Research Note

Prof. Terman and Those Horrible, He Thought, College Students: The Intelligence of American College Students in 1920 and Later, From Army Alpha to SAT

Colin B. Burke, Nov. 2016

In 1921, there were many reasons why Lewis Madison Terman, the influential intelligence testing expert, should have been a contented American college professor --but he was not a happy man. Some of the causes of his discontent were voiced in an important speech he gave that year to a group of influential supporter of his university. He bemoaned the status and isolation of his home campus and he denounced the intellectual abilities of its students. The article also reflected his frustrations over his unfulfilled career ambitions.[1]

Terman went beyond complaining about his university. He declared there was an academic emergency facing all of America's colleges. Although it was the 'age of the research university' there was, he insisted, a dire need to eliminate the economic and academic waste caused by the colleges and universities admitting thousands of intellectually inferior students.

He was direct about a solution to a coming crisis that would result from the anticipated expansion of enrollments in higher education. The immediate and massive application of new-fangled intelligence tests, like the ones he created, had to replace the old selection methods the colleges and universities had been using. The old systems were no longer workable and allowed unqualified students to burden the nation's higher educational system.

The Non-Sweet Taste of Success

Terman's negativity is somewhat surprising. Although it had taken decades of personal and professional struggle, by his early forties he had finally become recognized as one of the outstanding new cadre of professional American academics, a type that had begun emerging at the turn of the century as the United States developed its own research institutions and as ministers and moralists were replaced by 'scientists' in its universities.[2]

Terman certainly was one of the first renowned 'scientific' educational psychologists in any American college. He was adept at employing the newly developed statistical tools, such as correlation and regression, to explore the implications of Darwinian evolution theory as he and his peers replaced philosophical speculations about human psychology and intelligence with their empirically based studies built on such revolutionary tools as 'verbal' mental tests.

There was more that should have made Terman a happy man. He had gained international professional status and had a satisfying personal life. He held a highly-paid full professorship at Stanford University in beautiful Palo Alto California located just thirty miles from San Francisco; he was on the verge of receiving quite handsome royalty income from the sale of millions of copies of his intelligence tests (such as the famous 'Stanford-Binet'); and, he lived in a handsome custom-built home on Stanford's grounds. He also had a solid marriage and had fathered an obviously brilliant son who would become renowned after World War II as the 'father of Silicon Valley' and who would be revered as the man who moved Stanford into the ranks of America's great universities.

Although Palo Alto was three thousand miles and days of train-travel from the power centers of America's new academia, Terman was not, as he often complained, isolated and cut-off from the advanced ideas and leaders on America's East Coast. He had worked closely with the nation's foremost psychologists for decades and his coworkers and friends included, among

many others, the celebrated and influential Robert Yerkes, Henry Goddard, and Edward Thorndike. In addition, Terman was active in the nation's major professional organizations, including the National Research Council and the National Education Association--and he was on-track to become the president of the American Psychological Association. He was also somewhat of a hot-item in the new national market for academics. He had turned down job offers from prestigious Eastern institutions, such as Columbia University's Teacher College in New York City. As well, he was not a secluded ivory-tower academic. He was an influential applied scientist and believed he had a mandate to shape public policies. His work on intelligence testing was aimed at improving all levels of American education and he would join the unique Psychological Corporation that applied psychology to industrial problems.

Of great significance, Terman had played a major role in the first mass intelligence evaluation project in the world, the American Army's World War I Alpha and Beta testing of some 1,700,000 recruits and officers. Terman was also involved in Robert Yerkes' ambitious post-war plan for a National Intelligence Test. It was to be used in all of the nation's schools and, like Terman's own Stanford-Binet, its proponents hoped it would allow the sorting of students into educational tracks, as well as future occupations, based on their measured intellectual capacities.

An Almost Horatio Alger Academic with an Elitist Attitude

Terman's climb towards the top of America's new academic hierarchy had not been quick or easy, however. His early struggles were one of the reasons for his discontents and, ironically, what became his elitist perspective on educational policies. No privileged family or educational background accounted for Terman's achievements, something that shaped his later belief that 'nature' was more important to intellectual accomplishments than 'nurture', and that there was a natural limit to the number of intelligent people in any population.

Terman was an academic version of Horatio Alger, but without Horatio's luck in finding a rich benefactor early in life. Born in 1877, Terman was the twelfth of fourteen children of a well-off but not rich Indiana farm-family. He was a rather 'sickly' boy and his formal education was in one-room, one-teacher rural schools until he was fifteen. He was recognized as bright and motivated but that did not lead to early entry into a college or university. The best his family could do was to enroll him in Danville, Indiana's privately-run, for-profit Central Normal College, one of those hybrid and not well-regarded institutions that served as a combination high-school, teacher preparation institution and, over-ambitiously, a college. Terman was awarded a Bachelor of Pedagogy and Bachelor of Arts Degree at age seventeen, but that was not the end of his relationship with the 'college'. While he taught at local grammar schools for the next four years he earned more degrees from Central. His new degrees helped his career a bit, but not by much. [3]

The best he could find was a job as a lowly-paid principal of a local rural high school where he had to do most of the teaching. At the same time, he took-on the responsibilities of wife and child--just as he had one of his recurrent serious tubercular episodes. Along with his intellectual interest in the emerging 'science of education', and his fears that his health would not allow him to meet the physical challenges of school-teaching, he accepted family loans and once again enrolled in college, but this time with a determination to become a college professor.

At the rather advanced age of twenty-six he was awarded another Bachelor of Arts Degree, but not one from a prominent elite Eastern institution. He had again chosen a nearby school, Indiana University, an institution that was attempting to meet the standards of the East Coast's

new research universities, but had not quite done so. Another of Terman's life-critical decisions followed. Although with family responsibilities, needing more financial help from relatives, and with his wife having to take-in boarders, he decided to continue his education and to do so in the emerging but still ill-defined specialty of educational psychology.

There Will Be a Science of Education!

This time he did enroll in one of his idolized East Coast institution. He entered the unique but stressed Clark University in Worcester, Massachusetts. Clark was devoted to post graduate education and was led by G. Stanley Hall, the man regarded as the founding father of American educational psychology.[4] Hall's studies in Germany and his belief in Darwinian theories about the role of genetics in all aspects of human life profoundly influenced Terman, as did Hall's reliance on empirical research and near blind-faith in statistical analysis. Although Terman, as had Hall, first concentrated on measuring the physical development of the young, Terman spent some time during his two years at Clark exploring a new and still amorphous field in intelligence research, one sometimes called 'mental testing'. It relied upon a subject's verbal responses to questions rather than measurement of such things as reaction time to stimuli.

Terman suffered from another round of tubercular episodes as well as academic in-fighting while at Clark, but received one of the still rare American Ph. D. degrees in 1905—at the advanced age of twenty-eight. Disappointing, despite his new academic status, he was not asked to become a member of any of the many emerging psychology or education faculties in America. Frustrating, he could not afford travel to Europe to raise his academic status by gaining another degree from a German of French university, something prestigious American universities were demanding. As maddening for Terman, he was not recruited to lead even a private preparatory school, nor was he asked to head any urban education department. The best offers were for positions as a high school principle—and not in the East. Partly because of his physicians' advice to move to a better climate, he accepted an offer from the small town of San Bernardino, California, located some sixty miles from then tiny Los Angeles.

Although annoyed by California's geographic isolation and suffering more tubercular attacks, Terman managed to perform his principal's duties and to publish some works on the nature of the precocious child, a topic that had interested him and his mentor G. Stanley Hall. Perhaps reflecting his own youthful torments, Terman emphasized that intellectually gifted boys did not fit the stereotypes of being physically and socially maladjusted.

Terman's publications, and recommendations from his friends at Clark and Indiana Universities, soon led to a chance to take a step towards a true academic position. As he was approaching thirty he received a job offer, but not from a research university or even a recognized college. It from Los Angeles' State Normal School. Normal was an upgraded version of the many institutions that had been created in the late Nineteenth Century to quickly supply teachers for the expanding common schools. Along with zero or low tuition they had not expected their students to meet the admission standards of traditional colleges, nor did they ask the students to spend more than two years before receiving teaching certificates. Then, as primary schools became larger, and as high schools were changing from being elite college-preparatory institutions to becoming complex institutions for mass education, the normal schools expanded their curricula and strengthened their standards. With increased status and budgets, schools such as Los Angeles Normal were able to lighten the instructional-loads of their faculty and aim at educating administrators, not just teachers.

