20/20:
Reflections on the Last 20 Years of the 20th Century

Richard C. Atkinson

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FOREWORD

20/20: The Last 20 Years of the Twentieth Century was recorded and transcribed in August of 2000, five years into Richard Atkinson's tenure as president of the University of California. His 1995 appointment, after fifteen years as chancellor of the San Diego campus, had coincided with a university budget crisis and a crisis of governance precipitated by the Board of Regents' decision to end affirmative action at UC. The stormy transition to the post-affirmative action age was a long, difficult, and at times politically perilous task. By the summer of 2000, however, budgets had risen and, to some extent at least, the institutional weather had cleared. It seemed a moment ripe for a look back at his combined twenty years of campus and systemwide leadership.

Atkinson's account is a distillation of the influences and experiences that shaped his university career, public and private. These included a University of Chicago education; pioneering research in memory, cognition, and learning as a faculty member at Stanford University; and immersion in the world of federal science policy as fifth director of the National Science Foundation. At San Diego he was known for his unrelenting pursuit of academic quality and the persistent energy he devoted to expanding UCSD's role in the region's emerging high-tech economy. His leadership style, on the campus and in the Office of the President, was active, entrepreneurial, and animated by a firm belief in the importance, resilience, and genius for adaptation of the American research university—very much including the University of California.

20/20, as Atkinson explains, does not "follow a strict chronological sequence, but rather will focus on a list of topics that reflects my perspective on life as a chancellor and president." His essay is part memoir, part practical advice on managing large academic enterprises, and part reflection on a range of subjects from liberal education to theories of leadership (most of them wanting, in the author's opinion) to the often underappreciated value of engineering schools to research universities. Two appendices of relevant articles, speeches, and other materials supplement the text.

The ban on affirmative action at the outset of the Atkinson administration meant that UC's admission policies—who gets selected and how they are judged—remained a prominent and highly public issue. In 2001, Atkinson expanded *20/20* to describe two related events of that eventful year. One was the Board of Regents' decision to rescind its controversial 1995 resolution, which had been rendered moot by a ballot initiative, Proposition 209, that ended affirmative action in all State agencies. The other was an initiative Atkinson took on his own: a challenge to the dominance of the SAT college entrance examination in the admission of students. His much-publicized recommendation that the University of California eliminate

the SAT as a requirement for admission sparked a national debate on the use and misuse of standardized tests.

Atkinson concludes *20/20* with his decision—private at the time—to step down in 2003 after eight years as president. "The University has survived the problems of the early 1990s with its quality intact and recent years have witnessed a time of great progress," he notes. Yet the return of the budget uncertainty that marked the early days of his administration, the need to accommodate unflagging student demand, and persistent tensions over race and ethnicity remind him of the hazards of university leadership: "Most university presidents, in this day and age, leave office under a barrage of complaints and criticisms. This may be my fate, but the die is cast and there is no turning back."

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Richard C. Atkinson

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Several years ago, I gave a lecture at the Berkeley campus in a colloquium series on the history of science and technology. My talk was titled "The Golden Fleece, Science Education, and U.S. Science Policy"[1] and was an account of my five years at the National Science Foundation. The talk was recorded and subsequently transcribed. I received many comments, including some from individuals who had participated in the events described in the paper. The editor of the *Proceedings of the American Philosophical Society* suggested that he publish the paper, and I readily agreed.

Given that experience, I have now decided to dictate an account of my years as the chancellor of the University of California, San Diego (UCSD) and as president of the University of California System. I have chosen to title these remarks "20/20." I started as chancellor of UCSD on July 1, 1980, and became president of the University of California System on October 1, 1995, and now am a few weeks short of having served for 20 years in those two positions. The period in question is indeed the last 20 years of the 20th century — hence the title for these reflections.

This account will focus on personal experiences and anecdotes rather than on a careful analysis of the period. Possibly at some later time I'll take a more analytic view of my period as chancellor and president. For those interested in other aspects of my life, there are several accounts. When I received the Distinguished Scientific

1 "The Golden Fleece, Science Education, and U.S. Science Policy," *Proceedings of the American Philosophical Society*, Vol. 143, No. 3, September 9, 1999.

Contribution Award from the American Psychological Association, an account of my career was published in *American Psychologist.*[2] When I was elected president of the American Association for the Advancement of Science, another account, written by Bill McGill, the former president of Columbia University, appeared in *Science.*[3] I have written briefly about my years at Stanford University in the preface to a book entitled *On Human Memory: Evolution, Progress, and Reflections on the 30th Anniversary of the Atkinson-Schiffrin Model.*[4] Yet another reference is the book by Nancy Anderson entitled *An Improbable Venture,*[5] covering the history of UCSD.

My account of these 20 years will not follow a strict chronological sequence, but rather will focus on a list of topics that reflects my perspective on life as a chancellor and president.

Appointment as Chancellor

Many universities, when searching for a president, turn naturally to the director of the National Science Foundation (NSF). As director, I had a steady stream of inquiries from universities, but had no desire to be a university president. My intention was to complete my term at NSF and then return to Stanford and reestablish my teaching and research programs. However, I did engage in a

2 "Distinguished Scientific Contribution Awards for 1977," *American Psychologist*, January 1978.

3 William J. McGill, "Richard C. Atkinson: President-elect of AAAS," *Science*, 29 July 1988.

4 Chizuko Izawa, ed., *On Human Memory: Evolution, Progress, and Reflections on the 30th Anniversary of the Atkinson-Schiffrin Model* (Lawrence Erlbaum Associates, 1999).

5 Nancy Scott Anderson, *An Improbable Venture* (UCSD Press, 1993).

discussion with the search committee of Brown University in the spring of 1976 and was offered the presidency. Never reach the point of receiving an offer unless you are prepared to accept it. In this case, matters moved too quickly and my wife, Rita, and I were caught by surprise. Our daughter was a freshman at Brown University and I doubt that she would have appreciated my becoming president. Moreover, I had been at NSF only a short time, and it was simply too soon to leave. Rita and I never regretted our decision to turn the offer down.

I was also interviewed by the trustees of the University of Southern California (USC). I won't give an account of that presidential search except to refer the reader to a stream of articles that appeared in the *Los Angeles Times* in January of 1980, providing details of the search, including my name and the name of the other candidate. It was a thoroughly botched search. I withdrew and so did the other individual. Fortunately, USC was able to regroup and several months later succeeded in appointing a president. If the *Los Angeles Times* is to be believed, a faculty group led by the dean of engineering was adamant in supporting my candidacy, but several of the trustees believed that I was too radical for USC. One of the trustees was a former director of the CIA and was quoted in the *Los Angeles Times* as saying that he had the agency investigate my background and uncovered the fact I had a close working relationship with Ted Kennedy and other members of the Kennedy family. The implication was that I might be a subversive. Again, it was a mistake to have let the search process go as far as it did, but there were some attractions about USC that caused me to delay too long in withdrawing.

The events at USC occurred in the early months of 1980. When they were over, I had had my fill of presidential searches. David Saxon, president of the UC System, had scheduled an appointment with me at the National Science Foundation. I assumed the physics community had unleashed him on me because they were unhappy with the funding NSF was providing for a new accelerator. To my surprise, he arrived with a University of California Regent in tow and was unaware of the accelerator issue. Rather, he asked whether I was interested in being considered for the chancellorship of UCSD. My immediate response was that I was not interested in participating in another search so soon after the publicity regarding USC. He then asked if I'd be willing to meet with the search committee on a completely confidential basis if they were down to a short list of three candidates. I responded that, under those conditions, I would consider the matter if Rita was agreeable. A week later, on a Wednesday, Saxon called and indicated that they were down to a list of three and invited me to meet with the search committee at the Los Angeles Airport the following Sunday. He assured me that the meeting would be kept secret and that no visit to the campus would be expected.

Rita liked the idea of UCSD. Our daughter had spent the summer of 1975 working in the neurophysiology laboratory of Ted Bullock at Scripps Institution of Oceanography (SIO). The three of us were enamored of the La Jolla area. Further, UCSD was a major recipient of NSF funds, in large part because of the deep-sea drilling program run out of SIO. I knew many faculty from the University, including Bill Nierenberg, the director of SIO, who also was a member of the National Science

Board (the presidentially appointed oversight board of NSF). Finally, the outgoing chancellor, Bill McElroy, had been the third director of NSF and over the years we had been in frequent contact.

So on Saturday I flew to Los Angeles, telling no one but Rita where I was going. The secretary of the UC Regents was equally discreet in ensuring that no one in California learned of my visit. The meeting with The Regents was at a hotel near the Los Angeles Airport scheduled for 12 o'clock on Sunday. That morning I went for a long run and on my return to the hotel encountered Bob Adams, who was out for a morning walk. Bob was the provost at the University of Chicago and later went on to become the secretary of the Smithsonian Institution in Washington, D.C.; I am pleased to say that he is now retired at UCSD as an adjunct professor in the anthropology department. After exchanging greetings, we asked each other why we were in Los Angeles. Bob told me he was meeting with the UCSD search committee at 9 o'clock and I told him I would be meeting with the committee at 12 o'clock. We were both surprised and I went away thinking that the search committee had shown very good taste indeed. Bob is someone whom I admire — he has had a brilliant career both as a scientist and administrator.

After my interview, I had dinner and returned to my room. Shortly thereafter, I received a phone call from David Saxon offering me the chancellorship. I told him that I wanted to talk with Rita, but that I would be in touch with him before the evening was out. After a lengthy phone conversation, Rita and I both agreed that I should accept the position. By Monday, I had coordinated my resignation as director

of the NSF with the White House. The UCSD campus and the Office of the President made the announcement a few days later.

Early Period as Chancellor

Rita and I moved to La Jolla on July 1, 1980, and were once again overwhelmed with the beauty of the area. But matters at the campus were less tranquil than the scenery. During the preceding year, there had been a nasty battle on the campus between Paul Saltman, vice chancellor for academic affairs, and Bud Sisco, vice chancellor for administration. Essentially, it was an argument over whether the principal authority for UCSD research programs should fall in Paul Saltman's area or be transferred elsewhere. Bill McElroy, who was the chancellor, sided with Bud Sisco and soon the matter seriously divided the faculty. A debate at a faculty senate meeting led to an informal vote of no confidence in the chancellor. That, in turn, was followed by a mail-ballot vote and the chancellor's resignation.

Bill McElroy was a distinguished biologist, a member of the National Academy of Sciences, and an effective director of the NSF. He was one of the individuals whose research helped set the stage for the revolution in biology that occurred in the second half of the last century. Bud Sisco had come to UCSD from NSF with Bill McElroy, having been a senior administrator at NASA prior to his service at NSF. Bill had great confidence in Bud Sisco. However, at NSF and at UCSD, Sisco demonstrated poor judgment on issues related to faculty matters. Bill should have detected the emerging problem much earlier, but in the 1970s he had personal

difficulties and was not as alert to University issues as he should have been. I had a high regard for Bill and felt very sorry for what happened to him as chancellor. We kept in close touch with each other until his death a few years ago.

One aspect of the vote of no confidence by the Academic Senate still disturbs me. When Bill realized that he had serious problems with the faculty, he went to the leadership of the Senate and said that there was no need for a mail ballot since he would be tendering his resignation, effective July 1, 1980. But the senate leadership disregarded his plea and pressed forward on the mail ballot. The vote was unnecessary and created a great deal of turmoil, not only at the University but in the greater San Diego community, where Bill was highly regarded, especially because of his efforts to heal some of the wounds of the Vietnam War period.

During that period, the relationship between UCSD and the San Diego community had been testy, to say the least. The city of San Diego was still a Navy town, very conservative and inclined to view UCSD as a hotbed of radicals. Bill McGill, who was chancellor of UCSD from 1968 to 1970, describes the situation quite well in his book *Year of the Monkey.*[6] Bill McElroy, McGill's successor as chancellor, had worked hard to build bridges to the community and his efforts were much appreciated. The community leaders were outraged when the faculty called for his resignation, and, among other things, published several full-page ads supporting Bill.

Accordingly, as the incoming chancellor, I had two immediate responsibilities —

6 William McGill, *Year of the Monkey: Revolt on Campus*, 1968-69 (New York, 1982).

to restore faculty confidence in the UCSD administration and to rebuild town-gown relations. I am reminded of a story about each.

I was scheduled to visit all academic departments in my first few weeks at UCSD to exchange ideas and meet with the faculty. These visits proved to be important in building relationships with the faculty and understanding the institution. But there were some contentious moments. One occasion stands out in my memory. I was with the literature faculty and we were engaged in a discussion about the nature of a liberal education. Having been an undergraduate at the University of Chicago, I had views on the topic that didn't please several members of the literature faculty. That discussion ended with one faculty member, who later became a good friend, simply announcing, "Well, we got rid of one chancellor. If we have to, we can get rid of another." I had only been there a few weeks.

The other story relates to town-gown relationships. I had been chancellor for less than a year when I was visited by a society matron who was the chair-person of the San Diego commission on the bicentennial of the American constitution. Each city had its own committee charged with planning events and celebrations for the bicentennial. She came to my office and with me during her visit was a member of our history department. We talked about the bicentennial and then my colleague in history and I proceeded to describe what the University was planning for the bicentennial celebration. She was impressed and at the end of the meeting finally asked if she could speak to me privately. She indicated that her committee had recommended that she not raise this subject with me since nothing would come of it;

but because I had been so forthcoming, she decided to overlook her committee's advice. I urged her to tell me what she had on her mind. She said, "I know it's policy that the University will not fly the American flag on campus, but I was wondering if during the bicentennial you would possibly be willing to fly it, nevertheless." I was stunned, walked her to the window, and pointed to a flag pole flying the American flag. I said it had flown there every day since the University was established. She was surprised but still had some lingering doubts. During the Vietnam War, some students had threatened to take the flag down, and several groups in San Diego continued to elaborate on that story as though it were indeed fact. After that I decided to install a flag at every major entrance to the UCSD campus. Not long thereafter, I invited a Marine Corps general with his Marine Corps color guard to raise the American flag at the dedication of a new facility, and I made sure we got good press and TV coverage.

Goals and Faculty Quality

When starting as a new president or chancellor, it's important to establish goals and to announce them widely. The goals help guide day-to-day decisions, but they also give the faculty and the larger university community a clear sense of the direction in which you would like to see the university move. (Note that I did not say, "The direction in which I would lead the university." Faculty do not respond warmly to the idea of being led by the chancellor.)

The archives have my inaugural speech as chancellor with goals stated for the institution. As president of the UC System, I again stated goals. And this very

week, I am preparing a report to The Regents restating my initial goals and the progress that has been made during the last five years.

I won't review my goals as chancellor or as president; they are a matter of record. However, one goal heads both lists, namely, recruiting and retaining excellent faculty — world-class leaders in their fields of research and scholarship. If one has a truly excellent faculty, then all else follows. Stated in the language of the logician, an excellent faculty is a "necessary and sufficient condition" for a great university. When I say "sufficient" I may be overstating the case, because a strong library, laboratory facilities, excellent students, and meaningful curricula are also needed. Nevertheless, I like to take the hard form of the assertion "necessary and sufficient" when it comes to emphasizing the critical role of the faculty.

The founding faculty at UCSD were people at the forefront of their disciplines and a culture soon emerged that gave faculty pride of place. As chancellor, my goal was to see that this culture was maintained and that outstanding people were recruited to the faculty. The culture of an institution is a powerful motivator; it can give individual faculty confidence in the significance of their work and ensure that new hires quickly adapt to that culture.

On the topic of faculty recruiting I am reminded of Fred Terman, who played a key role in the development of Stanford University in the years after World War II. Fred had a bagful of tricks for recruiting. One that I found useful involved election to the National Academy of Sciences. Each year the election process yields a rank-ordered list of individuals. About a hundred individuals are on the list and 40 are

elected in a given year; the remainder have an excellent chance of election in subsequent years. Terman would look at the list just below the 40 cut-point and pick a few of the best to recruit to Stanford University. In those days, the recruitment process moved quickly. A Terman recruit's appointment to the Stanford faculty would soon be followed by election to the National Academy of Sciences.

A Liberal Education

Having been imprinted as a college student at the University of Chicago, I have a strong commitment to the concept of a liberal education. The college of the University of Chicago, in the 1940s when I was a student, did a superb job with a curriculum that balanced study in mathematics and science with equally diligent study in the humanities and the social sciences. The keystone idea in my mind is that a liberal education involves both the sciences and the humanities. One without the other is not adequate to qualify for the title "liberal education."

At times I do battle with an occasional humanist who regards the sciences as a diversion from a true liberal education. My early experience in these debates occurred at the University of Chicago in a marvelous course entitled "Observation, Interpretation, Integration" (OII). I was fortunate to be in a group of students that was jointly taught by none other than Maynard Hutchins and Mortimer Adler. Hutchins was president of the University of Chicago, and he and Adler had developed the idea of the hundred great books. Although the Chicago curriculum did indeed have an emphasis on the hundred great books, it also provided a solid

background in the sciences.

Despite that curricular balance, it's fair to say that neither Hutchins nor Adler had the slightest exposure to modern science, unless one wanted to claim that knowledge of Freud's work qualified in this regard. Included in my class of students was Allan Bloom, who later became famous with the publication of *The Closing of the American Mind* in 1987. Allan was a fascinating individual who was made memorable by Saul Bellow in his novel *Ravelstein* — a memoir-like account of Bellow's friendship with Bloom. Bloom, Hutchins, and Adler saw eye-to-eye on every issue. Early in the course, we were engaged in a lively discussion about the nature of a liberal education. Everyone, myself included, agreed on the importance of the great Greek philosophers and the University of Chicago's list of a hundred great books. But I quickly got into deep trouble when I advocated that the calculus, the bedrock of modern science, was also a prerequisite for a liberal education. Hutchins and Adler disagreed, and the entire class stood in disbelief that I would offer such a heretical view. I remember Allan Bloom being particularly vocal in condemning my position, and we remained antagonists for the rest of the course. I never quite recovered from that experience and it still occasionally recurs in my dreams. Some 20 years later, I chatted with Adler at a social event in San Francisco. I reminded him of the class and he remembered our debate very well. He had not changed his mind and indeed I had not changed mine.

These comments about the University of Chicago bring to mind a special connection between Chicago and UCSD. In its founding period in the late 1950s and

early 1960s, UCSD had great success in recruiting faculty from the University of Chicago. The numbers recruited were so large that it surely was an embarrassment to Chicago, but what better place to recruit faculty? Harold Urey, a Nobel Laureate, was one of the first recruits on a long list that included several younger faculty who were students at Chicago with me and are still at UCSD, although retired. One husband-and-wife team was a special catch. Joe Mayer was a physical chemist and his wife, Maria Mayer, was a physicist. Joe was a faculty member at Chicago, but the university would not give his wife a faculty position because of its nepotism policy. UCSD offered both of them faculty positions and they arrived in the fall of 1960. In 1963, Maria Mayer was awarded the Nobel prize in physics, the second woman in history to win a Nobel prize. San Diego was not the most sophisticated of cities in those days, and the local newspaper headline read "La Jolla Housewife Wins Nobel Prize."

Administrative Style

When I arrived at UCSD, it was necessary to make a number of changes in senior administrative positions. One of my strengths as an administrator is that I move quickly on personnel issues. By the mid-1980s the administration of UCSD was regarded as one of the best in the UC system. Some of the new administrators were recruited from other institutions, some from within UCSD. In the process, I managed to persuade several people whom I had inherited to seek jobs elsewhere.

A careful examination of my record at NSF, at UCSD, and at the Office of the

President will show considerable turnover in key positions at the start of my administration. I believe in making changes quickly when they are needed. But in letting someone go I have always tried to arrange things so that the individual could leave with dignity and with the departure being viewed by others as a decision made by the individual in his or her own best interest.

The faculty and the Office of the Chancellor had a very constructive relationship during my time at UCSD. I established a full-time position of "Associate to the Chancellor," which was filled — usually for a term of one to three years — by a series of senior faculty members who participated in all activities of the Office of the Chancellor, ensuring that the faculty's views were well represented. I also had regular meetings with the chairman of the Academic Senate and invited him or her to attend on a regular basis the Monday morning meetings of the chancellor's council.

When I became president, I extended the same invitation to the chairman of the statewide Academic Senate, namely to participate in the Monday morning meetings of the senior officials of the University of California. I have always believed in shared governance and the importance of faculty involvement in decision-making. That doesn't mean that decisions cannot be made in a timely manner or that all decisions will be supported by the faculty. It does mean that the faculty will have a clear understanding of how administrative decisions are made and the opportunity to make their views known during the decision-making process.

I am reminded of an occasion in which I was in sharp conflict with the UCSD

faculty and did not follow their advice. It involved the construction of Library Walk, a project that required cutting down a large number of trees. A group of faculty was violently opposed to the project, even though earlier the faculty senate had approved a master plan for the campus with the walk as a centerpiece and the addition of many more trees than were to be cut down. Students soon joined in the melee and placed white crosses on the trees — a stunning sight to behold. I proceeded with the project nonetheless and had to have several students and one faculty member removed who had chained themselves to the trees. With the passage of time, the walk has become one of the most attractive areas of the campus. Cutting down trees — whether one or many — is always hazardous for a chancellor or a president.

Community Issues

The interaction between UCSD and the San Diego community while I was chancellor is well documented in Nancy Anderson's history of UCSD. Another account is presented in a recent report by the U.S. Small Business Administration entitled *Developing High-Technology Communities: San Diego.*[7] A section of that report is reproduced on the next several pages.

7 "Developing High-Technology Communities: San Diego," U.S. Small Business Administration, Washington, D.C., March 2000.

V. THE UNIVERSITY-INDUSTRY CONNECTION

THE UNIVERSITY OF CALIFORNIA AT SAN DIEGO (UCSD)

The Critical Role of UCSD's Chancellor

> Industry-university cooperation enriches the university. In San Diego, UCSD took the lead in creating a more favorable environment for building knowledge-based businesses. As businesses built up, the University benefitted from the technology people (that the businesses) attracted.
>
> – Richard Atkinson, President, University of California

Dr. Richard Atkinson, President of the University of California, was the Chancellor of UCSD from 1980 to 1995. Dr. Atkinson played an important leadership role in promoting high-technology development in the San Diego region. As Chancellor, he set the tone and direction for the University, encouraging, cooperation with industry, which helped the region's defense industries diversity and helped small, high-technology enterprises get started.

At UCSD, Dr. Atkinson actively involved local industries in recruiting science and technology "stars" and endowing chairs at the University. In fact, the campus recruited faculty of such stellar quality in virtually all disciplines that, despite the need to add positions quickly to keep pace with an increasing enrollment, by 1995, a National Research Council study ranked UCSD tenth in the nation in the quality of its graduate programs. The excellence of the faculty, and of the research the faculty produced, increased the credibility and visibility of the University in the community, state, and nation, and was a major factor in UCSD's success in contributing to the San Diego economy.

Dr. Atkinson's strategy included establishing a new school of engineering, whose principal advocate and architect he became as soon as he arrived on campus. The school has grown in size and distinction over the past 10 to 15 years, and one of its first faculty members, Irwin Jacobs, went on to found QUALCOMM. Under Dr. Atkinson's leadership, the campus successfully bid for one of five national Supercomputer Centers and aggressively sought and attracted research funding in science and engineering, making UCSD one of the top five university recipients of federal research funding during most of his tenure.

Dr. Atkinson encouraged collaborative research with industry by establishing technology transfer programs in science and engineering departments and saw that UCSD mounted a vigorous campaign to attract industrial consortia — the Microelectronics and Computer Corporation (MCC) and Sematech — to San Diego. Although both eventually located in Austin, Texas, San Diego was the only city in California to be a finalist. He engaged the University Extension in developing corporate executive programs, and later, working with community and private sector leaders, promoted networking activities for high-technology business and industry. The networking activities became a more formalized program — CONNECT — which has grown into an impressive program aimed at networking advocacy, assistance to and promotion of technology firms. Dr. Atkinson charged Dr. Mary Walshok, Dean of Extended Studies and Public Program, with developing the corporate programs including CONNECT, and subsequently recruited a well-respected business leader, William Otterson, to direct the program. The CONNECT program and the San Diego Computer Center are described in the next section.

INTERVIEW WITH DR. RICHARD C. ATKINSON, PRESIDENT, UNIVERSITY OF CALIFORNIA

In September 1998, Innovation Associates' President met with Dr. Richard Atkinson to discuss his philosophies on the role of the university in stimulating high-technology economies. The following is derived from that meeting.

Dr. Atkinson's philosophies on university-industry cooperation are rooted in his experiences as a professor at Stanford University. At Stanford, he witnessed Dr. Fred Terman, Dean of Engineering, actively encouraging university-industry cooperation and promoting spin-offs of high-technology industries from the University. Dr. Atkinson carried this philosophy with him to the National Science Foundation (NSF), where, as Director, he began to build bridges between universities and industries. At the NSF, Dr. Atkinson started the Industry-University Cooperative Research Program (IUCRP), which required university R&D projects funded by the IUCRP to involve industrial partners. In the late 1970's, Dr. Atkinson promoted the idea of university-industry cooperation at the NSF when there was not much interest in this type of cooperation. At first, the idea of requiring industries to partner with universities to receive grants met with opposition, but eventually the concept became accepted and institutionalized. Dr. Atkinson promoted the importance of university R&D and the role of university-industry collaboration at the NSF:

- By initiating formal analysis to measure the economic results of R&D investments;
- By promoting technology transfer policies aimed at moving intellectual property rights from government to universities (which later was mandated through the Bayh-Dole Act);
- By institutionalized engineering as an integral part of NSF activities, and underscoring the relationship between science and engineering; and
- By encouraging university-industry relationships in R&D through the IUCRP.

Dr. Atkinson said that, prior to the "Sputnik era," universities and industries had strong relationships in science and engineering. Universities cooperated with industries because it was economically beneficial for them to do so. But the bonds between universities and industries weakened during the Cold War when the federal government provided extensive funding for university research, lessening the need for university-industry cooperation. As the "Sputnik era" was coming to an end, Dr. Atkinson believed it was time to renew the once strong relationships between universities and industries. The IUCRP, and other activities that stemmed from Dr. Atkinson's tenure at the NSF, laid the groundwork for national policy and provided a model for state technology programs. Programs such as the Ben Franklin Program in Pennsylvania, and the Thomas Edison Program in Ohio, followed NSF's lead by focusing resources on university-industry collaboration in R&D and university-centered technology transfer.

As Chancellor of UCSD from 1980 to 1995, Dr. Atkinson drew on his Stanford and NSF experiences to position UCSD as a key technology generator in the San Diego region. During his tenure, the University played a central role in creating an entrepreneurial climate by attracting federal research dollars and helping bring research to market. Dr. Atkinson believed that it was part of the University's mission, as a state-funded institution, to give something back to California by creating a more favorable environment for attracting and developing technology-based industries around the University and in the community.

Dr. Atkinson promoted his ideas of university-industry collaboration at a critical time in San Diego's economic development. In the late 1980's and early 1990's, when the region experienced cutbacks, Dr. Atkinson worked externally, with community organizations, and internally, with the University's department heads, to forge a relationship between the University, the community, and the private sector. He believed that it was natural that small, high-technology enterprises would fill the gap left from reductions in defense contracts to major corporations.

In order to promote the development of high-technology enterprises in the San Diego region, Dr. Atkinson's initiatives at UCSD aimed:

- To increase the University's basic and interdisciplinary research capacity,
- To increase the University's computer and engineering education and research through new schools and centers,
- To encourage the transfer of the University's technologies to the private sector and into the market place,
- To support the development of new technology enterprises, and
- To develop national credibility and visibility for the University and the regional technology community.

Dr. Atkinson believed research was the key to economic progress, and that university-industry collaboration was essential to transfer research into the market place. Citing principals set out by President Truman's Science Advisor almost 50 years ago, Dr. Atkinson said that (1) basic research should be funded by the federal government, (2) basic research should be carried out in research universities, and (3) funding should be make available to individuals not institutions. Dr. Atkinson's active pursuit and success in obtaining federal funding for research, and his active courtship of private funding, were prerequisites to building UCSD as a nationally prominent research university.

Dr. Atkinson believed in greater freedom for academics to carry out their own research programs. He also believed horizontal, non-hierarchal structures encouraged "academic entrepreneurs." Under Dr. Atkinson's direction, UCSD professors were expected to spend about half of their time conducting research. Dr. Atkinson said, despite the emphasis on research, that teaching quality remained high. This was demonstrated by consistently high satisfaction ratings from undergraduate student.

Industries, he said, primarily want two things from research universities: access to students, and a window on science and technology. In San Diego, Dr. Atkinson helped provide the window on science and technology by instituting university-industry cooperative programs, executive fora, and programs that networked high-technology firms in the region.

Dr. Atkinson believed, although direct technology transfer to industries was important, perhaps even more important was the indirect technology transfer which resulted from students taking jobs with local industries and starting businesses. This indirect technology transfer benefitted growing local industries as well as the University's ability to attract top students.

Dr. Atkinson stressed the difference between the university being an "engine that drives the economy" and a "job shop." As an "engine," the university provides technology firms with research and development and technology transfer. Moreover, Dr. Atkinson said that not every university should be engaged in research, for different universities serve different purposes in the community and the state.

Dr. Atkinson believed the most important asset for any university was to employ the best people. He actively involved the private sector in recruiting top national scientists and engineers to the San Diego region. He said, "you cannot create intellectual talent, you must go after it and reduce the constraints in attracting the best people." He contended that a public university is presented with greater challenges than a private university in attracting the best people, but that this could be overcome, in part, by involving the private sector.

In terms of the national economy, Dr. Atkinson said that the application of knowledge may be (the United States') best strategic advantage in an international market. In order to apply knowledge and increase the U.S. competitive position, he believes two factors are key: (1) increasing productivity of the American workforce, and (2) increasing investments in research and development (which ultimately leads to increased productivity). He referred to a report by the Council of Economic Advisors which stated that 50 percent of all U.S. economic growth in the past 50 years has been due to investments in research and development (R&D). He said that research universities have been, and continue to be, a valuable source of that R&D. Dr. Atkinson expressed concern about declining federal R&D funding to research universities, and suggested that this could weaken future economic growth.

In 1995, Dr. Atkinson assumed the Presidency of the University of California, where he is applying experiences from Stanford University, the National Science Foundation, and the University of California at San Diego. He has already increased the University of California's university-industry efforts in biotechnology, and is expanding that collaboration to other fields. If the State of California benefits from Dr. Atkinson's leadership, as San Diego has benefitted, the State is indeed fortunate to have him at the helm of its university system.

Association of American Universities

After becoming chancellor, one of my first efforts was to lobby for UCSD's election to the Association of American Universities (AAU). The AAU is a group of distinguished research universities and membership is by election. The AAU includes the expected cast of schools: the Ivy League universities (except for Dartmouth), the Big Ten schools, the University of Chicago, Stanford University, MIT, the University of Washington, and so forth. UC was a founding member of the AAU at the turn of the last century; after the UC System was established, the Berkeley campus took on the mantle of AAU membership. UCLA was not elected until 1972, an election long overdue. UCLA's election was the first time that any university s stem had more that one campus as a member of the AAU. As chancellor I began a correspondence with friends who were presidents of AAU universities, making the case for UCSD in terms of the excellence of its faculty, its research and teaching programs, the level of federal R&D support, etc. A strong group of supporters emerged among the AAU members and the UCSD case was presented to the AAU selection committee in 1982. No institution had been admitted to the Association since UCLA in 1972 and resistance to enlarging the membership was considerable. Many AAU members also believed that an equal balance should be maintained between private and public universities. But the case for UCSD was extremely strong and a favorable decision occurred with the election of one public institution and one private institution: UCSD and Rice University. I believe my campaign with AAU presidents was critical to moving the election process forward;

Rice University was a beneficiary.

I was pleased that during my second year as president of the UC System, UC Santa Barbara was elected to the AAU followed, a year later, by UC Davis and UC Irvine. I campaigned for their election and it's a mark of the University of California's overall distinction that it is still the only system with more than one campus represented in the AAU. No one can doubt the great distinction of UC Berkeley. But many people, particularly in the eastern U.S., do not recognize the breadth and depth of quality throughout the UC System. For example, in the year 1999 federal R&D funds going to the University of California System were greater than those for the entire Big Ten (which has 11 medical schools compared to our five) and greater than the entire Ivy League. Every school in the UC System deserves the title "research university."

Leadership

By no plan but by serendipity, I've been involved in research on leader ship for much of my adult life. While serving in the U.S. Army in the early 1950s, I was assigned to an organization called HumRRO (Human Resources Research Organization) located at Fort Ord, California. One of the research projects I worked on involved identifying the leadership characteristics of effective junior officers. During my Army service, I published several papers on leadership. And in the 1980s, I served on the Board of Directors of the Center for Creative Leadership, headquartered in North Carolina. The center was involved in research and training

programs on leadership for various types of organizations ranging from large corporations to national, state, and local government agencies. With that background and a survey of the recent literature, I believe I would be qualified to write a review article on research findings dealing with principles of leadership. But I have no such inclination. Clearly, talented people focused on the problems of leadership have useful observations and anecdotes to contribute; however, the research that's been done to date — based principally on correlational analyses — has not led to meaningful scientific advances.

MBA programs have courses in leadership and most corporations provide their executives with seminars on leadership. Obviously, many people believe they gain a great deal from these courses and seminars, but they are not based on scientific evidence. Rather, it's a collection of anecdotes and observations about what good leaders seem to do. The same observations were made by the Greeks and Romans many centuries ago. Indeed, the Greek biographer, Plutarch, in his study of famous leaders of antiquity, offers an analysis of leadership as sophisticated as any available today. It has been a disappointment to me that research in this area has not led to significant advances; hopefully, in the future, the situation will change. Thus, my comments on leadership are nothing more than intuitions based on my experiences. I have not served as a president of a major corporation or led an army in the field, and my views may be of no value in those circumstances. They may have some relevance for university administrators, however.

My perspective on leadership is reflected in a poem by Lao Tzu, a 6th century

B.C. Chinese philosopher. The poem reads as follows:

He does not make a show of himself
Hence he shines
Does not justify himself
Hence he is glorified
Does not boast of his ability
Hence he gets his credit
Does not brandish his success
Hence he endures
Does not compete with anyone
Hence no one can compete with him.

I have already discussed the importance of establishing goals early in one's tenure as a president and making those goals visible to the university community. Another feature of leadership is being forthright and direct in all dealings, whether with faculty, students, staff, alumni, or friends of the university. It is important to establish a reputation as someone who can be trusted and relied upon to follow through on commitments. Once that trust is broken, it's near impossible to restore.

It is also important to give people who work for you full credit for their ideas and contributions. I've always gone to an extreme, both privately and publicly, to recognize individuals who've had good ideas or made special contributions. By doing so, you help ensure their loyalty but also send a message to the broader community that creativity is encouraged and rewarded. Some people in leadership positions have difficulty giving credit to others; in the long run, nothing is more damaging to their reputation.

I also believe in making decisions quickly — decisions that sit on a president's desk too long send out a message that a leader is indecisive. And indecision at the top is contagious throughout the organization. In dealing with people who work for

you, encourage them to act promptly, even if on occasion they are wrong and have to reverse course later. In a university environment, there is a tendency to check with every constituency several times, often without being precise about the possible alternatives from which one must choose a course of action. Formulate the options clearly and then push for agreement. If agreement is not possible, then presidents and chancellors need to act on their own, recognizing that they will not always have the full support of every constituency.

It's important to establish an environment on the campus where the chancellor is available and readily approachable. Be visible, take frequent walks on the campus, and drop in on people unexpectedly as a way of showing interest in their work. This is particularly important in the first few months as a new president or chancellor. Once you have established the image of being available and approachable, that image will endure even though your responsibilities may prevent you from sustaining that initial level of public visibility.

The job of chancellor places one in a special position. I will never forget an experience I had in my first weeks as chancellor. I went shopping one evening with my wife. She was at a counter making a purchase and I was standing off to the side. When she'd made her decision, I came over and offered my credit card to the young woman who was clerking at the counter. She was a UCSD student. When she looked at the credit card and saw my name, her response was, "You're the chancellor! I never knew chancellors went shopping!" It's a bizarre comment, but it reflects a certain attitude toward the position of chancellor.

Let me now skip quickly through a series of bullets in no particular order:

- Never misrepresent facts. You will be brought to task sooner or later. Faculty and students are too bright to be deceived over the long run.
- When fundraising, be convinced that the project you're trying to raise money for is worthwhile. When that's the case, never hesitate to ask a potential donor for support. Some presidents have great difficulty making the final pitch and let subordinates do the job. That's a missed opportunity. If it's an important project, then it is the president's responsibility to convince the donor of its value.
- Be careful about funds that are available for your personal use. Never use university dollars to support your own research or to benefit yourself in any way. Always assume that your expenditures will be scrutinized by many people, some looking to find fault. Be sure that there is no question that the funds are being used appropriately and that their uses can withstand public review.
- Be very careful about publicly criticizing anyone, particularly faculty. No matter how outrageous or unjustified a faculty member's remarks, try to be reserved in your response. If you attack — even though you are justified — other faculty will worry that you might turn on them in the same way.
- When you fire someone working for you, keep it confidential. Relieve them of their position in such a way that publicly it is viewed as a decision that they themselves have made and have made in their own best interest. The

individual should be permitted to resign with dignity. With care, this can be done successfully, even in cases where the individual is difficult to deal with.

- Know the university budget in detail. It is a mistake to let someone else control the purse strings.
- Make a habit of writing to individual faculty and staff recognizing their successes or special contributions. These can be very brief notes — a few sentences — but they will be greatly appreciated.
- When a newspaper publishes a story that is unfair and misrepresents the facts, think carefully about whether or not to respond. Newspapers rarely if ever retract a story, and a counterattack by a chancellor or president will intensify the matter. Stories of this type tend to be quickly forgotten and are usually best ignored. If you feel that a response is absolutely necessary, it is better for someone else to write a letter-to-the-editor that is strictly factual and does not impugn the integrity of the reporter or newspaper.
- Avoid engaging in any kind of activity on or off the campus that will not withstand public scrutiny. You can be away from the campus and think that no one knows you, but in all probability someone will recognize you. For example, when you're driving your car, don't engage in maneuvers that other drivers will regard as discourteous or reckless. Those other drivers may turn out to be staff or faculty and they will be quick to tell others.
- This comes late in the list, but to be a successful president or chancellor, one must have had the experience of engaging in serious scholarly work.

Someone who has never been involved in intellectual pursuits will have difficulty gaining the respect of the faculty. Unfortunately, faculty search committees sometimes go astray and push for a president who is not intellectually competent, feeling that they can dominate the person. That's a problem trustees and regents have to guard against in selecting a president.

- Every statement you make, whether in private or public, probably will be quoted and often distorted, so be careful what you say even to friends. When a chancellor or president speaks, the world listens.
- Public speeches are important in establishing one's reputation. Most speeches that are read tend to be dull and soporific. Obviously, for speeches before major audiences, a prepared text is useful. But take time to become so familiar with the text that it rolls off your tongue without hesitation. When speaking to faculty groups, speak off the cuff whenever possible; it builds their confidence in you as a leader. Ideally, you will be so familiar with the subject that extemporaneous speaking is not a problem. And have something of substance to say — particularly to the faculty.
- When talking with young students, don't be taken off guard by facial expressions or gestures that appear hostile or indifferent. When I've talked to these students later, it's been my experience that their intent was to be positive and friendly. Young people, particularly when encountering a president or chancellor, can be ill at ease; don't misinterpret their expressions or gestures.

