1970); *Trans-action* **7**, 54 (November 1969); W. H. Friedland and H. Edwards, *ibid.* **7**, 62 (December 1969); J. C. Stanley, *College Board Rev.*, No. 77 (Fall 1970), p. 24; *APA Monitor* **1**, 9 (December 1970).
37. G. Joseph and B. Newsom, *Cornell Alumni News* **70**, No. 8 (June 1968), p. 10.
38. See, for example, economist J. D. Owen, *Towards a More Consistent, Socially Relevant College Scholarships Policy* (Center for Social Organization of Schools, The Johns Hopkins University, Baltimore, Rep. 61, January 1970).
39. J. McPartland, *Johns Hopkins Mag.*, **21**, No. 20 (April 1970), p. 22. Neither McPartland nor I advocate racially, ethnically, or socioeconomically segregated schooling at any level. As noted earlier, most colleges in the United States are only mildly selective, if at all. Somewhere there is a college easy enough for almost any high school graduate. Unfortunately, the applicant with poorly developed academic abilities may not be near a suitable college. Comprehensive open-door community colleges, in particular, are not nearly widely enough available. See W. W. Willingham, *College Board Rev.*, No. **76** (Summer 1970), p. 6.
40. L. M. Terman and M. H. Oden, *The Gifted Child Grows Up, Genetic Studies of Genius, IV* (Stanford Univ. Press, Stanford, Calif., 1947); M. H. Oden, *Genet. Psychol. Monogr.* **77**, 3 (1968).
41. O. D. Duncan, *Eugen. Quart.* **15**, 1 (1968).
42. D. R. Witmer, *Rev. Educ. Res.* **40**, 511 (1970).
43. J. C. Stanley, *Science* **160**, 139 (1968).
44. H. C. Lindgren, *ibid.* **171**, 232 (1971).
45. J. C. Claudy, "Educational outcomes five years after high school," paper read at the annual meeting of the American Educational Research Assoc., New York, February 1971.
46. T. Sowell, *N.Y. Times Mag.* (13 December 1970), p. 36.
47. D. T. Campbell, *Amer. Psychol.* **24**, 409 (1969).
48. The views expressed in this article are those of the author. They should not be construed as reflecting official or unofficial policies of the College Entrance Examination Board or The Johns Hopkins University. An earlier version of this article appeared in September 1970 as Report No. 79 of the Center for Social Organization of Schools, The Johns Hopkins University. I thank John M. Stalnaker for his penetrating written comments concerning that report.

Participatory Technology

Citizen participation in the public development, use, and regulation of technology is examined.

James D. Carroll

In recent decades the idea of the alienation and estrangement of man from society has emerged as one of the dominant ideas of contemporary social thought. While interpretations of the concept of social alienation vary, Etzioni (*1*) has expressed the core of the idea as "the unresponsiveness of the world to the actor, which subjects him to forces he neither comprehends nor guides. . . . Alienation . . . is not only a feeling of resentment and disaffection but also an expression of the objective conditions which subject a person to forces beyond his understanding and control."

There is considerable speculative and observational testimony and some empirical evidence (*2*) that the scope and complexities of science and technology are contributing to the development of social alienation in contemporary society. Keniston (*3*), for example, suggests that technology and its effects have been a factor in the alienation of many young people. At the same time he notes that the attitude of many young people toward technology is ambivalent because a revolt against the effects of technology must inevitably exploit the technology it opposes. In a different vein, De Jouvenel (*4*) has testified to the adverse psychological impact of scientific and technological complexities on sustaining general confidence in one's judgment. "Because science saps such individual confidence, we have a problem, which I feel we can meet but which it would be imprudent to deny." In a more general observation Mesthene (*5*) recently has referred to "the antitechnology spirit that is abroad in the land."

Participatory Technology

In this article I analyze the incipient emergence of participatory technology as a countervailing force to technological alienation in contemporary society. I interpret participatory technology as one limited aspect of a more general search for ways of making technology more responsive to the felt needs of the individual and of society. The term *participatory technology* refers to the inclusion of people in the social and technical processes of developing, implementing, and regulating a technology, directly and through agents under their control, when the people included assert that their interests will be substantially affected by the technology and when they advance a claim to a legitimate and substantial participatory role in its development or redevelopment and implementation. The basic notion underlying the concept is that participation in the public development, use, and regulation of technology is one way in which individuals and groups can increase their understanding of technological processes and develop opportunities to influence such processes in appropriate cases. Participatory technology is not an entirely new social phenomenon, but the evidence reviewed below suggests that its scope and impact may be increasing in contemporary society.

I first analyze several facts of which people are becoming increasingly aware that suggest why participatory technology is emerging as a trend, and I then analyze different forms of this trend. Finally, I evaluate some of its implications.

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