Because of those changes, Terman accepted the position of a 'professor of education' and began teaching pedagogy in Los Angeles. He was able to find time to publish a string of education related articles, some in popular magazines. They were usually about student health issues, a subject that had become his recognized specialty and that was of great interest to those in the expanding educational bureaucracies as schools became responsible for more and more aspects of their students' lives.

Terman was not satisfied in Los Angeles, however. He hoped to escape the intellectual loneliness of the West and join the ranks of America's academic elite in the East. He achieved some academic recognition by lecturing during a summer session at Indiana University, his alma mater, but he remained at Los Angeles Normal for four frustrating years until 1910 when the first-choice candidates for a university position pulled out of contention.

To 'The Farm'

Perhaps not realizing he was less than second-choice, the late-arriving offer was appealing to Terman-- although it was only for an insecure assistant professorship, was at a salary less than that at Los Angeles Normal, and was at the out-of-the-way Palo Alto California 'farm' campus of Stanford University. Stanford had begun in the 1890s with an enormous endowment from the railroad magnate Leland Stanford's estate but it was still a struggling institution located on the Stanford family's old rural retreat. It had not yet found its educational way nor had it attained financial security. The school was relatively small and was recovering from battles among its faculty, its administrators, and its founder's widow. The suspicious poisoning death of Mrs. Stanford in 1905 had compounded the campus' internal political problems. [5]

As well, in 1910 the school had not fully rebuilt after the devastating earthquake of 1906 and it was enduring disappointments caused by its students misusing the university's policy of allowing undergraduates to select all of their classes rather than requiring them to meet intellectual standards by having a prescribed liberal-arts course for freshman and sophomores. The campus also had a reputation within the academic community of being overly generous in its admission standards.[6]

Although Stanford University was tuition-free, and still had that 'elective' policy in 1910, its administrators and faculty feared that it might never attract enough talented male students to fulfill its original mandate to achieve the balance between liberal and applied programs as Leland Stanford had thought his educational hero, Cornell University, had done. There was also a gender issue. At the insistence of its benefactress, it had passed a rule that no more than 500 of its students could be female. Mrs. Stanford wanted to ensure that the school would not become a West Coast version of the East's elite Seven Sister female colleges--or just a producer of female school teachers.

Even before Terman arrived the university had been attempting to raise it standards because its leaders desperately wanted the school to be regarded as a research university. Its administrators would soon end the 'elective' system, they battled to increase admission standards, and they began demanding increased faculty research productivity. Stanford's education department had been among the first targeted for an academic uplift. Ellwood Paterson Cubberley, the soon-to-be famous educational administration expert, and historian of education, had been hired in 1905 by David Starr Jordan, the college's president, who then helped Cubberley obtain a Ph.D. at Columbia University in New York City so that Stanford's department would have a chance to attain national status. Without a Ph. D-holding chairman, Stanford's department was unlikely to attract exceptional students or faculty.

Disappointing, Stanford had not been able to become a competitor in the national market for outstanding faculty. Jordan always had to rely on his old connections when searching for his professors. He had been Indiana University's president before being selected by Mr. and Mrs. Stanford in 1891 to head their campus and he used his Indiana connections to recruit his original faculty, and continued to do so when he searched for 'new blood'. Cubberley, as well as Terman and others, were Indiana graduates or ex-faculty members.

Cubberley was a wise choice to guide Stanford's education department, but when Terman was recruited it had not made-its-mark in academia. So, while enthusiastic about working under Cubberley, Terman knew he had made a risky career choice when he agreed to move with his wife and ten year old son Frederick to Palo Alto. Fortunately, Terman got along well with Jordan and his successor, and with his faculty colleagues. Terman was soon promoted to associate, then full professor, and felt secure enough to accept funds from his wife's family, and help from the university, to erect a home on the campus' grounds. Following Jordan's goal of making Stanford a research hub, Cubberley allowed Terman to do more than teach and publish on school hygiene and sex education. He was given time and some resources to pursue the development of intelligence testing, an interest of his since studying at Clark University.

There Will Be A Science of Intelligence—The Fit Will Prevail!

Terman was one of many researchers in the United States envisioning the redoing the verbal intelligence tests developed in 1905 by Alfred Binet and Theodore Simon. Those French psychologists had been mandated by their government to efficiently identify intellectually deficient lower-school students so they could be assigned to special classes or institutions. Their tests tapped the reasoning and knowledge of subjects, rather than measuring physical attributes. Terman and other Americans sought to fit the Binet-Simon test to American students—and to do much more with the results. They wanted tests that went beyond identifying the young children who were unlikely to do well in regular schools.

Terman hoped for a test that would bring efficiency to all levels of schooling by providing the information needed for assigning students to educational tracks that fit their capabilities. He also hoped his test would aid teachers in advising parents and students on making career choices early-on in life. In addition, one of his most important goals was to identify gifted students who had been overlooked by the educational system so that their talents would not be wasted.[7]

As soon as he reached Palo Alto, Terman began revising and expanding Simon's test—and advancing his career. He leaped ahead of other American educational psychologists by establishing the validity and norms for his versions through administering them individually to over 2,300 people in the area around Stanford. Some 1,700 students, 400 adults, and 200 "retarded" were used to refine the tests' content and to establish benchmarks for such things as expected normal scores by age and occupation. Terman published the first tentative edition of his Stanford-Binet test in 1912, immediately making quite a name for himself in academia. Four years later, he released an operating version.

He did much more. Reflecting his deepening Darwinian beliefs, his commitment to play a role in shaping America and its schools, and his Horatio Alger-like life history his emphasis shifted from pedagogy (teaching) to the identification of those naturally 'fit' to benefit from education. He declared that the growth of a person's general intelligence leveled-off by age sixteen and that only a few persons belonged to the natural intellectual elite. He also began determining refined intellectual norms, in terms of intelligence test scores, for selecting those who had the potential for success in college and professional life. His standards were high and

reflected his belief that America needed to identify an intellectual cadre that could counterbalance the downward forces that were distorting the nation's culture and politics.

Terman declared that an intelligence score typically achieved by only the top two or three percent of any population was the minimum required for any important leadership position, or for success as a student in a true university. Meanwhile, Arthur S. Otis, his graduate student, was working on a paper-and-pencil version of the test that could be administered to many people at one time and then scored by low-cost clerical workers. Otis' version was much less expensive to employ than Terman's original Stanford-Binet, and paper-and-pencil versions soon allowed the widespread use of intelligence testing in American, European and Asian schools. [8]

Terman's intelligence testing work, along with his continued publications on school health issues, was making him a national figure and there were hints he was going to receive more offers of positions in the elite schools in the East. Stanford responded with a substantial salary increase, a promise of more time for his research, and help in obtaining grants from such organizations as the Rockefeller's General Education Board. Terman was disappointed in his first grantsman's efforts but more favors from Stanford's administration and his family's desires kept him in California.

Then, his career received a great boost. Robert Yerkes, another academic intelligence researcher, a central player in the psychology profession's organizations and in the powerful National Research Council, asked Terman to join in a project to develop a test to aid the United States' armed forces as they prepared to enter World War I. The military wanted help in eliminating unfit recruits and in identifying potential officers. The project began with limited goals but soon morphed into a test for determining broadly defined 'intelligence' levels. The goal was no longer just tapping the particular job aptitudes of test-takers or whether they were mentally deficient.

Terman spent two years on the ambitious project, as did Arthur Otis. Meanwhile, Terman had been developing new tests for school students and was, at age forty-four, beginning what became, a decades-long project for tracing the lives of several hundreds of 'genius' students who had been chosen after scoring at the highest levels on his tests. He achieved more fame when he published his popular work on how intelligence tests could and should be used to reorganize the schools by sorting out students into classes designed for their ability levels. He was also becoming a figure in the eugenics movement that, because of a fear that the nation's intellectual (and moral) levels were declining, supported various methods of population limitation, as well as immigration restriction.

A Real University Needs Money and, Above All, Great Students….

Yet, Termin remained unhappy. His 1921 presentation to the Stanford Forum indicated that. There were continuing problems at Stanford that justified his frustration. Faculty salaries had stagnated and the university's financial situation remained precarious. Faculty pensions were in danger and only a grant from the Rockefeller foundation saved them. The financial crisis was one of the reasons for the school's inability to attract the kind of prestigious faculty it needed to raise its academic stature.