As chancellor or president, you are viewed as someone with great knowledge and authority. On occasion, however, you will find yourself at a loss to understand the intricacies of some issue. I have in mind a technical presentation I once received from a group of astronomers that was way over my head. On such occasions, you do the best you can. As chancellor and later as president, I've often been reminded of the character Chance, played by Peter Sellars in the movie *Being There*, based on Jerry Kosinski's novel. Chance finds himself in conversations he doesn't understand and, being simpleminded, says things that other people misinterpret as profound because they believe he is someone with special knowledge.

Schools of Engineering

When I arrived at UCSD, the campus had no school of engineering, although there were several departments and research groups that at most universities would be included in a school of engineering. The explanation is straightforward. In the late 1960s a group led by Fred Terman of Stanford University was asked to assess engineering education in California and make recommendations for the future. At the time, California was in a recession and appeared to have an oversupply of engineers. Not surprisingly, Terman's report recommended that no new schools of engineering be established in California, and consequently the San Diego, Santa Cruz, and Irvine campuses did not start engineering programs.

By 1980, however, the picture had changed. There were several reports by the National Research Council and the National Science Foundation pointing out the need for more engineers. One of my first initiatives as chancellor was to establish a

school of engineering at UCSD. However, there was no reference to a new school of engineering in my publicly announced list of goals. The last thing the faculty wants to hear is that the chancellor is pushing for a particular school or program and claiming credit for its creation. The faculty need to be at the forefront; a sure way to undermine any such effort is for the chancellor to claim credit for championing a new program while dragging the faculty along behind.

In establishing any new school, the faculty worry that resources will be diverted from other programs. Even though budgetary constraints were severe in the early 1980s, I was able to convince the faculty that new funds would be obtained. Another argument that helped gain faculty support was that the school would not be isolated from the rest of the campus — engineering students would meet the same liberal arts requirements as any other student. In addition, courses like calculus and physics would not be taught in the school of engineering but in already established departments.

After much maneuvering, the UCSD faculty senate voted to establish a program; however, they were not willing to call it a school of engineering. They insisted on naming it Division of Engineering, but they did approve the appointment of a dean of engineering. Over the course of the next several years, excellent faculty were recruited who in turn attracted significant federal funds. Student interest was high, and the programs received a great deal of local and national recognition. Given that kind of success, the faculty soon agreed to change the name to School of Engineering. In a recent *US News and World Report* ranking, it was 15th among all

U.S. schools of engineering — a remarkable ranking, given the school's brief history.

When I came to the University of California System as president, my intention was to establish schools of engineering at all of the UC campuses (except UC San Francisco, which is devoted exclusively to the health sciences) and to expand engineering across the system. I made no reference to the plan in my announced list of goals, for the same reason mentioned earlier. I was surprised at how quickly the statewide academic senate adopted recommendations to establish new schools of engineering, and to expand the number of students in engineering across the UC System by 50 percent (at both undergraduate and graduate levels). Governor Wilson and later Governor Davis were enthusiastic about the expansion and were generous in providing the necessary funds.

Some may believe that I have placed too much emphasis on engineering, but in our "new economy" the need for engineers — particularly with the type of education UC offers — is greater than ever. Further, an education in engineering is different today from what it was 30 or 40 years ago. It's no longer a trade-school program but in every sense an academic discipline. Because of the Terman report, the percentage of engineering students across the UC System was woefully low by the 1990s; only UCLA and Berkeley had percentages that were comparable to institutions like Stanford and the University of Michigan. With the expansion of our programs, the overall percent of students studying engineering across the UC System will be similar to that at our comparison institutions.

I'm reminded of a story involving Hannah Gray, the former president of the

University of Chicago. She is a good friend and someone for whom I have great regard. Shortly after the engineering program was established at UCSD, she saw me at an AAU meeting and said in the presence of several university presidents, "Dick, there is something wrong with you. You're a product of the University of Chicago. You've always professed your belief in a liberal education and yet everywhere you go, you establish engineering programs. As director of NSF, you established the directorate of engineering, quite a departure from the original plan for NSF. Now you no sooner arrive at UCSD than you establish a school of engineering. What's wrong with you? Have you forgotten your roots at the University of Chicago?" Her comments were meant to be humorous but with a decided edge. I responded, "Hannah, engineering is not like it was when you and I were students. A UCSD degree in electrical engineering or computer science or mechanical engineering is as much a liberal arts degree as a degree in physics, or history, or philosophy. Engineering students are engaged in real intellectual endeavors and no longer simply acquiring the tools of a trade." A modern research university without programs in engineering is at a serious disadvantage; the synergy between engineering and other disciplines is simply too important.

Appointment as President of the University of California

I will leave it to someone else to give a full account of the process that leads to the election of a UC president. In brief, a subcommittee of The Regents is established to evaluate and interview candidates; at the end of interview process, the chairperson of the subcommittee recommends one name to the full Board of

Regents for its concurrence. In addition to the Regents' subcommittee, there is a faculty committee appointed by the Academic Senate to sort through the list of candidates and provide advice to the Regental subcommittee.

In the presidential searches of 1983, 1992, and again in 1995, my candidacy was compromised by the fact that I'd been named in a lawsuit by a woman faculty member at Harvard University involving a personal matter. The lawsuit attracted national attention and was not settled until 1985. The settlement involved no admission of wrongdoing on my part, but after five years of legal hassles, my wife and I wanted to get the matter behind us.

Throughout my period as chancellor, I had strong support from the faculty and the lawsuit did not affect that support. Even though the lawsuit was settled in 1985, several Regents believed that the allegation alone was too big a drawback. In 1995, the chairman of The Regents' subcommittee was determined to pick someone from outside the UC System, but the faculty advisory committee pressed hard for my appointment. The chairman of The Regents' subcommittee offered the position to an individual from another university, but when the news of the offer leaked to the press, there were several embarrassing newspaper stories. The faculty committee announced that it had not been consulted and made its objections evident. The outside candidate withdrew. At that point the faculty committee was empowered and pressed vigorously for my appointment. Without determined faculty support, I doubt that I would have been selected as president. Fortunately, my record as chancellor was the principal news item when my appointment was

announced, and only one or two newspapers had more than a few sentences about the lawsuit.

I dislike the phrase "capstone to a career," but in my case it fits. At the age of 66, this appointment would be my last. My academic career as a teacher and researcher at Stanford University, my early election to the National Academy of Sciences, my time in Washington, D.C., plus my 15 years at UCSD, all were excellent preparation. Age is a factor in jobs of this sort, but Rita and I were (and continue to be) in good health, and I still have the drive and vigor to be an effective president. Further, I had been well schooled in the problems of UC and the complexity of its relationships with the legislature and governor.

The governor and the lieutenant governor are ex-officio members of the Board of Regents. Pete Wilson was governor when I was elected president. We had known each other since 1980 and worked together well. While I was president, he made every effort to support the University and our budget. We had only two disagreements. One was over my decision to delay implementation of The Regents' resolution SP-1 (the elimination of affirmative action), and the other was about benefits for domestic partners. But even with these two complications, Pete was a good person to work with and someone I respect.

At the time of my appointment as president, Gray Davis was lieutenant governor. In that role he spent a good deal of time on University business and attended Regents' meetings regularly. We had come to know each other well while I was chancellor. He was interested in high tech and the role UCSD played in

fostering high-tech companies in San Diego. While he was lieutenant governor, I introduced him to a number of business leaders in San Diego; he became familiar with the concept of "new growth theory" and has been a strong proponent of university research in shaping the California economy. When I was appointed president, Gray jokingly said to me that I should hope for his election as governor, for he would be one of my best supporters. Indeed that has been the case.

The NRC Report Rating Ph.D. Programs

The year I became president, the National Research Council (NRC) published *Research Doctorate Programs in the United States: Continuity and Change*, a massive report containing information on the quality of doctorate programs in American universities. The report covers 41 disciplines from the sciences to the humanities, and involves 247 universities. The reputational ratings were based on the judgments of approximately 8,000 faculty. I will not review the details of that report except to note that all UC campuses did remarkably well. The report rank-ordered universities in each of the 41 disciplines, but no overall ranking of universities was provided. However, David Webster and Tad Skinner, in an article that appeared in *Change* magazine in June 1996, took the next step of computing the "scholarly quality of program faculty" rankings averaged over individual disciplines for each university. These averages were then used to produce an overall ranking of universities. That ranking is presented on the next page for the top 50 universities.

TABLE 1
"SCHOLARLY QUALITY OF PROGRAM FACULTY" BY MEAN SCORE OF ALL PROGRAMS, FOR INSTITUTIONS WITH 15 OR MORE PROGRAMS RATED

Rank	Institution	Mean Score	Number of Programs Rated
1	Massachusetts Institute of Technology	4.60	23
2	University of California-Berkeley	4.49	37
3	Harvard University	4.40	30
4.5	California Institute of Technology	4.29	19
4.5	Princeton University	4.29	29
6	Stanford University	4.21	43
7	University of Chicago	4.13	30
8	Yale University	4.08	30
9	Cornell University	3.95	37
10	University of California-San Diego	3.93	29
11	Columbia University	3.92	34
12.5	University of California-Los Angeles	3.85	36
12.5	University of Michigan	3.85	41
14	University of Pennsylvania	3.79	36
15	University of Wisconsin-Madison	3.70	39
16	University of Texas at Austin	3.63	37
17	University of Washington	3.60	39
18	Northwestern University	3.58	30
20.5	Carnegie Mellon University	3.56	15
20.5	Duke University	3.56	33
20.5	University of Illinois at Urbana-Champaign	3.56	37
20.5	Johns Hopkins University	3.56	34
23	University of Minnesota	3.45	39
24	University of North Carolina at Chapel Hill	3.44	34
25	Brown University	3.40	30
26	New York University	3.37	25
27	University of California-Irvine	3.35	24
28	University of Virginia	3.34	32
29	Purdue University	3.31	25
30	University of Arizona	3.25	29
31	University of Rochester	3.24	28
32.5	Emory University	3.23	16
32.5	Rutgers University-New Brunswick	3.23	33
34	Washington University	3.22	27
35.5	University of California-Davis	3.18	26
35.5	Pennsylvania State University	3.18	39
37	Ohio State University	3.16	39
38	Indiana University	3.15	28
39	State University of New York at Stony Brook	3.13	30
40	Rice University	3.11	22
41	University of California-Santa Barbara	3.08	32
42.5	University of Colorado	3.05	31
42.5	CUNY Grad. School and University Center	3.05	26
44.5	University of Maryland College Park	3.04	28
44.5	University of Southern California	3.04	26
46	North Carolina State University	3.03	23
47	Texas A&M University	3.00	27
48	Vanderbilt University	2.99	26
49	University of Massachusetts at Amherst	2.98	31
50	University of Iowa	2.97	33

In the article, the authors devoted the following section to the University of California:

The University of California (UC) system rated extraordinarily well in many areas, as did two of its campuses, UC-Berkeley and UC-San Diego.

UC-Berkeley rated exceptionally high any way you look at the *Report's* figures. It achieved the second highest overall mean rating (4.49) of all 274 institutions rated, below only MIT. It had more programs rated in the top 10 in their disciplines (36) than did any other institution, ahead of Stanford (32), Harvard (26), Princeton (22), and MIT (20). It also had the highest proportion of its programs rated in the top 10 in their disciplines (36 of 37, or 97 percent), ahead of Harvard (26 of 30, 87 percent), MIT (20 of 23, 87 percent), Princeton (22 of 29, 76 percent), and Stanford (32 of 43, 74 percent) — the only other institutions that had more than 70 percent of their programs rated in the top 10. Of Berkeley's 37 programs included int he *Report*, five were first, or tied for first, in their disciplines. Berkeley was rated first in chemistry and German and was tied for the rank of 1.5 in mathematics as well as statistics (although it rated lower in biostatistics) and for the rank of 2.0 in English. Twenty of its programs were rated anywhere from second to fifth (including any ties) in their disciplines, and 11 more were rated from sixth to 10th. The only Berkeley program that rated lower than 10th was cell and developmental biology (13th).

UC-San Diego rated extraordinarily well, particularly for an institution that became a UC campus as recently as 1964. It was rated 10th in mean score (3.93) for faculty scholarly quality — higher than older and larger UCLA, higher than any public university campus in the United States except Berkeley, and higher than such highly regarded private universities as Columbia, the University of Pennsylvania, and Northwestern. Two of its programs — in neuroscience and oceanography — rated first in the United States. Three more programs at UC-San Diego rated from second to fifth, and nine more from sixth to 10th, for a total of 14 of its 29 doctoral programs (48 percent) that were rated in their discipline's top 10.

Impressive as are the ratings of UC-Berkeley and UC-San Diego, the showing of the UC system as a whole is even more remarkable. Of its 229 programs included in the study, 119 — or 52 percent — rank in the top 20 in their disciplines. The nine UC campuses represent only 3 percent of the 274 institutions included, and the eight UC campuses (all but UC-San Francisco) that have 15 or more programs rated represent only 8 percent of the 104 institutions in the category. Remarkably, however, these nine house 15 percent of the nation's top 20 programs, 19 percent of its top 10 programs, and fully 20 percent of its top five programs. Six of the nine UC campuses

placed one or more programs in the top five in their disciplines, and eight of the nine — all but UC-Riverside — placed one or more programs in the top 10.

The eight UC campuses with 15 or more programs rated, taken as a group, achieve a higher mean score than do the 11 schools in the Big Ten. They score an average of 3.55 in faculty scholarly quality, compared to the Big Ten's 3.37, and 3.38 in program effectiveness, compared to the Big Ten's 3.32. This performance is astonishing, considering that the Big Ten universities, taken as a group, are much older than the UC campuses and have much larger faculties (reputational rankings of doctoral programs generally correlate quite highly with size of program faculty). It is all the more astonishing when one considers that eight of the Big Ten universities — all except Indiana, Michigan State, and Northwestern — are, according to the *Report*, the highest-rated public research universities in their states.

In the past 40 years or so, many states that long had only one state university campus have established one or more other campuses, and some states are developing their new campus(es) to eventually achieve parity with the flagship campus. As of now, however, none of these non-flagship campuses has achieved anything approaching parity with any of the UC's five highest-rated non-flagship campuses.

Need I say more? This report was immensely helpful in making the case for the University of California with the governor, the legislature, and the general public. For a new president, the timing of the NRC report couldn't have been better.

The Knowledge-Based Economy and University Research

I've been a vigorous advocate for undergraduate education, but I've also paid special attention to graduate education and research. Not too many years ago, some legislators and commentators were fond of saying that the research universities should devote all of their resources to undergraduate education and "cease and desist" in their research efforts. That view is rarely expressed today, in large part because the case for university research and graduate education has been so well

documented. To give you a sense of my efforts in this regard, reproduced here is a section of a lecture I gave in October 1999 at the China-U.S. Joint Science Policy Seminar in Beijing.

The term "knowledge-based economy" — sometimes called the "new economy" — refers to a set of industries whose main products or services use information to decrease costs and create new opportunities for growth. Generally speaking, the industries of the new economy tend to produce jobs more rapidly and with higher salaries, increase productivity growth faster, and provide greater profits for employers than the "old" economy. These high-technology industries rely on a constant infusion of new knowledge to stay competitive, and the principal source of such knowledge is basic research. The California economy provides a striking example. Its recovery from the economic recession of the early 1990s depended on knowledge-driven businesses and jobs that didn't exist 15 or 20 years ago — biotechnology, telecommunications, and multimedia, for example.

The evidence regarding the relationship between research and development (R&D) and economic growth in the United States is overwhelming. As recently as the early 1970s, there was no substantial economic analysis of the relationship between investments in R&D and economic development. When I served as director of the National Science Foundation in the 1970s, we were well aware of the lack of such economic data in making the case to the Congress for federal support of research. And we realized that most of our arguments about how R&D affected economic growth were based on little more than anecdotal evidence. Accordingly, we initiated a special research program at NSF focused on just that issue — the relationship between investments in R&D and the growth of the American economy.

In the intervening 25 years, a substantial body of research has led to a development in economics called "new growth theory." This work was nicely summarized in a 1995 report of President Clinton's Council of Economic Advisors: 50 percent of the growth in the American economy in the last 40 years has been due to investments in research and development. Obviously, the private sector is a major driver of R&D, but federally funded research at universities also plays a key role. The report points out that when federal investments in university research increase, there is — with an appropriate time lag — a corresponding increase in private-sector investments. There is now a well-understood link between university-based research and industries' R&D efforts. As I mentioned, the State of California provides one

of the best examples of this linkage. In the early 1990s, the state endured one of the worst economic recessions in its history. California in prior periods had entered economic recessions later, and come out much earlier, than the rest of the United States. But in the 1990s this traditional pattern broke down. California suffered a brutal economic downturn fueled by tremendous cutbacks in defense and aerospace — a loss of jobs that resulted in a dramatic drop in the tax revenues of the state.

What has happened in the past few years? California has come storming back from the recession. Why? New jobs have been created at a fast rate. Where are those jobs coming from? From a particular type of activity: high technology. And these high-tech enterprises are not the vast IBMs and AT&Ts of the world. The companies that pulled California out of recession are small, entrepreneurial, high-tech ventures. These companies (and their technologies) can be traced directly to the research universities of California, both public and private.

Biotechnology, for example, a booming industry in California, traces its success — in fact its very existence — to research programs that came out of the state's universities. Digital telecommunications is another case in point. It could not exist at its current scale and scope without the California universities that produce the research and educate the engineers and scientists essential to keeping this industry on the cutting edge.

California succeeded in its remarkable economic comeback because it possessed four advantages essential to the new economy: 1) world-class research universities that encourage faculty — and allow them to benefit financially — when they are involved in research that leads to the development of new technologies; 2) a supply of entrepreneurs experienced in launching and developing high-technology businesses; 3) venture capital and other sources of private investment in early stage business ventures; and 4) the accounting, legal, and other ancillary services needed by start-up companies.

I would like to mention a concrete example, one that I am familiar with because it began while I was chancellor of the San Diego campus of the University of California (UCSD). In the early 1980s, the San Diego region was in the midst of a painful economic transition created by the demise of many of its defense-related industries. It was clear that something needed to bridge the gap, but what? My colleagues and I decided that UCSD had to play a more aggressive role in regional economic growth, specifically in the high-technology and biotechnology areas. Our view was that small, high-technology corporations were the most likely candidates to fill the economic vacuum that followed reductions in defense contracts to many San Diego corporations. UCSD had specific strengths it could contribute to the high-

technology sector: the campus is one of the nation's top recipients of federal research funding; it was home to strong science departments and an excellent school of engineering.

We expanded the breadth of UCSD's basic research capacity, creating — in cooperation with industry — interdisciplinary research centers in such areas as magnetic recording, molecular genetics, wireless communications, and structural engineering. We reinvigorated our technology transfer programs in the science and engineering departments. And we created a program called UCSD CONNECT, which had as its goal not only technology transfer but also nurturing the business support infrastructure that has proven essential to small entrepreneurial firms. UCSD CONNECT draws on expertise across all campus departments and from all professional sectors. It has served to fill a critical gap in San Diego's business infrastructure, linking local high-tech entrepreneurs with financial, managerial, and technical resources.

What this means, for example, is that UCSD CONNECT will act as an agent on behalf of small companies to help them locate investors and find the research they need to develop new products. Working with start-up companies as early as the business plan stage, UCSD CONNECT will help an entrepreneur find contacts for raising capital, forming strategic alliances, gaining marketing and management expertise and technical advice. UCSD CONNECT is often referred to as an "incubator without walls" because it has nurtured so many successful businesses in San Diego.

UCSD CONNECT is just one example of the kind of help UC is committed to providing. There are similar efforts on every one of UC's nine campuses to bring venture capitalists and people from the industrial sector together with scientists and engineers on the campuses to move UC research ideas into application.

Two years ago, the University held a statewide conference on technology transfer, bringing people from UC together with colleagues in government and in industry to examine how we can do more to facilitate the transfer of technology. In response to the business community's concerns that California is not producing enough computer scientists and engineers, between now and 2005 we are committed to increasing enrollments in engineering and computer science (at both the undergraduate and graduate levels) by 50 percent across the UC system.

And we have established a program — the Industry-University Cooperative Research (IUCR) program, now in its fourth year — that seeks to identify the most promising research areas for new products that, in turn, create new jobs. The IUCR program builds research partnerships involving

industry and UC faculty. Let me explain briefly how it works.

A UC researcher joins with a scientist or engineer from a private company to formulate a research proposal. A panel of experts drawn from industry and academia selects the best proposals for funding. Industry investments are partially matched with University funds. In just three years, the investments by industry and UC have totaled more than $100 million for new research undertaken by University faculty and students. An important feature of the program is the opportunity for graduate students to participate in research. It would be difficult to overstate the crucial link between research and graduate education in American universities. Graduate students participate in all aspects of faculty research projects. This experience is an essential part of the educational process for graduate students that produces both excellent young faculty for universities and R&D leaders for industry. In the case of the IUCR program, graduate students learn firsthand about industry's needs and its opportunities. And industry gets the benefit of some of the world's brightest young minds.

Two-thirds of the 323 companies currently participating in the IUCR are small businesses. A particularly valuable benefit for them is the opportunity to work with UC faculty on multidisciplinary research that would be difficult or impossible to pursue in the private sector. Research supported by the IUCR program lays the foundation for next-generation technologies; it provides hundreds of UC students participating in the research a window on future career opportunities. The six industrial sectors that currently participate- - biotechnology, communications, information technology, microelectronics, multimedia, and semiconductor manufacturing — are all critical to the California economy.

There is growing interest in programs like these not only in California but throughout the United States. The impetus to greater linkages between universities and industry grows out of a longstanding American belief that universities should not be divorced from society, but should be involved in helping solve society's problems.

The United States is unusual in the degree to which it relies on universities to perform basic research. The roots of this phenomenon date back over 50 years to World War II. Near the end of the war, President Roosevelt turned to his science advisor, Vannevar Bush, for advice about the future of American science. Bush's report, which appeared shortly after President Roosevelt's death, was entitled "Science: The Endless Frontier." As the title suggests, Bush viewed science as a vast frontier of opportunities to serve virtually every aspect of the national welfare. His report set the stage for the modern era of science and technology in the United States.

What were the arguments that Vannevar Bush put forward? First of all, he asked "Who should fund the research and development effort of the United States?" Let me make a few distinctions here.

For simplicity of expression, I will use the terms basic research, applied research, and development. Basic research is not focused on applications; the terms "curiosity research" and "discovery research" are sometimes used to describe it. It is driven by a sheer interest in the phenomena rather than potential applications. But basic research may reach a stage where there is potential for application and accordingly a need for applied research and, in turn, the development of new products and processes. Bush argued that applied research and development should be done by the private sector, by industry. But he also argued that the private sector would not provide adequate funding for basic research. In essence, he believed that private market mechanisms ensured that industry would invest in applied research and development, but that those same private market mechanisms would not generate adequate investment in basic research. Thus, he concluded that the funding of basic research was an obligation of the federal government.

The second question he asked was "Who should perform R&D activities?" Applied research and development, he said, is a private-sector responsibility; the private sector could be relied upon to perform that kind of activity. Who should perform basic research? The Bush concept, founded on the experiences of World War II, was that American universities should be the principal performers of basic research; and as noted above the federal government should provide the funds for that work.

Then there was a third part to Bush's analysis. He believed that basic research should be funded through a peer-review process. Individual scientists should make proposals for research projects and a group of peers — leading scientists from around the country — should evaluate these proposals and decide which to fund and which not to fund.

Federal science agencies in the United States do not provide unrestricted block-grant funding to universities. Rather, individual scientists submit proposals that request funding for specific research projects. A scientist's proposal is then sent to other scientists for their evaluation and judged competitively against other research efforts. This evaluation — the peer review process — is the critical factor in ensuring that the best science is funded.

Those were Bush's arguments: Applied research and development should be funded and conducted by the private sector; basic research should be performed in universities and be funded by the federal government via a peer-review process. The Bush model created a sea-change for American

universities. Before World War II, universities were peripheral to the R&D enterprise. Today they are at the center of American research activities, thanks in large measure to an extraordinarily successful partnership with the federal government. As a result, both the research enterprise itself and the U.S. economy have prospered. I do not believe it is an overstatement to say that when the history of the last half of the twentieth century is written, the role research universities have played in the American economy will be regarded as one of our greatest accomplishments.

In recent years, there has been much discussion in the United States about the need for a new national science policy, on the premise that Bush's 50-year-old vision cannot provide a blueprint for the twenty-first century. It is true that some of the arguments in Bush's report are now questionable, some of the issues he considered important are of interest only to students of the period. What remains pertinent is his vision of the role of government in research, including his assertion that the federal government has both the authority and the obligation to support basic research. More boldly, by arguing for the primacy of basic research supported according to norms set by scientists themselves, Bush implicitly asserted that universities defined the U.S. research enterprise. Bush gave them pride of place at the center because, as he argued, they had the potential to energize the entire system.

In spite of these remarkable successes, there is a concern in the United States today that federal funding for basic research will decline as the government struggles to balance its budget. The President of the United States and the Congress have reaffirmed their commitment to keep the federal budget balanced and to use a part of the surplus to reduce the national debt. Although some of the predictions about draconian cuts in federal funding for research have not so far materialized, this remains a matter of concern to universities throughout the nation.

The potential erosion of federal support for academic research is worrisome precisely because of the central role universities play in the overall R&D effort. Could industry take their place as the vital center of the American research enterprise? The evidence suggests not. As recently as a decade ago, several large U.S. firms performed significant basic research in their corporate laboratories. Today, virtually all industrial research focuses on the solution of specific problems, often by building on the results of university research. AT&T and IBM have essentially pulled out of basic research; both companies have come to the view that they are not wealthy enough to support basic research — at least not at the level they once did. In the United States we are relying more than ever on universities for the basic research that will ultimately fuel our economy. A recent statistic sums it up: Seventy-three percent of the papers cited by U.S. industry patents are based on publicly supported science, authored principally by university scientists;

only 27 percent are authored by industrial scientists.

> I am more optimistic than many of my colleagues that the federal government will find a way to continue funding university research at a reasonable level. Most political leaders in the United States who have thought about these issues — Democrats and Republicans alike — have concluded that support of our research enterprise is critical to the national interest, and therefore sound federal policy. In its simplicity and flexibility, Bush's report remains a model for science policy in the United States.

Appointment of Chancellors

Every UC president has organized the search for chancellors somewhat differently. The procedure I adopted has several unique features that have proved valuable. By way of background, I should note that I have never employed a search firm in recruiting chancellors. I have nothing against search firms and have enlisted their aid for other senior-level positions. However, when searching for chancellors or presidents, even the best firms provide no added value in identifying a pool of candidates; further, by and large, they do not understand the subtleties of a research university well enough to make the right inquiries on background checks. Too often these firms have established cozy relationships with individuals who are perpetually on the prowl for chancellorships or presidencies; these individuals may interview well with a search committee, but usually lack the ability to lead a major research university.

Cited below is the "University of California Procedure for Appointment of Chancellors," which was revised in November of 1995.

> The President of the University of California will conduct a continuous

search for promising candidates for Chancellorships. This process is included as an important complement to the systematic, nationwide search which will be undertaken each time a vacancy occurs.

When a vacancy occurs or is imminent, a Committee will be appointed to advise the President. The Committee will consist of (a) five Regents appointed by the Chairman of the Board, (b) five faculty members appointed by the President from a panel submitted by the campus Academic Senate Committee on Committees, (c) a graduate student and an undergraduate student appointed by the respective graduate and undergraduate student associations of the campus, (d) an alumni representative appointed by the alumni association of the campus, (e) a representative appointed by the foundation affiliated with the campus, and (f) a staff employee of the campus selected in accordance with procedures established by the President. In addition, the Chairman of the Board and the President will serve on the committee and the President will serve as chair.

The President of the University will submit to the Committee for evaluation not less than five nor more than fifteen names of candidates whom the President considers promising. The Committee will evaluate these nominations of the President and may consider or suggest other names. It may interview candidates. It will solicit the opinions of interested groups in whatever manner it considers appropriate. Both the Committee and the President shall be mindful of the University's firm commitment to equal employment opportunity and affirmative action in seeking the most qualified candidates.

After the President has been advised by the Committee of its evaluation of the candidates, the President will make a recommendation to The Regents for appointment.

Once a search committee has been established, a series of four all-day meetings typically takes place over a period of eight to ten weeks. The purpose of these meetings is to trim the initial pool of individuals to a short list of six or seven candidates. At the last meeting, it is the president's task — at his own discretion and without explanation — to select four individuals from the group of six or seven to be interviewed by the search committee.

All four interviews take place on the same day, usually in a hotel near the Office of the President. No one on the search committee knows the names of the four individuals until the day of the interview. Unlike some universities, the four finalists are not required to pledge that they will accept the position if they agree to be interviewed. Every effort is made to maintain secrecy in order to protect the reputation of the candidates and ensure the integrity of the process.

After each interview, the committee discusses the pros and cons of that candidate; then, after all four interviews, there is a general discussion. However, at no point does the search committee, as a group, take a vote or rank the candidates. Rather, at the end of the day, each member fills out a form in private ranking the candidates, and provides an explanation for his or her ranking. As president, I am the only person who sees these rankings, and once I have reviewed them, they go directly to the paper shredder. Consequently, no one on the search committee knows who is first, second, or third choice. This process may seem excessively secretive, but even the best committees — particularly ones as large as our search committees — have at least one member who will leak information to the press.

The most significant change from earlier UC search procedures was not taking a vote in the presence of the search committee. To not vote as a group may seem undemocratic, but it does ensure confidentiality. Moreover, each member of the search committee comes to the task with a somewhat different set of interests and that needs to be considered in weighing his or her advice.

It is my task to analyze the committee members' individual rankings and, using

my best judgment, establish a preference order among the four interviewees. When it comes time to make an offer, the exchange with the candidate has all the features of a Kabuki dance. No offer is made until the candidate has accepted the offer. The point here is that if a candidate should turn us down, then he or she was never given an offer. By design, we always end up with our first choice. The aim is to protect both the reputation of the individuals involved and the reputation of the institution. If all goes well, no one will be able to state with assurance that a particular person was rejected by the University, nor will anyone be able to say that they rejected the University's offer. Good candidates who already have excellent jobs are usually not willing to expose themselves to the type of public scrutiny that goes on at so many universities; if they are not selected for the position, then to some extent they become damaged goods.

If a UC president were to be judged on only one dimension, then I would propose that the most important dimension is the quality of chancellorial appointments. A good deal of my time as president has been involved in chancellor searches. Among the current group of ten chancellors, only Ray Orbach, Larry Vanderhoef, and Henry Yang were appointed prior to my being named president. Henry Yang started as chancellor a few months before I became president; I wish I could claim him as one of my appointees because he has done a magnificent job at Santa Barbara.

During my first year, M.R.C. Greenwood was appointed as chancellor of the Santa Cruz campus and Bob Dynes as chancellor of the San Diego campus. During

my second year, Bob Berdahl was appointed as chancellor of Berkeley and Al Carnesale as chancellor UCLA. Haile Debas was appointed as chancellor of the San Francisco campus that same year without a search. Haile was adamant that he was willing to serve only one year. I could have appointed him as an acting chancellor, but given his major contributions to the campus, he deserved recognition as chancellor without qualification. The third year, I appointed Ralph Cicerone as the chancellor of Irvine, Michael Bishop at San Francisco, and Carol Tomlinson-Keasey as the first chancellor of the Merced campus.

Eight chancellors were appointed in my first three years as president. Each of these individuals had a distinguished academic career, and all have proved to be capable and innovative administrators.

After appointing a chancellor, the president has the responsibility to create an environment on the campus that helps ensure the chancellor's success. The first few weeks and months are critical. The president must accompany the chancellor at campus and community meetings, and take every opportunity to express The Regents' and president's unstinting support. Strong public support needs to be accompanied by private advice about the strengths and weaknesses of key people on the campus. The chancellor should be assured he or she has the flexibility to make whatever personnel changes are necessary — with the full support of the president. For the president to walk away and leave the chancellor to sink or swim is reprehensible. If a chancellor fails, the president either has selected the wrong person or has not provided the necessary support.

A reserve fund should be established at the campus, so that the new chancellor will have some flexibility in budget matters. In this regard, I blundered early in my presidency. On one of my early appointments, I had worked with the campus budget officer and the outgoing chancellor to determine the size of their reserve and indicated that the reserve should remain intact until the new chancellor was in place. To my shock, the retiring chancellor dispersed virtually all of the funds in the reserve in his last week in office. There is no longer ambiguity in this matter. I now require that an appropriate reserve be sequestered before the search process begins.

One precaution, often overlooked until too late, involves the expenditure of funds to renovate or redecorate the chancellor's residence (University house). Too often, the press and students have had a field day criticizing a new chancellor for any expenditures on the house, no matter how small. When Karl Pister became chancellor of the Santa Cruz campus in the 1980s, he purchased a much-needed washer and dryer; that purchase unleashed a barrage of criticism from students and others that lasted for weeks. When I became president, I chose to take full responsibility for all funds expended on the maintenance and renovation of University houses. Several of our houses were in a bad state of repair and needed to be seismically retrofitted. I wanted to protect the chancellor by making it clear that house expenditures were strictly the responsibility of the president. As it turned out, we incurred some staggering bills in bringing houses up to a safe and livable standard. There were a few newspaper stories giving a detailed account of the expenditures; but, without the chancellor to blame, no one seemed particularly

interested.

The Respective Duties of the President and the Chancellors

The University of California has evolved from "one campus with one president" to "a system with one president and multiple campuses, each with a chancellor." The history of that transformation is thoughtfully described in Gene Lee's book, *The Origins of the Chancellorship: The Buried Report of 1948.*[8] The history helps explain the uniqueness and indeed the greatness of UC. We are not a system with one flagship institution and an array of satellite campuses, but rather a system of nine institutions (soon to be ten) each of which, as I have explained earlier, has earned the distinction of being designated a research university.

My goal here is not to review that history but rather to make some remarks about the respective roles of the president and the chancellors. On the next eight pages I've reproduced two of The Regents' standing orders. Standing Order 100.4 describes the duties of the president and Standing Order 100.6 the duties of the chancellors.

8 Eugene C. Lee, *The Origins of the Chancellorship: The Buried Report of 1948* (University of California, Berkeley, 1995).

STANDING ORDER 100.4 Duties of the President of the University

(a) The President shall be the executive head of the University and shall have full authority and responsibility over the administration of all affairs and operations of the University, excluding only those activities which are the responsibility of the Secretary, Treasurer, and General Counsel of The Regents. The President may delegate any of the duties of the office except service as an ex officio Regent.

(b) The President is authorized in the name of The Regents to award degrees to candidates recommended by the Academic Senate for degrees in course and certified by the respective registrars, and to confer honorary degrees, the award of which has been approved by the Board. In the absence of the President, or when specifically delegated by the President, the Chancellors on the respective campuses of the University shall confer the honorary degrees so awarded by The Regents. Degrees in course, awarded by the President as prescribed above, may be conferred by any Officer of the University, including Officers of the respective campuses, on delegation by the President. The President shall seek the advice of the Academic Senate, through committees appointed in a manner which the President shall determine, in connection with the award of all honorary degrees.

(c) The President of the University, in accordance with such regulations as the President may establish, is authorized to appoint, determine compensation, promote, demote, and dismiss University employees, except as otherwise provided in the Bylaws and Standing Orders and except those employees under the jurisdiction of the Secretary, Treasurer, and General Counsel of The Regents. Before recommending or taking action that would affect personnel under the administrative jurisdiction of Chancellors, Senior Vice Presidents, Vice Presidents, or Directors of the Ernest Orlando Lawrence Berkeley National Laboratory, the Ernest Orlando Lawrence Livermore National Laboratory, and the Los Alamos National Laboratory, the President shall consult with or consider recommendations of the appropriate Officer. When such action relates to a Professor, Associate Professor, or an equivalent position; Assistant Professor; a Professor in Residence, an Associate Professor in Residence, or an Assistant Professor in Residence; a Professor of Clinical (e.g, Medicine), an Associate Professor of Clinical (e.g. Medicine) or an Assistant Professor of clinical (e.g., Medicine); a Senior Lecturer with Security of Employment, or a Lecturer with Security of Employment, the Chancellor shall consult with a properly constituted advisory committee of the Academic Senate.

(d) The President and those of his staff to whom he may delegate such authority are authorized to act as agents of The Regents to carry out the collective bargaining responsibilities of the University under the Higher Education Employer-Employee Relations Act (HEERA sections are 3560-3599). Whenever the President, under either general or specific authority

delegated to him, takes action affecting the terms and conditions of employment of University employees, it shall be understood that for employees represented by an exclusive representative, such action may be taken only after satisfaction of any obligation the University may have to meet and confer with respect to such action, and then only to the extent approved by the President.

(e) The President is authorized to grant leaves of absence with or without pay, in accordance with such regulations as the President may establish, except that paid leaves of absence that exceed ninety days for Chancellors, Laboratory Directors, Senior Vice Presidents, and Vice Presidents shall be subject to approval by the Board upon recommendation of the President of the University.

(f) The President annually, through the appropriate Standing Committee, shall present to the Board recommendations as to the budget of the University, recommendations as to the Capital Improvement Program of the University, and recommendations as to requests for appropriations of funds for the University.

(g) The President shall fix and determine the amount, conditions, and time of payment of all fees, fines, and deposits to be assessed against students of the University, except that the President shall secure the Board's approval prior to the assessment of the University Registration Fee, Educational Fee, tuition fees, compulsory student government fees, and fees and charges required in connection with the funding of loan financed projects, except parking facilities and housing projects.

(h) The President shall fix the calendar of the University, provided that no session of instruction shall be established or abolished except with the advice of the Academic Senate and the approval of the Board.

(i) The President is authorized to make awards of fellowships, scholarships, and prizes with the advice of the Chancellors and the Academic Senate, and to approve expenditures from appropriations, gifts, and endowments for these purposes.

(j) The President shall consult with the Chancellors and the Academic Senate regarding the educational and research policies of the University, and shall keep the Chancellors and the Academic Senate informed about significant developments within the University and within the State and Federal governments which may have serious consequences for the conduct of education and research within the University. The President shall present recommendations to the Board concerning the academic plans of the University and of the several campuses. The President shall transmit to the Board any memorial which the Academic Senate may address to The Regents.

(k) The President shall develop, initiate, implement, and approve fundraising campaigns for the benefit of the University in accordance with the policies of the Board.

(1) The President shall represent the Corporation and the University in all matters requiring action by the Congress or officers of the United States or by the Legislature or officers of the State of California.

(m) The President is authorized to negotiate and approve indirect cost rates to be applied to contracts and grants under which the University conducts programs supported by extramural funds, provided that such negotiations shall be directed toward full recovery of indirect costs, except that the fixed payment in lieu of indirect costs under the major United States Department of Energy contracts shall be approved by the Committee on Finance. Newly approved indirect cost rates determined under the provisions of Office of Management and Budget Circular A21, and any successor publication thereto, shall be reported to the Committee on Finance annually.

(n) The President is authorized to permit expenditures against contracts, grants, and gifts, or against firm commitments thereon, provided that the contracts, grants, and gifts have been solicited or negotiated in accordance with established Regental policy.

(o) The President is authorized to approve transfers or allocations of University operating funds and transfers of funds designated for Capital Improvement purposes, subject to any limitations which might be imposed by the terms of said funds, provided:

1. That no such transfer or allocation shall result in the establishment of a new policy, program, or project involving a continuing commitment;
2. That no transfer shall be made from a reserve fund for a purpose other than that for which the reserve fund was established.

