Tracing Burt's Descent to Scientific Fraud

Writer of authorized biography provides psychological study of eminent British psychologist's decline after pioneering work

A new and definitive biography of the eminent British psychologist Sir Cyril Burt* has confirmed that he engaged in deliberate deception, fabricated research data, and invented nonexistent "colleagues" to support his theories about intelligence. The conclusion carries the more weight because the author of the biography, Professor Leslie Hearnshaw, began his task as an admirer.

Hearnshaw admits that when the first critical murmurs about Burt surfaced in 1974 he was inclined to doubt them. Even when in 1976 these doubts were picked up and developed by Oliver Gillie of the London *Sunday Times* into a now-famous front-page story, Hearnshaw still doubted that the charge of fraud had been proved. But Hearnshaw says that gradually, as evidence accumulated, "I became convinced that the charges against Burt were, in their essentials, valid, and the problem became that of explaining how a man of Burt's eminence and exceptional gifts should have succumbed in this way."

This conviction turned Hearnshaw's biography into a psychological study of Burt. It reveals the pressures and the loneliness which turned Burt into an obsessive, constantly imagining that others were out to discredit his work or diminish his achievements. It also shows in considerable detail how Burt attempted to rewrite the history of psychology in Britain, giving himself a more prominent role in the discovery of factor analysis (an important statistical method) than he in fact deserved.

Hearnshaw, a psychologist who held the Chair of Psychology at Liverpool University between 1947 and his retirement in 1975, has specialized in the history of British psychology. After Burt died in 1971, Hearnshaw was asked to deliver the oration at his Memorial Service and was subsequently chosen by Dr. Marion Burt as the right man to produce a biography of her brother. The work was begun with a grant of £300 from Marion Burt to Hearnshaw to enable him to start research.

As it began, therefore, it seemed likely that Hearnshaw's book would be favorable to Burt. Hearnshaw had not known Burt well and had never worked in the same fields of psychology, so had no reason to doubt that the old man was all he had claimed to be. Marion Burt clearly had no doubts either; as late as November 1976 she wrote an angry letter to this writer claiming that any doubts about Sir Cyril's results were a libel to a dead man and a "defamation without foundation." It was not until Hearnshaw told her in April 1978 that he had been forced to accept the truth of the accusations that she seems to have acknowledged her brother might have been dishonest. Her reaction then, says Hearnshaw, was rather remarkable: "She simply said that if I was to substantiate the charges I should need much more space than the 100,000 words originally agreed with the publishers. When I informed her that I had been granted permission to extend the length of the book she replied 'I am delighted.' " She died suddenly in May 1978 at the age of 87, an old lady with much of the force of character which had made her brother such a tough adversary in the world of psychology.

Cyril Burt came from a middle-class but not a wealthy background; his father was a general practitioner who never seems to have made much money. Burt, born in 1883, won scholarships at school and at Jesus College, Oxford, where he studied classics, philosophy, and a little psychology. In 1908 he took up a post as a lecturer at the University of Liverpool, at a moment when psychology was expanding rapidly. A phenomenal worker, Burt quickly began studies of suitable tests for intelligence, a field in which he was to make his name. Four years later he was appointed Psychologist to the London County Council, and it was here that most of his studies of schoolchildren were carried out.

It was a key post, which Burt held for almost 20 years, and it enabled him to establish himself as the dominant voice in educational psychology in Britain (*Science*, 26 November 1976). The intelligence tests he carried out on children form the raw material from which the arguments about the heritability of intelligence have been queried by many subsequent investigators. The quality of this raw material is now impossible to assess, because all of Burt's notes were lost in 1941 when a bomb fell on University College, London, where they had been stored.

The data which are of greatest interest are those that relate to identical twins reared apart. In 1943, in an article on "Ability and income" he reported on 15 such pairs; in 1955 the number in his sample had increased to 21, and by 1966 to 53. Curiously, despite the increase in numbers, the correlations calculated by Burt remained identical to three places of decimals, a mathematical impossibility which seems to have gone unnoticed at the time.

From a careful study of Burt's diaries, Hearnshaw concludes that the increased numbers of twins quoted by Burt were a fabrication. The diaries are so exceptionally detailed, listing his visitors as well as such trivia as haircuts, tea in the garden, walks on Primrose Hill, or the disappearance of the cat, that one can be reasonably certain, Hearnshaw says, that no important contact or activity has been omitted. Hearnshaw doubts that Burt gathered any new data after 1950, and perhaps none after 1939; certainly the rapid increase in the numbers of twin pairs in the 1950's was an invention.

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Nor was Burt visited during the 1950's and 1960's by his two mysterious "collaborators," Miss Howard and Miss Conway, whom he credited with having gathered some of the data. Although there are those who believe that Miss Howard really existed, evidence for the reality of Miss Conway is scanty in the extreme. Even if both did exist, they certainly did not carry out the research published under their names in the journal

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Environmental Warfare Treaty

Prospects for U.S. ratification of the environmental warfare treaty, which the Senate itself first proposed but then was in no hurry to approve, are now excellent because of a switch in strategy on the part of the Federation of American Scientists (FAS) and several major environmental groups. On 30 July the Committee on Foreign Relations voted 9-0 to report the treaty to the Senate with its approval.