The economic situation was dire. For the first time in its history, Stanford had to charge tuition, some $75 ($1,009 in 2016 dollars) a quarter by 1921. With that, and with the long-awaited new requirement of a mandated freshman and sophomore course of study, there were worries that the school's increase in undergraduate enrollments might end and that few bright graduate students would appear. There were also, as Terman emphasized, problems with the

enrolled students. Some sort of disciplinary action had to be taken on half the student body each year. Also, like many colleges and universities, even state institutions with attractive occupation-preparation courses and low tuitions, Stanford was losing near half of each freshman class before graduation, most dropping out or being dismissed after their freshman year. That, Terman declared, meant a great loss to the university and society because of the thousands of dollars in subsidies expended on each student per year. Those wasted funds prevented universities from supporting their most vital function what, he now proclaimed, was research.

Terman had became so irritated that he almost accepted an offer to move east to Yale University, the Connecticut college that was soon to be the home of Robert Yerkes' ground-breaking intelligence research project. Yerkes was following Darwinian evolutionary premises by extending psychological research to the study of primates' intellectual capabilities.[9] The promise of being made the head of Stanford's psychology department as soon as there was an opening was perhaps the reason Terman once again decided to remain in Palo Alto.

He continued to be dissatisfied. He wanted Stanford to change—especially its student body. He wanted its students to match the ability levels at the few "true" American universities in the East, such as Clark. Now a firm believer that inheritance, not education, determined intellectual abilities, and that higher education and faculty time would be wasted on all but a fraction of the population, Terman advocated his own version of eliminating the unfit. For him, only when the bottom half of Stanford's student body was replaced by a thousand students with intelligence quotients that would qualify them for membership in later intellectuals' organizations, such as Mensa, could Stanford have a chance to become a real university. Terman more than implied that the need to sort-out the less than elite students applied to almost all American educational institutions.

A Nation of Mostly Morons?

Terman's low estimation of the abilities of the average America college student had been reinforced by his interpretation of the results from the World War I Army Alpha (for literates) and Beta (for illiterates) intelligence testing.[10] For Terman, and most of his professional colleagues, the Alpha and Beta tests were indisputable evidence of the low (innate) intelligence level of the American population**.** The results from the world's first mass intelligence tests affirmed Terman's prior beliefs--and startled the nation. The average 'mental age' was declared to be thirteen and one half years, a level far below that needed for success in high-school. For those scoring below that there seemed little chance of doing well in a middle or even common school. Those scoring lower than the very disappointing national average were usually foreign-born recruits, Negroes, laborers, farmers, and those from the American South. The Army's and other intelligence tests also typically gave lower scores to those above age twenty.

The tests' results had the potential to shape fundamental educational policies and institutions. Limiting access to schools and creating special programs for the low scorers were often mentioned alternatives. Many Americans accepted the Alpha-Beta findings, worrying they might be living in a nation of what they called "morons".

There were criticisms of the tests, however, especially of their use as justification for any fixed, inherited-abilities interpretations. Even before the Army tests had been administered psychologists who had experience with aptitude examinations for jobs in industry and government pulled away from the Army tests' development group, objecting that 'intelligence' was too difficult to define or measure. Then, there were protests that the low scores by those in various groups were the product of racial and cultural biases. When several of the developers of

the Alpha and Beta tests, such as Carl Brigham, declared that the tests proved there were genetically caused ethnic and racial differences in native intelligence, a never-ending stream of denunciations of the nature, administration, and analyses of the World War I tests began.[11]

The criticisms were immediately countered. Terman became more of a public figure when he responded to the famous liberal (but elitist) Walter Lippmann's condemnation of Alpha and Beta with a defense of those tests and intelligence testing in general.[12]

The Bias: The Modern Man and Student

The criticisms were immediately countered. Terman became more of a public figure when he responded to the famous liberal (but elitist) Walter Lippmann's condemnation of Alpha and Beta with a defense of those tests and intelligence testing in general.[13] However, criticisms such as Lippmann's had merit. There had been procedural problems when administering the Army's tests and they did have, inescapably, a 'slant'. But that slant was towards indentifying those who would be likely to succeed in a modern, urban, and intellectually oriented setting. The tests had been developed by the nation's new academic best-and-brightest and had been validated by investigating how well members of the most respected occupations, and those with most education, scored. The tests did seem to fulfill the goal of identifying 'modern men': Civil engineers, accountants, military officers, college graduates and urbanites scored much higher than others. However, to the surprise of those who had long criticized religious influence in schools and colleges, Army chaplains and civilian ministers many times scored as high as the iconic modern men of the era, civil engineers.

How well the tests measured intelligence remains controversial, but is certain the tests were evaluating readiness for higher-education. It was no accident that the first mass test for college admissions, the Scholastic Aptitude Test (SAT) was created in 1926 by one member of the team that devised the Army tests. SAT was modeled after Alpha and rewarded those who fit the mold of the students most desired by America's new research universities—the kind of student Lewis Terman demanded.[14]

There were more spin-offs from World War I's tests. The belief of many educators that intelligence testing would be valuable for all schooling levels was quickly turned into action. By 1930, 13,000,000 American lower-school students had been tested using one of the many new instruments devised for the young. Well before then, testing had also spread to high schools, teachers colleges, universities and colleges. By shortly after World War I, some 200 colleges had used one of the intelligence or aptitude tests. Among them, approximately forty-five colleges and universities have been identified as employing the army's Alpha examination. The outcomes from all but six were released to the public.[15] The scores on some forty high school Alpha examinations and over fifty normal school Alphas were also made available. While only a fraction of the some 1,000 colleges and normal schools of the era, the reporting institutions are a fair representation of the condition of higher education that was of such concern to Terman and his colleagues.[16]

Importantly, the results from the army's World War I national sample confirm the results from the schools' tests, as well as providing the only national base-line for comparing the results of the school results to the general population of the period.

There were several reasons for employing the Alpha test in the higher schools. One was economic: The manuals and forms had been declared war surplus and there was little expense in using them. That meant that educational psychologists with a purely scientific interest in the results found it easier to convince administrators to give the tests. There were more general

educational forces at work that spurred the testing movement. With high school attendance rates exploding, going from fourteen to forty seven percent of the relevant age group (15-18) between 1900 and 1920 (to seventy-six percent by 1930), and with college rates increasing from two to five percent of those between eighteen to twenty-four in the same period (and to seven percent by 1930), there was a need to bring order. The high schools wanted to know if they were producing less able graduates because of the pressures to be democratic. The colleges and universities worried they would soon be admitting too many ill-qualified students. The new intelligence tests seemed an efficient way to evaluate the situation. They seemed cost-effective replacements for the old expensive on-site college entrance examinations and an alternative to the system of admitting students simply because they had graduated from an accredited secondary school.

The Alpha and other tests seemed so important they quickly became subjects in themselves. Numerous studies appeared in the next decades to determine how well they predicted success or failure in the schools and colleges. As with later college entrance tests, the findings concerning the relationship between scores and academic achievement are debatable, although the examinations always proved to be the best single predictor of success.

Yes, the Schools Were Elitist--But Not Enough for Terman

Together with the education related results from the WWI Army tests, the scores from the 1920s examinations in high schools, normal schools and colleges give a rather clear picture of the selective character of American higher education in the early Twentieth Century. Not surprising, Lewis Terman had his own interpretation of the test results. Although he had some justification for complaining about Stanford's students, he used an ultra elitist standard when evaluating the degree of selectivity of America's colleges in the 1920s.

It had long been known that American higher education was 'selective'. Its student population never matched the profile of the general population and it did not do so in the early Twentieth Century. The results from the World War I surveys showed that, for those over the age of college graduation, of each one hundred men forty-five who had completed the eighth grade, only nine completed high school and only one college. There was more to the selectivity. The well respected Reports of the Commissioner of education showed the colleges had and continued to eliminate students once they had been admitted. During the 1910s, only fifty-four percent of any college freshman class went on to earn a degree in a typical college. The 1920s had an increase to sixty-one percent, but that was followed by a return to a completion rate in the mid-fifties during the 1930s. Those drop-out rates were a major concern to more educators than Terman. Some looked to change the nature and standards of college education to reduce the loss rates, others like Terman sought ways to prevent the admission of the 'unfit'.[17]

It was never determined how much both types of selectivity (entrance and withdrawal) had been the result of social and economic inequalities and how much had been due to intellectual sorting. Sociologists pointed towards economics, as would the many historians of higher education who viewed college students of the era, especially those in liberal arts programs, as pampered youths hesitating to compete in a modern world.