(p) The President is authorized to approve the incurring of commitments and expenditures against the following year's budget in advance of the effective date thereof. Advance commitments for expenditure for materials, services, and equipment shall not exceed fifty percent of the Governor's budget proposal to the Legislature for such purposes for the ensuing fiscal year. Advance commitments for appointments shall not exceed the number of positions and the funds provided in the Governor's budget proposal to the Legislature for the ensuing fiscal year. The number of such advance commitments authorized shall be determined annually by the President.

(q) The President is authorized to approve amendments to the Capital Improvement Program for projects not to exceed $10 million. The President is also authorized to approve amendments to the Capital Improvement Program for projects exceeding $10 million up to and including $20 million, provided that concurrence is obtained from the Chairman of the Board, the Chairman of the Committee on Grounds and Buildings, and the Chairman of the Committee on Finance, and also provided that all actions taken in excess of $10 million up to and including $20 million under this authority be reported at the next following meeting of the Board. However, the following shall be approved by the Board: (1) projects with a total cost in excess of $20

million, (2) for projects in excess of $20 million, any modification in project cost over standard cost-rise augmentation in excess of 25%, or (3) capital improvement projects of any construction cost when, in the judgment of the President, a project merits review and approval by The Regents because of special circumstances related to budget matters, external financing, fundraising activities, project design, environmental impacts, community concerns, or substantial program modifications.

(r) The President is authorized to modify budget estimates of income of wholly or partially self-supporting activities, and in connection therewith to increase or decrease appropriations accordingly. Such authorization is subject to the availability of funds.

(s) The President is authorized, in accordance with the terms specified by the donor, to designate the purpose for which, and the campus or other location at which, the income and/or principal of a gift shall be used and to make allocations in accordance therewith.

(t) The President is authorized to determine, consistent with any expressed intent of the donor, the purpose for which and the campus or other location at which a gift shall be used, to determine whether income and/or principal shall be used, and to make allocations and reallocations in accordance therewith, to the extent not specified by the donor of a gift.

(u) Any action taken pursuant to sections (s) and (t) above shall conform to established University programs and policies and shall not constitute a commitment requiring expenditures in excess of budgeted items.

(v) The President is authorized, after consultation with the General Counsel, to return to the donor all or any unused portion of a gift of personal property, when the purposes of the gift have been fulfilled or fulfillment has become impossible or impracticable and when alternative uses are precluded.

(w) The President is authorized to write off bad debts, provided reserves for that purpose are adequate or that specific income or an appropriation is available for that purpose. A report on bad debt write-offs shall be submitted annually to the Committee on Finance.

(x) The President is authorized to write off against funds received from the Federal Government in reimbursement of indirect costs, routine disallowed claims under grants and contracts.

(y) The President is authorized to appoint and to execute necessary agreements with executive architects, executive landscape architects, and executive and consulting engineers for approved projects.

(z) The President is authorized to approve building plans and to solicit bids in connection with approved projects, except that the President shall not approve the design of such projects as the Board has specifically designated as requiring design approval by the Committee on Grounds and Buildings.

(aa) The President is authorized to approve the siting of individual buildings or projects, provided that their locations are generally in accordance with a long-range development plan previously approved in principle by the Board,

and to approve the siting of individual buildings or projects on University properties, such as field stations and research stations, which may not be covered by approved long-range development plans.

(bb) The President is authorized to execute on behalf of the Corporation claims against debtors in bankruptcy, in receivership or in liquidation, and against estates of deceased persons.

(cc) The President is authorized to approve and execute on behalf of the Corporation contracts, real property rental agreements, and other documents pertaining to the use of facilities for academic, research, or public service programs of the University, or for related administrative support activities with a term of no more than ten years, including option periods provided that base annual rent (exclusive of operating expenses and all concessions to the University) shall not exceed $500,000 for the initial year, and annual rent increases for subsequent years shall be limited to either (i) the actual annual percentage increases in the Consumer Price Index for all Urban Consumers (CPI-U all items), or (ii) such amounts that, when the rent is aggregated over the lease term, the total base rent does not exceed $10 million. Provided that concurrence is obtained from the Chairman of the Board and the Chairman of the Committee on Finance, the President is also authorized to approve and execute contracts, real property rental agreements, and other documents, as described above, provided that base annual rent shall not exceed $1 million for the initial year, and that, when the rent is aggregated over the lease term, the total base rent does not exceed $20 million, and also provided that all actions taken for these amounts under this authority be reported at the next following meeting of the Board. Amounts in excess of the $1 million and $20 million described above require Board approval. The maximum initial year base rent and the maximum aggregate rent specified above shall each be increased annually by a percentage equal to the percentage increase in the National Consumer Price Index for all Urban Consumers (CPI-U all items) for the preceding year, said increase to be reported annually to the Committee on Finance.

(dd) Except as otherwise specifically provided in the Bylaws and Standing Orders, the President is authorized to execute on behalf of the Corporation all contracts and other documents necessary in the exercise of the President's duties, including documents to solicit and accept pledges, gifts, and grants, except that specific authorization by resolution of the Board shall be required for documents which involve or which are:

1. Exceptions to approved University programs and policies or obligations on the part of the University to expenditures or costs for which there is no established fund source or which require the construction of facilities not previously approved.
2. Renewal or modification of prime contracts with the Department of Energy for the operation of the Lawrence Berkeley National Laboratory, Lawrence Livermore National Laboratory, and the

Los Alamos National Laboratory.

3. Loans of funds of the Corporation, other than loans from established student, faculty, and staff loan funds.
4. Agreements for the provision of employee group insurance benefits, with the understanding that Board authorization shall not be required for periodic revisions to existing agreements when the revisions do not substantially change the authorized scope of the benefit plans.
5. Affiliation agreements with other institutions or hospitals involving direct financial obligations or commitments to programs not previously approved.
6. Agreements with associations composed of medical staff for collection of professional fees for services rendered to patients at University or affiliated teaching hospitals.
7. Applications for new licenses to the Federal Communications Commission for authority to operate radio or television broadcast equipment.
8. Construction contracts in excess of appropriated funds.
9. Agreements by which the University assumes liability for conduct of persons other than University officers, agents, employees, students, invitees, and guests. This restriction does not apply to agreements under which the University assumes responsibility for the condition of property in its custody.

(ee) Anything contained in subsection (dd) above to the contrary notwithstanding, the President is authorized to take all actions and to execute all documents necessary in the exercise of the President's duties when an emergency precludes prior submission to the Board, provided that in all such cases the President shall report such actions to the Board, through an appropriate Standing Committee, at its next regular meeting.

(ff) The President is authorized to negotiate the sale, purchase, receipt by gift, or lease of real properties which are used, held, or to be acquired for campus-related purposes, and to administer all such properties, which are defined as properties within the boundaries of a campus of the University and other properties used, held, or to be acquired for student and employee housing, parking, athletic programs, research, public service, educational programs, or administrative staff purposes of the University.

(gg) The President is authorized to approve the sale, purchase, receipt by gift, or other acquisition of real property when such real property (1) is used, held, or to be acquired for campus-related purposes as defined in (ff) above, and the consideration does not exceed $10 million, (2) consists of for-sale housing units within an approved University for-sale housing program, (3) is acquired through foreclosure, deed-in-lieu of foreclosure, or otherwise in realization of a security interest under an approved University home loan program, or (4) is the former residence of a recently recruited employee

acquired pursuant to an established personnel policy for covered moving expenses. The President is also authorized to approve the sale, purchase, receipt by gift, or other acquisition of real property, as described above, when the consideration is in excess of $10 million up to and including $20 million, provided that concurrence is obtained from the Chairman of the Board and the Chairman of the Committee on Finance, and also provided that all actions taken for these amounts under this authority be reported at the next following meeting of the Board. Amounts in excess of $20 million require Board approval.

(hh) In furtherance of the authority set forth in (ff) and (gg) above, the President is authorized to execute documents, except those conveying title; provided, however, that any such documents executed prior to approval by the Board or by a Committee thereof empowered to act, or by the President in accordance with (gg) above, shall be conditioned upon such approval.

(ii) The President shall be the custodian of all contracts of sale, mortgages, and deeds of trust for all real property held or acquired for campus-related purposes and of all insurance policies and other documents relating to such instruments.

(jj) The President is authorized to approve and execute licenses, easements, and rights-of-way with respect to real property held or acquired for campus-related purposes when (1) the consideration does not exceed $10 million or (2) such instruments are revocable with 120 days' notice.

(kk) The President is authorized to approve leases, assignment of leases or subleases, and related amendments of such documents for mineral rights, including gas, oil, and other hydrocarbons, or geothermal resources as to real property held or acquired for campus-related purposes if the land rent does not exceed $500,000 per year during the primary lease term.

(11) The President is authorized to take all appropriate action incident to the administration of University home loan programs as approved by The Regents, including (1) receiving and administering promissory notes, mortgages, deeds of trust, grant deeds, and deeds-in-lieu of foreclosure, (2) executing releases and satisfactions of mortgages and requests for reconveyances of deeds of trust when the University home loan program notes secured by such mortgages and deeds of trust have been paid in full or otherwise satisfied, and (3) accepting title to real property through foreclosure, deed-in-lieu of foreclosure, or other similar actions.

(mm) The President is authorized to develop and implement policies and procedures on matters pertaining to intellectual property, including patents, copyrights, trademarks, and tangible research products, and to execute documents necessary for the administration of intellectual property, including those which may contain commitments existing longer than seven years. The President annually shall report to the Board on matters pertaining to intellectual property.

(nn) The President is authorized to approve external financing for amounts up to

and including $10 million for the construction, acquisition, equipping, and improvement of projects in the President's areas of responsibility. The President is also authorized to approve external financing for amounts in excess of $10 million up to and including $20 million, provided that concurrence is obtained from the Chairman of the Board and the Chairman of the Committee on Finance, and also provided that all actions taken in excess of $10 million up to and including $20 million under this authority be reported at the next following meeting of the Board. External financing in excess of $20 million requires Board approval.

Includes amendments through October 14, 1999

STANDING ORDER 100.6 Duties of the Chancellors

(a) The Chancellor of each campus shall be the chief campus officer thereof and shall be the executive head of all activities on that campus, except as herein otherwise provided and excepting such activities as may be designated by the Board as University-wide activities; and with reference to these on a particular campus the Chancellor shall be consulted. In all matters within the Chancellor's jurisdiction, the Chancellor shall have administrative authority within the budgeted items for the campus and in accordance with policies for the University as determined by the President of the University. The Chancellor shall be responsible for the organization and operation of the campus, its internal administration, and its discipline; and decisions made by the Chancellor in accordance with the provisions of the budget and with policies established by the Board or the President of the University shall be final. The Chancellor of each campus shall nominate Officers, faculty members, and other employees on that campus in accordance with the provisions of these Standing Orders.

(b) The Chancellor on each campus shall appoint all the members of the instructional staff deemed necessary for the conduct of instruction in any summer session on that campus, and may fix their remuneration in accordance with the provisions of the budget established by the Board and of the salary scales ofthe University.

(c) The Chancellor of each campus shall preside at all formal functions on that campus. At formal exercises and ceremonies attended by the President, the Chancellor shall present the President, who, as the University's chief executive, shall function in accordance with the University's rules for protocol and procedure. The Chancellor, with the approval of the President, may replace or supplement formal exercises on the campus, including Commencement exercises, with informal functions at which Vice Chancellors, Provosts, or Deans may preside.

Includes amendments through February 19, 1971

The president's document runs on for many pages of closely spaced text, whereas the chancellor's document requires less than one page. The standing order for the president was drafted in the early days of the University — in the 19th century — and over the years has been revised, maintaining the style of the original document. In contrast, the standing order for chancellors was drafted in the 1950s. It is a brief and concise document and does not spell out every possible detail of the chancellor's duties.

The difference between the two documents in part reflects the change in literary style from one century to the next. However, the nature of the standing order for the president has an historical antecedent. In the early days of the University, The Regents conducted most of the day-to-day business of the institution and the latitude of the president was narrowly prescribed. Indeed, the vice president for business affairs reported directly to The Regents until 1959. The last such direct reporting relationship changed only this summer; at its July 2000 meeting, The Regents resolved that the treasurer should henceforth report to the president.

In the UC System, the chancellor's responsibilities and day-to-day activities are very much like that of a president of a private research university. The chancellor's constituents are the students, the faculty and staff, alumni, friends of the campus, and the greater campus community. In recent years, private philanthropy has been critical, and no chancellor can be successful without being an effective fundraiser.

My intent here is to emphasize that the president of the University of California is not a president in the traditional sense of that term. The president,

of course, deals with all constituents of the University, but his principal responsibilities lie with The Regents, the governor, the State legislature, the university-wide academic senate, and the federal government. The president has a limited role in the life of students or the day-to-day events on the campuses. In order to fulfill his responsibility, the president must spend more time in Sacramento and Washington, D.C. than on visits to the campuses.

It's important that the president understands his role vis-à-vis the chancellors, and does not inject himself into the politics of a campus. Constituents of a campus — students, faculty, staff, alumni — must not be encouraged to bypass the chancellor and go directly to the president to air problems or to make special requests for funds or new programs. To understand the types of problems that arise, read some of the oral histories of previous chancellors.

I hope that the chancellors I have worked with will attest to the fact that I was careful not to be drawn into the affairs of the campus. I sought to give the chancellors as much independence and freedom as possible. When I first became president, I regularly asked the chancellors to identify issues where they thought the president's office was intrusive in their affairs or burdened the campus by requiring unnecessary approvals.

Many changes were made, some as trivial as letterheads. In an earlier period, there was a presidential order that the chancellor's letterhead should have the president listed by name and title at the top left-hand corner with the

chancellor's name and title immediately below. From a systemwide perspective, this may appear reasonable, but it led to confusion at the campus level. On one occasion while I was chancellor, an individual came to my office. He handed me a letter that I had written to him and explained that he did not wish to deal with me but rather with the president of UC San Diego. That type of confusion undermines the authority and effectiveness of the chancellor.

The move of the Office of the President from its location adjacent to the Berkeley campus to its current site in Oakland was helpful in this regard. Prior to the move, there were many occasions when confusion and rivalry existed on the Berkeley campus as to who was indeed the chief campus officer — the chancellor or the president.

When the next search for a president takes place, it will be important for all concerned to clearly understand the unique role of the president of the University of California. The job is not like that of other university presidents. The search committee, The Regents, and candidates need to appreciate the differences. If an incoming president expects to be greeted by a marching band and the adulation of an assembly of students and parents, he or she will be surely disappointed.

The Future of the University of California

What follows in this section is an unpublished paper prepared in September 1998, giving my views on issues confronting UC and how they will shape the

University in the 21st century.

The role of knowledge in transforming virtually every aspect of our world has moved research universities like the University of California to center stage of American life. More than any other institution in our society, research universities are on the cutting edge in producing the well-educated people who drive our economy and the new research ideas that keep it growing.

The tradition of research universities has been to value knowledge for its own sake. However, society's increasing need for applications of knowledge has placed new demands on these institutions, including the University of California, as we move into the twenty-first century. I want to discuss the organizational changes, goals, and initiatives UC needs to pursue to meet these demands and to sustain itself as a great university. These reflections do not cover all the issues of importance to the University. Instead I am concentrating on a few of the trends that, in my judgment, will shape our future as a particular kind of university during a particular period in its history. I should emphasize that these are personal views. They have not been fully discussed with Regents, Chancellors, faculty, or other members of the University community.

ASSUMPTIONS

I begin with some assumptions. The first assumption is that California will continue its 38-year commitment to the Master Plan for Higher Education. The combination of record numbers of students and constrained funding for higher education over the next two decades will test California's will to keep the Master Plan's promise of access, quality, and affordability. But although some details of the Master Plan may need to be altered to address new circumstances, its central idea — the concept of three public segments (the University of California, the California State University, and the Community Colleges) with different missions, admission standards, and responsibilities — should endure because it serves this state so well.

My second assumption is that the University of California's future is committed to the notion that we will remain a research university. And by the term "research university" I mean an institution in which the search for knowledge is at the center of everything we do. This does not mean a university in which research is carried out at the expense of undergraduate education. Rather, a university in which, in the words of a 1974 University of California mission statement, every responsibility is "shaped and bounded by the central and pervasive mission of discovering and advancing knowledge."

RESEARCH UNIVERSITIES IN A KNOWLEDGE-BASED SOCIETY

For 50 years we have had a good understanding of the role of education as a driver of the economy, but it is only in the past 10 to 15 years that we have begun to fully understand the impact of research and development (R&D) on economic growth. A substantial literature on this subject has evolved, which has led to a development in economics called "new growth theory." This work is nicely summarized in a report by the Council of Economic Advisers: 50 percent of American economic growth since World War II has been the result of investments in research and development. Obviously, the private sector is a major driver of R&D, but federally funded research in universities like UC also plays a key role. The literature also supports the conclusion that when investments in university research increase, there is (with an appropriate lag) a corresponding increase in private-sector investments.

No state in the country illustrates the connection between knowledge and wealth more vividly than California. Almost all of the industries in which California leads the world — biotechnology, software and computers, telecommunications, multimedia, semiconductors, environmental technologies — were born of university-based research. Hewlett-Packard, one of the top ten exporter companies in the United States, estimates that over half of its revenue comes from products that were developed within the past two years. More and more of these products are emerging from work done at universities.

Ensuring strong economic growth has implications beyond simple dollars and cents. The state and the nation face tremendous problems — deteriorating inner cities, homelessness, degradation of the environment, the prospect of a huge number of baby-boomers retiring with a far smaller workforce to support them in their retirement. How are we going to deal with these problems? There is only one way — we must have substantial economic growth. This requires investments in university-based research and a highly educated workforce. The link between California's success and the success of its universities is clear and direct.

Even as research universities are being called on to contribute more to economic vitality, they are being transformed by a revolution they themselves helped create. The way learning takes place — the interaction between teacher and student — has not varied much since the time of Plato's Academy over 2,000 years ago. But today, computer and communication technologies are creating a dramatically different environment.

Videoconferencing, interactive instruction via the Internet, and various forms of computer-assisted learning are transforming the educational process throughout the University of California. There are many examples, but one of the most exciting is the recently established California Digital Library (CDL). This is a virtual library that will make UC's digital collections — not just books but works of art as well — available via computer to UC faculty and students. Ultimately, the CDL is intended to be California's library, open to

all the citizens of this state. We will accomplish this goal through a partnership with the California State Library and California library leaders to employ the CDL as the primary means of making digital library services available throughout California.

The California Digital Library illustrates how learning is beginning to transcend the conventional limits of time and space that have bound universities to a particular place and a particular schedule. The term "lifelong learning" takes on new meaning in light of the capacity of these technologies to reach people beyond the doors of our campuses, in their homes, offices, and community centers.

What these two phenomena — society's growing dependence on knowledge and the technological revolution in education — will ultimately mean for the organization and role of universities is a topic we have barely begun to understand. But it is clear that we need to look at the University anew in light of both the demands and the possibilities of a knowledge-based society.

UC AS A COLLECTION OF TEN RESEARCH UNIVERSITIES

Such a knowledge-based society requires a university sufficiently large in scope to span the map of knowledge but flexible enough to respond to the economy's shifting demands for educated people and the research necessary to keep productivity growing. What does this suggest for our vision of the University?

We envision UC as a collection of ten research universities — as a single but not a monolithic institution of ten campuses — not all identical and not all moving toward the same template. Just as Princeton and the University of Michigan are both research universities but clearly different in size, in the array of academic disciplines, and in the make-up of their professional schools, so the University of California's campuses can be seen as variations on a single theme, each pursuing excellence in different ways.

What are the implications for the future of viewing UC from this perspective?

- Each campus will be differentiated, even at the level of individual disciplines. All campuses will have mathematics and history, for example, but not every sub-field. This is consistent with the philosophy that guided the creation of three new UC campuses in the 1960s, each distinctive in academic emphases, organization, and physical design. The idea was not to replicate Berkeley or UCLA but to develop new university options for the people of California. And the fiscal reasons are clear: prospects for State support are such that we cannot afford to offer the complete array of disciplines and subdisciplines, graduate and undergraduate courses, at every campus.
- There will be greater decentralization of authority from the Office of the President to the campuses. This, too, is consistent with trends in

the University's development since the late 1950s. At the same time, the Office of the President must play a leadership and coordinating role, as, for example, ensuring that all campuses comply with University-wide policy and regulations, evaluating the quality of programs systemwide, and determining which fields to emphasize at which campuses. An example of the Office of the President's role in setting systemwide academic priorities is UC's engineering initiative. Business leaders have expressed their concern that unless this state produces more engineers, California companies cannot remain competitive. Our own studies have substantiated this concern. In response, the Office of the President initiated a plan to increase significantly undergraduate and graduate enrollment in engineering and computer science programs across the UC system.

- The reciprocal of greater decentralization is greater accountability. Campuses will be held responsible for fulfilling campus and University-wide priorities, while the Office of the President will concentrate on outcomes and monitoring accountability.
- The ratio of graduate to undergraduate students will vary from campus to campus, department to department, discipline to discipline. Traditionally this ratio has been driven more by the teaching and research needs of faculty than by the marketplace. In the future the marketplace will be a principal determiner of how many doctoral students we produce in various fields. Over the past several years we have been modifying our graduate enrollments in various disciplines as a function of student demand, market demand, societal need, and the ability to support graduate students. I do not mean to imply that the University's current graduate enrollments are too high; in fact the opposite is the case. The proportion of graduate students at the University has declined from 29.4 percent in 1960 to 17.8 percent today. To put these figures into perspective, it is useful to look at graduate enrollments at the eight universities with which UC compares itself for faculty salary purposes. As of 1993, the percentage of graduate and professional students at UC's public comparison institutions averaged 30 percent; the average for our private comparison institutions was 52.8 percent. It is clear that, at less than 18 percent, UC's graduate enrollments are far too low.
- To help the University maintain both quality and access, campuses have been given greater flexibility in how they use resources. Campuses have freedom to set campus priorities and deploy resources, but they also have to enter into an agreement with the Office of the President that reflects both university-wide and campus-specific expectations.

GOALS AND INITIATIVES

The purpose of these changes is to organize the University to carry out its missions of teaching, research, and public service in ways that capitalize on its strengths and that respond to society's demands for new knowledge and well-educated people. Meeting those demands will also require that we pursue the following goals and initiatives.

- The quality of the entire University enterprise depends on the quality of its faculty. UC's ability to recruit and retain the very best scholars and scientists is fundamental to its capacity to remain a great university.
- The University must be prepared to educate its share of the estimated 538,000 new students seeking a college or university education between 1994 and 2005 — an increase in enrollment demand of 31 percent for California higher education generally. According to the California Education Round Table, these figures translate to an enrollment growth rate two and a half times that expected for the nation as a whole. The shorthand term for this phenomenon is Tidal Wave II, and it is surely the single most significant issue facing higher education in this state. We estimate that UC will grow by about 45,000 students between now and the year 2010, with almost half of that expansion occurring before 2005. UC's planned tenth campus in Merced, which will open its doors in 2005, will help accommodate some of this additional demand.
- UC plays a critical role in research as it affects the well-being and economic vitality of California. We are not a job shop, and we will not compromise the quality, independence, or breadth of the University's research enterprise. What we will do is explore new forms of collaboration with industry to bring UC's tremendous intellectual resources to bear on stimulating productivity and economic growth. The UC Industry-University Cooperative Research program is an important step toward that goal. Its aim is to build partnerships with industry to mine the most promising research areas for new products and processes that will create jobs and prosperity for California. The doubling (from 12 to 24 percent) of the tax credit industries can claim for investing in university research makes this an especially auspicious time to expand research partnerships with industry. The tax credit encourages more industry investment in R&D generally; UC's cooperative research program targets specific, next-generation research in areas of California's greatest strength and opportunity. Together, they offer an historic opportunity to forge a strategy for California's economic preeminence into the next century.
- We must maintain UC's world leadership in the application of digital technology to problems of instruction. An incredible array of

instructional technologies has been developed on each of our campuses, and we must continue to be a leader in this field. We want to be sure, too, that the K-12 schools are on the cutting edge of instructional technology. Toward this goal, we have mounted a systemwide initiative called UC Nexus to promote a statewide partnership between UC and the K-12 schools in encouraging high-quality teaching and learning through instructional technology. UC's role will be to help train and support teachers in the use of computers for instruction and curriculum development.

- The University will explore new paths to teaching and learning. Among these paths will be off-campus learning centers where students of all ages who do not want or need the residential campus experience can further their education. The Ventura Learning Center near UC Santa Barbara and our new UC Center in Fresno are examples. Another path will be closer linkages between the campuses and University Extension. The emergence of new professions, the restructuring of the workplace, and the transition to an information-based economy are requiring individuals to renew their skills continually. This means that today UC Extension is more important than ever: it offers continuing education to 500,000 Californians annually, at no cost to the State, and there can be no question about the excellence of its activities and their contribution to educating California's work-force. But I believe our view of Extension's potential has not been broad enough, and that this potential can be best realized by integrating Extension more closely into the University as a whole. A new initiative called the Master of Advanced Study is a step in that direction. This program offers professional education and liberal studies beyond the bachelor's degree at times and places that are convenient for working adults. Courses can be offered by UC academic departments in partnership with University Extension or independently, but in every case the curriculum will be supervised by regular faculty members, who will conduct a significant portion of the instruction.
- Every university worthy of the name embraces a diversity of thought and opinion. As a public university in one of the most diverse states in the nation, the University of California has the further obligation of reflecting the mix of the state's population in the mix of its students, faculty, and staff. Both forms of diversity — a wide range of intellectual perspectives and a broad representation of California's population — are indispensable to our mission as a public university.

In enacting new policies on graduate and undergraduate admissions in July 1995, The Regents called for a task force on outreach to help establish new paths to diversity. The Outreach Task Force finished its work last year

and The Regents approved its recommendations. To implement the Task Force's report, we have launched a major initiative called the Outreach Action Plan. We are committed to doubling our investment in outreach from $60 to $120 million a year. At the heart of the plan is a renewed partnership between the University and the K-12 schools. Implementation of the Outreach Action Plan is among the University's highest priorities.

SCHOLARSHIP AND TEACHING IN A RESEARCH UNIVERSITY

The most important single contribution we can make to California — the one from which all others flow — is to keep the University intellectually vital. To accomplish this, we need a broad array of intellectual activity both in and across disciplines. Research is constantly exploring the boundaries between what we know and what we do not know. Sometimes the pace of discovery is greater in one discipline or era than in another, as in the blossoming of art in fifteenth-century Florence or the revolution in physics early in this century. But the exploration of all domains of knowledge is the daily business of the University. As one scholar has put it, lyric poetry and magnetic resonance imagery may be very different, but both are ways of giving us access to information that would be otherwise inaccessible. We do not expect every faculty member to win a Pulitzer Prize or become a Nobel Laureate. We do expect every faculty member to be engaged in innovative and intellectually challenging work.

And part of that innovative and intellectually challenging work is educating undergraduates. As a research university — not a research institute — we regard students as indispensable to everything we are and aspire to be. Given public perceptions about the academic performance of American students and the problems of American schools, it may come as a surprise to some that the students who enroll in the University today are the best prepared in history. These students are entrusted to us during what is, for many of them, one of the most critical and intellectually passionate periods of their lives. The process of education should help them focus their curiosity and enthusiasm and bring them into contact with the rigor and objectivity that are essential to the life of the mind. A research university, which is full of bright individuals with their own passionate commitments to learning, is a wonderful place in which to pursue such an education.

Much has been said about the notion of a core curriculum — a specific body of knowledge every student should master. Everyone has a different prescription for what the core curriculum should include. I am less committed to a core set of ideas. Rather, I prefer the Aristotelian approach that stresses some knowledge of several areas and deep experience in at least one. My conclusion after many years on the San Diego campus — where five undergraduate colleges offer five core curricula, all different, all rigorous, all intellectually demanding — is that there are many equally valid curricular paths to intellectual growth.

What is ultimately going to matter to students when their college years are over is not the particular books they read or the specific curriculum they followed but the cognitive skills they acquired. An in-depth knowledge of a particular subject is essential to knowing how to do something — to make a life's work. To master knowledge in one domain is also to master the grammar of learning, the intellectual and problem-solving skills that can be applied to learning virtually anything. Every student who possesses this grammar has the foundation on which future learning can be built. The shorthand term for this broad intellectual preparation is a "liberal education." Such an education clearly includes the quantitative skills associated with the natural and social sciences. And it just as clearly includes the ability to communicate and to create meaning that we associate with the humanities and the arts.

In my judgment there have been remarkably thoughtful dialogues in the University of California about improving undergraduate education. Many of the results of these dialogues have been impressive. Our undergraduates have the opportunity to engage in supervised research and to learn in an environment of discovery from professors who are on the cutting edge of new developments. Those students who can thrive on its demands find that UC offers unrivaled opportunities for learning. Students graduating from UC leave with a superb intellectual foundation and they make a contribution to this state precisely because they are so well educated.

One of the criticisms often leveled at research universities is that they do not adequately reward the faculty for excellent teaching. The report of UC's University-wide Task Force on Faculty Rewards emphasized the importance of recognizing "the scholarship of integration, application, and teaching" as well as "the scholarship of discovery." Furthermore, academic career rhythms are not uniform, nor is the relationship between research and teaching the same in different disciplines. The Task Force recommended that criteria for advancement be flexible in allowing faculty to shift emphases on teaching and research over the course of their careers. We need this kind of flexibility not just for the sake of our faculty but also for the sake of our students, who deserve exceptional teachers and teaching.

Concluding remarks

The University of California is an $11.5 billion-a-year enterprise. The State of California contributes about two billion of that $11.5 billion, which means that for every dollar the State provides we generate almost five dollars in other funds. One reason is that UC is a major recipient of federal research dollars, attracting over 10 percent of all federal funds spent on research in American universities.

Because of its extraordinary size and unparalleled strengths in teaching, research, and public service, the University of California is a major contributor to the well-being of the state and the nation. The University's

future, therefore, matters far beyond our campuses and research stations. What can we say about where UC is headed?

Externally, the University is moving towards closer integration with society because of the tremendous potential of knowledge to leverage economic growth and to improve the quality of life for Californians. Internally, the University is moving towards greater autonomy for individual campuses and new ways of providing education and performing research. Another way to put it is that the future is drawing the University of California in two seemingly contradictory directions. One direction is towards greater diversity and decentralization as a strategy to use our resources most effectively. The other direction is towards greater unity as a result of the revolution wrought by the marriage of computers and telecommunication, which is opening up new learning technologies and expanding exponentially the boundaries of the university.

The search for knowledge will remain at the center of everything we do at the University of California. But the UC of the twenty-first century will be more geographically dispersed, more technologically linked, and more available to the citizens of California than ever before in its history.

The future of the University depends on our success in balancing the tensions and opportunities inherent in a ten-campus enterprise. This means realizing the possibilities of our unity as well as our diversity. In the past, thanks to a fortunate combination of leadership, circumstances, and determination, UC has been one of the most successful balancing acts in higher education. Our responsibilities in today's knowledge-based society require us to embrace the future with realism, intelligence, and a clear sense of the University of California's destiny as this nation's preeminent example of that vigorous American hybrid, the research university.

Last Gasp

I started 20/20 during the first week of August 2000, and turned to the tape recorder whenever I had the opportunity. It is now Labor Day weekend, the academic year is about to go into high gear, and my enthusiasm for this project has diminished to near zero. In reading over the transcript, it's clear that this document needs to be placed in a file drawer and not see the light of day until after I step down as president.

On October 1, my fifth anniversary as president, I will issue a report to The

Regents reviewing the five-year period.[9] The plan is to organize the report around the nine goals I announced on being appointed president and to examine the progress that has occurred.

There is a long list of topics that I have not commented upon. The most glaring omission is a discussion of The Regents' resolution, SP-1, the elimination of affirmative action. In my five-year report to The Regents, I will review our outreach efforts and the various programs that have been established to upgrade the teaching skills of K-12 teachers. Prior to the Regents' adoption of SP-I, the UC System was spending about $50 million in State funds on outreach and related K-12 activities; next year the expenditures will be approximately $230 million. We have made great progress with our outreach programs and I'm proud of what has been accomplished. With modifications in our admission process and more focus on community college transfers, I believe that over the next several years our efforts will begin to produce more diversity among our students. However, it will not occur quickly and in the meantime we will be at political risk.

After I step down as president, I'll give my account of the events surrounding SP-1 and explain why I delayed implementation of The Regents' resolution by one year. Some have asserted that I failed to properly consult with The Regents and Governor Wilson on the decision to delay. Indeed, there was a call for a special meeting of The Regents to "review the performance of the president" that was widely reported in the press. Fortunately, saner heads prevailed.

9 The report was delayed and not sent to The Regents until January 22, 2001; see Appendix 1.

To implement SP-1 on the time schedule specified by The Regents would have been disastrous. There were too many technical and logistical problems that had to be solved before an orderly transition could occur. The administration and the faculty failed to give The Regents clear advice about the effects of SP-1 and the unrealistic time schedule proposed. The vote on SP-1 was ill advised; can anyone doubt that it was politically timed as a prelude to Proposition 209?

Another topic not discussed was the implementation in the summer of 1996 of a new methodology for allocating State funds to each of the campuses. I first presented my plan in a rather unorthodox way. It was summarized on a sheet of paper by an array of handwritten mathematical equations (to be exact, finite difference equations). The one-pager was an attention-catcher and generated a great deal of discussion. It was circulated widely and while I no longer have a copy, I'm sure that one exists in a file cabinet somewhere in the University. The details are too complicated to review here, but the goal was to give the campuses greater flexibility and responsibility for how funds were expended. Successful entrepreneurial efforts were to be rewarded and funds were to be returned to the campuses on the basis of how they were earned (e.g., indirect costs on federal and private research grants). There were historical inequities among the campuses that were addressed by this new methodology.

I was pleasantly surprised that the chancellors, the academic senate, and The Regents so readily accepted the rationale for change and agreed that we should implement the new methodology with the following year's budget. This methodology

represented a major change in the way the University does its business.

Our State budgets for the last five years have been exceptionally good. The budgets for the preceding five years (1990-1995) in many ways were the worst in UC history. David Gardner, in the early years of his presidency, had several excellent budgets that did a great deal to rectify some of the cuts that occurred while Jerry Brown was governor. But the budgets in his last two years and the three budgets during Jack Peltason's presidency were disastrous. The state's economy and in turn state revenues were in free fall; even during the Great Depression, UC did not suffer cuts as draconian as those imposed between 1990 and 1995.

The recession that led to these budget cuts ended as I became president, and I have enjoyed a span of five budgets unmatched in the history of UC. The California economy has been remarkably good and every year State revenues have broken new records. Governor Davis deserves special praise. He has gone far beyond what was necessary politically to ensure the continued excellence of UC.

What follows is a list of topics that I have not discussed but that deserve attention in surveying these last five years.

- State support for three California Institutes for Science and Innovation
- Establishing the Center for Teaching and Learning Technologies to facilitate the development of Web-based systems to support our educational programs
- Restructuring and greatly expanding UC's outreach programs and the development of summer institutes to upgrade the teaching skills of K-12 teachers
- Establishing the Commission on the Humanities to examine ways of strengthening these fields throughout the UC system
- Establishing the California Digital Library, which is now unparalleled in the nation

- Catastrophic consequences of creating UCSF-Stanford Health Care in 1997 and Stanford's withdrawal in 1999
- Opening California House in London to facilitate our overseas programs
- Establishing a new degree — Master of Advanced Study — for part-time students seeking an advanced degree in any of our academic programs
- Initiating UC Merced and recruiting its first chancellor
- Establishing the President's Commission on Agriculture and Natural Resources to build closer relations between the agricultural community and UC
- Unionization of teaching assistants
- Doubling of total private giving to the UC campuses over the last five years to approximately $1.2 billion
- Awarding health care benefits for domestic partners
- The design and deployment of CalREN-2
- Awarding fourteen Presidential Medals; the medal was established in 1997 so that the president can recognize contributions to UC or to the community of learning
- Planning and construction of the UC Washington, D.C., Center to house 280 students and various UC programs
- Change in the reporting relationship of the UC Treasurer from The Regents to the president
- Security issues at the Los Alamos National Laboratory and problems with the National Ignition Facility at Livermore
- Development of the Mission Bay campus of UCSF
- The governor's request that I chair an advisory group to address the issue of disposal of California's low-level radioactive waste
- Establishing the Institute for Labor and Employment with a State budget augmentation in this budget year of $6 million

Most of the entries on this list represent progress for the University, but several have had negative consequences of major proportion. The UCSF-Stanford Medical Care merger was costly and was mismanaged by the executives of the corporation that was established to operate the merged hospitals. Even now, at the end of August 2000, the magnitude of losses for UCSF and for Stanford is still not fully known, but it will be much greater than anticipated when Stanford abruptly withdrew from the merger. In hindsight, the merger was a mistake. At the time,

however, an army of experts and consultants reviewed and analyzed every detail of the plan and were overwhelmingly in favor of moving forward. Further, UCSF Chancellor Martin (who left for Harvard shortly after The Regents approved the merger) and Stanford President Casper were adamant that we must proceed. At a later time, I will have more to say about this sad episode.

Another topic on my list of issues is the "spying" incident at Los Alamos. I placed quotation marks around the word "spying" because even now at this late date, after endless investigations by the Department of Energy and the FBI, there is no evidence that national security was ever compromised. A steady stream of news leaks from DOE tried to place blame on UC's management of Los Alamos, but as more facts emerged the University's standing with the congressional oversight committees has improved. The congressional decision to establish the National Nuclear Security Administration and the subsequent appointment of General Gordon as its director are steps that I consider favorable to the University. I anticipate that before the November 2000 election, UC will sign a five-year extension of our contract to manage the laboratories.[10]

UC has managed the laboratories since their inception during World War II, and our involvement has been critical in the recruitment of first-rank scientists and engineers. Without UC's presence, the labs would have been like too many other federal laboratories and the quality of science would have suffered. The labs have played a decisive role in the cold war and, in the future, will be critical in dealing

10 My conjecture in August proved wrong. The five-year extension was signed on January 18, 2001 by Secretary Richardson in the final hours of the Clinton Administration.

with nuclear threats and biological terrorism. UC's continued management is in the best interest of this nation and the world — a strong statement but one that is justified by the historical record.

Yet another issue on the above list is the University's difficulties with organized labor. For some years the relationship between UC and our unions has been contentious, and this history was one of the factors that influenced graduate teaching assistants to vote for collective bargaining this past year. The newly formed Institute for Labor and Employment, jointly located at Berkeley and UCLA, is a step towards establishing better relations between UC and the union leadership in California. Our intention is to develop a program of research and teaching that will be academically distinguished and, at the same time, prove valuable to the state on policy issues. To a certain extent, the conflict between UC and its unions is inevitable, but hopefully it will be more muted in the future. With a Democratic governor and Democratic legislature, it is incumbent on the University to improve its relationship with organized labor.

Time has run out. It is now Labor Day and I have no intention of continuing with this project. I have not discussed: the changing demographics of the State of California and its implications for UC; my commitment to shared governance; the superb quality of undergraduate education that exists on every one of the UC campuses; my reservations about the SAT; the role of The Regents in the affairs of the University; proposed changes in UC admissions procedures that I plan to unveil next month; and many other topics. All for another time.

For the last year or so, I have been signing my letters to members of the University community with the phrase "Fiat Lux" rather than "Sincerely yours." For now, Fiat Lux.