As recently as last fall the FAS and the other groups, which include the Sierra Club and the Natural Resources Defense Council, were opposing U.S. ratification on the grounds that the treaty is too weak and too permissive. But, since then, these groups, aware that the treaty went into force in October when Laos became the 20th nation to ratify it, have decided that the best strategy is for the United States to become a party to the treaty and to press for strengthening changes.

In 1973 the Senate passed a resolution calling for all nations to join in an Environmental Modification Convention—the name the treaty is now known by—that would ban defoliation and rainmaking of the kind done by the United States in Vietnam along with such other and possibly more far-reaching environmental warfare methods that might be invented in the future.

But later, during the Ford Administration, the draft treaty was revised at the insistence of U.S. negotiators to include a "threshold" that limits the treaty's scope to "hostile use of environmental modification techniques having widespread, long-lasting, or severe effects." These were defined as effects that would be felt for at least several months over an area of several hundred square kilometers, with serious harm to "human life, natural and economic resources or other assets."

The FAS and the environmental groups strongly objected to this change, believing that it might be argued by the military in the United States and other countries that practices such as rainmaking and defoliation are not covered. James N. Barnes, an attorney with the Center for Law and Social Policy representing these groups, has observed, for instance, that, although the defoliation campaign in Vietnam extended over large regions and caused severe and long-lasting damage, it is not clear that "individual sprayings taken alone would cross the threshold."

The groups also saw other shortcomings in the treaty, among them the fact that research and development on hostile use of environmental modification techniques would not be banned. In 1976 the groups brought suit against the State Department to require that an environmental impact statement be prepared on the treaty. Last year when the statement was finally issued, the groups found it seriously deficient.

Nonetheless, despite his clients' long-standing objections to the treaty, Barnes announced at a Senate hearing in May that the groups now favored U.S. ratification. Senator Claiborne Pell (D-R.I.), the prime mover behind the treaty back in the early 1970's and now chairman of the foreign relations subcommittee on arms control, oceans, and international environment, asked Barnes and Assistant Secretary of State Thomas R. Pickering to seek agreement on what the scope of a State Department study of the treaty should be.

Pickering, whose responsibilities encompass international environmental and scientific affairs, reported to Pell in June that this has been accomplished. He and Barnes have agreed that the study, which the State Department will undertake within 6 months of Senate ratification, should cover the treaty's threshold provision and certain other matters, including the question whether R & D activities should be banned.

According to Geryld Christianson, Pell's aide for foreign relations, the senator will push for ratification of the treaty at the first opportunity, which could come either before or after the Strategic Arms Limitation Treaty is disposed of. Christianson said he knows of no groups or agencies now opposing the convention. In fact, he said, the Department of Defense, like the Environmental Protection Agency and the Council on Environmental Quality, is on record as supporting it.—LUTHER J. CARTER

edited by Burt. One entry in Burt's diary, for 7 April 1962, gives the game away: "chiefly doing Howard's reply to Isaacs," Burt wrote.

One of Burt's problems in the 1960's was in responding to educationalists and psychologists who asked for his original data. From 1960 onward, Hearnshaw says, he was often asked to do so, and with two exceptions he always failed to reply. One of these was when he supplied data on the 53 sets of separately reared twins to Christopher Jencks of Harvard in 1969. Jencks' request reached Burt on 2 December 1968, and he finally replied 7 weeks later on 25 January 1969. "I apologise for not replying more promptly," he wrote, "but I was away for the Christmas vacation, and college (where the data are stored) was closed until the opening of term."

This apology, Hearnshaw shows, was untrue in every particular. Burt had not been away for Christmas; his data were not stored at college, and the college had only been closed for a week. Burt's diary shows that he spent the whole of the week from 2 January onward "calculating data on twins for Jencks." On 11 January he "finished checking tables for Jencks." What he was in fact doing was reconstructing the raw data from the correlations, working back from his answer to create wholly fallacious data. The table he provided subsequently appeared in an article by American psychologist Arthur Jensen.

Burt's invention of co-workers did not stop with Howard and Conway. During his years as editor of the *British Journal of Psychology (Statistical Section)* some 40 different people contributed reviews, notes, and letters to the journal. Of these, well over half are unidentifiable, Hearnshaw says, and "judging from the style and content of their contributions were pseudonyms for Burt." Why did he do it? This large family of characters was invented, Hearnshaw believes, to save his face and boost his ego. They enabled him to expound his views, sometimes by replying to notes written by himself under other names; and, most important of all, it enabled him to maintain the fiction that he was still actively engaged in research and the collection of data on twins.