Despite sociologists such as George F. Counts emphasizing the role of family and social-status in attendance and persistence rates, World War I's Alpha results indicate that even if economics played a significant role, America's higher schools were part of an intellectual hierarchy that rewarded the 'modern student'.[18]

The Tests Showed a Biased System, But What a Bias

The results of World War I's and the schools' use of the Alpha examination were usually presented as the raw scores of individuals, institutions and groups, a form that is minimally useful for an historical perspective. More informative are percentile ranks that show the standing of a score relative to all others, the percentage of a group falling with the boundaries of what Terman's colleagues called the superior and very superior scores, and related mental age and IQ scores.

No matter which of those measures are used, or the technical particulars of how they are calculated, the results reveal that America had a positively biased educational system in the early Twentieth Century. Most all of those enrolled in America' colleges deserved the title of at least 'superior' and certainly 'modern'.[19]

Terman's colleagues on the Army project were more generous than Terman in defining the range of scores for those who might be successful college students. They tagged them as A or B students. They thought those who received an Alpha score of 105 to 134 fell into the B or 'superior' intelligence group and those with scores of 135 and above were A or 'very superior'. 105 was almost twice the national average (median) score of the native born white recruits. Being classified as 'A' implied an IQ of 130 or greater, 'B' pointed to an IQ of 120 or more. The 'mental age' of A and B students ranged from 16.6 to 20.6 while students with a high 'C' rating (in the percentile nineties) had an IQ of over 110 and a mental age of 15.6. [20]

The estimates from the soldiers' examinations indicated that just four percent of the nation's white population (including the foreign born) fell into the A category and a bit more than seven percent were Bs. The results of the analyses of the scores of just the native born white soldiers were higher, five percent A, and ten percent B. Both sets of scores point to only a small fraction, twelve percent, of the nation's total population close to being sure-fire A or B college material.

Although the results from the Army tests included those from the low scoring South and those in older age groups, they show that colleges and high schools were intellectually selective. The average native born white draftee who had just one or more years of high school had a C+ rating and those who had graduated reached the B level. Those who had gone to college but dropped-out were Bs. Those who had graduated received A rankings and were among the top three percent in the nation. The results from the tests given to officers also suggested intellectual selectivity in both the Army and the schools. Officers who had attended only one year or more of school just missed being As and all of those who had gone to college for any length of time were also in the top three percent on the nation's Alpha distribution. In terms of mental age, they were close to 19.0, while the national level was less than 14.0. As well, almost eighty-five percent of the soldiers who had graduated from the lowly normal schools fell in the A or B categories.

The results from the Alpha tests given in the schools and colleges yield a similar picture. The institutions may or may not have been socially elitist but they were certainly selecting a 'modern' student body. Averaging over the reported median Alpha scores for the schools for all classes, freshman through senior[21], leads to the following estimates:

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Intelligence Test Scores, Circa 1920, for American Schools and College

	Percentile Rank	% A or B	Mental Age	IQ range
Colleges And Universities	94	80	18.6	130

Normal Schools	93	77	17.6	125
High Schools	91	77	16.6	120
National population	50	12	13.6	105

The range of scores within each type of educational grouping was relatively narrow, indicating that a national system had already developed. The standard deviation, a typical measure of the spread of scores, was close to twenty-three percent of the total possible score on Alpha for the national population as a whole, but only six percent for the colleges and five percent for the high and normal schools.

There were differences, however. The reported average percentile ranks for the high schools ranged from seventy in the immigrant-heavy industrial city of Flint Michigan, to ninety-five in Iowa's Sioux City. In contrast, the often maligned private preparatory schools in Connecticut and New England usually had achieved an amazing ninety-ninth rank for their seniors—one equal to that of Yale University's freshman class. Within the normal school system, the Sam Houston School in Texas reported an average score that placed it in the mid-sixties percentile ranking while one of Michigan's teacher-training schools reported a score equal to the ninety-ninth percentile. [22]

The colleges had two exceptional institutions (outliers) that scored significantly less than all others. One was a dental college in Georgia; the other was Lincoln Memorial University in Tennessee. Lincoln was a fascinating attempt to create a college for ex-Union sympathizers in poverty-stricken Appalachia. Its average low eighties ranking was accompanied by its bottom twenty-five percent of students scoring below the national population average. Lincoln Memorial was an anomaly, but one accounted for by its mission and its state's low rank, thirty-seven, on the national population's intelligence distribution. However, even with its low ranking, the college's students fell into the C category. [23]

A Homogenous System

The rest of the nation's college and university scores were quite homogeneous and high. Of those reporting, thirty-eight percent fell into the B+ range and sixty two percent were 'As'. The typical American college student (even one in a junior college) was among the top four to six percent in the nation—the same as reported for the Army's Alpha results. As well, the known scores of the lowest twenty-five percent of college students place them in the B or high C categories. Many institutions, such as Yale and the University of California, had the bottom quarter of their students in the A range.

There was also within-college selectivity. Scores for seniors were always higher than for freshmen.

The reported high scores and rankings were spread across all types of colleges and universities. Among those who students ranked in the top two percent in the nation were private liberal arts colleges such as Dickinson, Oberlin and Yale. Technical schools such as the Massachusetts Agricultural College, and large state universities such as those in Ohio and Illinois--as well as research universities like the University of California at Berkeley, were also at the top. The schools with percentile scores between ninety-five and ninety-seven showed the same diversity of curricular and institutional types. The group with the ninety-first through the

ninety-fourth percentile ranking also included a variety of institutions, but did not include large state universities or well-known private ones. The larger and renowned schools usually scored higher.

There was also uniformity over regions. Although the American South had not yet recovered from the traumas of the Civil War and Reconstruction, all across the country college students were part of the modern elite.

Percentile Rankings on Alpha Test by Regions

	Ranking of Reporting Colleges (Highest Scoring College Per Region)	Ranking of Region's Population on Army WWI Test
New England	99	55
Mid Atlantic	97	54
South Atlantic	94	50
South	91	33
Mid West	97	53
West	96	56

The data on the regional distributions are another indicator of the unique society and culture of the American South. The gap between its leading colleges' rankings and its general population is quite pronounced and suggests a large educational divide between its population and its leadership class. The regional profile also shows that Terman was wrong about the West in general--it was doing quite well intellectually. Its recruits had the highest ranks in the nation and its leading university had a student body with a score equal to students in the East.

But Stanford Is….

However, there is some evidence that Terman was correct about Stanford's student population during the early Twentieth Century. Although Stanford was a center for the development of all types of intelligence testing and analysis, and while there are reports that it administered the Army Alpha test to its own students three times (soon followed by a policy of testing freshmen with the special Thorndike examination for college students) the failure to make public the outcome of its testing is a hint that Terman was justified in his comments about Stanford students' abilities.[24]

As a hub of the testing movement, Stanford's results should have been well advertised, unless they were embarrassing. Disappointment is perhaps the reason why only one report on Stanford's Alpha testing has been discovered—and it was not easily found.[25] The report on the 1916-17 Alpha testing of ninety-three freshman does gives credence to Terman's complaints. Stanford's Alpha sample suggests the school's freshman class had only thirty-one percent A or B students, less than four percent A, and that they had the low percentile rankings of the Atlanta Dental College and the heroic Lincoln Memorial University (eighty). Stanford's freshman score was some ten points below that of the average normal school or college. In contrast, the University of California's student body (all levels), located just thirty miles away from Palo Alto, earned a ninety-six rank and an average IQ almost a standard deviation higher then Stanford's freshman.[26]

The special Thorndike test for freshmen soon yielded a somewhat brighter picture of Stanford's students, but not much brighter. According to the elitist standards established by the developer of the test, the scores on the Thorndike examination during 1921-22 indicated that half of Stanford's enrolled freshman had just the minimum intellect needed to "do the work necessary to obtain a college degree." Only twenty-six percent fell into a range analogous to the A or B scores of the Army Alpha examination. That was one-half of the percentage of sure-fire students entering the liberal arts college at Columbia University in New York City. Terman's college was not alone in admitting what researchers like Thorndike and Terman thought were unqualified freshmen, however. Of the nine colleges and universities reporting freshman scores on the Thorndike examination, Stanford ranked fifth, tying with the less than prestigious University of Pittsburgh. [27]

Did Enrollment Increases Mean the End of a Student Era? Were the Eugenicists Wrong?
There were more than Stanford's problems that worried Lewis Terman. There were still many young non-college enrolled Americans who met the A&B criteria, and who might well succeeded in a university but who were not being recruited and there was the problem of escalating competition among a growing number of institutions to recruit the 'best-of-the best', making it more difficult for other colleges to maintain their status. As well, Terman may have thought that the general level of 'modern' in the nation was so low that even high scores on such examinations as Alpha were poor indicators of probable success in college.