A One-Year Update to 20/20

It is the month of August 2001 and approximately one year since I completed *20/20*. It's time for a one-year update to keep the account up to date. Again, I turn to the same tape recorder I used last year which has not been used in the interim, an indication of how office work has changed with the advent of the Internet and computers.

Last year at this time, Rita and I had decided that I would step down as president in July 2002, and that I would announce my intention this coming September so that The Regents would have ample time to find a replacement. Word of my plan leaked out and the governor intervened. He asked that I stay on at least through the academic year in which the next election for governor would take place. From his perspective, if the University was engaged in a search for a president in the middle of an election campaign, then both the campaign and the search could be compromised. Gray Davis has been a good friend and a great supporter of the University and I could not turn him down.

The plan now is to step down in July 2003. I will have served for eight years by that time, which is much longer than I anticipated when I became president.

Included as Appendix 2 are five documents:

1. "Standardized Tests and Access to American Universities," the text of my keynote speech at the Washington, D.C. meeting of the American Council of Education in February 2001.
2. "The California Crucible: Demography, Excellence, and Access at the University of California," the keynote address at the San Francisco meeting of the Council for the Advancement and Support of Education, which took place in July 2001.
3. An updated timetable that is current through the July 2001 meeting of The Regents.
4. "Head of U. of California Seeks to End SAT Use in Admissions" (*NY Times*)
5. "Should SATs Matter?" (*Time)*

The first two documents identify the key issues of this last year and the rationale that led to certain decisions. Before I turn to those topics, let me mention a few other items.

Three UC faculty were awarded Nobel Prizes in October 2000. In my tenure as president, University faculty have received a total of 11 Nobel Prizes distributed over six of our nine campuses and one of our three national laboratories. Until this year, Clark Kerr had held the record of nine Nobel Prizes during his nine years as president. I claim no credit for these prizes; they are simply another indication of the remarkable excellence of the University of California.

In *20/20*, I discussed Gray Davis' proposal to establish three Institutes for Science and Innovation. I regard these institutes as augmenting my efforts as

president to strengthen the research programs and the graduate education programs of the University. In the period from 1980 to 1995, graduate education suffered at the University of California as indicated by the declining percentage of students enrolled in graduate programs. Likewise, there was a lack of support for UC research programs. The new budget process described in *20/20* provides a significant increase in the level of support for both research and graduate education. The major expansion of engineering programs systemwide and the funding for industry/university cooperative research programs are also important steps in strengthening research and graduate education. Add the four centers to these efforts and the package of programs represents a major advance in research and graduate education. Note also that a regental commission on graduate education has been at work this year and has many useful recommendations for increasing financial support for graduate students.

The governor had initially proposed three institutes. However, during the course of preparing proposals, enlisting industry support, and peer review, it became evident that four proposals were truly outstanding and attracted very strong support from industry. In the end, the governor agreed to establish four institutes, even though the state's financial situation had deteriorated since the idea was first proposed.

Many people played important roles in making the institutes a reality but one person deserves special credit. Richard Lerner of the Scripps Research Institute in La Jolla was the first person to broach the idea of institutes with the governor, and

although the idea went through several metamorphoses, Richard stayed the course and in the end played a critical role in persuading the governor to establish the fourth institute and to fully fund the program.

The governor has been effusive in his praise for the institutes and the role they will play in the economy of the state. On several occasions, both privately and publicly, he has said that these institutes will be the defining accomplishment of his governorship. At the outset I was concerned when the governor asked for a 2 to 1 match for State funds. I had doubts about our ability to raise the necessary matching funds from the private sector. I was wrong. Industry leaders were remarkably enthusiastic about the institutes and we were able to raise close to a 3 to 1 match. On several occasions, the governor had some pleasure — at my expense — pointing out that I had questioned his judgment on the viability of accomplishing a 2 to 1 match; clearly, the governor had a better sense of these matters than the president.

Let me now turn to admission issues. The reader will have difficulty understanding my remarks without having read the ACE and CASE speeches. What follows assumes familiarity with those speeches.

ELC (Eligibility in the Local Context) was approved by The Regents in March 1999 and went into effect with this year's entering class of freshmen. Responses from students, parents, high school teachers and administrators, and the general public have been overwhelmingly positive. Students enrolled in high schools that rarely, if ever, sent a student to the University of California now have a clearly

defined path to the University if they take the A-G courses and are in the top four percent of their high school class. Parents and students have put strong pressure on the high schools to ensure that they offer the A-G courses and participate in the ELC program.

Last month, at the July meeting of The Regents, the dual admissions proposal was approved. The vote was 14-3 with the negative votes coming from Chair Sue Johnson and Regents Preuss and Lee. There are 26 Regents and there's no doubt that if the *ex officio* members had been present the vote would have been even more decisive. An undercurrent to the discussion on dual admissions relates to RE-28, the Regents' action last May rescinding SP-I and SP-2. Some Regents have implied that these proposed changes in admissions are an attempt to circumvent Proposition 209 and reintroduce affirmative action in a disguised form. There is no question that the University has every intention of being in full accord with state law as specified by Proposition 209. On the other hand, both ELC and dual admissions will yield a more diverse student body because they seek out talented students who — trapped in poor high schools — previously had little hope of attending the University. And of course the poor high schools have a higher percentage of underrepresented students. These new admissions programs are not based on race, but do take account of the opportunities that students have had — what I have called opportunity-to-learn measures.

The adoption of RE-28 by a unanimous vote of The Regents occurred at the May Regents' meeting. As background, let me list a few of the factors at play that led to

the adoption RE-28. (1) At almost every meeting of The Regents after the passage of SP-I and SP-2, there were demonstrations by supporters of affirmative action. These demonstrations, although not as violent as those in the late 1960s, were taking their toll on The Regents. The group that organized the demonstrations called themselves "The Coalition to Defend Affirmative Action by Any Means Necessary" and went by the acronym BAMN. I cannot recall all of the protestors' chants, but two stand out in my mind: "Defend affirmative action by any means necessary" and "The people united will never be divided." The chants had a ring about them that caused the adrenaline to flow whether you agreed or disagreed. (2) The continuing press coverage of The Regents' actions on affirmative action tended to be very critical and suggested that the University was unreceptive, if not indeed antagonistic, to admitting underrepresented students. (3) Regent Bill Bagley was particularly vocal at Regents' meetings and with the press, insisting that The Regents rescind SP-1 and SP-2. Of course, The Regents were not of one mind on this matter as indicated by the original vote. On SP-2 The Regents voted 15 to 10 in favor of adopting the resolution. On SP-1 the vote was 14 to 10; Velma Martinez, one of the affirmative votes on SP-2, voted in the negative on SP-1 and Bill Bagley, who was a negative vote on SP-2, chose to abstain on SP-1, believing that he should do so if he wanted to raise the issue in the future. (4) In the last several years the composition of The Regents was changing as Governor Davis made new appointments to the Board. (5) The Regents were criticized for not properly consulting with the Academic Senate on SP-1 and SP-2. Indeed, the faculty senate

was bypassed by The Regents on this matter; however, the leadership of the senate was at fault for not clearly articulating the historic role of the Academic Senate in admissions and the need for appropriate senate study on such a momentous decision. But Governor Wilson and Regent Connerly placed great pressure on all concerned and in fairness, the matter was before The Regents for about six months. (6) After The Regents adopted SP-1 and SP-2, the voters of California passed Proposition 209, which eliminated affirmative action in all State-funded institutions. Thus, SP-1 and SP-2 were moot after that election except for the new version of the tier system of admissions specified by SP-1.

All of these factors were at play and influenced The Regents as we approached the May meeting of the Board. Several Regents announced publicly that we should rescind SP-1 and SP-2. Others were adamant that no change should be made. And yet others argued that — even if the Regents' actions were correct — the passage of 209 made them irrelevant; by rescinding SP-1 and SP-2, we could help dispel the negative image created in the minds of many people.

Sometime during the winter months, Bruce Darling initiated a discussion with several Regents — most notably Judith Hopkinson and Ward Connerly — and they came to the view that Bruce should try to draft a resolution that would be acceptable to the several factions on the Board. The intricacies of the discussion that followed and the various draft resolutions that were considered is a story that can be best told by Bruce Darling; he has dictated a two-hour account of these events and someday the tape may be transcribed. Bruce played a heroic role in

keeping the discussion on track and in finally achieving consensus on what came to be called resolution RE-28.

The reader can only wonder how it was possible to gain consensus given the strong and divergent views among members of the Board. Regents' attitudes fluctuated wildly from day to day as we approached the May Regents' meeting. It was good luck and Bruce's persuasive skills that led to a unanimous vote in favor of RE-28. Not all Regents were happy with their vote but they recognized that the action was in the best interest of the University. Even the day before the meeting, I doubted that the word "rescind" would be acceptable to many Regents and believed that the vote would be closely divided. But in the end, the Board acted in united fashion and did much to reestablish the University's reputation for its commitment to all of California's young people. What follows is RE-28 as adopted by The Regents.

Approved by The Regents on May 16, 2001, by a 22-0 vote.

ITEM FOR ACTION RE-28

For Meeting of May 16, 2001

FUTURE ADMISSIONS, EMPLOYMENT, AND CONTRACTING POLICIES

RESOLUTION RESCINDING SP-1 AND SP-2

WHEREAS, on July 20, 1995, The Regents of the University of California adopted SP-1, a resolution that prohibited the consideration of race, religion, sex, color, ethnicity, or national origin as criteria for admission to the University or to any program of study, and SP-2, a resolution that prohibited the consideration of the same attributes in the University's employment and contracting practices; and

WHEREAS, on November 6, 1996, the voters of California passed Proposition 209 which was incorporated into the California Constitution as Article 1, Section 31.

WHEREAS, on February 15, 2001, President Atkinson requested that the Academic Senate conduct a comprehensive review of the University's admissions policies including, among other issues, the use of quantitative formulas, and provide recommendations to The Regents. It is anticipated that the admissions review initiated by President Atkinson, and currently underway by the Academic Senate, will be completed in calendar year 2001.

WHEREAS, some individuals perceive that the University does not welcome their enrollment at its campuses;

NOW, THEREFORE, BE IT RESOLVED THAT SP-I AND SP-2 ARE RESCINDED BY THIS RESOLUTION, AND:

1. That the University has complied with and will be governed by Article 1, Section 31 of the California Constitution by treating all students equally in the admissions process without regard to their race, sex, color, ethnicity or national origin, and by treating employees and contractors similarly,
2. That the University shall seek out and enroll, on each of its campuses, a student body that demonstrates high academic achievement or exceptional personal talent, and that encompasses the broad diversity of backgrounds characteristic of California,
3. In keeping with longstanding Regents' policy, The Regents reaffirm that the Academic Senate shall determine the conditions for admission to the University, subject to the approval of The Regents, as provided in Standing Order 105.2.

Pending any changes which The Regents might approve, the provisions for admission shall be those outlined in the Guidelines for Implementation of University Policy on Undergraduate Admissions, which were adopted in July 1996 and revised in May 2000,

4. That the University shall have programs available to assist in the retention of all students so as to assure that they successfully complete their education,
5. That the University's current commitment to outreach programs for California's public elementary and secondary school students shall be pursued on a long term basis to improve the early educational preparation of students who will seek a college education in the future,

and

6. That the University shall undertake new initiatives to improve the transfer of academically prepared students from California's Community Colleges to the University.

I should note that a group of about a dozen Latino legislators led by Lieutenant Governor Cruz Bustamante attended The Regents' meeting and insisted that RE-28 in the above form was inadequate because it did not also eliminate the two-tier admissions system required by SP-1. The student regent, Justin Fong, had lobbied the legislators on this matter and convinced many members of the Latino caucus to publicly oppose RE-28. From my perspective, there was no hope of gaining regental support for a resolution that included the word "rescind" and also eliminated the tier system. My proposal for comprehensive review in admissions — which would eliminate tiers — was already before the Academic Senate and would in turn come to The Regents. I argued that the tiers issue had to be first considered by the senate; the senate had been bypassed when SP-1 was adopted and I was committed to ensuring that the senate's role would not be compromised again. Many members of the Latino caucus were already hostile to The Regents and this issue inflamed attitudes on all sides. After some tense exchanges — and a commitment on my part that comprehensive review would be on The Regents' agenda in November — the Lieutenant Governor, speaking for the group, agreed to support RE-28 without amendments. Many Regents left that meeting feeling that they had been compromised by the political pressure placed upon them, and that the legislators had intervened in an unacceptable manner. The tension surrounding these events

continues to affect some Regents to this day and has the potential for conflict in the future.

My last topic relates to the speech last February at the ACE meetings. As noted in the CASE speech, there were four items on my agenda for changes in UC admissions. The first was Eligibility in the Local Context, approved by The Regents in March 1999. The second was Dual Admissions, approved by The Regents in May 2001. The third and fourth proposals are described in my ACE speech and are now under review by the faculty.

The specific proposals were made public for the first time in the ACE speech. However, neither The Regents nor the Academic Senate was taken by surprise. Since becoming president, I have often spoken to The Regents and to the Academic Senate indicating my reservations about the role SAT tests played in college admissions. Several days before the ACE speech, I sent a formal request to the Academic Senate asking them to consider the proposal described in the speech. What follows is the text of my letter to the Academic Senate.

February 15, 2001

ACADEMIC COUNCIL CHAIR COWAN

Dear Michael:

I am writing to ask the Academic Council to consider recommending to The Regents two changes in the University of California's admissions policies.

The first change is that the University require only standardized tests that assess mastery of specific subject matter rather than undefined notions of "aptitude." If this change were adopted, the University would no longer require applicants to take the SAT I, i.e., it would become optional rather

than mandatory. This means that the three SAT II subject matter tests now required of all applicants would substitute for the previous requirement of both the SAT I and the SAT II Staff analyses indicate that high school grades, coupled with the SAT II, are the best predictor of academic performance at UC and that the SAT I contributes very little additional information. Thus, the proposed change in test requirements would not impair the ability of admissions officers to evaluate an applicant's readiness for UC-level work and would not result in any diminution in the quality of admitted students. Rather, the proposed change would strengthen student preparation because it would establish a demonstrable relationship between what is tested and what students study in high school.

The second recommendation is that all campuses move away from admissions processes focused on quantitative formulas and instead adopt evaluative procedures that look at applicants in a comprehensive, holistic way. While this recommendation is intended to provide a broader and fairer basis for admissions decisions, it would also help ensure that standardized tests are not given undue weight in admissions decisions but rather are used to illuminate the student's total record.

In the short term, these proposals will not result in major changes in determining which students are admitted and which are denied. In the long term, however, they will help strengthen high school curricula and pedagogy, create a stronger connection between what students accomplish in high school and their likelihood of being admitted to UC, and focus student attention on mastery of subject matter rather than test preparation. These changes will help all students, especially low-income and minority students, determine their own educational destinies. They will also lead to greater public confidence in the fairness of the University of California's admissions process.

Analyses of specific issues raised by these proposed changes will be shared with you as they become available. We will also work with UC faculty experts in testing to formulate standardized tests that assess mastery of subject areas specified in UC eligibility policies.

I respectfully request that the Academic Council refer this proposal to the Board of Admissions and Relations with Schools for its consideration. Provost King and I would be glad to meet with BOARS to discuss this matter.

Sincerely,

Richard C. Atkinson
President

Before proceeding, I should acknowledge the key role that Pat Hayashi played in formulating and drafting the ACE speech. The effort was a collaborative one in every way and I am indebted to Pat for his analytical work and for his skillful approach to the political issues that swirled about the SAT. He understood UC admissions procedures far better than I did and his insights were invaluable.

I was scheduled to give the ACE speech on Sunday afternoon and departed for Washington, D.C. on Friday, anticipating a quiet Saturday in the nation's capital visiting a few of my favorite museums. The text of my speech was a carefully guarded secret and only a handful of trusted advisers had read and commented upon it. I anticipated that the speech would cause some excitement, but I was not prepared for what happened. I awoke Saturday morning and, following my usual routine, sought out a copy of the *Washington Post*. The front page story was about my ACE speech. I was stunned, but even more so when I saw the *New York Times*, which had an even longer front page story which ended with an insert box reproducing sections of the speech.

It was not hard to trace what had happened. The text of the speech reproduced in the *New York Times* was from an earlier draft. There were several editorial changes between the earlier draft and the final version that helped us identify the source of the leak. A young man in media relations in the Office of the President was leaving the University for another job and had somehow obtained a copy of the speech. He passed it on to a friend who was an AP reporter. It's impossible to

maintain secrecy in the Office of the President for any period of time and in retrospect the timing could not have been better. By Saturday morning, all of the major newspapers had the story and gave it good coverage.

The stories continued on Sunday and when I arrived at the ACE meeting there was a crowd of TV cameras, reporters, and an overflow audience. Stan Ikenberry, who was the president of the American Council on Education and a long-term friend, was delighted with the publicity attendant to the meetings, but I was concerned that the audience would feel betrayed since the substance of the speech had already appeared in the press. Quite the contrary; the ballroom was packed and standing room space was filled. The audience was attentive to every word and at the end there was a long, standing ovation.

In the months since my speech, I've been astonished at how intense and widespread the response has been. Many television programs and newspaper and magazine articles have presented arguments, pro and con. I've received hundreds of letters and e-mails, many with personal stories telling about their experience with the SAT. Clearly, my proposal crystallized a reservoir of unease about the SAT. Just as clearly, a national debate on the SAT and its influence on the lives and prospects of young Americans was long overdue. Attached to this update is the first *New York Times* story and also a copy of an article that appeared in the March 12 issue of *Time* magazine.

Sometime before the end of the year, I will be sending a communication to The Regents updating them on the various arguments pro and con for my admissions

testing proposal. From a technical perspective, the work of Saul Geiser in the Office of the President on the statistical relationship between UC freshman grades and the five SAT tests that we now require for admission (SAT I verbal, SAT I mathematics, SAT II writing, SAT II mathematics, and a third SAT II test of a student's choice) is of great significance. An account of his work will be published in the near future; the statistical evidence is overwhelming that SAT II achievement tests are superior predictors of college grades compared with SAT I aptitude tests. BOARS (Board of Admissions and Relations with Schools) under the leadership of Professor Dorothy Perry has done a remarkable job of dealing with a complicated and divisive set of issues. They have also made a valuable proposal indicating how UC could use five SAT II achievement tests (in modified form) to replace our current mix of tests.

BOARS and the Academic Senate have concluded their analysis of comprehensive review and will recommend that The Regents adopt the proposal when they meet in November. The proposal to substitute achievement tests for the SAT I aptitude tests is now being examined by BOARS, and their plan is to have the issue before the Regents next year at either the May or the July meeting.

This summer would have been an ideal time to step down as president. Many difficult and contentious issues have arisen during these last six years, but by and large circumstances have proved to be quite satisfactory. The University has survived the problems of the early 1990s with its quality intact and recent years have witnessed a time of great progress. My relations with members of the

legislature — Democrats and Republicans — are about as good as they possibly could be, the faculty continue to be very supportive, and working with The Regents has its own rewards. But looking ahead, I see trouble. This year's State budget was far short of our expectations and, with the economy in a serious downturn, next year probably will be worse. Budget problems will be compounded by the continuing need to expand the University to accommodate the ever-increasing number of students. Add to this mix the growing tensions over issues of race and ethnicity. How all of this will play out is impossible to predict, but surely the next two years will not be as good as the previous six years. Most university presidents, in this day and age, leave office under a barrage of complaints and criticisms. This may be my fate, but the die is cast and there is no turning back.

Appendix 1: Items Referenced in 20/20

THE GOLDEN FLEECE, SCIENCE EDUCATION, AND U.S. SCIENCE POLICY

Richard C. Atkinson
President, University of California

Colloquium Series on the History of Science and Technology - University of California at Berkeley - November 10, 1997

I was pleased to accept Roger Hahn's kind invitation to participate in this colloquium series. It gave me an opportunity to rethink some events I was associated with at the National Science Foundation (NSF) in the 1970s. I would like to review briefly U.S. science policy since World War II from the perspective of the National Science Foundation, and in particular from the narrower perspective of science education and the social sciences at NSF. This is a personal account, not a scholarly one, and I would be delighted if my remarks were to stimulate some aspiring young historians to undertake a more careful study of the events I am going to discuss.

My story begins with World War II and the remarkable success of U.S. science in the war effort--a critical factor in our victory. President Roosevelt's science adviser, Vannevar Bush, had been a long-term member of the faculty at the Massachusetts Institute of Technology, and was one of the key people responsible for building the quality of that institution. Bush had a close personal relationship with Roosevelt, and near the end of the war the President asked him to define a plan for American science in the postwar period. That request led to Bush's landmark report, *Science, The Endless Frontier,* one of the great documents of American history. The Bush report defined science policy for the post-World War II era.

What was the nature of that report? No summary could do justice to Bush's masterful analysis, but essentially he made three principal arguments about the future of the U.S. scientific enterprise. First, he argued that most aspects of R&D were the responsibility of the private sector. But he also recognized that market mechanisms would discourage the private sector from investing adequate funds in basic research. This led Bush to his second argument: ensuring support for basic research in the postwar period should be the responsibility of the federal government, because the enormous benefits to society at large justified the investment. He did not believe basic research should be conducted in government laboratories, however, but in the universities of the nation. As the institutions responsible for the nation's basic research, universities had pride of place in Bush's vision of the research enterprise. Third, he argued that decisions about which university research projects the government would fund should be made via a peer-review process.

Bush envisioned a federal agency that would be responsible for funding these research activities. Legislation was introduced in 1945, but because of disagreements between the Truman administration and Congress, as well as within the Congress itself, the National Science Foundation was not created until May 1950. The events of this five-year period are nicely described in an excellent biography of Vannevar Bush by G. Pascal Zachary, published just a few months ago.

One of the debates surrounding that legislation involved the scope of the Foundation's proposed activities. Harry Truman was now president, and his associates urged a broader range of responsibilities for the foundation than Bush's supporters did, one that included science education and the

social sciences. Bush, on the other hand, had only minimal interest in including science education and no interest at all in including the social sciences. James Conant, a close colleague of Bush renowned for his reorganization of Harvard's general education curriculum, was a strong proponent of including science education on NSF's agenda. In the end, Conant's view prevailed. Science education became one of NSF's responsibilities. So did the social sciences, but without a clear mandate to fund them.

NSF got off to an extremely slow start, with minimal funding in the various sciences. There was a trickle of science education activities in the early years, but they were almost wholly confined to supporting fellowship programs for graduate students. Bush and many other leading scientists of that period felt NSF was not meeting their initial expectations and viewed the agency as of little consequence.

The world changed in October 1957, when Sputnik was launched. The public response bordered on panic: there was much alarmed discussion of an education gap--an ominous disparity between the quality of American science education and its counterpart in the Soviet Union. Within a month the administration established the President's Science Advisory Committee (PSAC), which played a very important role in the Eisenhower, Kennedy, and Johnson administrations. Congress responded with the National Defense Education Act, which dramatically increased federal funding for student loan programs and graduate fellowships in science and engineering, among other things. In the post-Sputnik years, support for science climbed rapidly, and funding for NSF took off. Gradually the activities in the social

sciences increased until by 1968 legislation was introduced to change the NSF Organic Act to require funding in these disciplines.

In particular, science education blossomed. NSF began offering summer institutes for K-12 teachers, in which leading university scientists met with teachers to discuss scientific developments and how to teach them. Even more important were curriculum development projects. Few people trusted the Office of Education to carry out this responsibility; NSF was the agency everyone turned to. NSF started in physics, with a curriculum developed by Zacharias of MIT, and a mathematics curriculum quickly followed. So did a program in chemistry: Faculty at UC Berkeley played an important role in developing the chemistry curriculum. One can criticize these programs. They were too difficult for the average student--too focused on the best students--but the simple fact is that if you go anywhere in the world today, you will find that these programs are still in use and are regarded as outstanding curricula.

The curriculum projects went so well that NSF decided to be even bolder. It ventured into the area of the biological sciences and began to develop and distribute biology courses to the high schools. Teachers were given special training, and the curricula were widely used. Eventually these curricula expanded to include topics on evolution, which brought out the creationists in force. They criticized NSF's involvement both as undermining religious beliefs and as a federal intrusion into local authority. But the loudest outcry was reserved for a social science curriculum called Man: A Course of Study (MACOS). MACOS was developed under the intellectual leadership of Jerome Bruner, who was at Harvard at that time.

MACOS focused on cultural diversity, principally from an anthropological viewpoint, and was aimed at students in grades 7, 8, and 9. One of the films produced for the course told the story of an Eskimo village above the Arctic Circle. Among the Eskimo practices depicted in the film was the custom of borrowing someone else's wife to keep you warm on a long journey across the ice if your own wife was not well enough to accompany you. Another was the practice of abandoning grandparents on an ice flow when they became too old to contribute. MACOS succeeded brilliantly in demonstrating cultural differences; it was equally effective in arousing public outrage. There were protest rallies, public meetings at schools that adopted MACOS, and vitriolic editorials--Jim Kilpatrick wrote extensively on the damage MACOS was inflicting by undermining the moral character of America's young people.

Around this time Senator Proxmire began presenting Golden Fleece awards for instances of government fraud, waste, or abuse. An early award went to the Air Force for spending $2,000 per toilet seat for bombers. But soon Proxmire's interest shifted to NSF and the agency became a perfect target. One of the early awards was a Golden Fleece for a research grant entitled "The Sexual Behavior of the Screw-worm Fly." Proxmire got tremendous attention for that; I'll return to it a little later.

When he delved into the social sciences, he found an NSF-supported grant dealing with an experimental analysis of love from a social/psychological perspective, and another grant concerned with a theory of love. At that time the *National Enquirer* was paying a $500 bounty to freelance reporters who came up with a story of this sort, and many writers would just scan the titles of research projects supported by NSF. The *Chicago Tribune* had a field day

with the theory of love grant, and as if this wasn't bad enough, they found a project titled "A Theory of Necking Behavior." We tried in vain to find this grant on NSF's list of social science projects. Days later we finally unearthed it among the engineering projects--the necking referred to was of a metal, not a human, variety.

Several of the faculty grantees who were recipients of the Golden Fleece wore it proudly as a badge of merit and made the most of their notoriety on the Johnny Carson show. This was serious business for NSF, however, because it played havoc with the Foundation's public image and relations with the Congress.

This is where my story begins. I came to NSF on July 1, 1975. Guyford Stever, director of NSF at the time, had been a long-term professor of physics at MIT and later president of Carnegie-Mellon University, as well as having served as an aide to Vannevar Bush during World War II. He had landed at Normandy on the second day of the invasion to seek out and investigate V-2 sites. The beach commander told his group that such a site had been liberated 30 miles up the road. When they arrived they found the report had been a bit premature--the site was still occupied by the Germans. The German commander seized the opportunity to surrender, however, and all ended well. Newspaper reports established Stever as a national hero.

I was recruited by Stever to be the deputy director of NSF. I had never had any interest in administration as a university professor, and frankly had a rather low regard for academic administrators--university presidents included. But the prospect of spending some time in Washington, D.C., was appealing to both my wife and me, particularly since our daughter was due to go off to college that fall. Why, one might ask, was I chosen by

the people at NSF? I had a good relationship with the Kennedys; I had worked on Robert Kennedy's presidential campaign and Senator Ted Kennedy was the chairman of NSF's Appropriations Committee. Even though I was a social scientist I worked on mathematical problems, had been featured in *Life* magazine for having developed computer-based systems for education, and was a member of the National Academy of Sciences. I was not a hard scientist, but my pedigree was not too suspect. Guy Stever proved to be a persuasive recruiter and so I joined NSF on a two-year leave from Stanford.

At this time considerable criticism was being directed towards science activities of all sorts. Ever since the publication of Rachel Carson's *Silent Spring* in the 1960s, there was a growing feeling abroad that the purity of science, as it had emerged from World War II, was not quite as pure as it had seemed. This was immediately after the Vietnam War and there were sizeable cuts in science budgets; money was hard to come by and scientists whose grants were not funded were critical of peer review and in turn of NSF. Proxmire was tapping into this public unease about science, and Congress followed his lead. During the winter before I came to NSF two congressmen--John Conlan of Arizona and Robert Bauman of Maryland--were particularly severe critics. They introduced a series of bills eliminating science education from NSF. Bauman had one bill that would have required every grant from NSF to be reviewed by Congress; it passed the House and it was only thanks to the conference committee that the requirement was eliminated. The Congressional Record for that period is replete with speeches by senators and congressmen targeting NSF for criticism.

The criticism of science education programs became so intense that Stever wrote to Congress in March announcing his intention to establish an in-house group to review NSF's science education programs and to assess the criticisms that had been leveled at them. The group, which included some long-time insiders at NSF, was chaired by Bob Hughes, a new presidential appointee who served as one of the Foundation's assistant directors. Hughes had a very heavy travel schedule, so his personal involvement in the study was limited.

The Hughes report was published a few days before I arrived at NSF, and it was the first thing I read. The report did not deal with the philosophical criticisms of NSF. Instead, it discussed NSF's business dealings and the appropriateness of its peer-review procedures as they applied to NSF curriculum projects. The report made a persuasive case that NSF had done its business in an orderly and thoroughly appropriate way, and I finished it convinced that the cloud of criticism hovering over NSF would soon be dispersed.

A few weeks later I was asked to testify on the Hill about the peer-review process as it was used throughout NSF. Director Stever was on a trip to Russia, so I went solo on my first appearance before Congress as a member of a federal agency. The chair of the committee was James Symington, son of the former Senator Stuart Symington. He was sympathetic to NSF and many years later characterized his experience and the events associated with NSF's science education programs as comparable to his famous father's experience with Senator Joe McCarthy. Bauman and Conlan entered the room shortly after I had started my testimony and immediately accused NSF of having produced a report that was "a pack of lies." We were deliberately misleading

the Congress, they charged. I was stunned; there had never been criticism like this. When Stever returned from Russia he joined me at the next peer-review hearing, where the same accusations were repeated. Finally Stever responded in exasperation that we had done our very best to examine these matters, and if the Congress didn't think we had done a thorough job it should call for a General Accounting Office (GAO) investigation. After the hearing ended, Symington suggested that such an investigation would surely silence the critics. Stever agreed, and so that summer the Congress initiated a GAO investigation.

The fall passed with hardly a mention of the GAO investigation. One Friday in early January I received a call from Symington, who said he wanted to see me at three o'clock. When I arrived at his office, Symington was alone, with a stack of documents on his desk. One was the GAO report, sent to him first as the committee chairman. He told me to read the executive summary. My heart went at a fast rate as I scanned it. Then he handed me a press release, which he told me to read and change as I saw fit. The press release, he informed me, would be released before I left his office. He wanted to be sure that Conlan and Bauman didn't get a jump on him and release the news before he did. The news, needless to say, was very bad indeed.

I got in touch with Stever as soon as I could. It was about 6:00 and he was in a tuxedo, about to go to a White House dinner for the President of France. We decided to assemble a group to examine the GAO report and that time was of the essence. I pulled together a small investigative team comprised of people whom I had gotten to know at NSF and whom I trusted; none of them had served on the Hughes committee. By 9:00 that evening we had sequestered the relevant files and were hard at work. We worked all

night Friday, all day Saturday, and Saturday night as well. On Sunday morning I called Stever and went to his house in Georgetown. I explained to him that our investigation had made it clear that not only was the GAO report correct, it had only scratched the surface; matters were even worse than GAO portrayed them. We spent several days in despair, struggling to decide what to do. My view was that we had to reveal everything as quickly as possible; another perspective was to tough it out. A few days later, Stever met with Rice University president Norman Hackerman, chair of the National Science Board (NSB), the presidentially appointed oversight board of NSF. Stever explained the problem to him, and the two of them then asked me to outline a plan for dealing with the situation. I did so, and was told that afternoon to proceed without delay--get the whole story out and quickly.

What did the GAO report say about our science curriculum projects? 1) NSF engaged in poor business practices. 2) It failed to do appropriate audits. 3) There were some inappropriate expenditures of funds. None of this was criminal, but the indications were clear that the Foundation was doing a less than effective job. Many of these projects had gone on for over six years with little effort to assess their quality or effectiveness. A particularly difficult criticism was that the curriculum programs often involved major commitments of funds--so much so that they had to go for final approval to the National Science Board. Yet the peer reviews sent to the NSB were redacted by program officers so that they were highly selective, emphasizing positive assessments and deleting negative ones.

Why did the Hughes group fail so badly? Hughes is a fine individual, a distinguished chemist, and has been an important contributor to science

policy. But he was a new presidential appointee with an incredibly heavy workload and travel schedule. He did not have time to monitor the committee's activities on a day-to-day basis or involve himself in a detailed analysis of the relevant documents. Unfortunately, some of the staff on the Hughes group conspired among themselves to cover up the problems. And how did Conlan and Bauman know what was going on? They had two people inside the NSF who were keeping them informed daily. A few years later one of Conlan's aides remarked that they knew within hours after an NSF staff meeting exactly what had transpired.

NSF's response to the GAO report proved to be very effective. Our candor stunned the Congress and took the wind out of our critics' sails. We acknowledged the faults in our procedures, the questionable character of our business practices, and the inappropriateness of some of our expenditures. Two individuals were placed on administrative leave and one was later terminated. We restructured the science education programs, revised our policies, and recruited new leadership. There is an account of these changes in various NSF news releases and reports issued at that time.

We also changed the peer-review process throughout NSF. The program officers had, and still have, great flexibility. They solicit peer views for a given proposal, and then use the information--as they judge appropriate--to decide whether or not to fund the project. Program officers should have that kind of decision-making authority, but there is also a need for oversight. Accordingly, we established an audit office that did random samples of peer reviews to ensure that they were being used appropriately.

In addition, we changed the procedure for soliciting peer reviews. Reviewers, in the past, had been told that applicants could request a copy of

their review, but that the review would be redacted to protect the identity of the reviewer. Redaction proved to be a serious problem in the GAO report and more generally throughout the Foundation. Too many errors were made in the process (especially when many reviews had to be redacted) and this compromised the entire peer-review system. Accordingly, we told reviewers that in the future their review might be shared with applicants, and that they should write them in a way that protected their anonymity. Reviewers quickly adjusted to this procedure and redaction was no longer necessary.

We also began to edit titles and abstracts of proposals to avoid the kinds of problems we had with the *National Enquirer*. This proved to be necessary only on rare occasions, but the very idea created a stir in the academic community. How dare you edit our work? was a common reaction. I don't know whether they still do this at NSF, but in my day it was useful in preventing reporters from misrepresenting the true nature of a research project.

In the summer of 1976 Stever resigned to become science adviser to President Ford. Nixon had fired his science adviser, Ed David, and had abolished PSAC in 1973. He was unhappy with the academic community in part because of its anti-Vietnam war activities. Nelson Rockefeller, Ford's vice president, believed that PSAC had played an important role in the past and should be re-established, but with congressional legislation this time. That took a while, however, and in the summer of 1976 Stever became the director of the newly established Office of Science and Technology and I became acting director of NSF.

The next few months were possibly the most interesting of my life. I took steps to phase out the RANN (Research Applied to National Needs)

program; in many respects it was a reasonably productive program but its approach to the support of research was not appropriate for NSF and did not live up to our standards. I closed several regional offices, including one in San Francisco. I ordered a reduction in force--a RIF--a very unusual action in the federal government. These actions raised some hackles in Congress and OMB, but in my view I was cleaning house for the next director.

By the time Jimmy Carter was elected in 1976, I had the strong support of the National Science Board, whose membership included Frank Press, soon to be named the president's science adviser. The next thing I knew I was nominated to be director of NSF. It was a move I had neither intended nor expected. Nor did I, with my social sciences background, quite fit the mold of an NSF director. Not long after my appointment, on a visit to Columbia University, I saw Dr. I. I. Rabi, an influential physicist during and after the Second World War. He told me he had heard only the best things about me, and was so pleased I was going to be the director of NSF--and by the way, what field of physics was I in?

Perhaps my most important contribution as director was to recruit George Pimentel, from this campus, as deputy director. George was a world-renowned chemist, whose death a few years ago was a great loss to science and to UC Berkeley. George and I worked well as a team and accomplished a great deal. Together we brought the business and administrative practices of NSF into the modern age. We expanded the behavioral and social sciences. We elevated engineering to the level of a full directorate. This pleased the engineering community, many of whose members were trying to get the Foundation's name changed to the "National Science and Engineering Foundation." We also established a research program in economics, focused

on the role of R&D in stimulating economic growth; that field of research has prospered over the past 20 years and has led to an important development in economics known as "new growth theory."

It was also clear to us in the late 1970s that while the nation's research universities were amazingly fruitful in producing new ideas, the process of transforming those ideas into applications--technology transfer--was not working as well as it should. We responded in several ways. NSF initiated the Industry-University Cooperative Research Program, a venture that was controversial in the 1970s but today is standard practice. In addition, we assembled a working group to address federal policy that patents generated from government-supported research at universities reside with the government. We conducted a series of policy studies that laid the groundwork for the passage in 1980 of the Bayh-Dole Act, which transferred patent rights to universities.

Those were the years in which China, with the end of the Cultural Revolution, was beginning to open to the West. During my tenure as NSF director I negotiated and signed the first memorandum of understanding in history between the People's Republic of China and the United States, an agreement for the exchange of scientists and scholars. Finally, I claim sole credit for establishing the Vannevar Bush Medal, awarded annually by the NSB to an individual who has made major contributions to the well being of the science enterprise. As may be obvious, Bush stands tall in my eyes.

During my years as director, NSF received no Golden Fleece awards; Senator Proxmire indeed became a good friend to the Foundation. In my last few weeks at NSF, Proxmire spoke at a seminar on biological methods of pest control. At the seminar he freely admitted that the study of the sex life of the

screw-worm fly had been of major significance to progress in this important field.

I left NSF in July of 1980. Ronald Reagan was elected the following fall and named David Stockman director of the budget. His first budget eliminated all science education activities (except graduate fellowships) and all of the social sciences. By the time the budget made its way through Congress, some of the social science activities were reinstated, but at greatly reduced levels. A few years later, in an article in the *New York Times,* Stockman stated that he had made a mistake in eliminating these programs, but on the other hand, he said, it was the kind of mistake he didn't mind making. But as the 1980s unfolded there was a renewed focus on science education throughout the country, and gradually NSF re-introduced and added programs in that area.

Congress always liked science education. One of NSF's problems was that most of the research it funded went to a relatively small group of universities; their concentration in a few large states complicated NSF's ability to gain broad support in Congress. In science education, on the other hand, funds went to virtually all of the states. While I was director we started a program to work with universities in states that received few NSF grants, giving them advice and assistance so that they could be more competitive in seeking grants. It was called Experimental Program to Stimulate Competitive Research, or EPSCoR, and is still in existence today. That is an interesting story all by itself and needs to be examined.

By 1992 the science education directorate was re-established and the social sciences were viable if not prospering, but clearly the re-emergence of these two areas was influenced by earlier events. Some people argue that the

Foundation--shaped by these events--has been too cautious in its approach to science education and the social sciences.

Conlan lost the 1978 election. Bauman prospered throughout the 1970s--he was a leader on the floor of Congress and an important figure in the conservative movement. Everyone thought he would run for the Senate in 1982. Then the world came apart for him--he was arrested for sexually molesting a young boy. This story is told, with admirable candor, in a book he wrote called "The Gentleman from Maryland: The Conscience of a Gay Conservative." Once arrested, his career was finished. He had been NSF's most severe, persistent, and unrelenting critic, charging that our efforts in science education served only to undermine the moral character of American children. Reading his book, I felt a certain sadness about what happened to him. But when I recall him across the witness table, my sadness is easier to bear.