But the fascination of Burt was that he was not simply a phony. He was a man of extraordinary knowledge and capable of considerable charm. In his retirement, living on a totally inadequate pension in a large Hampstead apartment, he earned a little money by reading manuscripts for publishers. His reports were astonishing for their length and erudition; so much so

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that publishers were occasionally embarrassed into paying him more than they had promised.

Hearnshaw's conclusion is that until about 1930 Burt deserved his high reputation. But in the late 1930's things began to go wrong. His marriage in 1932 to a much younger woman was a failure, his papers were destroyed in 1941, and he began at about the same time to suffer from attacks of Ménière's disease, a condition affecting the organs of balance. It was in the late 1930's that Burt began to make exaggerated claims about his own contributions to factor analysis, which he promptly withdrew on being challenged by C. E. Spearman, its true originator. After Spearman's death Burt's claims became even more outrageous, but with nobody to deny them they became generally accepted.

The egotistical and devious behavior, Hearnshaw suggests, was a reaction to setbacks Burt began to experience in the late 1930's and that as those setbacks accumlated, so the changes in Burt's personality became more pronounced. The 1943 paper on ability and income was a watershed in Burt's career: "provocative in content and suspect in its procedures," according to Hearnshaw. Most of Burt's work after that time represents a decline from the standards he had earlier reached.

Hearnshaw suggests that in fact Burt suffered from paranoia; his secrecy, suspicion of rivals, egocentricity, compulsive motivation, and hypochondria are all consistent with this diagnosis. But whether Burt actually deluded himself, and believed his own fictions, is harder to answer. Hearnshaw believes that the root to Burt's problems lay in a tough childhood where he had been obliged to make his own way; but many others survive such a childhood unscathed. Whatever the explanation, Burt "chose to cheat rather than see his opponents triumph" is the sad and touching conclusion Hearnshaw finally reaches.

—NIGEL HAWKES

More Stress on Applied Science at NSF

Atkinson favors faster growth for programs in this field; agency under scrutiny as Congress reviews basic law

What the Carter Administration and Congress will do to encourage U.S. industrial innovation and productivity in the face of stiff foreign competition will not be known for some months yet, after completion of the Administration's ongoing "domestic policy review" of this problem (*Science*, 27 July). But the very fact that the problem is squarely on the national agenda is having an effect on the National Science Foundation, which seems more clearly disposed than before to seek rapid growth of programs in engineering and applied science.

NSF's basic statute comes up for renewal next year and a general review of the agency's activities has begun in Congress (*Science*, 8 June). Under the circumstances now prevailing, it is possible that pressure will be applied for significant changes in the foundation's role.

Some people on Capitol Hill and elsewhere feel that, in the past, NSF deliberately chose not to push vigorously for development of programs in applied fields for fear that such growth would take money away from the support of basic research, the foundation's primary mission. Under the NSF budget for fiscal 1980 just approved by House and Senate conferees, funding levels for most applied science programs will remain flat unless supplemental appropriations are requested by the Carter Administration and approved by Congress. Support for basic science and engineering programs will be up 8½ percent, which is a slightly larger increase than usual but not enough to offset inflation.

But, according to Jack T. Sanderson, NSF's assistant director for engineering and applied science, prospects are now much improved for programs in his area. "I'm upbeat right now," he said. "The time is ripe for a substantial growth in the NSF engineering and applied science areas." In Sanderson's view, such programs are likely to receive strong support both from NSF and Congress.

Richard C. Atkinson, director of NSF, confirmed that he favors accelerating growth of these programs. "If things develop the way I hope over the next 10 years," he said, "there will be very healthy increases for the basic science budget, but the engineering budget will be growing even faster."

As he sees it, it will be partly a matter of building on past NSF initiatives, which have included development of three programs to strengthen ties between industry and the universities. In these particular programs, NSF is supporting cooperative research projects by industrial firms and universities; providing start-up money for the establishment of university-industry centers focused on technological innovation in certain fields; and paying for the initial phases of high-risk innovative research by small businesses, often with university collaboration.

On 31 July, at a hearing held by the House subcommittee on science, research, and technology on the question of what federal agencies can do to encourage industrial technology and innovation, Atkinson indicated that NSF hopes to get early budget increases for these programs. "We are actively seeking ways to expand our efforts in industry-university collaboration," he told Representative George E. Brown, Jr. (D-Calif.), chairman of the subcommittee. NSF was, he said, discussing this possibility with the White House Office of Science and Technology Policy (OSTP) and the Office of Management and Budget (OMB).

NSF has just enhanced the status of engineering and applied science by bringing programs in these two fields together in the new directorate that Sanderson heads. This marks a new stage in the foundation's fitful evolution of a role for itself in supporting research that is directly addressed to societal needs.

That evolution began with the "Daddario amendments" of 1968 by which Congress gave NSF authority to support certain kinds of applied research. Then, in 1971, came RANN (Research Applied to National Needs), a program that peaked in fiscal 1975 when its budget rose to $143 million. But that same year RANN lost its fast-growing energy research programs to the newly created Energy Research and Development Ad-

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