However, while Terman did not mention it, perhaps because it would undermine his commitment to nature-over-nurture, there were signs that the general 'intelligence' of America's youth was improving and that the dire predictions about the consequences of expanded enrollments during the 1920s and 1930s were off-the-mark. There was a gradual improvement in the scores on all types of intelligence tests and by 1940 new American Army test results indicated there had been a significant increase in the mental ability of the American population in general.[28] There were similar increases in Europe, even Japan. [29]

There is no way of determining how much of the increase in America was due to more and better education in the schools, increased experience in test-taking, or fewer foreign born taking the examinations but the results of the testing of American military recruits of World War II show a near doubling of the average population scores by the early 1940s—just one generation after World War I.[30] By then, almost one-half, not twelve percent, of the recruits seemed to be close to being at least B students according to the norms of World War I. [31]

All of the 10,000, 000 recruits tested during the war, except those who had schooling less than the tenth grade, had scores much higher than those of a similar education levels in World War I. The 1940s average high school student (with two-thirds of the relevant age group enrolled in a high school) moved from a C+ to a B; graduates reached B+; and, all college students of the late 1930s and early 1940s shifted into the A category. The typical recruit with a college degree by the first years of World War II, when higher education was serving almost double the percent of the population enrolled in 1920 (nine vs. four) had an Alpha score quite close to Yale's astounding freshman class of the post World War I era.[32]

But Wait, Were the Eugenicists Like Terman Correct?
Lewis Madison Terman died in 1944 and may not have known of those astonishing increases, ones that undermined his elitist theories. Certainly, he could not have known of some later changes that tend to support his Darwinian beliefs. Within a few years after World War II mass

higher education appeared to face the consequences Terman had feared. In the 1950s, there was another shift in Army's test results. Earlier increases in the intelligence levels of college students seemed to have come to a halt. The average score for the recruits remained the same as in the 1940s, but those in most sub- groupings slipped back to the levels of 1920. High school graduates barely made the B category and all college-level soldiers became B, not A students. As enrollments rates jumped from nine to near seventeen percent between 1940 and 1950, finally exceeding the old estimate of twelve percent of the population being 'A or B' quality, scores slid downward. The overall average for recruits who had attended college even fell below the 1920s score. The equivalent Alpha scores for graduate school attendees tested by the armed forces dropped from what would have been a 99th percentile rank in 1920 to below the 95th, or only four Alpha point greater than the score for the average undergraduate student of the early 1920s. [33]

WWI, 1940s, 1950s ALPHA Equivalent Scores By Highest School Grade Completed[34]

	WWI		1940s		1950s	
	Score	Grade	Score	Grade	Score	Grade
Population	68*	C-	101	C+	101	C+
4th	37	E	37	E	22	E
6th	-	-	44	D	44	D
8t h	60	D	65	D	66	C-
10th	82	C	105	B	84	C
12th	98	C+	124	B+	105	B-
College						
1 year	130	B+	143	A	138	A
1&2 years	130	B+	147	A	120	B
3&4 years	137	A	153	A	130	B
All years	133	B+	147	A	130	B+
Graduate	155	A	155	A	138	A

There were other indicators of decline. As more and more colleges asked students to submit their SAT results, those scores also began to drop. Stable during the 1950s and early 1960s, after the percent of the population enrolled began to double, reaching over thirty percent by 1970, a significant and continuous decline began. Investigations concluded most of the slip was the result of what was politely termed "demographic" changes, but the reduction in the absolute number of high scoring students was more difficult to explain in an era of vastly increased resources devoted to education. [35] Accompanying those changes was a drift away from the homogeneity of scores of the early Twentieth Century. There was a growing difference among colleges. The high and low scorers were becoming segregated as schools battled to find the elite student.

There was one change that certainly would have delighted Lewis Terman and his Stanford colleagues. Partly due to his son Frederick's policies when he was dean, then provost, at Stanford University during the 1950s and 1960s the school became one of the elite American universities and a model for a new type of entrepreneurial institution.[36] Its student population began to match those at the Ivy League schools such as Yale. SAT scores at Stanford climbed to become thirty percent higher than the national average. [37]

[1] Terman Lewis, "Intelligence Tests in Colleges and Universities," *School and Society*, XIII (April 23, 1921): 481-494; Terman, Lewis M., "Adventures in Stupidity: A Partial Analysis of the Intellectual Inferiority of a College Student," *The Scientific Monthly*, 141 (1922): 24-40.

[2] An insight into the mentality and goals of those replacing old moralistic premises with what they believed was an objective science is given in: Haskell, Thomas L., *The Emergence of Professional Social Science* (Baltimore: The Johns Hopkins University Press, 2000). How that mentality helped shape the new American university in shown in the now classic, Vesey, Laurence R., *The Emergence of the American University* (Chicago: University of Chicago Press, 1965).

[3] On Terman's life and the spread of intelligence testing: Chapman, Paul Davis. *Schools as Sorters: Lewis M. Terman, Applied Psychology, and the Intelligence Testing Movement, 1890-1930 (*New York*:* New York University Press, 1988.*);* Minton, Henry L., *Lewis M. Terman: Pioneer in Psychological Testing* (New York: New York University Press, 1988).

[4] On Hall, the brilliant work, Ross, Dorothy Ross, G. *Stanley Hall: the Psychologist as Prophet* (Chicago: University of Chicago Press, 1972), is essential.

[5] Useful on the early history of Stanford University: Elliott, Orrin L., *Stanford University, The First Twenty Five Years* (Stanford: Stanford University Press, 1937); Miracles, Edith Ronald, *Stanford, the Story of a University*, (New York: Putnam.1959)*;* Mitchell, John Pearce, *Stanford University, 1916-1941* (Stanford, CA: Stanford University Press, 1958). On the later history and the role of Frederick, Terman's son: Lowen, Rebecca S., *Creating the Cold War University: the Transformation of Stanford* (Berkeley: University of California Press, 1997).

[6] Elliott, *Op. cit*., 500.

[7] The argument that intelligence tests would democratically identify 'wasted' talent (human capital) and compensate for social disadvantages of many bright students was repeated throughout the century, even into the next. See, Ackerman, Michael "Mental Testing and the Expansion of Educational Opportunity*," History of Education Quarterly, 35, 3 (Autumn, 1995): 279-300.*

[8] Terman Lewis M., *The Measurement of Intelligence; an Explanation of and a Complete Guide for the Use of the Stanford Revision and Extension of the Binet-Simon Intelligence Scale, (Boston, Houghton Mifflin, 1916);* Terman, Lewis M., *The Intelligence of School Children: How Children Differ in Ability, the Use of Mental Tests in School Grading and the Proper Education of Exceptional Children* (Boston: Houghton, Mifflin & Company, 1919).

[9] Robert Mearns Yerkes*, The Mental Life of Monkeys and Apes: A Study of Ideational Behavior (*NY: H. Holt, 1916); Yerkes, R. M., The *Mind of a Gorilla. Genetic Psychology Monographs*, 2, 1-2 (1927):1-193.

[10] The major data sources for the WWI intelligence tests are in the official publications of the results: Yoakum, Clarence Stone and Robert M. Yerkes, *Army Mental Tests* (NY: H. Holt, 1920); Yerkes, R. M. "Memoirs of the National Academy of Sciences, Vol. XV, *Psychological Examining in the United States Army* (Washington, DC: G.P.O., 1921); Yerkes, Robert Mearns, United States Surgeon-General's Office, Division of Psychology, *Psychological Tests*, (Washington: U.S. Government Printing Office, 1921); Cobb, Margaret V. and Robert M Yerkes*, Intellectual and Educational Status of the Medical profession as Represented in the United States Army (Washington, D.C. :* the National Research Council of the National Academy of Sciences, 1921).