The purpose of these remarks has been to give you a sense of the evolution of federal policy on science and science education in the postwar era, through the lens of my personal experience at NSF. The science enterprise during the postwar period needs to be interpreted from a variety of perspectives, and perhaps my experience will prove useful. Let me end as I began, with the hope that, if nothing else, these remarks may stimulate some young historians to take a fresh look at this fascinating era in the annals of American science.

Richard C. Atkinson: President-Elect of AAAS

WILLIAM J. MCGILL

When Washington veterans describe managerial effectiveness as practiced in their town, they use abstractions such as agencies, staffs, and access to the White House. They dwell on adversary contentions: turf fights, budget struggles, and legislative coups. What emerges is the style of an experienced political operator overcoming opposition by any means necessary.

The successful manager is usually far less combative. Anyone who has received a late-night urgent phone call from Dick Atkinson during his tenure as director of the National Science Foundation (NSF) or as chancellor of the University of California, San Diego (UCSD), will attest to his powers of persuasion and his unremitting assaults against problems until they are resolved. But the essence of Atkinson's managerial style is a restless flood of energy. He simply does not rest until he has constructed paths to all of his goals.

On 12 August 1976, about a year after arriving in Washington, D.C., on an 18-month leave from Stanford University, Atkinson was named acting director of NSF after H. Guyford Stever's move to the White House as science advisor. At that time, the foundation's peer review system was under attack in Congress. Intense pressures were being generated on Capitol Hill to mount research efforts directed at national needs with prospects for short-term payoffs. The funding picture for NSF was bleak as the nation struggled with runaway inflation and with an oil embargo by the Organization of Petroleum Exporting Countries.

Single-minded and determined, Atkinson managed to turn the situation around. Peer review was successfully defended against congressional pressure to allocate science support on a geographic basis. Funding for basic research increased by 11% in Jimmy Carter's first budget, a reversal of declining fortunes in the Nixon-Ford years. Total NSF support grew by nearly 30% between 1976 and 1980, the year Atkinson resigned to become chancellor of UCSD.

Richard C. Atkinson

Atkinson's principled and competent leadership of NSF earned him the admiration of congressional critics. Senator William Proxmire (D–WI), who made four Golden Fleece Awards to NSF during Atkinson's tenure as director, remarked at Atkinson's last appearance before the appropriations subcommittee, "You have won the confidence of Congress and of this skeptical senator, and you are going to be sorely missed."

Richard C. Atkinson was born on 19 March 1929, in Oak Park, Illinois. At the end of his sophomore year in high school, he was admitted to the University of Chicago, graduating in 1948 with a Ph.B. degree when he was 19 years old. As an undergraduate, Atkinson was attracted to mathematics and biology, a consequence of after-hours computational work with the biophysics research group led by Nicolas Rashevsky. Atkinson decided to pursue graduate work in biology at the University of Chicago and registered for courses, but in 1950 an unusual opportunity opened up in the Psychology Department at Indiana University.

William K. Estes and Cletus J. Burke at Indiana had developed a mathematical theory of learning formulated in the language of set theory. They were searching for graduate students with mathematical skills to help extend their ideas. Atkinson enrolled at Indiana as a graduate student in the fall of 1950 and studied mathematics and psychology. He completed the course work for a Ph.D. in both fields, submitted a dissertation to the Psychology Department, and was awarded the doctoral degree in 1955.

In 1954, Atkinson enlisted in the U.S. Army. He finished his tour of duty in 1956 and soon after accepted a post as lecturer in applied mathematics and statistics at Stanford University. Despite his degree in experimental psychology, Atkinson was still undecided on possible careers in applied mathematics, psychology, or biology. While at Stanford he met Patrick Suppes, a young logician with strong interests in mathematical models. Atkinson and Suppes understood that advances in mathematical learning theory, as well as in the branches of mathematics that supported it, would create an entirely new environment for education in the form of computer-based instruction. It was a time when the impact of computers was just beginning to affect the traditional barriers between the physical and social sciences. Problems were clearly more important than disciplines.

In the fall of 1957 Atkinson accepted an offer of a tenure-track post in the Psychology Department of the University of California, Los Angeles (UCLA). His career direction was now settled. The next 4 years at UCLA were an exhilarating time. Despite a heavy teaching load, Atkinson wrote a book and a dozen published papers during his UCLA tenure and established himself as one

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of the brightest young psychologists in the United States.

Suppes, meanwhile, was determined to bring Atkinson back to Palo Alto. In 1961, Atkinson returned as associate professor of psychology and entered into a close working relationship with Suppes at Stanford's Institute for Mathematical Studies in the Social Sciences. At Stanford, Atkinson attracted brilliant graduate students and continued to publish four to six, sometimes eight, papers each year, many of which were coauthored with his students. He took on major editorial responsibilities and became acknowledged as a national leader in his field.

In 1964 Atkinson was named professor of psychology at Stanford with affiliate appointments in the Schools of Education and of Engineering. In 1968, the Stanford Psychology Department elected him chairman, a post in which he served until 1973. That same year the membership of the American Psychological Association (APA) elected Atkinson to its Board of Directors, and he also became chairman of the Psychonomic Society, the national organization of experimental psychologists. A year later he was named president of APA's Division of Experimental Psychology, and in 1975 chairman of the Psychology Section of AAAS. Atkinson's rapidly growing reputation in science and education was also recognized in 1974 by election to the National Academy of Sciences, the National Academy of Education, and the American Academy of Arts and Sciences.

During the Stanford years, Atkinson's intellectual interests were focused on the study of human memory and cognition. His research ranged from the formulation of mathematical models of memory and tests of these models in carefully controlled experimental situations to the practical problems of developing computer-based systems for teaching reading and mathematics to elementary school children. A paper published in 1968 with R. M. Shiffrin, one of his graduate students, entitled "Human memory: A proposed system and its control processes," is a statement of Atkinson's outlook at this juncture; it is one of the most widely cited publications in the history of the behavioral sciences (*1*). The citation for the APA Distinguished Scientific Contributions Award presented to Atkinson in 1977 summarizes the style of his work: "For combining classical methods of mathematics with emerging techniques of computer science, the best traditions of experimental psychology with new concepts of information processing, in the advance of psychological theory and its applications." That award also recognized his "pioneering contributions to computer-assisted instruction and mathematical methods for optimizing the learning process."

Ernest Hilgard of the Stanford Psychology Department, a leading psychologist of the World War II generation and a revered teacher, was the author of a well-known textbook, *Introduction to Psychology*, first published in the early 1950s. In 1967 Hilgard asked Atkinson to assist him in producing a new version, so Hilgard and Atkinson coauthored the fourth edition. Then in 1971, Rita Atkinson, who earned her Ph.D. at Indiana University in 1957, joined the team of authors. The book is currently in its ninth edition and has been translated into eight languages (*2*).

In 1975, President Gerald Ford asked Atkinson to become deputy director of NSF. On joining the foundation, Atkinson immediately assumed responsibility for reorganizing the social sciences at NSF and for calming a congressional furor over NSF's controversial science curriculum projects.

In 1977, after his appointment by President Carter as director of NSF, Atkinson confronted powerful pressures aimed at redirecting the foundation's efforts toward applied research on national needs. Atkinson told Congress (*3*): "For the average citizen, for the average member of Congress, it's a very appealing idea to think of scientists as wasting their time. . . . Government and the public have tended to weigh scientific merit based on what they think will be immediately useful. . . . But that's not how progress is made. Progress is made by stumbling in dark areas and shining a light on something that perhaps no one could quite conceive of. What's important is to ensure that the scientific community is not driven by the limited views of what science might do as those views evolve in the Washington bureaucracy. There's just too much pressure in Congress to orient science toward the solution of practical problems."

Atkinson became chancellor of UCSD in 1980. The once powerful University of California system had been languishing for nearly two decades. When Atkinson took up his duties at UCSD, he found the campus at about one-third of its originally programmed size, without a capital construction program, and operating in severe budget austerity. During Atkinson's first 2 years as chancellor, he relied on his flair for opportunistic funding and planning. But by 1983 the University of California system had a new president, David Gardner, and the state had a governor, George Deukmejian, who understood the importance of the university for California's economic well-being. The governor's budgets restored higher education to its proper place in the states's priorities. Funds were appropriated and soon began to flow to the campuses, promising a restoration of UC's traditional excellence. Atkinson's managerial skills were taxed to the utmost by the new-found opportunities to correct long-standing problems, and to build on a scale not seen at UCSD since the post-Sputnik era.

Today, as chancellor of UCSD, Atkinson labors at his accustomed energetic pace. He is no longer the bright, confident, very young man who took psychology by storm in the 1960s. Bold youthful self-assertion has given way to quiet self-assurance. His conversation still sparkles with warmth and friendship, but it is cautious, as befits someone who has survived a long time in the political jungle.

Rita Loyd and Richard Atkinson were married in 1952. Rita has become senior author of the Atkinson, Atkinson, Smith, and Hilgard text. The Atkinsons have one daughter, Lynn, who is a neurosurgeon at the Henry Ford Hospital in Detroit, Michigan.

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3. *Washington Post*, 14 May 1980.

Distinguished Scientific Contribution Awards for 1977

The Awards for Distinguished Scientific Contribution are presented by the Association at the annual convention. The awardees for this year, along with those for the preceding years since the establishment of the custom, are:

1956
WOLFGANG KÖHLER
CARL R. ROGERS
KENNETH W. SPENCE

1957
CARL I. HOVLAND
CURT P. RICHTER
EDWARD C. TOLMAN

1958
FRANK A. BEACH
PAUL E. MEEHL
B. F. SKINNER

1959
LEON FESTINGER
DONALD B. LINDSLEY
NEAL E. MILLER

1960
HARRY F. HARLOW
CHARLES E. OSGOOD
S. SMITH STEVENS

1961
JAMES J. GIBSON
DONALD O. HEBB
HENRY A. MURRAY

1962
JEROME S. BRUNER
WILLIAM K. ESTES
HARRY HELSON

1963
ROGER G. BARKER
GEORGE A. MILLER
CARL PFAFFMANN

1964
GORDON W. ALLPORT
WENDELL R. GARNER
J. P. GUILFORD

1965
FLOYD ALLPORT
FRITZ HEIDER
PAUL THOMAS YOUNG

1966
NANCY BAYLEY
CLARENCE H. GRAHAM
RICHARD L. SOLOMON

1967
SOLOMON E. ASCH
ERNEST R. HILGARD
JAMES OLDS

1968
JAMES E. BIRREN
ELEANOR J. GIBSON
MUZAFER SHERIF

1969
JEAN PIAGET
STANLEY SCHACHTER
HERBERT A. SIMON

1970
DONALD T. CAMPBELL
DAVID KRECH
R. DUNCAN LUCE

1971
ROGER WILLIAM BROWN
HAROLD H. KELLEY
ROGER WOLCOTT SPERRY

1972
EDWIN E. GHISELLI
DOROTHEA JAMESON AND LEO HURVICH
PATRICK SUPPES

1973
LEE J. CRONBACH
BRENDA MILNER
BENTON J. UNDERWOOD

1974
ANGUS CAMPBELL
LORRIN A. RIGGS
RICHARD F. THOMPSON

1975
DONALD E. BROADBENT
ROBERT R. SEARS
DAVID SHAKOW

1976
BEATRICE C. LACEY AND JOHN I. LACEY
THEODORE M. NEWCOMB
ROGER N. SHEPARD

1977
RICHARD C. ATKINSON
RUSSELL L. DE VALOIS
EDWARD E. JONES

Atkinson, De Valois, and Jones were each presented with a check for $1,000 and an engrossed citation of his formal contributions to the development of scientific psychology. These psychologists have agreed, in accordance with established custom, to present addresses on some phase of their scientific work at the 1978 Convention. The presentation of awards was made by Richard F. Thompson, former Chair of the Committee on Scientific Awards. Other members of the Committee are Gerald C. Davison, John I. Lacey, Walter Mischel, Lorrin A. Riggs, and Elaine C. Walster.

Richard Chatham Atkinson

CITATION

"For combining classical methods of mathematics with emerging techniques of computer science, the best traditions of experimental psychology with new concepts of information processing, in the advancement of psychological theory and its applications. His long-term collaboration with Patrick Suppes yielded among its fruits the first extensive application of learning theory to multiperson interactions. With Richard M. Shiffrin, Atkinson developed the model that has set the pace for research on human short-term memory; with James Juola and others he developed an almost equally influential family of models for recognition and search processes. And on a quite different tack, Atkinson anticipated current demands for 'relevance' with his pioneering contributions to computer-assisted instruction and optimization of learning."

BIOGRAPHY

Richard C. Atkinson was born in Oak Park, Illinois, on March 19, 1929, and attended grade school and the first two years of high school in that township. Instead of completing high school, he entered the University of Chicago in the fall of 1944, earned the PhB degree in 1948, and then stayed on for an additional year of course work. After a brief period of study at the University of Louisville, he enrolled at Indiana University where he received the PhD degree in 1955. While at Indiana University, he worked closely with William K. Estes,

Cletus J. Burke, and James Egan. The working relationship with Estes was particularly important in shaping his interests in psychology; they have published several papers together, and few of Atkinson's research projects have been undertaken without prior consultation with Estes.

In 1952, Atkinson married Rita Loyd, also a graduate student in psychology at Indiana University, who completed her PhD degree in 1957. They have one daughter, Lynn, who is currently in medical school at Brown University.

From 1954 to 1956, Atkinson served in the U.S. Army and was assigned to the Human Resources Research Unit at Fort Ord, California. His first academic position was at Stanford University in the fall of 1956 as lecturer in the Department of Applied Mathematics and Statistics. It was at this time that he met Patrick Suppes, with whom he has maintained a long and close relationship on both scientific and personal matters.

At the time he went to Stanford University, Atkinson planned a career in applied mathematics and statistics. However, six months after arriving at Stanford he received an offer from UCLA to be an assistant professor of psychology. Academic positions were scarce, and the opportunity for an appointment with a clear track to tenure was extremely appealing—thus the decision to change career objectives from an emphasis on mathematical work to a primary commitment as an experimental psychologist.

Atkinson found life at UCLA exciting and rewarding. His research went well, and the first exposure to academic politics was intriguing, if not a total waste of time and energy. He remembers that period as one with virtually complete freedom to do research and explore new ideas. Edward Carterette of the UCLA faculty was a particularly good sounding board for research proposals and proved to be a close personal friend. Atkinson's research at UCLA focused primarily on psychophysical problems concerned with signal detection and signal recognition, and on problems of learning —particularly models for stimulus discrimination learning.

Teaching requirements at UCLA seemed minimal at the time but, by today's standards, were quite rigorous. Every semester, he taught two sections of introductory psychology plus one other course—statistics in the fall semester and a graduate course in mathematical psychology in the spring. Each section of introductory psychology had over 300 students, so in a given year he had contact with some 1,200–1,300 students. Although this was a large number of student contact hours, it seemed like an easy teaching load since it involved only three preparations per week.

In 1961, Stanford University made Atkinson an offer to be an associate professor in both the Psychology Department and the School of Education. The offer also involved an appointment in the Institute for Mathematical Studies in the Social Sciences and an affiliated faculty membership in the School of Engineering's Department of Engineering and Economic Systems. Gordon Bower had been appointed to the Stanford faculty the previous year, and William K. Estes was to be appointed the following year. These and other appointments, combined with Patrick Suppes' presence at Stanford, made the university an exciting place for work in psychology.

In the early 1960s, much of Atkinson's research was on mathematical models for learning and perception, and it was during this time that he became interested in the classroom instruction of young children. This interest led to his development of systems for computer-assisted instruction, one of which was a program in reading for children in the primary grades.

By the mid-1960s, Atkinson's interest had turned to the area of memory and cognition—particularly theories of human memory and their control processes. This work, in conjunction with his applied interests in computer-assisted instruction, led to a concern for optimizing the learning process—both in a practical sense and in the development of mathematical models for optimization. These optimization models proved to be particularly effective when implemented as part of a program of computer-assisted instruction.

It is important to note that most of Atkinson's research has been published in collaboration with graduate students. Stanford University attracted unusually talented and dedicated students. These students contributed greatly to the intellectual environment at Stanford and helped create a near optimal situation in which to do research.

In 1967, Atkinson joined Ernest R. Hilgard as a coauthor on the fourth edition of *Introduction to Psychology;* and in 1971, his wife, Rita, joined the team on the fifth edition. This collaborative enterprise has been exciting and productive. It has deepened his interest in all aspects of psychology and has provided a framework within which to organize his thinking about the field as a whole, its relationship to other sciences, and its potential contributions to society.

On May 9, 1975, Richard C. Atkinson was appointed by President Ford as the Deputy Director of the National Science Foundation. On May 3, 1977, he was appointed by President Carter as the Director of the Foundation. He is on leave from Stanford University and plans to return to the university after completing his assignment at the National Science Foundation.

Honors awarded to Atkinson during his professional career include the following: Distinguished Research Award, Social Sciences Research Council, 1962; Fellow, Center for Advanced Study in the Behavioral Sciences, 1963–1964; Society of Experimental Psychologists, elected 1967; Guggenheim fellowship, 1967–1968; Distinguished Visiting Scholar, Educational Testing Service, 1971; Chairman, Psychonomic Society, 1973; President, Division of Experimental Psychology, American Psychological Association, 1974; National Academy of Education, elected 1974; American Academy of Arts and Sciences, elected 1974; National Academy of Sciences, elected 1974; Chairman, Psychology Section, American Association for the Advancement of Science, 1975; President, Western Psychological Association, 1975–1976; Professional Achievement Award, University of Chicago Alumni Association, 1976; DSc (honorary), Bucknell University, 1977.

PROFESSIONAL AND SCIENTIFIC PUBLICATIONS

1952

With R. B. Ammons. Experimental factors in visual form perception. *Journal of Experimental Psychology, 43,* 173–178.

1956

An analysis of the effect of nonreinforced trials in terms of statistical learning theory. *Journal of Experimental Psychology, 52,* 28–32.

With C. J. Lange & C. H. Rittenhouse. *Films and group discussions as a means of training leaders* (Tech. Rep. 27). Washington, D.C.: George Washington University, Human Resources Research Organization.

1957

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1958

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With J. Popper. Discrimination learning in a verbal conditioning situation. *Journal of Experimental Psychology, 56,* 21–26.

1959

Applications of a Markov model to two-person noncooperative games. In R. R. Bush & W. K. Estes (Eds.), *Studies in mathematical learning theory.* Stanford, Calif.: Stanford University Press.

With W. Bogartz & R. Turner. Discrimination learning with probabilistic reinforcement schedules: Supplementary report. *Journal of Experimental Psychology, 57,* 349–350.

1960

A theory of stimulus discrimination learning. In K. J. Arrow, S. Karlin, & P. Suppes (Eds.), *Mathematical methods in the social sciences.* Stanford, Calif.: Stanford University Press.

The use of models in experimental psychology. *Synthese, 12,* 162–171.

With G. Sommer & M. B. Sterman. Decision making by children as a function of amount of reinforcement. *Psychological Reports, 6,* 299–306.

With P. Suppes. *Markov learning models for multiperson interactions.* Stanford, Calif.: Stanford University Press.

1961

A generalization of stimulus sampling theory. *Psychometrika, 26,* 281–290.

The observing response in discrimination learning. *Journal of Experimental Psychology, 62,* 253–262.

1962

With R. E. Dear. Optimal allocation of items in a simple, two-concept automated teaching model. In J. E. Coulson (Ed.), *Programmed learning and computer-based instruction.* New York: Wiley.

With E. C. Carterette & R. A. Kinchla. Sequential phenomena in psychophysical judgments: A theoretical analysis. *Institute of Radio Engineers Transactions on Information Theory* (Vol. IT-8), September.

Choice behavior and monetary payoff. In J. Criswell, H. Solomon, & P. Suppes (Eds.), *Mathematical methods in small group processes.* Stanford, Calif.: Stanford University Press.

1963

With W. K. Estes. Stimulus sampling theory. In R. D. Luce, R. R. Bush, & E. Galanter (Eds.), *Handbook of mathematical psychology* (Vol. 2). New York: Wiley.

A variable sensitivity theory of signal detection. *Psychological Review, 70,* 91–106.

Mathematical models in research on perception and learning. In M. H. Marx (Ed.), *Theories in contemporary psychology.* New York: Macmillan.

Mathematical models in research with children. In J. C. Wright & J. Kagen (Eds.), Basic cognitive processes in children. *Monographs of the Society for Research in Child Development, 28*(2, Serial No. 86).

1964

With E. J. Crothers. A comparison of paired-associate learning models having different acquisitions and retention axioms. *Journal of Mathematical Psychology, 1,* 285–315.

With R. C. Calfee, G. R. Sommer, & W. E. Jeffrey. A test of three models for stimulus compounding with children. *Journal of Experimental Psychology, 67,* 52–58.

With J. L. Myers. Choice behavior and reward structure. *Journal of Mathematical Psychology, 1,* 170–203.

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With E. C. Carterette & R. A. Kinchla. The effect of information feedback upon psychophysical judgments. *Psychonomic Science, 1,* 83–84.

With R. A. Kinchla. The effect of false-information feedback upon psychophysical judgments. *Psychonomic Science, 1,* 317–318.

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1965

With R. A. Kinchla. A learning model for forced-choice detection experiments. *British Journal of Mathematical and Statistical Psychology, 18,* 184–206.

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1966

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1967

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1968

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With E. R. Hilgard & R. L. Atkinson. *Introduction to psychology* (5th ed.). New York: Harcourt Brace Jovanovich.

R. C. Atkinson (Ed.). *Contemporary psychology: Readings from Scientific American.* San Francisco: Freeman.

1972

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With C. F. Darley & R. L. Klatzky. Effects of memory load on reaction time. *Journal of Experimental Psychology, 96,* 232–234.

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With J. D. Fletcher. Evaluation of the Standard CAI program in initial reading. *Journal of Educational Psychology, 63,* 597–602.

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1973

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With K. T. Wescourt. Scanning for information in long- and short-term memory. *Journal of Experimental Psychology, 98,* 95–101.

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With C. F. Darley, J. R. Tinklenberg, W. T. Roth, & L. E. Hollister. Influence of marihuana on storage and retrieval processes in memory. *Memory and Cognition, 1,* 196–200.

With J. D. Fletcher, E. J. Lindsay, J. O. Campbell, & A. Barr. Computer-assisted instruction in initial reading: Individualized instruction based on optimization procedures. *Educational Technology,* September, 27–37.

With M. H. Beard, P. V. Lorton, & B. W. Searle. *Comparison of student performance and attitude under three lesson-selection strategies in computer-assisted instruction* (Tech. Rep. 222). Stanford, Calif.: Stanford University, Institute for Mathematical Studies in the Social Sciences.

With R. C. Mohs & K. T. Wescourt. Effects of short-term memory contents on short- and long-term memory searches. *Memory and Cognition, 1,* 443–448.

1974

With J. F. Juola. Search and decision processes in recognition memory. In D. H. Krantz, R. C. Atkinson, R. D. Luce, & P. Suppes (Eds.), *Contemporary developments in mathematical psychology: Vol. 1. Learning, memory, and thinking.* San Francisco: Freeman.

With D. J. Herrmann & K. T. Wescourt. Search processes in recognition memory. In R. L. Solso (Ed.), *Theories in cognitive psychology: The Loyola Symposium.* Hillsdale, N.J.: Erlbaum.

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With C. F. Darley, J. R. Tinklenberg, & W. T. Roth. The nature of storage deficits and state-dependent retrieval under marihuana. *Psychopharmacologia, 37,* 139–149.

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Teaching children to read using a computer. *American Psychologist, 29,* 169–178.

With D. J. Herrmann & F. V. Geisler. The serial position function for lists learned by a narrative-story mnemonic. *Bulletin of the Psychonomic Society, 2,* 377–378.

With W. P. Banks. Accuracy and speed strategies in scanning active memory. *Memory and Cognition, 2,* 629–636.

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1975

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With M. R. Raugh. A mnemonic method for learning a second-language vocabulary. *Journal of Educational Psychology, 67,* 1–16.

With A. Barr & M. Beard. A rationale and description of a CAI program to teach the basic programming language. *Instructional Science, 4,* 1–31.

With M. R. Raugh. An application of the mnemonic keyword method to the acquisition of a Russian vocabulary. *Journal of Experimental Psychology: Human Learning and Memory, 104,* 126–133.

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With L. D. Rothstein. Memory scanning for words in visual images. *Memory and Cognition, 3,* 541–544.

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1976

Adaptive instructional systems: Some attempts to optimize the learning process. In D. Klahr (Ed.), *Cognition and instruction.* Hillsdale, N.J.: Erlbaum.

With K. T. Wescourt. Fact retrieval processes in human memory. In W. K. Estes (Ed.), *Handbook of learning and cognitive processes* (Vol. 4). Hillsdale, N.J.: Erlbaum.

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With A. Barr & M. H. Beard. The computer as a tutorial laboratory: The Stanford BIP Project. *International Journal of Man-Machine Studies, 8,* 567–596.

With C. L. Krumhansl & R. C. Mohs. Sequential search processes in long-term memory. *Memory and Cognition, 4,* 401–408.

1977

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With D. Jamison, J. D. Fletcher, & P. Suppes. Cost and performance of computer-assisted instruction for education of disadvantaged children. In J. Froomkin, D. Jamison, & R. Radner (Eds.), *Education as an industry.* Cambridge, Mass.: Ballinger Publishing Company for National Bureau of Economic Research, New York.

With M. R. Raugh & R. D. Schupbach. Teaching a large Russian language vocabulary by the mnemonic keyword method. *Instructional Science, 6,* 199–221.

In Press

With V. G. Chant. Applications of learning models and optimization theory to problems of instruction. In W. K. Estes (Ed.), *Handbook of learning and cognitive processes* (Vol. 6). Hillsdale, N.J.: Erlbaum.

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Biographical Data

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Birthdate and place: March 19, 1929; Oak Park, IL.
Marital status: Married, Rita Loyd Atkinson, Ph.D.; one child, Lynn L. Atkinson, M.D.; born 1957.

Selected speeches and commentaries are available at www.ucop.edu

Appointments

1956-1957 Lecturer, Applied Mathematics and Statistics Laboratories, Stanford University
1957-1961 Assistant Professor of Psychology, University of California, Los Angeles
1961-1965 Associate Professor of Psychology, Stanford University
1961-1975 Associate Director, Institute for Mathematical Studies in the Social Sciences, Stanford University
1963 Visiting Professor of Psychology, University of Michigan
1965-1980 Professor of Psychology (also Professor of Education and Affiliate Faculty Member, Institute of Engineering-Economic Systems, School of Engineering), Stanford University
1968-1973 Chairman, Department of Psychology, Stanford University
1975-1976 Deputy Director, National Science Foundation (appointed by President Ford)
1976-1977 Acting Director, National Science Foundation
1977-1980 Director, National Science Foundation (appointed by President Carter)
1980-1995 Chancellor, University of California, San Diego
1995-present President and Regent, University of California

Degrees, Fellowships, and Honors

Ph.B., University of Chicago, 1948
Ph.D., Indiana University, 1955
Doctor of Science (honorary), Bucknell University; Michigan State University; University of Pittsburgh; Indiana University; Adelphi University; University of Louisville; Bowling Green University; Virginia Commonwealth University; University of Illinois; University of North Carolina; Obirin University (Japan); Trinity College
Doctor of Laws (honorary), California Western School of Law
National Academy of Sciences, Elected 1974
American Academy of Arts and Sciences, Elected 1974
National Academy of Education, Elected 1974
Institute of Medicine, Elected 1978
American Philosophical Society, Elected 1980
Distinguished Research Award, Social Science Research Council, 1962
Fellow, Center for Advanced Study in Behavioral Sciences, 1963
Guggenheim Fellowship, 1967
Society of Experimental Psychologists, Elected 1967
Fellow, American Association for the Advancement of Science, Elected 1968
Distinguished Visiting Scholar, Educational Testing Service, 1971
Professional Achievement Award, University of Chicago Alumni Association, 1976
Distinguished Scientific Contribution Award, American Psychological Association, 1977
Society of the South Pole, 1978

Degrees, Fellowships, and Honors (Continued)

Science Medal, Polska Akademia Nauk, 1978
E. L. Thorndike Award, American Psychological Association, 1980
Mountain in Antarctica named Mt. Atkinson (78° 39° S.L. 85° 30' W.L.), 1980
Distinguished Contributions Award, The Society of Research Administrators, 1988
President, American Association for the Advancement of Science, 1989
William James Fellow, American Psychological Society, Elected 1989
Tree of Life Award, Jewish National Fund, 1993
Revelle Medal, University of California at San Diego, 1995
Distinguished Service Medal, Institute of the Americas, 1996
Human Unity Award, The National Conference, 1996
National Leadership Award, U.S. Small Business Administration, 2000

Other Activities

1954-1956	Military Service, U.S. Army
1958-1967	Consultant, Systems Development Corporation
1961-1963	Consultant, Bell Telephone Laboratories
1961-1966	Editorial Board, Journal of Verbal Learning and Verbal Behavior
1963-1969	Committee on Learning and the Educational Process, Social Science Research Council (Chair, 1966-1968)
1963-1970	Editor, Journal of Mathematical Psychology
1964	Co-director, Summer Research Conference on Learning and the Educational Process, sponsored by the U.S. Office of Education
1964-1969	Consultant, Radio Corporation of America
1965-1968	Task Force on Information Networks of EDUCOM (Interuniversity Communications Council)
1965-1973	Associate Editor, Perception and Psychophysics
1966	Director, Job Corps Reading Institute, sponsored by the Office of Economic Opportunity
1966-1968	Editorial Board, Psychological Review
1968-1970	Committee on Technological Augmentation of Cognition, Smithsonian Institution
1968-1971	Personality and Cognition Review Committee, National Institute of Mental Health
1968-1973	Mathematical Social Science Board, Center for Advanced Study in the Behavioral Sciences (Chair, 1971-1973)
1968-1975	Editorial Board, Contemporary Psychology
1968-1975	Consultant, Office of Computing Activities, National Science Foundation
1970-1978	Board of Editors, Journal of Mathematical Psychology
1971-1976	Research Advisory Committee, Children's Television Workshop
1973-1974	Chairman, Psychonomic Society
1973-1976	Board of Directors, American Psychological Association
1974-1975	Chair, Personality and Cognition Review Committee, National Institute of Mental Health
1974-1975	President, Division of Experimental Psychology, American Psychological Association
1975-1976	Chairman, Psychology Section, American Association for the Advancement of Science
1976-1977	President, Western Psychological Association
1976-1981	Advisory Council, International Association for the Study of Attention and Performance
1977-1980	National Science Board, Washington, D.C.
1977-1980	U.S. Member of the U.S.-U.S.S.R. Joint Commission on Scientific and Technical Cooperation
1977-1980	Intergovernmental Science, Engineering and Technology Advisory Panel, Office of Science and Technology Policy, Executive Office of the President
1977-1980	Federal Council on the Arts and the Humanities, Executive Office of the President
1977-1980	National Museum Services Board, Institute of Museum Services, Department of Education

Other Activities (Continued)

1978 William W. Cook Lectures on American Institutions, University of Michigan
1979-1980 U.S. Member of the U.S.-People's Republic of China Joint Commission on Scientific and Technological Cooperation
1981-1982 Assembly of Behavioral and Social Sciences, National Research Council
1981-1982 California Commission on Industrial Innovation, Executive Department, State of California (appointed by Governor Edmund G. Brown, Jr.)
1981-1984 President's Committee on the National Medal of Science (appointed by President Carter)
1981-1988 Board of Directors, Whittier Institute for Diabetes and Endocrinology
1981-present Advisory Committee, Center for Advanced Study in the Behavioral Sciences
1982-1985 Board of Councillors, National Academy of Sciences
1983-1984 Chair, Blue Ribbon Panel on the Information Policy, Implications of Archiving Satellite Data, National Commission on Libraries and Information Science
1983-1985 Vice President, National Academy of Education
1983-1995 Board of Directors, Economic Development Corporation, San Diego
1984-1985 Committee on Science, Engineering, and Public Policy, National Academy of Sciences
1984-1987 Commission on Education and Public Policy, National Academy of Education
1984-1992 Higher Education Policy Advisory Committee, Online Computer Library Center (OCLC)
1984-1995 Board of Governors, Institute of the Americas
1985-1987 Board of Governors, Center for Creative Leadership
1986-1992 Visiting Committee, Department of Psychology, Harvard University
1986-1993 External Advisory Committee, Beckman Institute for Advanced Science and Technology, University of Illinois
1987-1995 Board of Directors, Center on Budget and Policy Priorities, Washington, D.C.
1988-1990 Board of Trustees, American College Testing Program, Inc.
1988-1993 Board of Directors, Institute for Evaluating Health Risks
1988-1993 Commission on Science, Technology, and Government, Carnegie Corporation of New York
1988-1993 Editorial Board, Issues in Science and Technology
1988-1991 Board of Directors, American Association for the Advancement of Science, Washington, D.C.
1989-1990 President, American Association for the Advancement of Science, Washington, D.C.
1989-1993 Board of Directors, California Council on Science and Technology
1990-1993 Board of Advisors, United States Naval Postgraduate School, Monterey, California
1990-1992 Commission for Strengthening of America, The Center for Strategic and International Studies, Washington, D.C.
1990-1992 Chair, Committee on the Federal Role in Education Research, National Research Council/National Academy of Sciences, Washington, D.C.
1990-1996 Advisory Council, The Cecil and Ida Green Center for the Study of Science and Society, University of Texas at Dallas
1991-1995 Committee for the Study of Research-Doctorate Programs, National Research Council
1991-1992 Chair, Association of American Universities, Washington, D.C.
1992-1993 Past Chair, Association of American Universities, Washington, D.C.
1993-present Board on Testing and Assessment, National Research Council/National Academy of Sciences, Washington, D.C. (Chair, 1993-1995)
1996-present Executive Committee, Council on Competitiveness, Washington, D.C.
1997-present Board of Trustees, Center for Advanced Study in the Behavioral Sciences, Stanford, California
1998-present Board of Directors, California Chamber of Commerce

Biographies of R. C. Atkinson

Distinguished Scientific Contribution Award for 1977: Richard C. Atkinson. American Psychologist, 1978, 33, 49-55.
Richard C. Atkinson: President-Elect of AAAS. Science, 1988, 241, 519-520 (by William J. McGill).

COLLECTED PAPERS

Human Memory and the Learning Process: Selected Papers of Richard C. Atkinson, edited by Y. Zabrodin and B. F. Lomov. Moscow: Progress Publishing House, 1980 (published in Russian).

On Human Memory: Evolution, Progress, and Reflections on the 30th Anniversary of the Atkinson-Shiffrin Model. (Mahwah, New Jersey: Lawrence Erlbaum Associates, 1999 (ed., Chizuko Izawa; foreword by Richard C. Atkinson).

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Markov Learning Models for Multiperson Interactions. Stanford, California: Stanford University Press, 1960 (with P. Suppes).

An Introduction to Mathematical Learning Theory. New York: John Wiley & Sons, 1965 (with G. H. Bower and E. J. Crothers). Translated into Russian, 1969.

Introduction to Psychology (4th ed.). New York: Harcourt Brace Jovanovich, Inc., 1967 (with E. R. Hilgard). Translations: Hebrew edition, 1967; Norwegian edition, 1967; Portuguese edition, 1969.

Introduction to Psychology (5th ed.). New York: Harcourt Brace Jovanovich, Inc., 1971 (with E. R. Hilgard and R. L. Atkinson). Translations: Italian edition, 1971; Spanish edition, 1971.

Introduction to Psychology (6th ed.). New York: Harcourt Brace Jovanovich, Inc., 1975 (with E. R. Hilgard and R. L. Atkinson).

Introduction to Psychology (7th ed.). New York: Harcourt Brace Jovanovich, Inc., 1979 (with E. R. Hilgard and R. L. Atkinson). Translations: French edition, 1980; Spanish edition, 1980; Chinese edition, 1982.

Introduction to Psychology (8th ed.). New York: Harcourt Brace Jovanovich, Inc., 1983 (with R. L. Atkinson and E. R. Hilgard).

Introduction to Psychology (9th ed.). New York: Harcourt Brace Jovanovich, Inc., 1987 (with R. L. Atkinson, E. E. Smith, and E. R. Hilgard). Translations: Russian edition, 1993; Chinese edition, 1993; Spanish edition, 1994; Hungarian edition, 1994.

Introduction to Psychology (10th ed.). New York: Harcourt Brace Jovanovich, Inc., 1990 (with R. L. Atkinson, E. E. Smith, and D. J. Bem).

Introduction to Psychology (11th ed.). New York: Harcourt Brace Jovanovich, Inc., 1993 (with R. L. Atkinson, E. E. Smith, and D. J. Bem).

Introduction to Psychology (12th ed.). New York: Harcourt Brace & Company, 1996 (with R. L. Atkinson, E. E. Smith, D. J. Bem, and S. Nolen-Hoeksema).

EDITED VOLUMES

Studies in Mathematical Psychology. Stanford, California: Stanford University Press, 1964.

Computer-Assisted Instruction. New York: Academic Press, 1969 (with H. A. Wilson).

Contemporary Psychology. San Francisco: W. H. Freeman & Company, 1971.

Contemporary Developments in Mathematical Psychology: Volume I, Learning, Memory, and Thinking; Volume II, Measurement, Psychophysics, and Neural Information Processing. San Francisco: W. H. Freeman & Company, 1974 (with D. H. Krantz, R. D. Luce, and P. Suppes).

Psychology in Progress. San Francisco: W. H. Freeman & Company, 1975.

Mind and Behavior. San Francisco: W. H. Freeman & Company, 1980.

Stevens' Handbook of Experimental Psychology (2nd ed.): Volume 1, Perception and Motivation; Volume 2, Learning and Cognition. New York: John Wiley & Sons, 1988 (with R. J. Herrnstein, G. Lindzey, R. D. Luce).

Research and Educational Reform. Washington, D.C.: National Academy Press, 1992 (with G. B. Jackson).

The Origins and Development of High Ability. Chichester, England: John Wiley & Sons, 1993.