[11] On Brigham's early views: Brigham, C. C., (Princeton: Princeton University. Press, 1923); Wedell, C. H., "Carl Campbell Brigham: 1890-1943." *American Journal of Psychology*, 56 2 (1943): 305. Examples of the continuing criticisms, both general and technical: Pastore, Nicholas., "A Fallacy Underlying Garrett's use of the Data of the Army Alpha and Beta Tests--A Comment*," The Scientific Monthly, 69 (1949): 279-28;* Galloway, Fred J., "Inferential sturdiness and the 1917 Army Alpha: A new look at the Robustness of Educational Quality Indices as Determinants of Interstate Black-White Score Differentials," *The Journal of Negro Education*, 63,2 (1994): 251-266; Conrad, Herbert S., "The Measurement of Adult Intelligence, and the Requisites of a General Intelligence Test*," Journal of Social Psychology.*, 2 1 (Feb.1931): 72-86; Neff, Walter S., "Socioeconomic Status and Intelligence: A Critical Survey," Psychological Bulletin, 35 10 (Dec.,1938): 752-34; Doll, Edgar A., "The Average Mental Age of Adults," *Journal of Applied Psychology*, 3 4 (Dec.,1919): 317-330.

[12] Useful on the historical background of intelligence tests in general, and the WWI and WWII efforts in particular: Arps, George, "Application of Psychological Tests to Army Camps," *Natural History*, 2 (1920): 147-151. Carson, John, "Army Alpha, Army Brass, and the Search for Army Intelligence*" Isis*, 84 2 *(Jun.,1993): 278-83:* Carson, John, *The Measure of Merit :Talents, Intelligence, and Inequality in the French and American Republics, 1750-1940 (*Princeton :Princeton University Press, 2007); Kevles, Daniel J., "Testing the Army's Intelligence: Psychologists and the Military in World War I," *The Journal of American History*, 55 3 (1968): 565-581; Richardson, Theresa, and

Erwin V. Johanningmeier. "Intelligence testing: the legitimation of a meritocratic educational science." *International Journal of Educational Research* 27 8 (1998): 699-714; Yerkes, Robert M. "Man-power and military effectiveness: The case for human engineering," *Journal of Consulting Psychology*, 5, 5 (Sept, 1941): 205-209; Zenderland, Leila. *Measuring Minds: Henry Herbert Goddard and the Origins of American Intelligence Testing* (Cambridge, U.K: Cambridge University Press, 1998). An interesting idealistic spin-off from the early educational testing movement is seen in: Arps, George F., "Higher Education and Modern Trends," *The Journal of Higher Education, 4* 6 (1933): 290-294.

For later IQ testing results, methods, and politics: *Herrnstein, Richard J. and Charles Murray, The Bell Curve : Intelligence and Class Structure in American Life* (NY: Free Press, 1996); Kamin, Leon J., *The Science and Politics of I. Q.* (NY: John Wiley, 1974)"; Loehlin, John C., *et al., Race Differences in Intelligence* (San Francisco: W. H. Freeman and Co., 1975); and, the outstanding review article on the sociological investigations of the role of intelligence, .Hauser, Robert M., "Meritocracy, Cognitive Ability, and the Sources of Occupational Success," Robert M. Hauser Department of Sociology Center for Demography and Ecology The University of Wisconsin-Madison August 17, 2002.

On Lippmann and Terman's responses to critics of intelligence testing: Pastore, Nicholas, "The Army Intelligence Tests and Walter Lippmann," *Journal of the History of the Behavioral Sciences* (1978): 316-7.;Terman, Lewis M., "Mental growth and the IQ," *Journal of Educational Psychology*, 12 6 (1921): 325; Terman, Lewis M., "The Psychological Determinist; or Democracy and the I. Q," *The Journal of Educational Research*, 6 1 (1922): 57-62.

[13] Useful on the historical background of intelligence tests in general, and the WWI and WWII efforts in particular: Arps, George, "Application of Psychological Tests to Army Camps," *Natural History*, 2 (1920): 147-151. Carson, John, "Army Alpha, Army Brass, and the Search for Army Intelligence*" Isis*, 84 2 *(Jun.,1993): 278-83:* Carson, John, *The Measure of Merit :Talents, Intelligence, and Inequality in the French and American Republics, 1750-1940 (*Princeton :Princeton University Press, 2007); Kevles, Daniel J., "Testing the Army's Intelligence: Psychologists and the Military in World War I," *The Journal of American History*, 55 3 (1968): 565-581; Richardson, Theresa, and Erwin V. Johanningmeier. "Intelligence testing: the legitimation of a meritocratic educational science." *International Journal of Educational Research* 27 8 (1998): 699-714; Yerkes, Robert M. "Man-power and military effectiveness: The case for human engineering," *Journal of Consulting Psychology*, 5, 5 (Sept, 1941): 205-209; Zenderland, Leila. *Measuring Minds: Henry Herbert Goddard and the Origins of American Intelligence Testing* (Cambridge, U.K: Cambridge University Press, 1998). An interesting idealistic spin-off from the early educational testing movement is seen in: Arps, George F., "Higher Education and Modern Trends," *The Journal of Higher Education, 4* 6 (1933): 290-294.

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[14] Useful on college admission procedures and SAT: Schudson, M. I., "Organizing the Meritocracy: A History of the College Entrance Examination Board," *Harvard Educational Review*, 42 1 (February, 1972: 34-69); Wechler, Harold S., *The Qualified Student: A History of Selective College Admission In America (*NY: John Wiley & Sons, 1977). The irony of SAT and like tests that were intended the break-through class and family biases in college admissions becoming symbols of a new type of supposedly meritocratic bias in America is explored in works such as Lemann, Nicholas, *The Big Test: The Secret History of the American Meritocracy* (New York: Farrar, Strauss, and Giroux, 1999).

[15] Sources for the results of Alpha tests in the colleges, normal schools and high schools were: Anderson, John E., "Intelligence Tests of Yale Freshmen," *School and Society* 11 (April 3,1 920): 417-420*;* Anonymous, "Intelligence Tests in Colleges and Universities," *School and Society*, 13 (April 23, 1924*);* Banker, Howard J., "Mental Age

Distribution in School Progress," *The Journal of Educational Research*, 23 4 (1931): 273-279; Bell, H. and William Martin Proctor, "High-School Populations Then and Now: A Sixteen-Year Span," *The School Review*, 44 9 (1936): 689-693;.Bennett, George K. "Distribution of Scores From Revisions of Army Alpha," *Journal of Applied Psychology*. 27.2 (1943): 150-151; Benson, C. E., "The Results of the Army Alpha Test in a Teacher-Training Institution," *Educational Administration and Supervision*, 7 (1921): 348-49; Burtt, H. E., and G. F. Arps, "Correlation of Army Alpha Intelligence Test with Academic Grades in High Schools and Military Academies," *Journal of Applied Psychology*, 4 4 (1920): 289-293; Cobb, Margaret V., "The Limits Set to Educational Achievement by Limited Intelligence," *Journal of Educational Psychology*, 13.8 (1922): 449*;* Colvin, Stephen S., and Andrew H. MacPhail, *"*The Value of Psychological Tests a Brown University," *School and Society, 16, 396 (July, 29, 1929);* Colvin, Stephen S., and Andrew H. MacPhail. "Intelligence of Seniors in the High Schools of Massachusetts," Bulletin, 1924, No. 9.Bureau of Education, Department of the Interior (1924); Fling, Harold Pierce, "Some Results and Correlations of the Alpha Army Intelligence Test at the University of Nebraska," *Kentucky High School Quarterly*, 4 (Oct., 1921): 25-; Fryer, Douglas, "Occupational-Intelligence Standards," *School & Society* 16 (Sept. 2, 1927): 273-277; Hill, David Spence, "Results of Intelligence Tests at the University of Illinois," *School and Society*. 9 (1919): 542-545; Hunter, H. T. "Intelligence Tests at Southern Methodist University," *School and Society*,10 (1919): 437-440; Hunter, H. T., "Intelligence Tests at Southern Methodist University," *School and Society*, 10 (1919): 437-440; Johnson, Donald M., "Applications of the Standard-Score IQ to Social Statistics," *The Journal of Social Psychology*, *27 2 (1948): 217-227;* Jones, Edward A. *"*The Army Tests and Oberlin College Freshmen," *School Society 11 March 27,(1920): 389-390;* Jones, Harold E., "The Intelligence of Preparatory School Students," *Journal of Educational Psychology*,17.6 (1926): 376; Jordan, A. M. "Some Results and Correlations of Army Alpha tests," *School and Society* , 11 (March 20,1920): 354-358; Lehman, Harvey C., and Stuart M. Stoke, "Occupational Intelligence in the Army," *American Journal of Sociology*, (1930): 15-27; MacPhail, Andrew H., "Psychological Tests Applied to Nurses in Training at the Rhode Island Hospital."The *American Journal of Nursing* (1929): 203-206; MacPhail, Andrew Hamilton, *The Intelligence of College Students*, (Baltimore, Warwick & Sons, 1924).

Madsen, I. N. *"*Group intelligence Tests as a Means of Prognosis in High School, *"The Journal of Educational Research.1 (1921): 43-52;* Madsen, *I. N.*, and R. H. Sylvester, *R.H, "*High School Students' Intelligence Ratings According to the Alpha Test,*"* *School and Society*, 10: (October 4,1919): 407-410); Neff, Walter S. "Socioeconomic Status and Intelligence: A Critical Survey," *Psychological Bulletin*, 3510 (1938): 752-75; Noble, Ellis L., and George F. Arps, "University Students' Intelligence Ratings According to the Army Alpha Test." *School and Society* 11 (Feb. 21, 1920): 233-.237; Noble, Ellis L., and George F. Arps. "University Students' intelligence ratings according to the Army Alpha test." *School and Society*, 11 (April 3, 1920): 417-420; Obrien, Francis P., "Mental ability with reference to selection and retention of college students," *The Journal of Educational Research*, 18 2 (1928): 136-143; Odell, C. W., "Are College Students a Select Group?," University of Illinois, *Bulletin*; vol. 024, no. 036, 1927; Peterson , H.A. and J.G Kudorna, "Army Alpha in the Normal Schools," *School and Society*, 10 (July 12, 1919): 476-480; Reeder, Ward Glenn, *Results of the Army Intelligence Tests in Minnesota Public Schools*. Moorhead State Teachers college, 1921; Reitz, Wilhelm, *The Intelligence of Teachers: A Study of Scholastic Aptitude in Relation to Teaching Success*. University of Wisconsin--Madison, 1930; Crenshaw, Samuel, "The Intelligence of Teachers in Training, with a Note on Practice-Effects with Intelligence Tests," *The Journal of Educational Research*, 7 1 (1923): 28-36; Roberts, G. L., and G. C. Brandenburg. "The Army Intelligence Tests at Purdue University," *School & Society*, 10 (1919): 776-778; Walcott, G. D., "Mental Testing at Hamline University," *School & Society*,10 (1919): 57-60; Whipple, Guy M., "Intelligence Tests in Colleges and Universities," National Society for the Study of Education Year Book, 21 (1922); Whipple, Guy M., "Sex Differences in Army Alpha Scores in the Secondary School," *The Journal of Educational Research*,15 4 (1927): 269-275; Whitney, Frederick L. "Intelligence Levels among State Normal-School Graduates," *The Journal of Educational Research*, 7 3 (1923): 229-235; Yerkes, Robert Mearns, *Psychological Examining in the United States Army*, Memoirs of the National Academy of Sciences, Vol. 15 (Washington: US Government Printing Office, 1921).

[16] This study's results are in conflict with some of the accepted conclusions concerning the 'selectivity' of the nation's high schools and colleges during the first half of the Twentieth Century. In, *Mental Abilities and Higher Educational Attainment in the 20th Century*, Paul Taubman and Terence Wales asserted that the high schools and colleges had students who ranked near the average for American intelligence during the 1920s -- in the 55 percentile range (with IQs less than 110) but increased from that "low point" to the reach the mid 60s percentile rank by the later 1950s. While this study also found an increase in scores over time, it concludes the WWI era's average students, and by implication those of the 1920s, ranked in the 90s and had scores in the 120-130s range.

Taubman and Wales relied on fragmentary data from several published studies of small areas and samples and that used different intelligence tests and scales that are difficult to equate, or accept, even after converting the results into percentile rankings. Some of the studies they used and other relevant ones relied upon some tests that are not acceptable as measures of the distribution of intelligence levels in the general population or of the relative levels in the schools and colleges. For example, it is known that one of the popular Otis examinations was normed on a high achieving group and that the test was constructed to rapidly reduce the IQ scores by age after scores reached above average. One analysis shows that the Otis prevented any high school senior from achieving more than a 110 IQ score. The examination also inflated the role of lower scores. In sum, it 'compressed' the higher education results. Such norms and restraints seem to go far in accounting for (and discounting) the several low estimates of high school and college students' 'intelligence' during the 1920s. Example of studies based on questionable tests and norms is, George W. Odell, *Are College Students a Select Group*, University of Illinois Bulletin, May 10, 1927 No. 36, 1927, and, Stephen S Colvin and Andrew H. MacPhail, *Intelligence of Seniors in the High Schools of Massachusetts*, U.S. Department of the Interior, Bureau of Education, Bulletin, 1924, No. 9, USGPO, 1924. . On criticisms of the Otis examinations, Stephen S Colvin, "Some Recent Results Obtained from the Otis Group Intelligence Scale," *The Journal of Educational Research*, 3 #1 (Jan. 1921), 1-12.

Taubman and Wales mentioned, but did not utilize, the army tests or the many reports of the use of Alpha in the schools, nor did they use the results from the WWII and post WWII era new armed forces tests that have been equated to those of WWI and thus form the only long-term comprehensive and unified data series on intelligence levels--and the only tests normed on the population as a whole.

[17] Also useful on drop-out rates: Benson, Viola E., "The Intelligence and Later Scholastic Success of Sixth Grade Pupils," *School and Society*, 55 1415 (1942): 163-167; Jennings, E. D. "The Elimination of Freshmen from the University of Texas." *Journal of Educational Psychology*. 6.4 (1915): 221.

[18] Counts, George S., *the Selective Character of American Secondary Education* (New York: Arno Press, 1969); Reynolds, O. E., *the Social and Economic Status of College Students* (New York City: Teachers College, Columbia University, 1927).

[19] The results from the data and analysis of this study bring some of the theses in Richard J. Herrstein and Charles Murray's, *The Bell Curve: Intelligence and Class Structure in American Life* (NY: Free Press, 1996), into question, especially the one that the pre WWII colleges were not selective in terms of intelligence levels. The army and institutional Alpha data usually showed higher scores than cited or implied in the *Bell Curve.* Surprisingly, that magnificent work did not use the Alpha results to check the sources they relied upon.

[20] Useful for equating the WWI Alpha scores with mental age, IQ, and percentiles are: Bennett, George K. "Distribution of Scores From Revisions of Army Alpha," *Op. cit.;* Cobb, Margaret V., "The Limits Set to Educational Achievement by Limited Intelligence," *Op. cit.;* Finch, F. H., "Equating Intelligence Quotients from Group Tests," The Journal of Educational Research, (1935): 589-59; Finch, Frank Herschel, *Enrollment Increases and Changes in the Mental Level*, No. 10.(Stanford: Stanford University Press, 1946); Kefauver, Grayson N., "Need of Equating Intelligence Quotients Obtained From Group Tests," *The Journal of Educational Research*, 19 2 (1929): 92-101; Yoakum, Clarence Stone, and Robert Mearns Yerkes,(eds.), *Army Mental Tests*. Op. cit..

[21] Only two of the colleges reported graduate student scores.

[22] Jones, Harold E., "The Intelligence of Preparatory School Students," *Journal of Educational Psychology, (1926): 376-378.*

[23] Hess, Earl J., *Lincoln Memorial University and the Shaping of Appalachia* (Knoxville: University Of Tennessee Press, 2011).

[24] *The Report of the President* (Stanford University) 1920-23, pp. 52-3, indicates the Alpha test was also used to judge if some special students and veterans should be admitted although they had not fulfilled the usual entrance requirements.

[25] Request to the Stanford archives for copies of the various student test results has yet to be answered, 9-14-16

[26] Proctor, William Martin, "The Use of Psychological Tests in the Educational and Vocational Guidance of High School Pupils" No. 1. Public School Publishing Company, 1921, espec. 93.