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2. An analysis of the effect of nonreinforced trials in terms of statistical learning theory. Journal of Experimental Psychology, 1956, 52, 28-32. (Republished in Stimulus Sampling Theory, edited by E. D. Neimark and W. K. Estes, San Francisco: Holden-Day, Inc., 1967.)
3. Films and group discussions as a means of training leaders (Tech. Rep. 27). Washington, D.C.: George Washington University, Human Resources Research Organization, 1956 (with C. J. Lange and C. H. Rittenhouse).
4. A stochastic model for rote serial learning. Psychometrika, 1957, 22, 87-95.
5. Probabilistic discrimination learning. Journal of Experimental Psychology, 1957, 54, 233-239 (with W. K. Estes, C. J. Burke, and J. P. Frankman).
6. A Markov model for discrimination learning. Psychometrika, 1958, 23, 309-322. (Republished in Stimulus Sampling Theory, edited by E. D. Neimark and W. K. Estes, San Francisco: Holden-Day, Inc., 1967.)
7. An analysis of two-person game situations in terms of statistical learning theory. Journal of Experimental Psychology, 1958, 55, 369-378 (with P. Suppes).
8. Discrimination learning in a verbal conditioning situation. Journal of Experimental Psychology, 1958, 56, 21-26 (with J. Popper). (Republished in Stimulus Sampling Theory, edited by E. D. Neimark and W. K. Estes, San Francisco: Holden-Day, Inc., 1967.)
9. Applications of a Markov model to two-person non-cooperative games. In Studies in Mathematical Learning Theory, edited by R. R. Bush and W. K. Estes, Stanford, California: Stanford University Press, 1959.
10. Discrimination learning with probabilistic reinforcement schedules. Journal of Experimental Psychology, 1959, 57, 349-350 (with W. Bogartz and R. Turner). (Republished in Stimulus Sampling Theory, edited by E. D. Neimark and W. K. Estes, San Francisco: Holden-Day, Inc., 1967.)
11. A theory of stimulus discrimination learning. In Mathematical Methods in the Social Sciences, edited by K. J. Arrow, S. Karling, and P. Suppes, Stanford, California: Stanford University Press, 1960.
12. The use of models in experimental psychology. Synthese, 1960, 12, 162-171. (Republished in The Concept and the Role of the Model in Mathematics and Natural and Social Sciences, edited by H. Freudenthal, Dordercht, Holland: D. Reidel Publishing Co., 1961.)
13. Decision making by children as a function of amount of reinforcement. Psychological Reports, 1960, 6, 299-306 (with G. Sommer and M. B. Sterman).
14. A generalization of stimulus sampling theory. Psychometrika, 1961, 26, 281-290.
15. The observing response in discrimination learning. Journal of Experimental Psychology, 1961, 62, 253-262. (Republished in Stimulus Sampling Theory, edited by E. D. Neimark and W. K. Estes, San Francisco: Holden-Day, Inc., 1967.)
16. Optimal allocation of items in a simple, two-concept automated teaching model. In Programmed Learning and Computer-Based Instruction, edited by J. E. Coulson, New York: John Wiley & Sons, 1962 (with R. E. Dear).
17. Sequential phenomena in psychophysical judgments: A theoretical analysis. Institute of Radio Engineers Transactions on Information Theory, September, 1962, Vol. IT-8, 155-162 (with E. C. Carterette and R. A. Kinchla). (Republished in Stimulus Sampling Theory, edited by E. D. Neimark and W. K. Estes, San Francisco: Holden-Day, Inc., 1967.)
18. Choice behavior and monetary payoff. In Mathematical Methods in Small Group Processes, edited by J. Criswell, H. Solomon, and P. Suppes, Stanford, California: Stanford University Press, 1962.
19. Stimulus sampling theory. In Handbook of Mathematical Psychology (Vol. 2), edited by R. D. Luce, R. R. Bush, and E. Galanter, New York: John Wiley & Sons, 1963 (with W. K. Estes).
20. A variable sensitivity theory of signal detection. Psychological Review, 1963, 70, 91-106.

21. Mathematical models in research on perception and learning. In Theories in Contemporary Psychology, edited by M. H. Marx, New York: MacMillan Company, 1963.
22. Mathematical models in research with children. In Basic Cognitive Processes in Children, edited by J. C. Wright and J. Kagen, Monographs of the Society for Research in Child Development, 1963, 28, (2, Serial No. 86). (Republished in Cognitive Development in Children, edited by R. Brown, Chicago: University of Chicago Press, 1970.)
23. A comparison of paired-associate learning models having different acquisition and retention axioms. Journal of Mathematical Psychology, 1964, 1, 285-315 (with E. J. Crothers).
24. A test of three models for stimulus compounding with children. Journal of Experimental Psychology, 1964, 67, 52-58 (with R. C. Calfee, G. R. Sommer, and W. E. Jeffrey).
25. Choice behavior and reward structure. Journal of Mathematical Psychology, 1964, 1, 170-203 (with J. L. Myers). (Republished in Stimulus Sampling Theory, edited by E. D. Neimark and W. K. Estes, San Francisco: Holden-Day, Inc., 1967.)
26. The effects of forced-choice trials upon free-choice behavior. Psychonomic Science, 1964, 1, 55-56 (with R. C. Calfee).
27. The effect of information feedback upon psychophysical judgments. Psychonomic Science, 1964, 1, 83-84 (with E. C. Carterette and R. A. Kinchla).
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30. Short-term memory with young children. Psychonomic Science, 1964, 1, 255-256 (with D. N. Hansen and H. A. Bernbach).
31. A learning model for forced-choice detection experiments. British Journal of Mathematical and Statistical Psychology, 1965, 18, 184-206 (with R. A. Kinchla).
32. Paired-associate models and the effects of list length. Journal of Mathematical Psychology, 1965, 2, 254-265 (with R. C. Calfee).
33. Mathematical learning theory. In Scientific Psychology, edited by B. B. Wolman, New York: Basic Books, Inc., 1965 (with R. C. Calfee).
34. Intermodality judgments of signal duration. Psychonomic Science, 1965, 2, 271-272 (with T. A. Tanner, Jr. and R. M. Patton).
35. Mathematical models for verbal learning. In Cybernetics of the Nervous System: Progress in Brain Research (Vol. 17), edited by Norbert Wiener and J. P. Schade, Amsterdam, The Netherlands: Elsevier Publishing Company, 1965 (with R. C. Calfee and T. Shelton, Jr.).
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37. Some two-process models for memory. In Proceedings of the XVIII International Congress of Psychology, Moscow, Russia, 1966.
38. Models for optimizing the learning process. Psychological Bulletin, 1966, 66, 309-320 (with G. J. Groen).
39. Two-choice behavior under limiting cases of contingent reinforcement schedules. Journal of Comparative and Physiological Psychology, 1966, 62, 193-200 (with R. C. Calfee).
40. Influence of correlated visual cues on auditory signal detection. Perception and Psychophysics, 1966, 1, 67-73 (with R. A. Kinchla, J. T. Townsend, J. I. Yellott, Jr.).
41. Short-term recall of paired-associates as a function of the number of interpolated pairs. Psychonomic Science, 1966, 4, 73-74 (with J. W. Brelsford, Jr., L. Keller, and R. M. Shiffrin).
42. The effect of signal intensity on comparative judgments of auditory durations. Psychonomic Science, 1966, 4, 353-354 (with T. A. Tanner, Jr. and R. M. Patton).
43. Computer-assisted instruction in initial reading. Reading Research Quarterly, 1966, 2, 5-25 (with D. N. Hansen).

44. Effects of list length on short-term memory. Journal of Verbal Learning and Verbal Behavior, 1967, 6, 303-311 (with J. L. Phillips and R. M. Shiffrin).
45. Multi-process models for memory with applications to a continuous presentation task. Journal of Mathematical Psychology, 1967, 4, 277-300 (with J. W. Brelsford, Jr. and R. M. Shiffrin).
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49. Reading instruction under computer control. American School Board Journal, 1967, 155, 16-27.
50. The effects of reinforcement interval on the acquisition of paired-associate responses. Journal of Experimental Psychology, 1967, 73, 268-277 (with L. Keller, W. J. Thomson, and J. R. Tweedy).
51. Signal recognition as influenced by presentation schedules. Perception and Psychophysics, 1967, 2, 349-358 (with T. A. Tanner, Jr. and R. W. Haller).
52. Instruction in initial reading under computer control. Journal of Educational Data Processing, 1967, 4, 175-192.
53. Computer-based instruction in initial reading: A progress report on the Stanford Project (Tech. Rep. 119). Stanford, California: Stanford University, Institute for Mathematical Studies in the Social Sciences, 1967 (with H. A. Wilson).
54. Human memory: A proposed system and its control processes. In The Psychology of Learning and Motivation: Advances in Research and Theory (Vol. 2), edited by K. W. Spence and J. T. Spence, New York: Academic Press, 1968 (with R. M. Shiffrin). (Republished with commentary in Human Memory: Basic Processes, edited by G. H. Bower, New York: Academic Press, 1977.)
55. Computerized instruction and the learning process. American Psychologist, 1968, 23, 225-239. (Republished in The Bobbs-Merrill Reprint Series in Psychology, New York: Bobbs-Merrill Co., 1969; Research in Psychology Readings for the Introductory Course, edited by B. L. Kintz and J. L. Bruning, Glenview, Ill.: Scott, Foresman and Co., 1970; Current Research in Psychology, edited by H. C. Lindgren, D. Byrne, and F. Lindgren, New York: John Wiley and Co., 1971; Classroom Management: The Successful Use of Behavior Modification, edited by K. D. O'Leary and S. G. O'Leary, Elmsford, New York: Pergamon Press, 1971; Readings in Learning and Human Abilities (2nd ed.), edited by R. E. Ripple, New York: Harper and Row Publishers, 1971; Guiding Learning: Readings in Educational Psychology, edited by M. D. Glock, New York: John Wiley and Co., 1971.)
56. Multiple reinforcement effects in short-term memory. The British Journal of Mathematical and Statistical Psychology, 1968, 21, 1-19 (with J. W. Brelsford, Jr. and R. M. Shiffrin).
57. Computer-assisted instruction. Science, 1968, 162, 73-77 (with H. A. Wilson). (Republished in Selected Readings in Psychology, edited by D. E. Gibbons and J. Connelly, St. Louis: C. V. Mosby Co., 1969; Contemporary Issues in Educational Psychology, edited by H. F. Clarizio and C. N. Mehrens, Boston: Allyn and Bacon, Inc., 1969; Individualization of Instruction: A Teaching Strategy, edited by V. M. Howes, New York: Macmillan Co., 1970.)
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66. First-letter clues in the retrieval of proper names from long-term memory. Psychological Reports, 1968, 23, 851-866 (with R. H. Hopkins).
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74. Storage and retrieval processes in long-term memory. Psychological Review, 1969, 76, 179-193 (with R. Shiffrin).
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76. Repetition versus imagery instructions in the short- and long-term retention of paired-associates. Psychonomic Sciences, 1969, 15, 183-184 (with J. A. Schnorr).
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78. Signal recognition as influenced by information feedback. Journal of Mathematical Psychology, 1970, 7, 259-274 (with T. A. Tanner, Jr. and J. A. Rauk).
79. Rehearsal processes in free recall: A procedure for direct observation. Journal of Verbal Learning and Verbal Behavior, 1970, 9, 99-105 (with D. Rundas).
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82. Study position and item differences in the short- and long-term retention of paired-associates learned by imagery. Journal of Verbal Learning and Verbal Behavior, 1970, 9, 614-622 (with J. A. Schnorr).
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99. Evaluation of the Stanford CAI program in initial reading. Journal of Educational Psychology, 1972, 63, 597-602 (with J. D. Fletcher).
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103. Marihuana and retrieval from short-term memory. Psychopharmacologia, 1973, 29, 231-238 (with C. F. Darley, J. R. Tinklenberg, and L. E. Hollister).
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October 2000

A FIVE-YEAR REPORT TO THE REGENTS
President Richard C. Atkinson - January 2001

Members of the Board:

Five years ago, at the beginning of my tenure, I announced a set of goals that I intended to pursue as president of the University of California. These goals grew out of several assumptions about the character of UC and the environment in which it will operate over the next decade or so. Those assumptions were, first, that California will continue its commitment to the Master Plan for Higher Education and the division of responsibilities it mandates in higher education; that UC will remain a research university in which every activity is shaped by the search for knowledge; and that society's increasing need for applications of knowledge will place new demands on the University.

I was convinced, in light of those assumptions, that UC needed to take certain steps--educational, organizational, financial, technological, and political--to fulfill its responsibilities as California's land-grant university and one of the nation's leading research institutions. These steps were summed up in nine goals that can also be expressed as nine answers to a single question: what must the University do to prepare itself for the twenty-first century? What follows is a progress report on these goals, as they were first publicly announced, from the vantage point of five--going on six--years as president.

1. Maintain faculty quality.

By every measure of academic quality, UC's faculty excel. In the last five years 11 faculty associated with the University of California have been awarded Nobel Prizes, three of them this past October. UC faculty make up 14 percent of the membership of the National Academy of Sciences and are well represented in other distinguished scientific, scholarly, and professional organizations, among them the National Academy of Engineering, the Institute of Medicine, and the American Philosophical Society.

In the 1990s, maintaining faculty quality meant restoring the University's ability to offer competitive salaries. Fortunately, thanks to a vigorous California economy and the generosity of the State, faculty compensation at UC is once again competitive with that of our peer institutions.

The next challenge will be recruiting more than 7,000 new faculty members to meet expanding enrollments and faculty retirements over the coming decade. Recruiting outstanding faculty rapidly enough to meet the pressures of growth will be difficult for campuses and departments alike. But the opportunity is clear: the chance to revitalize the faculty with new perspectives and new talent, including an unprecedented opportunity to expand the proportion of women and

underrepresented minorities. The representation of both groups in ladder-rank positions has declined over the last five years--a trend that runs counter to national data showing increasing numbers of women and minorities receiving doctoral degrees.

The imperative of growth means that, in virtually every department on every campus, change in the composition of the faculty will occur. We have what may be the best chance in several generations to shape this change in ways that serve the University's goals. Among public universities, we have played a special role in maintaining quality. My aim is to see that we focus on UC's tradition of excellence during the coming years of intensive faculty recruitment. The chancellors and the leaders of the Academic Senate understand the dimensions of this challenge and are prepared to ensure that faculty quality is maintained.

2. Ensure diversity at UC.

In a state that is experiencing one of the great demographic transformations in American history, the allocation of educational opportunity is *the* principal public policy issue. The University of California has been at the center of this debate. As the first selective public university to seek student diversity without affirmative action, we are a laboratory for the nation. That is not always a comfortable role; the issues are complex and controversial. Yet the University of California has a contribution to make in elucidating the issues, exploring the alternatives for action, and clarifying what is at stake, in California and elsewhere. This is what we have sought to do during the past five years, and it is clear that we are far from finished with this effort.

There are two principal ways in which an academic institution like UC can approach the goal of a diverse student body: through its admissions process and through its role in the preparation of K-12 students. UC's strategy over the past five years has embraced both.

First, we have scrutinized our admissions policies and processes to make them more valid tools for assessing academic talent and potential. The Regents have approved a number of policy initiatives in the past few years that reflect this strategy: Eligibility in the Local Context, the New Eligibility Index, and the Visual and Performing Arts requirement, for example. The proposed Dual Admissions Plan, by broadening the path to UC for high-achieving students in low-performing schools, also seeks to make our admissions process more sensitive to academic potential. The policy recommendations coming out of last December's conference on admissions convened by Vice President Saragoza and Academic Council Chair Cowan will also be useful in helping campuses make difficult choices from a pool of applicants that is surely among the most talented in the nation.

As I have told the Board, it is also important to focus on another dimension of this issue--the role of standardized tests in admissions decisions. It is time to again assess what tests we require and how we use them. We have to be sure that the tests are valid; that they are used responsibly in our admissions process; and that they foster sound educational practices in high school.

3. Expand UC's partnership with K-12 schools.

The 1997 Regents' Outreach Task Force Report concluded that achieving diversity in the post-209 era requires dramatic improvement in the academic preparation of all California students; UC's future is tied to the future of the K-12 schools. While we have worked with the schools on admissions and other issues throughout UC's history, in response to the Outreach Task Force Report we have embarked on major collaborative efforts to work with students and their families, improve teachers' skills, and strengthen the academic performance of schools.

The most dramatic expansion has been in professional development for K-12 teachers:

- In 1999 the governor, concerned about improving instruction in California's lowest-performing schools, asked UC to create the Governor's Reading Professional Development Institutes for K-3 teachers. These institutes--led by faculty from UC, CSU, and independent colleges as well as master teachers from the public schools--provided over 6,000 teachers with the skills they need to teach initial reading.

- Building on the success of the Reading Institutes, UC extended its efforts to reach 70,000 K-12 teachers annually from the state's lowest-performing schools to offer, in addition to initial reading, programs in mathematics and English-language development. Further, the governor expanded UC's network of California Subject Matter Projects, which has for the past twelve years helped teachers deepen their knowledge in subjects required for University admission.

Research confirms the central role teachers play in advancing student learning and the overriding importance of teacher preparation. Yet, on average, 14% of California teachers are underqualified in the subjects they teach (nearly 50 percent in mathematics), with the vast majority of these teachers concentrated in schools serving poor, minority, and non-English speaking students. Governor Davis's commitment to strengthening the teaching profession is reflected in this year's proposed budget, which devotes nearly $900 million over the next three years to training for teachers and principals. UC will have a central role to play in reaching this goal.

A second area of UC commitment has centered on technology as a way to reach as many students as possible in California's vast K-12 system. For example, the UC College Preparatory Initiative (UCCP), begun as a pilot program at UC Santa Cruz, offers on-line Advanced Placement (AP) courses to students in high schools that offer few or no such courses--important because AP courses are given additional weight in UC's admissions process. Other examples are UC Links, a statewide network of after-school programs that involves K-12 students in computer activities to develop their skills in mathematics, science and basic literacy; and UC Nexus, which brings UC faculty, staff, and students together with their counterparts in K-12 schools to use the Internet for learning both in and out of the classroom. As more and more of the state's K-12 schools are linked with the Internet, Web-based learning will become an important dimension of UC's outreach partnership.

The public clearly supports the governor's focus on improving the academic performance of K-12 schools. And the public expects UC to make a difference through its wealth of disciplinary knowledge, its resources for analysis and research, and its capacity for innovation. We want to make that difference in order to improve the quality of life for the state's nearly six million children. But it is also critical to our own prospects. The public will support UC only if it believes we are helping to create a better future for all of the state's citizens.

4. Reinforce public perception of UC's critical role in research.

Public awareness of the value of research conducted at universities has grown significantly with the advent of the knowledge economy and the stunning contributions of university research to economic growth in fields from agriculture to telecommunications. No one has been more focused on the role university research plays in the economy than Governor Davis. He recently announced the establishment of three California Institutes for Science and Innovation, with a fourth to be funded next year. The goal of these institutes is to create the knowledge-based industries of the future, just as today's biotechnology and other high-technology industries are the products of research conducted years ago. UC and industry researchers will work together to advance fields vital to the California economy--nanotechnology, telecommunications, information technology, and molecular biology. And the institutes will give both undergraduate and graduate students the opportunity to involve themselves in research with some of the state's best minds from both industry and academia.

Cross-fertilization between academic and industrial research is what distinguishes science in the U.S. from that of most other nations and is one of the reasons that university research is so rapidly translated into new industries, products, and services. The institutes will ensure that UC remains a leader in translating its research into benefits for California's citizens.

Among UC's other contributions to the state's innovative and economic strength:

- The Industry-University Cooperative Research Program (IUCRP), established in 1996 and jointly funded by the State, private industry, and UC, is a partnership program intended to strengthen the state's leadership in high technology. IUCRP invests over $60 million a year in matching grants in six key industries--biotechnology, communications, digital media, life sciences informatics, microelectronics, and semiconductor manufacturing.

- NASA and UC recently announced an historic partnership to create a world-class educational R&D campus at the NASA Research Park in the heart of Silicon Valley. Located at the NASA Ames Research Center, the research park will allow UC and NASA scientists to collaborate on advances in science and technology that will foster new industries and provide new products to benefit California's economy.

- The recently established Mission Bay campus at UCSF will include a special zone reserved for biotechnology, pharmaceutical, and other life sciences companies. The proximity of these industries to UCSF's health-sciences faculty will foster powerful research partnerships.

As these examples suggest, UC is responding vigorously to the demands of a knowledge-based society. We are able to do so because of the talent of our faculty and the size and distinction of our research enterprise. In FY 2000, UC earned almost $2.2 billion in federal research grants (not including UC's national laboratories), an increase of 8 percent from the previous fiscal year. With this year's increases in the federal research budget, the prospects for UC research are excellent.

5. Maintain the vitality and quality of education at UC.

The University's educational mission involves two responsibilities. The first is to prepare our students to take charge of their own lives by giving them a broad liberal education. The second is to meet society's need for well-educated people in critical fields.

UC does an excellent job in fulfilling both responsibilities. But we cannot continue to succeed without a better student-faculty ratio than we now have. For a variety of reasons, the student-faculty ratio (the number of students per faculty member) has deteriorated over the years from 17.6 to the current 19.4. This figure compares unfavorably to the student-faculty ratio at our eight peer institutions, which averages 17 at the public and 10.4 at the private universities.

We have begun an initiative to improve the student-faculty ratio. UC's 2001-2002 budget plan includes $8 million for the second year in this improvement plan. Besides hiring additional faculty to reduce class size, offering more seminars, and increasing opportunities for students to work with faculty on research projects, we will also provide funds to expand academic advising.

There are two commissions whose work will have important implications for education at UC. The UC Humanities Commission, which includes 24 faculty members, three of them from outside the UC system, is co-chaired by Professor Hayden White of UC Santa Cruz and Dean of Humanities Karen Lawrence of UC Irvine. I am optimistic that in this period of growth we can reverse some trends that have hindered the work of humanities faculty and students, and accordingly I have asked the Commission to recommend ways to ensure the continued vitality of UC's excellent humanities programs. The Commission is examining such issues as the humanities' educational and public service roles, graduate student support, career opportunities for humanities PhDs, and funding for individual and collaborative research. UC's programs in the humanities are among the best in the nation and we cannot let them be diminished.

Chair Sue Johnson and I have appointed a commission to develop strategies to generate financial support for the addition of at least 11,000 graduate students over the next decade. Graduate enrollments at UC have been virtually level over the last 30 years, while undergraduate enrollment has doubled. The Board has made clear that righting this imbalance is a priority, essential both to meeting the needs of California's economy and the needs of higher education for more faculty to deal with expanding enrollments. The Commission on Growth and Support of Graduate Education will report by next fall on steps UC should take to attract the best graduate students and to offer competitive financial packages.

6. Maintain UC's world leadership in the application of digital technology to learning and instruction.

Universities are about tradition and conserving the past, but they are also about change and creating the future. In UC's work with digital technology, we are doing both.

The California Digital Library (CDL), launched in late 1997 and opened for use in January 1999, is recognized as a national and international leader. Over 5,000 electronic journals are now accessible to our faculty, students, and staff. The CDL has produced many projects and partnerships that open digital resources--from photographs and works of art to specialized scientific databases--to the UC community and to the citizens of California. Through its eScholarship initiatives, it is also an innovator in new forms of publishing and scholarly communication. UC's

library collections--second only to those of the Library of Congress--are an extraordinary treasure whose use has been limited by the constraints of time and place. Thanks to increasingly sophisticated computer and Internet technologies, these constraints are now coming to an end.

This will happen sooner than many expect because of CalREN2, the California portion of the national networking initiative to create tomorrow's Internet. Internet2 and CalREN2 are enabling revolutionary Internet applications that are contributing to teaching and research. UC is a partner with the State, corporations, and other universities in a project to extend the Internet into each of California's 58 counties, where in turn it will connect to K-12 schools to provide online teaching and learning activities. Last September CalREN2 also established links with Mexico's equivalent network, a step that will multiply the opportunities for California and Mexican students and faculty to collaborate in research and education.

Finally, the University of California Teaching, Learning, and Technology Center is a systemwide effort to facilitate campus activities in teaching and learning technologies. The Center provides support to foster innovative uses of technology and cross-campus partnerships in implementing them. The Center plans an online magazine to publicize technological tools and strategies and promote best practices.

7. Expand UC's role in extended education.

CalREN2 and the California Digital Library are part of a transformation of teaching and learning that will expand the boundaries of universities beyond their geographical borders. At the same time, the emergence of new professions, the restructuring of the workplace, and the transition to an information-based economy are requiring individuals to renew their skills continually. UC Extension is key to the University's response to these far-reaching trends in American society.

UC Extension offers 21,500 courses to almost a half-million Californians every year at no cost to the State. More and more of these courses are becoming available on the World Wide Web, accessed through an electronic catalogue developed by UC in collaboration with the rest of higher education in California. Over 440 of these courses are offered by UC--a trend that will accelerate in coming years.

UC's new degree, the Master of Advanced Study (MAS), offers professional education and liberal studies beyond the bachelor's degree at times and places convenient for working adults. Eight campuses are developing MAS degrees in subjects ranging from healthcare management to criminology. The first MAS in Management of Healthcare Organizations at UC San Diego has received final approval; several more will be approved during the coming academic year.

Just as the University's traditional research mission is being rethought in terms of the demands of the new economy, so its role in extended education needs to be re-examined in light of the mounting need for individuals to engage in lifelong learning and the opportunities offered by the technological revolution. Whether identified as extended education, distance learning, Web-based instruction, or professional certification, bringing education to the people of California is an essential aspect of the University's mission.

8. Restructure business practices and distribute authority to the campuses so that they are as entrepreneurial as possible, yet with the clear proviso that authority is exercised according to systemwide policy, with the Office of the President playing an oversight role to ensure accountability.

Since the early 1990s, UC has progressively sought to reduce administrative costs and complexity, decentralize decision-making, and incorporate advances in information technology--all in the interest of improving business practices. Over the last several years, we have taken specific steps to strengthen accountability and control throughout the University. We have appointed controllers on each campus who act as the lead financial officer; employed private-sector models to encourage managers to understand risk and ways to mitigate it; given managers more and better training; and created a systemwide network for evaluating business risks and for collaborating among campuses on best practices. These have been significant accomplishments, given that the budget cuts of the early 1990s fell heavily on the business side of UC and have never been fully restored.

Yet we know that our administrative structures must be recast in terms of the challenges of the next decade. These will include, among other things, dramatic enrollment growth, technological advances, and increasing regulatory complexity. The New Business Architecture Planning Group has been working over the past year to lay the foundation for major changes in our business and administrative structure. Among the strategies proposed are new approaches to recruiting and retaining outstanding employees, streamlining our complex and sometimes cumbersome policies and processes, and using technology to contain costs and improve management and financial systems. We are well on our way to implementing these strategies.

9. Strengthen UC's ties with the public, its elected representatives in Washington, D.C. and Sacramento, and the University's one million alumni.

The governor and the legislature have given the University extraordinary support during the past five years. Over that time, UC's State-funded budget has increased

by 67 percent, from $1.9 billion to $3.2 billion. Student fees have not been raised in six years and are actually 10 percent lower for undergraduates, and five percent lower for graduate students, than they were in 1994-95. We have reached accord with the governor on a Partnership Agreement that will give UC the financial foundation needed to manage the coming decade of enrollment growth. And for the first time in many years, UC sought no vetoes from the governor because there were no bills passed by the legislature that UC opposed.

In Washington, the California delegation has been helpful to the University on a wide range of issues. One of the most notable accomplishments of the past year was our success in changing the way that "direct medical education funds" are calculated, resulting in significant increases for UC's medical centers. The FY 2001 federal budget provides increased support for basic research in every major agency. The National Institutes of Health and the National Science Foundation received the largest dollar increments ever, with increases of 15 percent and 14 percent, respectively. Student financial aid, particularly Pell grants, has received healthy increases as well.

The Washington, D.C. Center, scheduled to open next fall on Scott Circle near the White House, will integrate UC programs in a new building that will house 280 students. We are exploring the feasibility of establishing a similar facility in Sacramento.

Private support reached a milestone last year; the University received more than $1 billion in private support from friends and alumni, an increase of 32 percent over the previous year. This represents the sixth consecutive year that annual donations set a record, continuing UC's distinction as the leader in philanthropy among the nation's colleges and universities, and second only to the Salvation Army among all charitable institutions.

Concluding remarks

Progress on the nine goals I announced at the outset of my presidency has been possible in large measure because the governor, the legislature, and the public have given UC generous support. Problems remain, of course. UC's five academic medical centers, like similar institutions around the country, have yet to find a secure footing in the new health-care marketplace. All of our medical centers are struggling with the punishing squeeze brought on by the advent of managed care and the shrinking of traditional sources of support for medical education and care of the poor. Recent changes enacted by Congress have offset some of the damage the Balanced Budget Act of 1997 inflicts on university medical centers. Yet the funding of these centers remains at risk--an ironic situation, given American academic medical centers' great potential for achieving scientific breakthroughs in

this age of discovery in biology and medicine. The future of academic medical centers is a national issue that must be addressed at a national level. We need a new social contract that defines what the public expects of these enormously valuable assets--which have ensured American leadership in the health sciences--and what it is willing to pay for them.

UC's relationship with organized labor has long been troubled, a factor that influenced graduate students to vote for collective bargaining last year. I believe we are making progress in this area, and I intend that we will make more. The newly formed Institute for Labor and Employment, located jointly at UC Berkeley and UCLA, is one step toward establishing a better understanding of labor issues and, I hope, a better relationship between UC and its unions.

We need to improve staff salaries, especially for our lower-paid employees. A start on that improvement has been made, but we will need to do more to attract and retain the people we need in today's labor market. I am also concerned about the compensation of the University's chancellors and vice chancellors; chancellors' salaries lag those at our comparison institutions by more than 26 percent, and by nearly 30 percent if UCSF is excluded. As a major research university, we must compete with the best public and private institutions for leadership, and the salaries we offer should reflect that reality.

Most important of all is the diversity of our faculty, students, and staff. There are pedagogical and philosophical arguments on the importance of diversity in a university setting; how best to achieve it is one of the great debates in this period of our nation's history. But whatever side of the argument one chooses, it would be unwise for any public university to assume that it can flourish indefinitely if it does not reflect the society that supports it.

Historically, the University has succeeded by steadily enlarging the circle of opportunity while maintaining quality--the education we provided G.I.s returning after World War II is an example. The California of the twenty-first century, struggling with wide disparities of education and income among its diverse population, will look to the University for answers, through our research, our teaching, and our public service. Of all the issues facing UC, diversity will play a dominant role in whether we succeed in the future as we have in the past.

Let me conclude on a personal note. It is an honor to represent UC as its president; this university is known, envied, and admired throughout the world. I am constantly impressed by UC's incredible array of intellectual talent, the broad support we enjoy from the State, the public, and our friends and alumni, and the constructive governing role played by the Board of Regents. The University of California has demonstrated over and over again that "public" and "excellent" are compatible terms.

Appendix 2: Items Referenced in A One-year Update

STANDARDIZED TESTS AND ACCESS TO AMERICAN UNIVERSITIES[1]

Richard C. Atkinson

It is a distinct pleasure to present the Robert H. Atwell Distinguished Lecture. I have known and admired Bob for many years. As president of Pitzer College, as head of the American Council on Education, and in many other roles as well, he has been an eloquent voice on behalf of the nation's colleges and universities, and for that we are all in his debt. I cannot think of a better way to recognize his important contributions than by this annual lecture in his honor.

More than any country in the world, the United States has sought to put a college education within the reach of anyone with the talent and determination to succeed. And we have tried to allocate educational opportunity in ways that reflect American ideals of fairness and egalitarianism. Many argue that the use of standardized tests in admissions, and particularly the SAT, promotes those ideals by providing a common measure of readiness for college-level study. I have reached a very different conclusion, and that is what I want to talk about today.

A Proposal

Recently, I asked the Academic Senate of the University of California (UC) to consider two major changes in our admissions policies. First, I recommended that the University require only standardized tests that assess mastery of specific subject areas rather than undefined notions of "aptitude" or "intelligence." To facilitate this change, I recommended that we no longer require the SAT I for students applying to UC. This recommendation has significant implications for the University of California since we are one of the principal users of the SAT.

Second, I recommended that all campuses move away from admission processes that use narrowly defined quantitative formulas and instead adopt procedures that look at applicants in a comprehensive, holistic way. While this recommendation is intended to provide a fairer basis on which to make admission decisions, it would also help ensure that standardized tests do not have an undue influence but rather are used to illuminate the student's total record.

In the short term, these proposals will not result in earth-shaking changes in determining which students are admitted and which are rejected. In the long term, however, they will help strengthen high school curricula and pedagogy, create a

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[1]The 2001 Robert H. Atwell Distinguished Lecture, delivered at the 83rd Annual Meeting of the American Council on Education, Washington, D.C., February 18, 2001

stronger connection between what students accomplish in high school and their likelihood of being admitted to UC, and focus student attention on mastery of subject matter rather than test preparation. These changes will help all students, especially low-income and minority students, determine their own educational destinies. And they will lead to greater public confidence in the fairness of the University of California's admissions process.

Further, these changes will complement K-12 reform efforts that have been launched in California and around the nation to establish clear curricular guidelines, set high academic standards, and employ standardized tests to assess student achievement.

Let me describe how I came to make these recommendations. For many years, I have worried about the use of the SAT but last year my concerns coalesced. I visited an upscale private school and observed a class of 12-year-old students studying verbal analogies in anticipation of the SAT. I learned that they spend hours each month—directly and indirectly—preparing for the SAT, studying long lists of verbal analogies such as "untruthful is to mendaciousness" as "circumspect is to caution." The time involved was not aimed at developing the students' reading and writing abilities but rather their test-taking skills. What I saw was disturbing, and prompted me to spend time taking sample SAT tests and reviewing the literature. I concluded what many others have concluded—that America's overemphasis on the SAT is compromising our educational system.

Overemphasis on Standardized Tests

Let me make clear that I continue to be a strong supporter of standardized tests. I have high regard for the Educational Testing Service (ETS), which produces the SAT. Its staff knows how to develop and evaluate tests, and has an excellent record of administering tests and ensuring security. My concern is not with the ability of ETS to develop and administer standardized tests, but with the appropriateness of the SAT in college admissions.

Developed properly and used responsibly, standardized tests can help students gauge their progress and help the general public assess the effectiveness of schools. The problem is not the use of standardized tests to assess knowledge in well-defined subject areas. The problem is tests that do not have a demonstrable relationship to the student's program of study—a problem that is amplified when the tests are assumed to measure innate ability.

Many students spend a great deal of time preparing for the SAT. But students are not the only ones affected. Nobody is spared—not teachers, not parents, not admissions officers, not university presidents.

Teachers, knowing that they will be judged by the scores their students make, are under pressure to teach to the test. College admissions officers are under pressure to increase the SAT scores of each entering class. They know that their president, faculty, and alumni pay attention to how SAT scores affect their standing in college rankings, like those published by *U.S. News & World Report*. The stakes are so high that nobody is surprised when the *Wall Street Journal* reports that some universities manipulate—and indeed falsify—SAT scores in an effort to attain a higher ranking.

Knowing how important the SAT is in the admissions game, some parents go to great lengths to help their children get high scores. The *Los Angeles Times* reported that a growing number of affluent parents shop around for a psychologist willing to certify that their child is learning disabled so he or she can qualify for extra time on the SAT.

Many parents who can afford the fees enroll their children in SAT preparation courses. Last year alone, an estimated 150,000 students paid over $100 million for coaching provided by the Princeton Review, Stanley Kaplan, and the like.

Given attempts of some individuals and institutions to gain any advantage, fair or foul, is it any wonder that leaders of minority communities perceive the SAT to be unfair? These concerns are often dismissed as sour grapes, as special "ethnic pleading." The response by defenders of the SAT is, "Don't shoot the messenger." They argue that the lower performance of Blacks and Hispanics reflects the fact that Blacks and Hispanics tend to be clustered in poor schools, offering outdated curricula taught by ill-prepared teachers.

Minority perceptions about fairness cannot be so easily dismissed. Of course, minorities are concerned about the fact that, on average, their children score lower than white and Asian American students. The real basis of their concern, however, is that they have no way of knowing what the SAT measures and, therefore, have no basis for assessing its fairness or helping their children acquire the skills to do better.

Most troubling of all, SAT scores can have a profound effect on how students regard themselves. All of us have known students who excelled in high school, students who did everything expected of them and more, suddenly doubt their accomplishments, their abilities, and their basic worth because they scored poorly on the SAT.

Anyone involved in education should be concerned about how overemphasis on the SAT is distorting educational priorities and practices, how the test is

perceived by many as unfair, and how it can have a devastating impact on the self-esteem and aspirations of young students.

However, while there is widespread agreement that overemphasis on the SAT harms American education, there is no consensus on what to do or where to start. In many ways, we are caught up in the educational equivalent of a nuclear arms race. We know that this overemphasis on test scores hurts all involved, especially students. But we also know that anyone or any institution opting out of the competition does so at considerable risk.

Change is long overdue. Accordingly, I am recommending that UC change its test requirements in the admissions process.

Evolution of the SAT

Let me place my comments in perspective with some observations about how the SAT has evolved over the years. Originally, the test was developed to serve a distinctly American purpose. The College Board first met in 1900 and held its first examinations in Spring 1901. The goals of these exams were: (a) to move away from the existing system, in which each university had its own examination (of unknown validity, and if students wanted to apply to several universities, they had to take one exam per university); (b) to provide feedback to secondary schools about what should be covered in their curriculum and the appropriate level of instruction (i.e., standards); and (c) to widen the net of student applicants (at the time, prep schools provided "certificates" for some students which served as the entry hurdle for others). The initial tests of the College Board were clearly achievement tests with no implication that they measured "innate intelligence." They were intended to serve an egalitarian purpose. They were designed to identify students from a wide range of backgrounds who had demonstrated mastery of academic subjects needed to succeed in college.

But this changed in the 1930s. The then-president of Harvard University, James Conant, wanted to make the SAT a test, not of achievement, but of basic aptitude. His motivations were good. He wanted to reduce the advantage that wealthy students enjoyed by virtue of having attended schools with a rich curriculum and excellent teachers. However well intentioned, this change brought with it a sense that the SAT was akin to an IQ test—a measure of innate intelligence.

The College Board has since made attempts to change this perception. In 1990, it changed the name of the SAT from "Scholastic Aptitude Test" to "Scholastic Achievement Test." And in 1996, it dropped the name altogether and said that the "SAT" was the "SAT" and that the initials no longer stood for anything. Rather

than resolving the problem, this rhetorical sleight-of-hand served to underscore the mystery of what the SAT is supposed to measure.

Many universities, faced with the problem of having to choose from among thousands of highly qualified applicants, have adopted practices that give too much weight to the SAT. College presidents and others have candidly acknowledged that, while they appreciate the limitations of the test, they continue to rely on SAT scores because they provide a convenient basis for justifying admission decisions.

All too often, universities use SAT scores to rank order applicants in determining who should be admitted. This use of the SAT is not compatible with the American view on how merit should be defined and opportunities distributed. The strength of American society has been its belief that actual achievement should be what matters most. Students should be judged on the basis of what they have made of the opportunities available to them. In other words, in America, students should be judged on what they have accomplished during four years of high school, taking into account their opportunities.

The California Conundrum

The University of California requires that high school students take a set of college-preparatory courses—ranging from English, social sciences, and foreign languages to mathematics and a laboratory science. Those required courses shape the high school curriculum in direct and powerful ways. Under the California Master Plan for Higher Education, students who compile an academic record placing them among the top 12½ percent statewide of high school seniors are guaranteed a space at one of the UC campuses.

UC draws its students from over 1,000 comprehensive public and private high schools around the state. These schools vary widely in terms of the quality of faculty and curriculum. As elsewhere in the nation, low-income and minority students tend to be concentrated in poorer schools, with a limited curriculum taught by a large percentage of under-prepared teachers.

UC has a particularly difficult responsibility to fulfill. As the public institution entrusted by the state to educate its top high school graduates, it must set high standards. At the same time, UC must set standards that are attainable by individual students attending any of the state's comprehensive high schools. UC must also be mindful that it serves the most racially and ethnically diverse college-going population in the nation. The University must be careful to make sure that its standards do not unfairly discriminate against any students.

UC campuses have historically balanced these imperatives by giving the most weight to high school grades in the college preparatory courses required for UC admission. In this way, campuses attempt to strike a balance between meritocratic and egalitarian values. The criteria are meritocratic in that they emphasize grades earned in demanding courses. The criteria are egalitarian in that, in theory, they can be met by any student attending any high school in the state. However, because grading standards vary from high school to high school, we need some form of standardized testing and have in the past turned to the SAT.