[27] Leland Stanford Jr. University, *Report of the Subcommittee of Committee of Scholarship on Student Ability (*np: Stanford University, 1923): 9, 8, 19. Surprisingly, The University of California's freshman of the early1920s had scores a bit lower than Stanford's, in contrast to the schools' high scores for its general population on Alpha. This may be accounted for by the pressure on UC to be democratic in admissions but to be able to quickly eliminate under performing students.

[28] Both the new army test and Alpha were given to several groups of men, allowing scores to be equated. See, Tuddenham, Read D. "Soldier Intelligence in World Wars I and II," *American Psychologist, 3.2 (1948): 54-;* Lorge, Irving. "A Table of Percentile Equivalents for Eight Intelligence Tests Frequently Used with Adults, "*Journal of Applied Psychology*, 20 3 (1936): 392-395, provided the means of converting Tuddenham's data to original Alpha scores. Another estimate of high school students' IQ between WWI and WWII did not find either a significant increase or decrease despite the rise in the general IQ level in the nation: Finch, Frank Herschel, *Enrollment Increases and Changes in the Mental Level, Op. Cit.*, equated many different 'IQ' tests given between 1916 and 1942 finding them consistently in the 105-110 range for his definition of 'IQ', a score range significantly lower than the estimates of 120 from the Alpha tests. Berdie, Ralph F. *Who Goes to College?: Comparison of Minnesota College Freshmen, 1930-1960* (Minneapolis: University of Minnesota Press, 1962) equated many different college-ready tests used over time, including ACE, and found no decline after WWII.

[29] Flynn, James R., "The Mean IQ of Americans: Massive Gains 1932 to 1978," *Psychological Bulletin*, 95 1 (1984): 29. Flynn, James R., "Massive IQ gains in 14 nations: What IQ Tests Really Measure," *Psychological Bulletin*, 10 .2 (1987): 171; Lynn, Richard, and Susan Hampson, "The Rise of national Intelligence: Evidence From Britain, Japan and the USA, " *Personality and Individual Differences*, 71 (1986): 23-32.

[30] On the World War II and later military examination results (the AGCT): Bingham, Walter V. "Inequalities in Adult Capacity--From Military Data," *Science*, 104 (1946): 147-152; Chappell, Tolan L. "Note on the Validity of the Army General Classification Test as a Predictor of Academic Achievement." *Journal of Educational Psychology*, 46.1 (1955): Chauncey, C. Henry, "The Use of the Selective Service College Qualification Test in the Deferment of College Students." *Scienc*e, 116 3004 (1952): 73-79; Fuchs, E F. "Army Test Scores vs. Education Since World War I,", Unpub. paper presented at American Psychological Association Convention, 1957; Fulk, Byron E., and Thomas W. Harrell. "Negro-White Army Test Scores and Last school grade," *Journal of Applied Psychology*, 36,1 (1952): 34-*5;*Karpinos, Bernard, "Mental Test Qualification of American Youth for Military Service and Its Relation to Educational Attainment,": American Statistical Association, Proceedings, (1966):.92-111); Karpinos, Bernard D., *AFQT :historical data* (1958-1972) (Alexandria, Va.: Human Resources Research Organization, July, 1975); Staff, Personnel Research Section, The Adjutant's Office, "The Army General Classification Test…," *The Journal of Educational Psychology*, 38 7 (November,1947):385-420; Staff, Personnel Research Section, The Adjutant's Office, "The Army General Classification Test," *Psychological Bulletin*,42 (Dec. 1945): 760-768; U.S Army Personnel Research Branch, AGCT Scores for Level of Education Attainment," 2/7/42, p.2; U.S Army Personnel Research Branch, "Relation Between Acceleration in Retardation in School and GCT-1a Scores for Level Educational Attainment," 2/27/42; Tuddenham, *Op.cit.*

The works by Bingham and Fulk had different estimates of the score for college students on the AGCT, with Bingham's being higher than Fulk's. Fulk's seems the better estimate but his lower score (119 vs. 130) places the average for the mid 1940s at a standard deviation above the population mean. On the significant decline in the 1950s: Schrader, W. B., "Educational Data from Large Scale Testing Programs," in Karpinos, Bernard D., *AFQT :Historical data* (1958-1972) (Alexandria, Va., Human Resources Research Organization,1975) 112-117. Note that Chauncey, *Op. cit.*, using a sample of deferred from the draft college students in the late 1940s (an upwardly biased sample), found they scored in the equivalent of WWI's A- range (Alpha of 138) while the studies of the results of the 1950s by Schrader and showed a significant decline to the C+/B- range. The AGCT result for later in the decades pointed to a decline to the C range for the average recruit college student, a grade that Terman believed meant academic failure. The estimates for the 1950s used in this study (reconstructed from all relevant sources) were generous so as to counterbalance any tendency to exaggerate the decline after the GI Bill generation graduated from college. Unfortunately, published data on military testing during the 1960s was not in a form useful for a study of scores. See, for example, U.S. Army, Surgeon General's Office, "Supplement to the Health of the Army: Results of the Examination of Youths for Military Service, 1965 (Complementary Analysis, September, 1966), Washington, D.C.: GPO, March 1967).

[31] Walter V, Bingham, in his, "Inequalities in Adult Capacity—From Military Data," *Science*, 104 (1946): 147-152, was rather cautious in his analysis of the results from testing ten millions soldiers with the AGCT, the new version of Alpha. He concluded that thirty-two percent of the population fell in the new version of the WWI A and B

categories, with perhaps another thirteen percent in the high C range. He did find that the average college student in the army sample had a score at or above the ninety-third percentile.

[32] This finding contrasts with the pessimistic conclusions in Learned, William S. and Ben D. Wood, *The Student and His Knowledge: Summary of Results and Conclusions; a report to the Carnegie Foundation on the Results of the High school and College examinations of 1928, 1930, and 1932* (New York: The Carnegie Foundation for the Advancement of Teaching, 1938). Their study of Pennsylvania's institutions centered on the results of a knowledge, not intelligence, test, one apparently focused on what knowledge a student in a major university would have. This 'knowledge' approach probably accounts for the stark difference between the WWI army results and their conclusions. They concluded that the average Pennsylvania freshman had the equivalent of a C+ rating, while the state's ten largest institutions' students were B+. A report on the first SAT scores also had results that appear too low, perhaps because of the limited number of SAT takers. Although the 1,080 students were headed to Ivy schools, the test gave them only a C+ rating, something that if far. Far lower than the WWI and individual college test results cited herein. See, Herrnstein and Murray, *Op cit.*, 38, and Brigham, C. C., *A Study of Error… (*NY: College Entrance Examination Board, 1932).

[33] Useful on enrollments and social processes during the 1910s and 1920s: Spady, W. G., "Educational Mobility and Access: Growth and Paradoxes," *American Journal of Sociology*, 73, 3 (November 01, 1967). 273-286.

[34] The WWI general score (*) was adjusted to be compatible with the later distributions. See, Tuddenham, *Op. cit.*. Lorge, *Op. cit.*

[35] Beaton, Albert E., Thomas L. Hilton, and William B. Schrader. "Changes in the Verbal Abilities of High School Seniors, College Entrants, and SAT Candidates Between 1960 and 1972." *ETS Research Bulletin Series*1977.2 (1977): i-92; Lyke, Bob, "Scholastic Aptitude Test National Mean Scores : Academic Year 1952 through 1987*,"* Congressional Research Service, Library of Congress, 1987*;* Schrader, W. B., "Educational Data from Large Scale Testing Programs," in Karpinos, *Op. cit*, 112-117. Weakliem, David, et al., "Toward Meritocracy: Changing Social Class Differences in Intellectual Ability," *Sociology of Education, (1995): 271-286,* did a cohort analysis 1907-1967 on modern survey data that showed a similar homogenization but general decline in IQ like test scores. .

[36] The reshaping of Stanford and its links to national security needs are documented in: Lowen, Rebecca S., *Creating the Cold War University: The Transformation of Stanford* (Berkeley: U.C. Press, 1997), Leslie, Stuart W., *The Cold War and American Science: the Military-Industrial Complex at MIT and Stanford* (NY: Columbia University Press, 1993), and O'Mara, Margaret Pugh, *Cities of Knowledge: Cold War Science and the Search for the Next Silicon Valley* (Princeton, N.J.: Princeton University Press, 2005).

[37] The conclusions are based on combining the scores from later examinations that were normed by giving both the earlier and later tests to the same groups. See, Tuddenham, *Op. cit.*