When faced with large numbers of students applying for relatively few spots, admissions officers, unless they are very careful, will give undue weight to the SAT. All UC campuses have tried to ensure that SAT scores are used properly in the admissions process. However, because California's college-age population will grow by 50 percent over the next decade and become even more diverse than it is today, additional steps must be taken now to ensure that test scores are kept in proper perspective.

Recommendations

I have recommended that the faculty adopt the following criteria when setting requirements for standardized tests.

- The academic competencies to be tested should be clearly defined. There should be a demonstrable relationship between what is tested and what the student studied in high school. In other words, testing should be directly related to the required college preparatory curriculum.
- Students from any comprehensive high school in California should be able to score well if they mastered the curriculum.
- Students should be able to review their score and understand where they did well or fell short and what they must do to earn higher scores in the future.
- Test scores should help admissions officers evaluate the applicant's readiness for college-level work.

Let me now turn to specific recommendations. Henceforth, I will no longer refer to the SAT in general, but to the SAT I and the SAT II, and will assume that you are familiar with these two tests.[2] Based on the criteria listed above, I have proposed that the faculty adopt the following changes in the admissions process.

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[2]The SAT IIs are individual tests designed to measure knowledge in specific subject areas. The SAT I, in contrast, focuses on verbal and mathematical abilities that are used to help predict first-year college grades.

- No longer require that students take the SAT I in order to apply for admission to the University.
- Call for the development of standardized tests that are directly tied to the college preparatory courses required of students applying to UC.
- Until these tests are available, continue to require the SAT II. Under current UC admissions policy, applicants are required to take three SAT II subject tests, namely, writing, mathematics, and a third test of their choice.
- Establish policies and guidelines governing the use of standardized tests. In particular, make sure that tests are not overvalued, but rather used to illuminate other aspects of a student's record.

The SAT II begins to approximate what I judge to be an appropriate test for the University's admissions process. It tests students on specific subjects that are well defined and readily described. Of course, it is not coordinated with UC- required college preparatory courses, but at least students and their families know what to expect.

For some years, UC has required both the SAT I and the SAT II. Because UC enrolls a large number of students and has required tests for many years, we have the data necessary to make judgments about the value of different tests in our admissions process. We know that high school grades are by far the best predictor of first-year college performance. We have also found that the SAT II is a better predictor of performance than the SAT I. Further, the SAT II augmented by the SAT I is only slightly better than the SAT II alone in predicting freshman grades.

Comprehensive Reviews

Changing standardized test requirements is a step in the right direction, but in the best of circumstances there will be a tendency to overemphasize test scores. Admissions officers at UC campuses recognize this problem and have introduced more holistic, more comprehensive evaluation processes. Included in the comprehensive evaluation is the quality of the high school and the environment in which the student was raised. A student who has made exceptional progress in troubled circumstances needs to be given special attention.

These more holistic procedures have been well received by the public. Students report that they appreciate review processes that look at the full range of their accomplishments within the context of the opportunities they enjoyed and the obstacles they faced.

Conclusion

These proposed changes in UC's admissions process will come at some cost. They are labor-intensive and therefore expensive. However, considering the importance of admissions decisions to individual students and to society at large, we have no choice but to invest the necessary funds.

If the Academic Senate responds favorably to these recommendations, then UC would reaffirm its commitment to assessing achievement in ways appropriate to the 21st century—a commitment to assess students in their full complexity. Such decisions are difficult because they involve making sense of grades earned in different courses taught at very different schools. They require that judgments be made about the opportunities available to individual students. They call on admissions officers to look into the future and make judgments about what individual applicants might contribute to campus life and, later, to society. These are extraordinarily tough decisions that require both wisdom and humility. But the stakes are too high not to ensure that the job is done right.

THE CALIFORNIA CRUCIBLE: DEMOGRAPHY, EXCELLENCE, AND ACCESS AT THE UNIVERSITY OF CALIFORNIA[1]

Richard C. Atkinson

When Jim Langley invited me to speak today, I agreed enthusiastically. CASE has established itself as the premier advancement organization in the world. I applaud you for recognizing that education is essential to virtually every good thing our society aspires to accomplish. And I congratulate you for your consistently outstanding service, not just to your individual institutions but to all of higher education.

Last February I gave an address to the American Council on Education about two proposals I have made to the Academic Senate of the University of California. The first proposal was that the University make the SAT I examination optional for admission to the University of California, and that we replace it with a standardized test that assesses mastery of specific academic subject areas rather than aptitude, as the SAT I purports to do. The second was that the University should move away from admissions processes that use narrowly defined quantitative formulas and instead adopt procedures that look at applicants in a more comprehensive way.

In California, admissions issues inspire the kind of passion that in England or Italy is reserved for the World Soccer Cup. The reasons are similar: those involved know that it is a high-stakes game, that not everyone can play, and that the winners can count on substantial rewards. But I was unprepared for the national response to my proposal. I have heard from hundreds of educators, students, parents, and members of the public from around the country, many with moving personal stories about their experience with the SAT I. Clearly, a national debate on the SAT I and its influence on the lives and prospects of millions of American young people is overdue.

Yet reactions to my proposal have also made it clear that there is some confusion about what I proposed and why I proposed it. Many do not realize, for example, that eliminating the SAT I as a requirement is only one of several admissions changes I have recommended to the Academic Senate.

Today I would like to describe the context of my several proposals and the reasons I consider them steps in the right direction for the University. To understand why admissions issues at the University of California are the focus of so much public attention in this state, you have to understand some things about California.

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[1]Keynote address delivered at the 2001 International Assembly of the Council for Advancement and Support of Education, San Francisco, July 2, 2001.

A diverse and knowledge-driven society

California is one of the nation's first "new societies"--a society in which no racial or ethnic group predominates. With 34 million people, California is not only the nation's most populous state; it is also the most diverse. One in every four Californians was born outside the United States. It is estimated that by 2005, one in every three Californians will be foreign-born. Native Mexicans constitute 44 percent of California's immigrants; another 10 percent come from other Latin American countries; and Asians make up 34 percent of the state's newcomers. Nearly four in ten Californians speak a language other than English at home.

Although the biggest population increases in recent decades have been among the state's Hispanics and Asians, more than 60 different countries, from Australia to Yugoslavia, contribute immigrants to California. No other state--and no other country--has the range of races, ethnicities, languages, and cultures that characterize California today.

And to glimpse California's future, look at the composition of the nearly six million children enrolled in its K-12 public schools. Forty-three percent are Hispanic and 36 percent are white. Asian and Pacific Islanders make up 11 percent, while African Americans number close to nine percent and Native Americans are just under one percent. Twenty percent of these students have limited proficiency in English.

The demands on California's public schools are staggering. Their quality ranges from schools that can compare with the best in the nation to schools in which literacy is the ceiling rather than the floor of student achievement. The state's governor, Gray Davis, has made school reform the principal priority of his administration and has asked the University to play a significant role in improving the academic preparation of *all* California students. The University of California is spending well over $300 million a year to improve public schooling and to increase access to higher education. Our professional development programs in reading and algebra help 70,000 teachers a year; our counseling and academic support programs reach over 100,000 students and families; and each of our campuses is involved in long-term partnerships with public schools--all together, over 300 elementary, middle, and high schools.

The students who apply to UC come from public and private high schools around the state that vary widely in terms of the quality of teaching and curricula, opportunities to take Advanced Placement courses, and even the availability of basic textbooks. The students themselves come from communities that range from extreme poverty to great affluence, from the rural Central Valley to urban Los

Angeles. Some have parents who enroll them in preschool and later hire tutors to help them with algebra; some struggle to learn in schools with crumbling classrooms and teachers who are overworked and underprepared. These students have vastly different lives and dramatically different opportunities to learn.

California is not only a highly diverse society; it is also a premier example of an economy driven by knowledge. The state has some 80,000 scientists and engineers, the largest concentration in the country. California institutions were issued more than 18,000 patents in 1999--20 percent of all US patents issued that year. Many of those patents went to scientists and engineers at UC, which earns more patents annually than any other educational institution.

California's public and private sectors expended over $42 billion on research in 1997--more than the next three-highest states combined. Everyone has heard of Silicon Valley; it is less well known that Southern California produces almost 40 percent of California's high-technology goods and services. Innovation is as much a part of the California landscape as freeways and palm trees.

The critical role of innovation and research in the California economy has been well demonstrated. Huge cuts in the aerospace and defense industries sent the state into a devastating recession in the early 1990s. Those jobs have never been replaced, but hundreds of new high-technology companies, fueled by technologies created at California's research universities, have made up for all the jobs we lost *and* created thousands of additional high-paying jobs. Computer software, biotechnology, telecommunications, and other knowledge-intensive industries are driving the California economy today. It is widely recognized that the state's excellent system of higher education, especially its research universities, has been a key advantage in California's rise to the fifth-largest economy in the world.

The state expects the University of California to contribute the innovative research on which our knowledge-based economy depends. We are able to do so because of the distinction of our faculty and the size of our research enterprise. Recognizing the enormous contributions University research makes to economic growth, Governor Davis has established four California Institutes for Science and Innovation. The purpose of these institutes is to create the knowledge-based industries of the future, and they involve a partnership among UC, State government, and more than 200 of the state's high-technology businesses. Each institute will focus on areas of multidisciplinary research critical to the California economy--biomedicine, bioengineering, nanosystems, telecommunications, and information technology. The institutes will also help produce the next generation of scientists and engineers by giving undergraduate and graduate students the opportunity to involve themselves in research with some of the state's best minds from both industry and academia.

Excellence and access

California is clear about the role it expects the University to play in making this diverse and knowledge-driven society work. We must contribute cutting-edge research to fuel the state's economy, and provide an education for the state's citizens that combines excellence and access. I have already discussed UC's research role. Now let me turn to education.

California is unique in promising access to the state's public colleges and universities to every citizen with the ability and motivation to succeed. We need broad access to prepare students for the responsibilities of citizenship in a society where so many cultures, languages, and traditions intersect. And in a knowledge-based economy like California's, life is much kinder to the skilled than the unskilled. Someone with a bachelor's degree can expect to earn almost 70 percent more over a working lifetime than someone with a high school diploma. As a public university, we are responsible for ensuring that we are open to students from every background and that we recognize intellectual talent in all its many varieties.

Excellence and access are difficult to achieve under any circumstances. They are all the more difficult given that UC, like California, is growing rapidly. Over the next decade we expect our enrollments to expand by 52,700 students, from 158,300 to 211,000. To keep up with this growth and replace faculty who have retired, we will need to hire 7,000 faculty over the next decade. When you are faced with the need to expand so much and so quickly, the temptation is to lower standards. That would be a strategy for disaster. The University's tradition of faculty excellence must be maintained if we are going to meet our responsibilities to California.

Admissions policies that are inclusive and fair: four proposals

Now let me explain what all this has to do with admissions policy and the SAT. Under California's Master Plan for Higher Education, the University of California is required to draw its freshman class from the top 12-1/2 percent statewide of high school seniors. We must do so under certain constraints. For example, we cannot use race or ethnicity as factors in admissions, as a result of the passage of Proposition 209 in 1996. Since most UC campuses receive far more applications than they can accept, we know that our admissions policies and practices will attract attention not only inside the University but outside as well–from legislators, educators, parents, and students. Every eligible student is guaranteed a place at the University, but not necessarily at the campus of first choice. For Fall 2001, UC received almost 92,000 freshman and transfer applications for 39,000 places.

To meet its responsibilities to a diverse and knowledge-based society, the University of California must choose the state's highest-performing students in

ways that are inclusive and fair. More, they must be *demonstrably* inclusive and fair.

We should do this, in my view, by assessing students in their full complexity, which means considering not only grades and test scores but also what students have made of their "opportunities-to-learn," the obstacles they have overcome, and the special talents they possess. I have made four proposals that seek to move the University in this direction. They are 1) comprehensive review of applicants; 2) Eligibility in the Local Context; 3) Dual Admissions; and 4) changes in standardized test requirements, including the SAT I. I would like to describe each briefly.

Comprehensive review. Current UC policy defines two tiers for admission, and in the first tier students are admitted by a formula that places principal weight on grades and test scores. Selective private universities have by and large used a comprehensive review of a student's full record in making admissions decisions and, given the intense competition for places at UC, I believe we must follow their lead. I have recommended eliminating the two-tier system in favor of ensuring that every applicant receives the same comprehensive review of his or her achievements and potential. The proposal is now before the Academic Senate, which expects to act on it sometime during the coming fall quarter.

Eligibility in the Local Context. For the first time this year, students can qualify for admission to the University through what we are calling Eligibility in the Local Context, or the Four Percent Plan. This program grants UC eligibility to students who are in the top four percent of the graduating class in each California high school and who have successfully completed UC's required college-preparatory courses. It ensures that high-performing students, including those from rural and urban schools, have access to UC regardless of whether their schools offer such academic enrichment opportunities as Advanced Placement or honors courses. Almost 97 percent of California public high schools participated in the Four Percent Plan this year, many of which have traditionally sent few or no students to UC. The response has been enthusiastic from schools and students alike.

Dual Admissions. Another new path to UC is the Dual Admissions Proposal, which has been approved by the Academic Senate and will go to the University's Board of Regents for final action later this month. Under the proposal, students who fall below the top four percent but within the top 12-1/2 percent of each California high school graduating class would be admitted simultaneously to a community college and to UC, with the proviso that students must fulfill their freshman and sophomore requirements at the community college with a solid grade-point average before transferring to a UC campus. Consistent with Proposition 209, the Dual Admissions Proposal will not admit students based on race or ethnicity. But a large number of students who would qualify under this proposal are Latino,

African American, and Native American. Like the Four Percent Plan, the Dual Admissions Proposal, if approved, will give students who have excelled academically in disadvantaged high schools a clear path to a UC degree.

Standardized tests and the SAT. And this brings me to the last of the proposed changes in UC admissions policies. This proposal is now before the Academic Senate, which expects to act on it sometime during the coming academic year.

The SAT I--a two-part test assessing mathematical and verbal aptitude--has become the single most influential test in American higher education. Yet as an aptitude test that claims to assess quantitative reasoning and verbal ability, it is based on questionable assumptions about the nature of intelligence. As a rite of passage that can have lasting consequences for the futures of millions of young people every year, it has become a destructive national obsession.

Some have assumed that, because I oppose the SAT I, I also oppose all standardized tests. That is not the case. Grading practices vary across high schools, and standardized tests are essential to providing a measure of what students know that is independent of grades. But we need to be exceedingly careful about what standardized tests we choose. Students should not be judged on the basis of tests that embody ill-defined notions of aptitude or intelligence.

Accordingly, I have recommended that the University make significant changes in its test requirements. Under current UC admissions policy, applicants are required to take five tests, the two SAT I aptitude tests and three SAT II achievement tests--writing, mathematics, and a third in a subject of their choice. I have proposed that UC no longer require the SAT I for admission but instead use tests that have a demonstrable relationship to the curriculum that students study in preparation for college-level work.

UC requires students to take college preparatory courses that are referred to as the "a-g requirements." These requirements cover five main subject areas: English, mathematics, history/social science, laboratory science, and foreign language. The development of new standardized tests to cover these five areas should not be a difficult task; I believe either the ETS or the ACT could readily accomplish such an assignment for UC.

Until such tests are developed, the faculty committee responsible for UC admissions is considering, among other options, the use of five SAT II tests to replace the two SAT I tests and the three SAT II tests currently required. The five tests would be selected so that they correlated with the a-g requirements.

The principal claim about the usefulness of the SAT I---that it functions as the gold standard of student quality--rests on its supposed capacity to tell us how students will do in their first year of college. As one of the nation's largest users of SAT tests, UC is perhaps the only university in the country that has a data base large enough to compare the predictive power of the SAT I with that of the achievement-based SAT II tests. We have required both the SAT I and the SAT II since 1968, which means that we can compare component test scores with subsequent college performance for a large pool of students.

These data challenge the conventional wisdom about the superior predictive power of the SAT I. They indicate that the best single predictor of first-year college grades is high school grades; further, the three SAT II tests combined are a far better predictor than the two SAT I tests. If high school grades and the SAT II are combined, then one can account for 21.0 percent of the variance in college freshman grades. Combining high school grades, the SAT II, *and* the SAT I, one can account for 21.1 percent of the variance. In other words, the SAT I adds virtually nothing to our ability to predict freshman college grades.

There is another reason why the SAT I does not serve either students or schools. School reform efforts in California, like others across the country, are based on three principal tenets: curriculum content and goals should be clearly defined; students should be held to well-defined standards; and standardized tests should be used to assess whether those standards have been met. The SAT I, because it is not aligned with subject or scholarship requirements, sends a confusing message to students, teachers, and schools. It says that students will be tested on material that is unrelated to what they study in their classes. It says that the grades they achieve can be devalued by tests of material that is not part of their school curriculum. Most important, the SAT I scores only tell a student that he or she scored higher or lower than his or her classmates. They provide no basis for self-assessment and improvement.

The irony of the SAT I is that it began as an effort to move higher education closer to egalitarian values. Yet its roots are in a very different tradition: the IQ testing that took place during the First World War, when two million men were tested and assigned an IQ based on the results. The framers of these tests assumed that intelligence was a unitary, inherited attribute, that it was not subject to change over a lifetime, and that it could be measured and individuals ranked and assigned their place in society accordingly. Although the SAT I is more sophisticated from a psychometric standpoint, it is based on the same questionable assumptions about human talent and potential. The SAT I gives credence to the notion that intellectual ability is a unidimensional attribute that can be measured and expressed by a single number. I hope California will take a more thoughtful approach.

Final remarks

The common link among the admissions proposals I have made is that they call on students to work hard and strive for high academic achievement, and in return they commit UC to view those achievements in the context of the opportunities students enjoyed and the challenges they faced. While these proposals benefit all students, they particularly benefit hard-working, high-achieving students who through no fault of their own attend low-performing schools. In this respect, these proposals complement the educational reform efforts launched by Governor Davis.

The University of California has always reviewed its admissions policies from time to time to ensure that they are right for the young people of this state. The difference between the California of an earlier time and the California of today is that our economy is far more reliant on the generation and application of knowledge, the students coming to us are far more diverse, and the K-12 public schools are far more variable in the quality of their teaching and curricula. What we expect of our students in 2001 is no less rigorous than what we expected in the past. But now the admissions policies we employ to judge student achievement and promise must be comprehensive enough to recognize talent in all its forms. These policies must tell schools what we expect them to teach to prepare students for university-level study. They must give students the message that, with hard work in demanding courses, a University of California education is within their reach. They must help the University do what we have always done, which is to combine excellence and access by setting high standards and admitting students who meet those standards. We have no more important responsibility in the new society that is being born in California today.

ATKINSON PRESIDENCY TIMELINE

DATE	EVENT
Aug. 1995	Richard C. Atkinson appointed seventeenth president of the University of California, effective October 1, 1995.
Oct. 1995	National Research Council releases "Research-Doctorate Programs in the United States," a comprehensive study of the quality of Ph.D. programs in American universities. UC as a system did remarkably well, with more than half of its 229 graduate programs ranked in the top 20 in the nation. When averages were computed for individual universities, Berkeley ranked first in the nation, San Diego tenth, and Los Angeles twelfth; the other nine institutions in the top twelve were all private universities.
Oct. 1995	Three UC faculty awarded the Nobel Prize: Frederick Reines (Physics, Irvine), F. Sherwood Rowland (Chemistry, Irvine), Paul Crutzen (Chemistry, San Diego)
Oct. 1995	Inauguration of Henry Yang as fifth chancellor of UC Santa Barbara.
Dec. 1995	William H. Gurtner appointed Vice President, Clinical Services Development.
Jan. 1996	Industry-University Cooperative Research Program established.
Mar. 1996	C. Judson King appointed Provost and Senior Vice President, Academic Affairs.
Mar. 1996	Regents authorize construction of headquarters in Oakland for the Office of the President.
Apr. 1996	M.R.C. Greenwood appointed sixth chancellor of UC Santa Cruz.
Apr. 1996	Robert C. Dynes appointed sixth chancellor of UC San Diego.
June 1996	UC and the Los Alamos National Laboratory establish an office in Northern New Mexico to strengthen relationships with regional communities.
Aug. 1996	President Atkinson announces a new methodology for allocating State funds to the campuses. Among the changes are: most allocations to the

campuses to be made as a single block of funds; indirect cost reimbursements to be returned to the campuses on the basis of how the dollars are generated; campuses to assume greater flexibility and responsibility for how funds are spent.

Aug. 1996 Commission on the Future of Medical Education appointed (Charles Wilson, M.D., chair).

Sept. 1996 Robert N. Shelton appointed vice provost for research.

Oct. 1996 Bruce B. Darling appointed Vice President, University and External Relations.

Oct. 1996 Davis and Irvine campuses invited to join the Association of American Universities, bringing UC's membership to six campuses; the only university system in the nation with more than one AAU member.

Jan. 1997 President Atkinson establishes the UC Flood and Emergency Resource Task Force to assist the state in dealing with natural disasters.

Jan. 1997 President's Retreat on UC's Relationship with Industry in Research and Technology Transfer held at UCLA.

Jan. 1997 Carol Tomlinson-Keasey appointed vice provost for academic initiatives.

Feb. 1997 First Presidential Medal awarded to UC Berkeley Chancellor Chang-Lin Tien.

Mar. 1997 Robert M. Berdahl appointed eighth chancellor of UC Berkeley.

Mar. 1997 Albert Carnesale appointed fifth chancellor of UCLA.

Mar. 1997 All-University Conference on Teaching and Learning Technologies held at UCLA.

Mar. 1997 President Atkinson announces his intent to introduce a computerized version of the Universitywide Subject A Examination.

Mar. 1997 *New York Times* refers to the emergence of UC San Diego as a major research university, which had a great impact on the economy of the San Diego region, as the "Atkinson Miracle."

Apr. 1997 Haile T. Debas appointed seventh chancellor of UC San Francisco for 1997-98.

Apr. 1997 Presidential Medal awarded to UC benefactor Peter E. Haas, Sr.

Apr. 1997 President Atkinson establishes the Board on Research and Economic Development, a group of distinguished representatives from the private sector, to advise on future directions of the Industry-University Cooperative Research Program.

May 1997 Outreach Task Force issues draft report.

May 1997 Regents approve Mission Bay site for major expansion of UC San Francisco.

May 1997 UC joins with Caltech, the California State University, the California Institute of Technology, Stanford University, and the University of Southern California in establishing the Consortium for Education Network Initiatives in California (CENIC) to design and deploy CalREN-2, an advanced electronic superhighway that will link California's universities to the national high-speed network.

May 1997 UC and its affiliated national laboratories produce more research leading to patented inventions than any other public or private research university or laboratory in the nation, according to a study by the National Science Foundation.

May 1997 Presidential Medal awarded to UC San Francisco Chancellor Joseph B. Martin, M.D.

May 1997 Presidential Medal awarded to UCLA Chancellor Charles E. Young.

June 1997 Hugh Graham presentation to The Regents on his study (with Nancy Diamond), *The Rise of American Research Universities*, which found that the UC system leads the nation in research excellence and productivity among public universities.

July 1997 Regents approve Outreach Task Force Report.

July 1997 UC and Mexico's National Council on Science and Technology (CONACYT) enter into the most comprehensive research and education collaboration ever established between a U.S. university and Mexico.

Sept. 1997 Presidential Medal awarded to Los Alamos Laboratory Director Siegfried Hecker.

Sept. 1997 Judith Boyette appointed Associate Vice President–Benefits and Human Resources; reorganization of the merged benefits and human resources departments begins.

Sept. 1997 Regents approve five-year extension of UC's contracts to manage the Department of Energy Laboratories at Los Alamos, Livermore, and Berkeley.

Sept. 1997 Regents approve creation of UCSF Stanford Health Care, a merger of the clinical enterprises of UC San Francisco and Stanford University, to sustain the competitiveness of both in the changing health-care marketplace.

Oct. 1997 Two UC faculty awarded the Nobel Prize: Paul D. Boyer (Chemistry, UCLA), Stanley Prusiner (Physiology or Medicine, UCSF)

Oct. 1997 Report on UC academic planning, "Preparing for the Twenty-first Century."

Oct. 1997 John C. Browne appointed director of the Los Alamos National Laboratory.

Oct. 1997 UC Digital Library established and Richard Lucier named as University Librarian.

Nov. 1997 Pathways, UC's online undergraduate admission information and application network, begins accepting applications.

Nov. 1997 Faculty committee releases academic planning recommendations for UC's tenth campus.

Nov. 1997 Regents approve health benefits for domestic partners of UC faculty and staff.

Nov. 1997 Regents approve 1616 Rhode Island Avenue, NW, Washington, D.C., as the site for the UC Washington, D.C. Center. The UC Center will provide space for academic program and research activities and the Office of Federal Governmental Relations, as well as housing for 280 students.

Dec. 1997 President Atkinson approves naming of 10th campus "UC Merced."

Dec. 1997 UC Santa Barbara's school of environmental studies is renamed the Donald Bren School of Environmental Science and Management in recognition of a major gift from the Bren Foundation. The Bren gift supports establishment of the University's first intercampus program of environmental study integrating natural and social sciences, business and law curricula.

Jan. 1998 Outreach Action Plan announced at Regents' meeting.

Jan. 1998 Chancellor Emeritus Pister appointed Senior Associate to the President to coordinate UC's systemwide response to the recommendations of the Outreach Task Force Report.

Jan. 1998 For the third consecutive year, UC raises a record amount in contributions from alumni and friends, receiving $726.3 million in 1996-97.

Jan. 1998 Ralph J. Cicerone appointed fourth chancellor of UC Irvine.

Jan. 1998 UC announces applications from nearly 59,000 high school seniors for admission in fall 1998, an 8 percent increase from the previous year and the largest one-year jump in 10 years.

Feb. 1998 President Atkinson announces title changes for Anne C. Broome (Vice President, Financial Management) and Larry Hershman (Vice President, Budget).

Mar. 1998 President Atkinson appoints the President's Commission on Agriculture and Natural Resources, a group of agricultural, business, consumer, and governmental leaders charged with advising UC on issues related to agriculture and natural resources.

Mar. 1998 Organizational plan for the newly merged UCOP Human Resources and Benefits Department announced.

Apr. 1998 J. Michael Bishop appointed eighth chancellor of UC San Francisco.

Apr. 1998 Carol Tomlinson-Keasey, Vice Provost for Academic Initiatives, given additional appointment as Senior Associate to the President for UC Merced.

Apr. 1998	President Atkinson and the University's chancellors meet with members of the California Congressional delegation and federal officials in Washington, D.C., to discuss issues of mutual interest.
Apr. 1998	Presidential Medal awarded to President Emeritus Clark Kerr.
May 1998	Presidential Medal awarded to George Deukmejian, former governor of California.
May 1998	A. Scott Sudduth appointed Assistant Vice President--Federal Governmental Relations.
May 1998	President Atkinson announces the UC Engineering Initiative, a plan to help keep California's technology-based economy competitive by a 50 percent increase in the number of engineering and computer science students at UC 2005.
May 1998	Office of the President relocates to 1111 Franklin Street, Oakland, California.
June 1998	Presidential Medal awarded to Irvine Chancellor Laurel L. Wilkening.
July 1998	President Atkinson announces the Master of Advanced Study, a new systemwide degree program offering advanced professional education and advanced liberal studies for working adults.
Oct. 1998	Two UC faculty and one UC researcher awarded the Nobel Prize: Louis J. Ignarro, (Physiology or Medicine, UCLA), Walter Kohn (Chemistry, UCSB), Robert B. Laughlin (Physics, Livermore).
Nov. 1998	Governor-elect Gray Davis appoints President Atkinson to his Education Transition Group.
Nov. 1998	President Atkinson announces search for founding chancellor of UC Merced.
Jan. 1999	Governor Davis appoints President Atkinson as a member of the Governor's delegation to visit Mexico to strengthen relationships in commerce and education.
Feb. 1999	Presidential Medal awarded to Willie Lewis Brown, Jr., Mayor of San Francisco.

Mar. 1999 Governor Davis appoints President Atkinson to the Commission on Building for the 21st Century, charged with developing a comprehensive plan for meeting California's infrastructure needs.

Mar. 1999 Regents approve changes in freshman eligibility that make the top 4 percent of graduates from all California high schools eligible for admission to UC.

Mar. 1999 President Atkinson establishes the California Studies Fellowship program at the universitywide Humanities Research Institute to support research and scholarship on the history and culture of California. Four inaugural fellows selected for 1999-2000.

Mar. 1999 California House, jointly sponsored by UC and the California Trade and Commerce Agency, established in London to stimulate academic and commercial exchange between the United Kingdom and California.

Apr. 1999 President Atkinson and the University's chancellors meet with members of the California Congressional delegation and federal officials in Washington, D.C., to discuss issues of mutual interest.

Apr. 1999 Presidential Medal awarded to former UC San Francisco Chancellor Haile T. Debas.

May 1999 The Koret Foundation awards President Atkinson and Stanford University President Gerhard Casper the Koret Prize for preeminent contributions to American education.

May 1999 Presidential Medal awarded to the President of Mexico, Ernesto Zedillo Ponce de León.

May 1999 President Atkinson announces plans to establish the University of California Commission on the Humanities to examine the challenges the humanities and humanities scholars face in higher education and recommend ways to address them.

July 1999 Carol Tomlinson-Keasey appointed founding chancellor of UC Merced.

Oct. 1999 UC Medical Student Diversity Task Force appointed to examine short and longer-term trends in the admission and enrollment of underrepresented minority students at UC medical schools.

Oct. 1999 President Atkinson announces creation of the position Vice President-Educational Outreach to strengthen oversight of UC's growing outreach and K-12 programs and appoints Karl S. Pister to the post.

Oct. 1999 Pierce's Disease Task Force established to mobilize the University's scientific and technical expertise to help combat Pierce's disease, a threat to the state's wine and grape industries.

Oct. 1999 Advisory Group on Low-Level Radioactive Waste Disposal appointed, with President Atkinson as chair, to advise the State on options for handling low-level wastes.

Oct. 1999 Stanford University President Gerhard Casper announces that Stanford will withdraw from UCSF Stanford Health Care.

Nov. 1999 Regents authorize President Atkinson to take the necessary steps to dissolve UCSF Stanford Health Care.

Dec. 1999 President Atkinson establishes in the Office of the President the Center for Teaching and Learning Technologies to coordinate both campus and universitywide efforts to develop various digital approaches to education, including e-learning.

Jan. 2000 Los Alamos National Laboratory scientist Wen Ho Lee arrested for allegedly mishandling nuclear weapons secrets.

Feb. 2000 President Atkinson designates Veterans Day (November 11) as an official University of California holiday.

Mar. 2000 Presidential Medal awarded to Sidney Drell, former chair of the University of California President's Council on the National Laboratories and professor of physics at Stanford University.

Mar. 2000 Michael Drake appointed Vice President–Health Affairs.

Mar. 2000 Alex Saragoza appointed Vice President–Educational Outreach.

Mar. 2000 Joseph Mullinix appointed Senior Vice President–Business and Finance.

May 2000 Cerro Grande fire near Los Alamos National Laboratory destroys over 200 residential dwellings and requires closing of the Laboratory from May 8 - May 22.

May 2000 Two hard drives containing classified information about disarming nuclear weapons discovered missing at the Los Alamos National Laboratory.

May 2000 Regents approve change in title for Bruce B. Darling to Senior Vice President–University and External Relations.

May 2000 Julius Zelmanowitz appointed Vice Provost for Academic Initiatives.

May 2000 Governor Davis and UC confirm new partnership agreement to provide the University with a four percent annual increase in State general funds, plus support for enrollment growth and other key areas.

June 2000 Missing hard drives found at Los Alamos National Laboratory.

June 2000 Presidential Citation of Excellence awarded to Director of Personnel Edna Coleman-Smith.

June 2000 UC receives an 18 percent operating budget increase in the 2000-01 State budget approved by Governor Davis. Capital budget includes $75 million to create three California Institutes for Science and Innovation, which will focus on scientific and engineering research and teaching in fields key to the future of the California economy.

July 2000 Six finalists for California Institutes for Science and Technology announced:

- Systems Biology (UC Irvine)
- Agricultural Genomics (UC Riverside, UC Berkeley, and UC Davis)
- Communications and Information Technology (UC San Diego and UC Irvine)
- Nanosystems (UC Los Angeles and UC Santa Barbara)
- Information Technology in the Interest of Society (UC Berkeley, UC Santa Cruz, UC Davis, and UC Merced)
- Bioengineering, Biotechnology, and Quantitative Biomedicine (UC San Francisco, UC Berkeley, and UC Santa Cruz)

Sept. 2000 Regents approve mandatory student health insurance for undergraduates, making UC the first multicampus university system to adopt a policy of mandatory student health insurance.

Sept. 2000 President Atkinson requests the Academic Senate to review a "dual admissions" proposal that would supplement current admissions procedures.

Sept. 2000 Presidential Medal awarded to Chancellor Emeritus Karl S. Pister.

Sept. 2000 President Atkinson receives the National Leadership Award from the U. S. Small Business Administration for his role, as chancellor of UC San Diego, in forging industry-university-government partnerships that contributed to the economic revitalization of the San Diego region.

Oct. 2000 Three UC faculty awarded the Nobel Prize: Professor Alan J. Heeger (Chemistry, Santa Barbara); Professor Herbert Kroemer (Physics, Santa Barbara); and Professor Daniel L. McFadden (Economics, Berkeley).

Oct. 2000 Presidential Medal awarded to UC benefactor and Broadcom Corporation founder Henry Samueli.

Dec. 2000 Governor Davis and President Atkinson announce creation of four California Institutes for Science and Innovation at Los Angeles (nanotechnology), San Diego (telecommunications and information technology), San Francisco (bioengineering, biotechnology, and quantitative medicine), and Berkeley (information technology).

Dec. 2000 Chair Sue Johnson and President Atkinson appoint the Commission on the Growth and Support of Graduate Education to help UC meet its goal of adding at least 11,000 graduate students over the next decade.

Jan. 2001 President Atkinson announces a series of steps UC will take to move towards greater energy independence in response to California's energy crisis.

Jan. 2001 Regents approve extension to 2005 of UC's contracts with the Department of Energy to manage the Los Alamos and Livermore National Laboratories.

Feb. 2001 In the Robert H. Atwell Distinguished Lecture at the annual meeting of the American Council on Education, President Atkinson announces two proposals he has asked the Academic Senate of the University of

California to consider: 1) that the University eliminate the SAT I as a requirement for admission and 2) that the University move away from quantitative formulas and toward admissions procedures that look at applicants in a more comprehensive way.

Mar. 2001 Governor Davis, Mexico President Vicente Fox, and President Atkinson inaugurate the high-speed Internet2 link between California and Mexico.

Apr. 2001 David Russ appointed Treasurer of The Regents and Vice President--Investments.

Apr. 2001 Alex Saragoza resigns as Vice President--Educational Outreach. Manuel Gómez appointed interim vice president.

May 2001 John McTague appointed Vice President--Laboratory Management.

May 2001 Regents unanimously approve RE-28, which rescinds SP-1 and SP-2 and reaffirms the University's commitment to a diverse student body and to shared governance in determining admissions criteria.

July 2001 In a keynote address at the annual meeting of the Council for Advancement and Support of Education in San Francisco, President Atkinson discusses his proposals for change in UC's admissions policies: comprehensive review of applicants; Eligibility in the Local Context; Dual Admissions; replacement of the SAT I with standardized tests tied to the high school curriculum.

July 2001 Regents approve Dual Admissions Program.

Last updated July 19, 2001

NEW YORK TIMES
Saturday, February 17, 2001

Head of U. of California Seeks to End SAT Use in Admissions

By DIANA JEAN SCHEMO

WASHINGTON, Feb. 16 — Contending that standardized college tests have distorted the way young people learn and worsened educational inequities, the president of the University of California is proposing an end to the use of SAT's as a requirement for admission to the state university system he oversees, one of the largest and most prestigious.

The proposal by the president, Richard C. Atkinson, will need the approval of the faculty senate and the university system's governing board of regents. Though university officials would not predict how either body would vote, Michael Reese, a spokesman for the University of California, said the faculty appeared to embrace the president's proposal. He added that if adopted it could take effect as early as 2003.

In a letter Dr. Atkinson sent to the University of California's faculty senate today and in a speech he will give here on Sunday to the American Council on Education, an advance copy of which the school released tonight, Dr. Atkinson criticized the reliance on SAT's to rank students for admission to schools, saying that they are "not compatible with the American view on how merit should be defined and opportunities distributed."

If adopted, the proposed move to abandon the SAT's, taken by more than 1.2 million high school seniors applying for college each year, is expected to echo throughout the world of higher education. It follows similar moves by smaller schools, including Bates, Bowdoin and Mount Holyoke colleges, to make SAT's optional.

Dr. Atkinson's decision, which would apply to both in-state and out-of-state students, came several years after a university faculty committee urged that the SAT's be made optional to increase the number of black and Hispanic students gaining admission. Earlier, California had banned the use of race and ethnicity for college admission. Like other school officials around the country Dr. Atkinson has sought to balance the values of diversity and academic quality.

Under his proposal, the university would drop the requirement that applicants submit scores from the SAT I, an aptitude test, but continue to require the so- called SAT II, which tests students in subject areas, including English, math, history, science and foreign languages. Along with the SAT I, the University of California would also drop the use of the ACT test, another standardized test, which students were allowed to submit as an alternative to the SAT I.

Mr. Reese said some members of the board of regents would probably seek assurances from Dr. Atkinson that the quality of the student body would not suffer by dropping the SAT requirement.

Dr. Atkinson oversees nine campuses, eight of them with undergraduates, to which 91,904 high school seniors applied for admission this year. He said the SAT's did not measure mastery of specific subjects required for admission to the school, so much as an ill-defined aptitude. He talked about visiting classrooms where 12-year-old's spent hours studying lists of analogies, a central feature of the SAT.

"The time involved was not aimed at developing the students' reading and writing abilities but rather their test-taking skills," Dr. Atkinson wrote. "I concluded what many others have concluded — that America's overemphasis on the SAT is compromising our educational system."

"Change is long overdue," he wrote.

Gaston Caperton, the former Governor of West Virginia who is president of the College Board, said he did not consider Dr. Atkinson's coming speech a crisis for his company, which first developed standardized tests for colleges in 1901. The College Board owns the SATs, which are administered by the Princeton-based Educational Testing Service.

Mr. Caperton defended the exams as reliable predictors of a student's grades in college. "It is a national standard that cuts across state lines, and it really measures high achievement," Mr. Caperton said. To the criticism that SAT's did not reflect mastery of a specific knowledge, Mr. Caperton said the test was more sophisticated, because "it takes into account not just what they've learned, but critical thinking, which is what life is all about."

Stanley O. Ikenberry, the president of American Council on Education, said Dr. Atkinson's move to drop SAT's would likely "fuel a national dialogue on college admissions, simply because the University of California is one of the largest university systems in the United States, and many would say it is the premiere higher education system in the country."

Dr. Atkinson's proposal would have to be passed by two policy- making bodies within the university system before it takes effect, said Brad Hayward, a spokesman for the University of California system. The recommendation would first likely be reviewed by a committee of a dozen or so teachers within the academic senate, which has thousands of teachers drawn from the nine campuses. If the Senate supports the proposal, then the 26 members of the Board of Regents would vote on it. Only then would it go into effect.

When they were first developed, college admissions tests were envisioned as a way to transform a university system built around class into one based on merit. Youngsters without a prep school education, or whose parents were not alumni, could overcome objections about their ability with objectively-measured test scores. But the tests, on which blacks and Hispanics generally score lower than whites, have also come under severe criticism by those who contend they reflect and aggravate racial inequalities.

In addition, the tests, which have become the gatekeeper to many top- tier colleges, have spawned a nationwide preoccupation with test taking. Nearly 90 percent of four-year colleges and universities require the SATs for admission.

Bob Schaefer, president of an anti-SAT organization called FairTest, predicted that Dr. Atkinson's proposal would extend a debate on the validity of the tests, which has so far been limited to smaller schools, to larger colleges and universities. "If what Atkinson recommends becomes policy, there'll be no excuse for other large universities not to follow suit," Mr. Schaefer said.

Nicholas Lemann, author of "The Big Test: The Secret History of the American Meritocracy" (Farrar, Straus & Giroux, 1999) noted that the University of California system played a critical role in establishing the prominence of the Educational Testing Service in American universities. "When Atkinson gives this speech, it will not be a happy day for the E.T.S.," he said.

But others, like Derek Bok, the former president of Harvard University and co-author of "The Shape of the River: Long Term consequences of Considering Race in College and University Admissions," said other universities would not necessarily follow the University of California's proposed move to drop the SAT's.

Dr. Bok's 1998 book, written with William G. Bowen, a former president of Princeton, examined 28 colleges and universities employing racially sensitive admissions policies, and tracked the long-term effects of having attended institutions with diverse student bodies. He was reluctant to comment on another college president's suggestion, but said he did not expect Harvard eliminating its SAT requirement.

Dr. Atkinson is proposing eventually dropping the SAT II tests, at least until other tests tailored to measure the curricula taught in California high schools can be developed. Ultimately, he said, he would like to move away from numerical measurements of student aptitude, and encourage a more "holistic" approach to evaluating candidates.
Perhaps the biggest hurdle for the University of California will be physical, given the size of its applicant pool.

The university system has already chipped away at the pre-eminence of the SAT's, by allowing students in the top four percent of their high school class to bypass the standardized tests in applying for admission.

Dr. Ikenberry, whose council represents 1800 colleges and universities, said elementary schools and universities seemed to be moving in different directions. At public elementary and secondary schools, the national obsession has focused on accountability and testing. At colleges, however, the fear is that tests may have become too powerful as a tool for admissions.

He said he believed proposals like Dr. Atkinson's could have profound effects on students and, ultimately, those who developed standardized admissions tests. Playing down test scores "will mean greater emphasis being placed on high school achievement and high school grades," Dr. Ikenberry said.

"What it will mean is that colleges and universities will be looking more closely at individual courses being taken by students and their achievements in those courses rather than trying to sum it all up in a test score," he said.

/ sidebar /

Excerpt From Speech on SAT Scores

Following is an excerpt from remarks by Richard C. Atkinson, president of the University of California, prepared for delivery on Sunday at the annual meeting of the American Council on Education in Washington, in which he recommends that the university system no longer require the SAT for admission:

Let me describe how I came to make these recommendations. For many years, I have worried about the use of the SAT, but last year my concerns coalesced. I visited an upscale private school and observed a class of 12-year- old students studying verbal analogies in anticipation of the SAT. I learned that they spend hours each month — directly and indirectly — preparing for the SAT, studying long lists of verbal analogies such as "untruthful is to mendaciousness" as "circumspect is to caution." The time involved was not aimed at developing the students' reading and writing abilities but rather their test-taking skills.

What I saw was disturbing and prompted me to spend time taking sample SAT tests and reviewing the literature. I concluded what many others have concluded: that America's overemphasis on the SAT is compromising our educational system.

SHOULD SATs

A growing number of colleges are spurning a test that has measured and mortified Americans for 75 years. But what are the alternatives?

By JOHN CLOUD

FOR THE PAST TWO WEEKS, *TIME* HAS BEEN ASKING FAMOUS and accomplished people to tell us their SAT scores. Most of them declined—which is a little strange, since the big bad test couldn't possibly hurt Alan Greenspan or Oprah Winfrey. But the SAT occupies a central place in the American psyche, lying at the terrifying intersection of ability, class and pride. As TV's Conan O'Brien put it, "It has taken 20 years to forget the trauma of that damned test, and looking up my scores would be like going back to Vietnam."

The test's prominence ensures that shouting matches will erupt over it regularly. Usually one side says the SAT should die because it's racist; the other says it should flourish because it maintains standards. Their arguments are important but had started to seem pointless, since the number of SAT takers has increased virtually every year since Pearl Harbor.

Then, in a Feb. 18 speech to his fellow college presidents, the psychologist who runs the University of California suggested something radical: Scrap the thing. Richard Atkinson says the test hurls kids into months of practicing word games and math riddles at the expense of studying chemistry or poetry. He wants to make SAT scores an optional part of the application for all 90,000 kids who want to go to U.C. each year. "The SATs have acquired a mystique that's clearly not warranted," he proclaims. "Who knows what they measure?" Those of us who wanted to stick a No. 2 pencil in our eye while puzzling the meaning of "mendacious" gave a cheer.

Last week U.C.'s faculty and regents started what will be a long, fiery debate over his proposal. Since Atkinson began attacking the test, college administrators across the U.S. have reopened old fights about the SAT and started new ones. President John Peters of Northern Illinois University says the reaction of the hundreds of college officials to the speech was "extremely positive"; he plans to suggest a review of his school's standardized-test requirements at the next faculty meeting. The Georgia board of regents is reviewing admissions criteria, as are the University of Texas, the University of Massachusetts at Amherst and the College of Wooster in Ohio.

LEFT TO RIGHT: STEVE FINN—ALPHAGLOBE PHOTOS; NAILAH FEANNY—SABA; BRIAN SMITH—CORBIS OUTLINE; ROBERT FOOTHORAP; CLAUDIO VAZQUEZ—CORBIS OUTLINE; ANDREW ECCLES—ABC; CYNTHIA JOHNSON FOR TIME

HOW THEY SCORED ON THE TEST:

Here's how some famous folks told us they did on their SATs. A perfect score is 1600, based on 800 math and 800 verbal

PAUL WELLSTONE
SENATOR
UNDER **800**
Combined! Yet he went on to become a Phi Beta Kappa at the University of North Carolina

JENNIFER LOPEZ
ACTRESS AND SINGER
"nail polish"
What she said she got on her SATs, as reported in the New York Post

STEPHEN KING
AUTHOR
1300s
"People don't like SATs these days because everyone's got the idea that 'tests are, like, unfair, dude.' "

MATTER?

BEN STEIN
GAME-SHOW HOST
1573
"The people I know who are successful, hardworking, responsible people, by and large, were people who did well on their SATs."

MEREDITH VIEIRA
TALK-SHOW HOST
1300s
"I got 5's on my APs. Big deal! I still didn't get into Harvard."

AMY TAN
AUTHOR
1100s
"I was told I should become a doctor because the only thing I'd have to write is prescriptions."

GEORGE W. BUSH
PRESIDENT
1206

LEFT TO RIGHT: STEVE FINN—ALPHA/GLOBE PHOTOS; NAJLAH FEANNY—SABA; BRIAN SMITH—CORBIS OUTLINE; ROBERT FOOTHORAP; CLAUDIO VAZQUEZ—CORBIS OUTLINE; ANDREW ECCLES—ABC; CYNTHIA JOHNSON FOR TIME

Most universities have no immediate plans to stop asking for SAT scores. But at those schools that were having second thoughts about the test, Atkinson's stance will embolden anti- SAT forces. "It's gutsy," says Florida International University admissions chief Carmen Brown, "and a lot of other places will follow." The College Board, which oversees the SAT, was worried enough after the speech to e-mail colleges a defense of its test.

The board had plenty of reasons to worry before then. The California rumblings come at a precarious time for the SAT. To be sure, it remains a key part of the college-application process. Last year 44% of the kids who graduated from high school took it, up from 41% in 1995. In all, more than 2 million students took the SAT in 2000. The second biggest admissions test, the ACT, had 1.8 million takers last year. Published by an Iowa testing company, the ACT started in 1959 as a rival to the SAT and focuses more on subject matter than general reasoning. But the ACT never developed the SAT's aura of quality and rigor. Whenever a college suggests dropping its SAT requirement, traditionalists on campus inevitably say doing so would lower standards.

WILLIAM MERCER MCLEOD FOR TIME

WHERE THEY'RE GOING Defenders say campuses like U.C.'s élite Berkeley need SATs to maintain standards

Over the past few years, however, the test's defenders have started to lose ground. About 280 of the nation's 2,083 four-year colleges and universities make the SAT optional for some or all applicants; a handful of prestigious colleges, including Franklin and Marshall and Mount Holyoke, have joined their ranks since the early '90s and say they aren't admitting idiots as a result. Hamilton College is considering making the SAT optional. Countless other schools have de-emphasized the SAT in more subtle ways—continuing to ask for scores but weighing other factors more heavily.

Granted many of the SAT-optional schools sit on utopian campuses in liberal New England villages. But it's getting hard to find an admissions officer anywhere who says an SAT score alone tells you anything important. Deans at prestigious, traditional bastions such as Vanderbilt support the SAT, but some of the test's assumed proponents aren't guarding it against the barbarians. Even conservatives at the *Weekly Standard* have written about how the SAT has "shaped—and misshaped—modern American life."

But if we drop the SAT, by what means should we allot membership in the nation's élite? Of course, plenty of people make movies and play in the major leagues and run companies and write for magazines without high SATs. But good scores sure don't hurt. Besides, don't they measure *something* valuable—something beyond the diligence it takes to memorize the details of the Franco-Prussian War for a history exam? Much of the debate over the SAT boils down to this: Assuming we can measure innate intelligence, do we want a society that rewards genes? Are we afraid of what kind of society that might be? Or should we instead reward only the achievements of a life—what we do with our gifts, not what we start with?

AL GORE
EX-VICE PRESIDENT
1335

LARRY DOWNING—REUTERS

TO ANSWER THESE QUESTIONS, you have to understand both how the SAT rose to prominence and how it has fallen into turmoil. Appropriately, the story begins in California. In the two decades after World War II, the College Board struggled to build the reputation of the SAT, which was first used experimentally in 1926. The board desperately wanted the University of California, then the biggest university in the nation, to fully adopt the test. In 1962, as Nicholas Lemann says in his brilliant history, *The Big Test*, an SAT honcho wrote to his colleagues of the dire consequences if U.C. decided to end its then limited use of the test: "If they drop the SAT, we will lose a great deal more than the revenue; we will suffer a damaging blow to our prestige."

In 1967, its confidence in the value of high school transcripts eroded, U.C. finally started requiring SAT scores from all applicants. From that point, the test grew into a national juggernaut. Within a matter of years, as college attendance skyrocketed, many admissions offices were relying heavily on the standardized SAT scores to help winnow piles of applications.

By the 1970s, when the inevitable backlash began, two arguments emerged. The one that drew more media attention charged that the test was inherently biased against blacks and Latinos, who to this day score worse on average than whites. The other was that SAT scores measure only the ability to take the SAT—a skill that, depending on your ability to pay, you could pick up in a coaching class (a growth industry that in 1999 alone raked in $400 million). Aside from that class inequality, the test's failure to measure anything meaningful also meant that kids were spending a lot of time fretting over pedagogical phantoms at the expense of real learning.

The College Board says the average SAT taker spends only 11 hours preparing—and that coaching on average adds fewer than 40 points to a score. But test prep has become a big part of teen culture in most suburbs. Even the College Board sells its own test-prep material. The Princeton Review's $799-to-$899 SAT classes typically meet weekly for six weeks, and students are expected to practice analogies and memorize vocabulary at home. "There has been a kind of testing mania that's hit us at all levels," says Sylvia Manning, a chancellor of the University of Illinois. It begins as early as middle school, when kids prepare for the Preliminary SAT, whose results are used by some colleges to identify potential matriculants when they are only in 10th grade. By senior year, "kids live and die by what they score on that three-hour test," says Ray Brown, dean of admissions at

TEST YOURSELF

SAT I Questions from recent tests designed to measure verbal and math skills

VERBAL

Analogies

1. TORPID : SLUGGISH ::

(A) wrong : apologetic
(B) refracted : direct
(C) comic : funny
(D) sad : empathetic
(E) merry : morose

2. DOGGEREL : VERSE ::

(A) animation : cinema
(B) scroll : document
(C) burlesque : drama
(D) chisel : sculptor
(E) headline : article

Sentence Completion

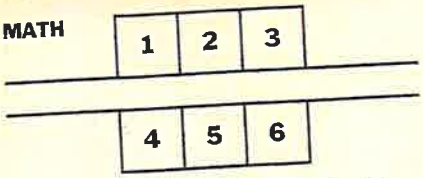
3. Some critics described the photographer's work as ____, citing his obvious ____ of the work of his renowned predecessors.

(A) distinctive . . assimilation
(B) sycophantic . . dismissal
(C) derivative . . adaptation
(D) controversial . . veneration
(E) pedantic . . ignorance

4. The essay was both ____ and ____ : although concise, it was profoundly moving.

(A) meandering . . denigrating
(B) compact . . enervating
(C) fictional . . touching
(D) argumentative . . rationalistic
(E) terse . . poignant

MATH



5. The diagram above represents six building lots along a street. There are no other residential sites in the area. Five families—v, w, x, y and z—are each interested in purchasing a lot, with the following restrictions.

v will occupy lot 6.

y and z will live on different sides of the street.

w and x will live on the same side of the street, and x will be the only next-door neighbor that w has.

One lot will remain unsold.

If all five families purchased lots and fulfilled all the restrictions, which of the following pairs of lots could be the ones purchased by y and z?

(A) 1 and 2
(B) 1 and 3
(C) 2 and 3
(D) 3 and 5
(E) 3 and 6

6. On a number line, point A has coordinate -3 and point B has coordinate 12. Point P is $\frac{2}{3}$ of the way from A to B. What is the coordinate of point P?

(A) –1
(B) 2
(C) 6
(D) 7
(E) 10

7. When tossed in the air, a coin is equally as likely to land with heads up as it is with tails up. The coin is to be tossed twice.

Column A	Column B
The probability that the coin will land heads up both times	The probability that the coin will land heads up on the first toss and tails up on the second toss

Answer:

(A) if the quantity in Column A is greater;

(B) if the quantity in Column B is greater;

(C) if the two quantities are equal;

(D) if the relationship cannot be determined from the information given.

8. Chairs ready for shipment at the Northern Chair factory come down a ramp in single file. Inspector A checks every third chair, beginning with the third. Inspector B checks every fifth chair, beginning with the fifth. If 98 chairs came down the ramp while both inspectors were working on Monday, how many of these chairs were not checked by either of these two inspectors?

Your answer: ☐

Answers (*Commentary from test designers*)

VERBAL

1. *"Choice E was the most attractive wrong answer. It's a hard question because of* torpid." **Answer: C. 27% answered correctly**

2. *"Some test takers recognized that there were words they didn't feel they understood and chose to skip the question."* **Answer: C. 17% answered correctly**

3. *"Most common wrong answers were A and B. Some students guessed (incorrectly) that B was right because sycophantic is such a hard word."* **Answer: C. 44% answered correctly**

4. *"Most popular wrong answer was B. Some test takers noted that* compact *in B fits the cue provided by* concise *and misread* enervating *to mean* upsetting." **Answer: E. 25% answered correctly**

MATH

5. *"Student has to eliminate possibilities or find a way to organize the information. It's a general skill used in more advanced math courses."* **Answer: D. 86% answered correctly**

6. *"Tests understanding of points plotted on a number line; students may simply compute or add wrong."* **Answer: D. 45% answered correctly**

7. *"Easiest approach is to list the possible outcomes. You don't have to compute the probabilities numerically."* **Answer: C. 58% answered correctly**

8. *"Involves understanding multiples. You have to realize you're dealing with a finite set of numbers, and know how to deal with overlapping sets."* **Answer: 53. 15% answered correctly**

Texas Christian University. "Or at least they think so."

In fact, most admissions officers—both at élite colleges and giant state schools—say they work hard not to put too much emphasis on SATs. They know, says Florida State admissions chief John Barnhill, that "the SAT doesn't measure heart." Although his office generally rejects applicants who score below 900, he remembers a student who was admitted with a 720—but who had a 3.9 GPA. "We have space for students like that, provided they are in the special support program," he says. "I like the SAT, but I don't love it. I wish I could find something that was a more fair and accurate measure."

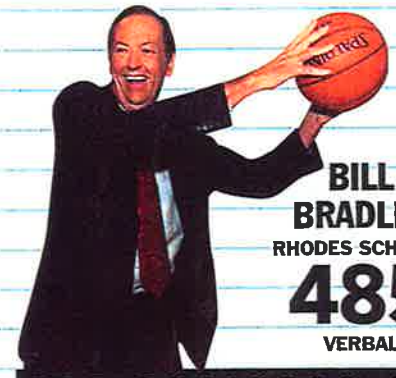
The racial gap in test scores is one of the most vexing problems in social science, in part because it opens the door to the whole creepy notion of eugenics. Eugenicists believe that the human species would advance more quickly if it discouraged reproduction among groups deemed unfit—say, those that score poorly on aptitude tests. It's worth noting that the SAT was designed by a psychology professor who became a leading member of the eugenics movement before denouncing it later in life.

The racial gap has fluctuated in size but never really declined. Today even blacks whose parents have the same level of education and income as a comparable sample of whites score about 120 points lower on average. Anti-testers often explain the gap by saying most of the test writers are white and import cultural biases into the SAT. But the College Board says SAT questions are always previewed by a large sample of test takers, and any questions that generate racial disparities are tossed out before they appear on SATs that count. "The SAT is probably the most thoroughly researched test in history," says College Board president Gaston Caperton. He attributes the test-score gap to the "different educational opportunities these students have had." Says Donald Stewart, one of Caperton's predecessors and the first African American to hold the job: "Poor kids are getting a lousy education. It's as simple as that."

Not really. Poor kids going to dismal schools doesn't explain why rich black kids score worse on average than white kids. Stanford psychologist Claude Steele has a theory that might explain it. His research shows that even high-achieving African-American pupils may be distracted by a fear that they will confirm the stereotype that blacks don't do well on intelligence tests. Steele has tested his theory by giving an exam to two mixed-race groups of students. One group was told that the exam was a simple problem-solving exercise; the other was told that their scores would show how smart they were. The white kids scored about the same no matter what they were told. The black kids who thought they were taking an intelligence test performed considerably worse than those told the test was no big deal.

That raises the question of whether we should try to test intelligence at all. Lemann, who wrote the history of the SAT, answers no. "You want to measure people on something they've done, not on supposedly innate abilities," he says. "I don't trust the whole idea of innateness." Fine, but what about those cool kids who would rather write concertos or build rockets than cram for a quiz on Grover Cleveland's second term? What about the bright rural Arkansas kid whose school is so screwed up that her grades mean nothing? Lemann says those students could still submit their perfect 1600 SAT score, since the test would simply be optional—although in his perfect world, the SAT would be replaced by other standardized tests that draw from

CHARLES REX ARBOGAST—AP



BILL BRADLEY
RHODES SCHOLAR
485
VERBAL

THE BUSINESS OF TESTING

Making Another Big Score

Lisa Ngai, a senior at Ferndale High School near Bellingham, Wash., aims to be the first from her immigrant family to go to college. In the past three years she has taken the SAT I three times, the PSAT (which determines National Merit Scholars) twice, SAT II exams in math, writing and U.S. history and, for good measure, the College Board's Advanced Placement calculus exam. This year she is enrolled in three more AP classes. By the time she graduates, she will have paid nearly $500 for tests sponsored by the College Board and designed by the Educational Testing Service—hardly an unusual sum for an ambitious high school senior. "I have no choice but to spend this money," says Lisa. "I want to get into college."

The near monopoly Lisa and millions of other anxious high school students face has been solidifying for more than half a century. At first blush, one would guess the companies that create and sell all these tests—the College Board and its spin-off, the ETS—would be shaken to their square roots by the latest rebellion against SATs. In truth, they should hardly notice. Both companies rely less and less on the SAT for income each year, and while the industry is becoming more competitive, the testing business as a whole is in the midst of a boom. The standards-and-accountability movement has led states and schools to test American students more often than at any other time in history. And if President Bush has his way, states will be required to test all students in third through eighth grades—22 million kids—every year in math and reading. That's big money for K-12 testmakers, a market currently dominated by textbook publishers but one that ETS is poised to join.

After a rough decade of losses caused by a heavy investment in computer-based exams,

TED THAI FOR TIME

HAYMAKER: Landgraf of ETS hopes to double revenues by 2005

CHRIS SMITH FOR TIME

HOW THEY GET THERE **The Princeton Review teaches students, like these in New York City, strategies it says can beat the SAT**

nationally standardized course material.

But at some point such questions fly too high above the SAT, since almost no one seriously argues any longer that it's an intelligence test. Not even its sponsors. The College Board stopped referring to it as the Scholastic Aptitude Test in 1994. For a while, the board redundantly called it an "assessment test." Now it just says the name is SAT and is unwilling to give the test much of an identity beyond that. President Kurt Landgraf of the Educational Testing Service, the company that designs the SAT under contract from the College Board, says it "is a relatively good predictor of how students will do in their first year of college." But he has a profoundly limited view of the nature of the test: "It's a measure of a student's ability to answer questions at a given place and time"—the kind of sentence you might find on an SAT to define the term tautology.

Research from colleges that have dropped the SAT requirement reinforces the notion that the test measures little. Bowdoin College, which started the SAT-optional movement in 1969, often studies how well its admissions officers predict college performance without SATs. It has repeatedly found that its rating—a numerical value assigned each applicant on the basis of GPA, essays and other factors—correlates very highly with the student's GPA at Bowdoin. Factoring in SAT scores improves that correlation only slightly. The College Board says that, across many colleges, SAT scores improve the correlation between admissions predictions and GPA realities by 10%.

And 10% means a lot on big campuses that can't afford to spend hours getting to know applicants. Even at Bowdoin, hero of the anti-testing crowd, head of admissions Richard Steele has mixed feelings about other schools' eliminating the SAT requirement. "I'm not one who would recommend this for everyone," he says, noting that Bowdoin is now "highly encouraging" one growing group of hard-to-evaluate applicants, home schoolers, to submit their SATs. "It works for us because we're only dealing with 5,000 applications, vs. 20,000 at the big schools."

Lafayette College, a small liberal-arts and engineering school in Pennsylvania, started a five-year experiment with making SATs optional in 1995. And Lafayette officials found that the test, combined with other measures, correlated better with their students' performance than other measures alone. In addition, admissions officers found themselves lost amid the inflated

ETS last year—for the first time in its history—hired a businessman, not an educator, to run the company. And looking to seize a large chunk of the pre-college testing market, it launched a for-profit subsidiary, ETS K-12 Works. ETS president Kurt Landgraf, former CEO of DuPont Pharmaceuticals, hopes to double ETS's overall revenues within five years, to more than $1 billion a year. "The future for testing is in K-12," says Landgraf. "It's the biggest initiative we have." His golden ticket may be ETS's new "e-rater," a nifty tool that can grade essay questions in under a second, using advanced artificial-intelligence technology. ETS claims the scores the e-rater spits out match those given by human graders 97% of the time. That's as accurate as a second human reader.

The company has a ready market in states looking for high-quality test designers. Today just three companies (conveniently, the three biggest school-textbook publishers) develop nearly all K-12 tests, and there is a severe shortage of psychometricians—specialists trained in educational measurement and test design. Last spring National Computer Systems (later purchased by textbook giant Pearson for $2.5 billion) mistakenly failed 7,930 Minnesota students on a basic-skills math test. Yet when Minnesota awarded its latest $3.4 million contract to develop new tests for middle and high schools, the state again turned to NCS Pearson. "I couldn't find a company with the accuracy rate that I think is high enough for high-stakes testing," complains Minnesota education commissioner Christine Jax. "There's not a lot of choice for something as critical as this."

While ETS is mining the whole K-12 market, the College Board has its eye on middle schools. This spring the company will unveil new math and English curriculums and tests designed to be like AP courses for seventh- and eighth-graders. College Board president Gaston Caperton says middle schools "are crying out" for such programs. Researchers at the College Board have also developed an SAT for eighth-graders, complete with developmentally appropriate math and verbal reasoning sections, to get kids thinking about college even sooner than they already do.

Not to be left out of the testing boom, the $400 million test-prep industry is also expanding. One might have expected John Katzman, founder and CEO of The Princeton Review, one of the two leading SAT-prep companies, to be at least a little concerned by University of California president Richard Atkinson's push to abolish the SAT. In fact, Katzman is ecstatic, calling the SAT "a vestige from another era" that "should be discarded at the first possible moment." It's a position he can afford to take, as his company, which is in the process of going public, recently launched homeroom.com, a potentially profitable interactive tool meant to help kids prepare for their state exams.

So here's the key question: When historians look back on this moment in American education, will they see a) the beginning of the end of the SAT; b) a national frenzy over school testing in general; or c) the dawn of the testing industry's greatest boom? Try d) all of the above. ***—By Andrew Goldstein. With reporting by Desa Philadelphia and Rebecca Winters/New York and Daren Fonda/Princeton***

Chat about the SATs with Andrew Goldstein on America Online at 7 p.m. E.T. Wednesday. **Keyword: LIVE**

TED THAI FOR TIME

grades and unranked classes that became common in 1990s secondary education. "We felt the SAT gave us one more consistent, nationally recognized standard," says Barry McCarty, a Lafayette dean. When the college went back to using the test last year, something unexpected happened: its applications surged 14%, and the school enrolled its strongest class in years. Though McCarty credits a flush economy and campus improvements for the increase, he raised another interesting possibility: "I do think students were more interested because of the perception of quality that's attached to [the SAT]."

Surprisingly, just as some U.S. schools are dumping the SAT because they consider it unfair, the British have discovered its potential value in elevating smart kids at poor schools. A study released last week shows that kids in state-run schools who did well on the SAT are falling through the cracks of the current British testing system, which rewards those who have mastered specific subjects rather than general skills. Britain's education czar said he thinks SATs could be compulsory there in a few years.

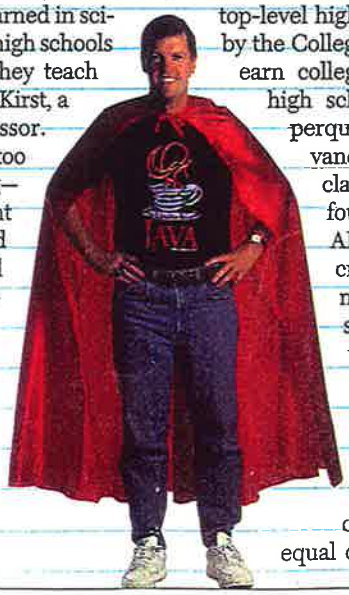
GERARDO MOLINA—LOS ANGELES TIMES

WHY THEY'RE SUING Some students allege that the U.C. admissions office favors wealthy schools

ADMISSIONS OFFICERS WILL always use hard-and-fast numbers to make decisions. But which numbers? U.C.'s Atkinson says California might develop its own test. Until it does, he suggests using scores on the SAT IIs, exams written by the same folks as the original SAT but focused on specific subject matter. "Once you start testing kids on what they learned in science or social studies, then high schools can start improving how they teach these things," says Michael Kirst, a Stanford education professor.

But SAT IIs (their name too was sanitized of meaning—they used to be Achievement Tests) have also spawned prep courses and racial score gaps. SAT II prep is actually more expensive than SAT I coaching, because most students take three separate SAT II exams, chosen from 22 subject areas. "[The SAT II] doesn't begin to approach a kind of equity solution," says University of Chicago dean Ted O'Neill.

College officials who de-emphasize the SAT usually focus more on evaluating the high schools that students come from. "If we don't have SAT any longer, we'll have to weigh more heavily on what's left—the students' GPA, their curriculum of college-prep courses and other things," says Rae Lee Siporin, admissions director of UCLA, which receives more applications each year—about 40,000—than any other U.S. college. But those measures can amplify the inequalities among high schools even more than the SAT. As Duke University admissions director Christoph Guttentag notes, "The students in school districts with more resources will be more equipped."



LOUIS PSIHOYOS—MATRIX

SCOTT MC NEALY
CEO, SUN MICROSYSTEMS
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Take Advanced Placement classes, the top-level high school courses sponsored by the College Board. APs can help kids earn college credit early, but many high schools can't afford the superqualified teachers and advanced books required for AP classrooms. A California study found that the availability of AP offerings in a school decreases as the percentage of minority and low-income students increases. In 1999, the A.C.L.U. sued the state of California, accusing U.C. schools of favoring applicants who have taken APs. Rasheda Daniel, a plaintiff, says she and her classmates didn't have an equal chance of getting into U.C. "When you look at a lot of high schools, there are gross disparities across class lines," she says. "It's not fair."

Daniel's contention is right and explains why no admissions scheme can be totally equitable. Some reformers say Florida and Texas come closest. By law, the public universities in those states must offer admission to all who graduate in the top 20% (Florida) or 10% (Texas) of their class, no matter how poor their high school. Public universities in both states still use SATs, however—Florida to sort out which kids will go to the larger, more presitigious colleges, Texas to decide who needs retention programs.

Of course, Florida and Texas lawmakers weren't attacking the SAT itself. They wanted to maintain diverse campuses even though affirmative action had been banned in their states. Conservatives suspect U.C.'s Atkinson has the same motive. Those who favor affirmative action have long wanted to ignore SAT scores, says Ward Connerly, a U.C. regent and anti-affirmative-action activist. (Atkinson has said he wasn't motivated by race.) Connerly believes moving away from standard measures like the SAT will mean colleges lose their fundamental goal of academic excellence. "Looking at a student's potential and the adversity they've overcome—what I call the Academic Misery Index—has the potential of totally reforming college," he says, turning campuses into institutions that value diversity and community service over learning.

High schools are changing too. Baby boomer parents have started movements against homework, stringent graduation requirements, class rankings; it's as though they believe their children should never have to suffer the indignity of being evaluated. Pity those kids when they get their first job. Last month Laila Kouri, 16, reflected on the SAT as she sat through an expensive coaching class in ritzy Westport, Conn. "I know people who blow off classes, are failing school and walk into the SAT and get a 1200 the first time," she sighed. "How can this be a fair test?" Well, as Kouri has learned, no one ever said life's tests were fair.

—Reported by Matt Baron/Chicago, Leslie Everton Brice/Atlanta, Daren Fonda, Andrew Goldstein, Jodie Morse, Desa Philadelphia and Rebecca Winters/New York, Marc Hequet/St. Paul, Kathie Klarreich/Miami, and Jeff Ressner/Los Angeles

Viewpoint ■ Nicholas Lemann

WHAT DO THESE TWO MEN HA

TO SOMEBODY WHO DOESN'T FOLLOW THE INS AND OUTS OF testing, the events of the past couple of weeks might seem contradictory. First the president of the University of California, Richard Atkinson, made a speech proposing dropping the SAT. It looked as if testing was going into ebb tide, right? Then, a few days later, George W. Bush began his first major address as President by proposing an enormous new federally mandated regime of standardized tests for public schoolchildren, with every student being tested in reading and math every year from third through eighth grade. This would be the first Washington-ordered standardized educational test, and if instituted it would increase the scope of testing by far more than Atkinson's proposal would reduce it. So what's going on here?

The answer is that there wasn't really any inconsistency between Atkinson's speech and Bush's, even though one man wants to abolish tests and the other wants to institute them, because the underlying idea is the same: to use tests as a tool to encourage students to master a set body of material in school.

This is not the underlying idea of the SAT—in fact, the original idea of the SAT was almost exactly the opposite: to use a test as a tool for discovering and whisking away to universities a small number of students of extraordinary ability, not to try to find out how well most students were learning or most schools were teaching.

The SAT began its life as an intelligence test, which its makers believed measured innate mental ability. Carl Brigham, the test's inventor, was part of the team that developed the Army intelligence tests during World War I; the first SAT was an adapted version of that test. Henry Chauncey, the founding president of the Educational Testing Service, and his boss during his previous job as an assistant dean at Harvard in the 1930s and '40s, James Bryant Conant, chose the SAT as an admissions test because Conant saw it as an IQ test. In those days, high school was a relatively new institution in the U.S. There were actually more high schools then than there are now, but they were decentralized and of highly variable quality. Conant wanted to accomplish two goals: primarily to make sure the best minds got to top universities so the nation could make use of them and secondarily to make the student bodies of Harvard and schools like it more academic and more national. The SAT was attractive to him because it seemed then to factor out the quality of the taker's education.

Atkinson was addressing a situation that Conant and Chauncey didn't imagine. The SAT, now with millions of takers a year, has become a national fetish. A large portion of the high school student and parent population believes it is the main determinant of admission to a selective college, which in turn is the main determinant of one's eventual socioeconomic status (both propositions that the test's makers heatedly deny). High school students and their parents also believe that scores on the all important test can be raised by spending hundreds, even thousands, of dollars on courses that teach you tricks for outwitting the test (its makers deny that too). Real estate values in suburban communities vary with the local high school's average SAT scores, even though the test was not designed to measure schools.

Although few people are aware of the SAT's direct roots in intelligence testing, lots of kids have a vague sense that the test measures how smart you are, and they internalize the score as a lifelong measure of their innate worth. The SAT is like a medicine that accomplished its original purpose—identifying a few hundred especially gifted high school students every year—but has had unusually powerful and harmful side effects.

The University of California, like most state universities, used the SAT to make itself more selective and to set itself apart from the public high school system of its state. In the early 1960s, the uni-

COURTESY UNIVERSITY OF CALIFORNIA

RICHARD ATKINSON
PRESIDENT, UNIVERSITY OF CALIFORNIA

HIS PLAN To drop the SAT for the U.C. system's 90,000 yearly applicants. He wants to replace it with standardized achievement tests that measure students' mastery of specific subjects

IAVE IN COMMON?

One wants to junk a test; the other wants to impose many. But they agree on what a test should measure

versity accredited California high schools and admitted many more students than it had room for, a large portion of whom dropped out or took longer than four years to graduate. With the advent of the SAT, the university stopped monitoring high school education and started accepting fewer students. Over the years, applications soared, and a series of increasingly bitter fights began over who would get the increasingly precious slots, especially at the university's flagship schools, Berkeley and UCLA. During the late '80s and early '90s, Berkeley admitted half of its freshman class purely by a numerical formula in which SAT scores were the most important element. Because of the substantial gap among the races on the SAT, the schools could maintain a substantial minority presence only by explicitly setting test scores aside—which led to a revolt, culminating in a successful state ballot initiative against affirmative action. Surely Atkinson proposed abolishing the SAT in the hope of diminishing some of the nearly unbearable pressures that the adoption of it had generated.

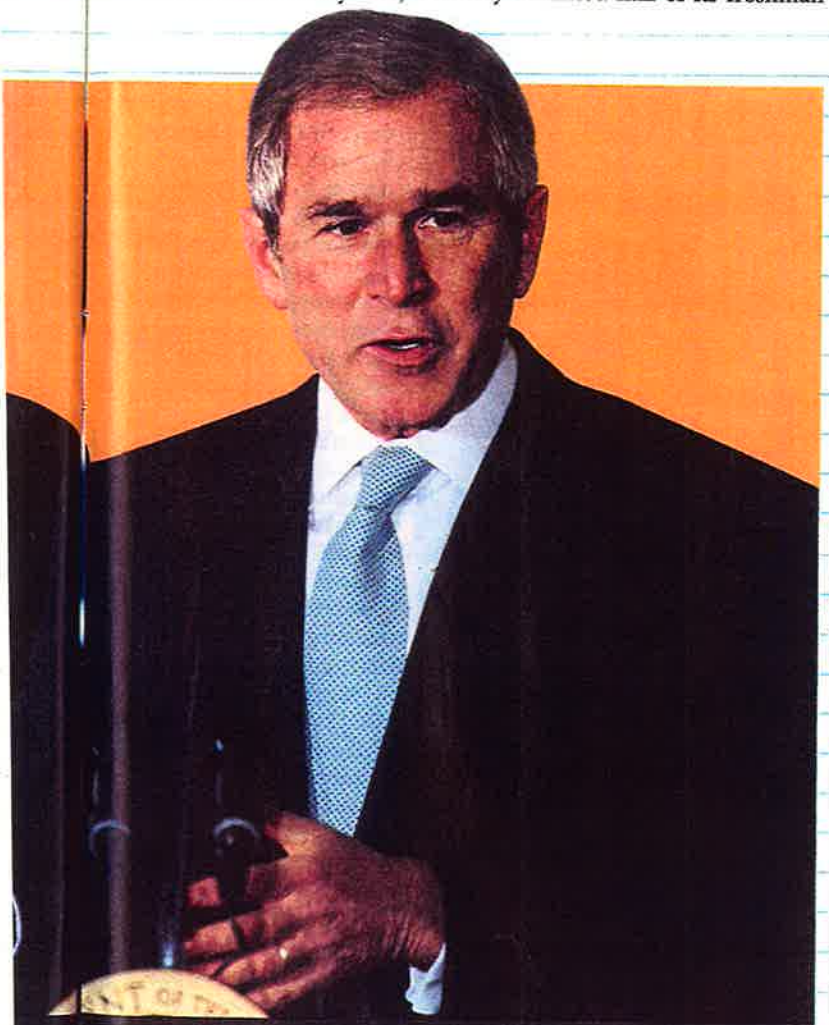
But Atkinson did not propose abolishing all standardized admission tests and allowing students to get in to the University of California on high school grades alone. He proposed, instead, replacing the SAT with standardized achievement tests that measure students' mastery of specific subjects they have learned in high school. This will preserve the medicinal power of the SAT—its ability to spot a potential future Nobel prizewinner languishing in an obscure high school, which was Conant's main interest—while substantially reducing its harmful side effects.

The vast majority of test takers don't wind up going to élite schools like Berkeley. Requiring achievement tests rather than aptitude tests is much better for the average high school student. Instantly it becomes clear what the tests measure: learning. There is a clear incentive to study the course material in school, rather than try to learn test-taking tricks. Parents and the general public have a way of measuring the quality of high school education, which ought to be a step on the road to making schools better. Scores will register in the mind as a record of accomplishment, not intelligence.

President Bush proposed a regime of achievement tests for the elementary and middle school grades all over the country, and president Atkinson proposed a regime of achievement tests for high schools in California. It's all the same idea. Half a century ago, Conant and Chauncey created, in the SAT, national education standards for the most gifted and best educated few. Now Bush and Atkinson are proposing to create national education standards for the many.

As we will soon see, national achievement tests are going to set off a series of fights different but no less intense than the ones the SAT has set off. Teachers and schools, which will be, in effect, graded and will have at least a good portion of what they teach dictated to them by outsiders, won't especially like achievement tests. People will complain that the tests have transformed American schools into drill factories. If the tests are pitched at a high level, they will be accused of punishing poor and minority students, and if they are pitched at a low level, they will be accused of dumbing down the schools.

The fights ought not be taken as proof that national standards are unworkable. National standards serve a much more ambitious cause than the SATs, and also a nobler one—not identifying a few very smart students regardless of background, Cinderella style, but trying to ensure that all students reliably acquire basic educational skills and therefore a meaningful chance in life. ■



CYNTHIA JOHNSON FOR TIME

GEORGE W. BUSH
PRESIDENT, UNITED STATES OF AMERICA

HIS PLAN To mandate standardized tests for public school children in reading and math every year from third through eighth grade. Like Atkinson, he views tests as a way to encourage students to master factual material

Nicholas Lemann, a staff writer at the New Yorker, *is author of* The Big Test: The Secret History of the American Meritocracy