thors conclude that genetic variance was less important for infant mental development than for adult intelligence, but the genes that affected infant scores were correlated with the genes that affected adult scores.

For temperament and personality, the infants' scores were aggregated into three composite scores representing affect-extraversion, activity, and task orientation; and these were then compared to the parents' scores on extraversion and neuroticism (from Cattell's 16PF) and on emotionality, sociability, and activity (from Buss and Plomin's EASI).

Some correlations were found between maternal sociability/extraversion and the corresponding measure in the infant, but in the main parental personality had little power to predict infant temperament. Environmental correlates were not robust either, although one dimension of family organization termed personal growth was correlated with sociability in the infant.

The book closes with a provocative and sometimes optimistic set of conclusions drawn from the study, which give considerable prominence to genetic continuity between infancy and adulthood. One can accept this conclusion while being skeptical about the values of the genetic correlations that are adduced to support it. Heredity does play a role in individual differences; it contributes to developmental change as well as continuity, and it enters into certain ostensibly environmental relationships with infant development.

As the authors observed, the inherent limitation of the parent-offspring design was such that neither genes nor environment could account for a large proportion of the variance. As the infants get older and as other siblings are added to the study, we may expect a more powerful data set to appraise the role of genes and environment in guiding the course of development.

Any research project so large and complex involves countless decisions about data analysis that might be questioned, and this one is no exception. Factor analysis is heavily employed as a way of condensing variables and generating scores for the families, and often the factor scores represent only a limited proportion of the variance among the selected variables.

For example, the so-called IQ scores for the parents are based on the unrotated first factor obtained from 16 specific cognitive ability tests, and the first factor represents only 36 percent of the variance among the ability tests. A single-factor score of this sort is clearly losing some significant information about IQ.

The same approach was taken with the various environmental measures and personality/temperament measures, with some derived factor scales replacing the original scales. The authors are forthright about how the scales were created and what proportion of variance they account for, but when the results are reported in later chapters the reader must recall that the designated variables such as parental IQ are derived surrogates with reduced power. Perhaps some of the low-order relationships are due to the diminished variance represented in the factor scores.

Factor analysis also was employed in a marginal manner with the items from the Bayley Mental Scale. The Bayley items are arrayed by order of difficulty, without regard to content, and consequently the item intercorrelations are higher for adjacent items and lower for remote items. This generates a simplex matrix with a predetermined factor structure, and it is imprudent to use item factor loadings as a basis for identifying specific cognitive skills in infancy.

The path analysis model is a powerful analytic tool, and it does provide a genetic correlation between infancy and adulthood, but a caveat should be entered here against taking the genetic correlation too seriously. As computed in this model, the correlation can take on values exceeding 1.00 and gives an artificial impression of correspondence between infancy and adulthood that far exceeds the empirical correlation for the behavior involved.

Such detailed criticisms could be multiplied manyfold, but it is important to recognize that they represent only a mildly dissonant counterpoint to a very strong theme. The design and execution of this adoption study are without parallel in psychology, and only those investigators who have labored in longitudinal studies can fully appreciate what a major accomplishment the study is. With trivial exceptions, it is a textbook case of how the complete adoption study should be performed.

The assessments are comprehensive and well chosen, the samples are well matched and reasonably representative, the retention rate is high for families in a longitudinal study, and the analyses are drawn from the powerful models in quantitative behavior genetics. If the results are somewhat tentative at this point, it is because the authors have shouldered a heavy burden in looking for parent-offspring relationships between infancy and adulthood.

As it stands, this book is an invaluable description of a research program and a sophisticated discussion of the behavior-genetic concepts that undergird it. The results are a provocative preview of more powerful results to be expected five years hence. It is an authentic landmark study, and when the final history of developmental psychology is written its impact will loom large.

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Lewis Strauss

No Sacrifice Too Great. The Life of Lewis L. Strauss. RICHARD PFAU. University Press of Virginia, Charlottesville, 1985. xii, 314 pp., illus. $17.95.

Lewis Strauss was a major figure in the politics of U.S. nuclear policy. He was a member of the Atomic Energy Commission (AEC) from 1946 to 1950 and chairman from 1953 to 1958. It is useful therefore to have Richard Pfau's documentation of Strauss's positions on important postwar issues. However, Pfau does not match thoroughness of research with persuasiveness of interpretation. His overall view of Strauss as a tragic hero is ultimately too exaggerated to sustain.

Pfau describes how Strauss's first encounter with Washington administration changed his life. In 1917, at 21 years of age, he volunteered for administrative duty with Herbert Hoover's Food Administration, and by luck and design became the great man's personal secretary. As a result, he gained permanent membership in Hoover's Republican circle and also found his way into the world of investment banking. He joined the Wall Street firm of Kuhn, Loeb in 1919.

Strauss prospered between the wars. His income rose. So did his status. He became active in Jewish philanthropic organizations. He campaigned for Hoover in 1928. He took a commission in the naval reserve, and in 1941 he went on active duty. In five years of distinguished wartime service he contributed to a number of projects, including development of the proximity fuse and naval planning for postwar programs. His war work brought him into close contact with Navy Secretary James Forrestal, a former Wall Street acquaintance, Navy partisan, and fervid anti-Communist; and his term as Forrestal's representative on the Interim Committee on Atomic Energy led him to the AEC in 1946.

Strauss was frequently at odds with his fellow commissioners. Data security was an idée fixe with him. He remained far more wary than others about technical cooperation with the British, for example, and about shipment of radioisotopes to the Norwegian Defense Establishment. Strauss was also more aggressive in favor of arrangements to monitor radioactivity in the upper atmosphere. Pfau regards him as a major force in the eventual inauguration of a long-range detection system. Strauss also came early to the view that American security depended upon the super-bomb, and he was equally tenacious on that issue both before and after his resignation from the AEC in April 1950.

If Strauss had disappeared from public view at this point he would in all likelihood have escaped scholarly attention. But in 1953 Eisenhower appointed him AEC chairman, and the controversies that swirled around him in the next five years kept him in the headlines.

The Oppenheimer loyalty case was the first issue Strauss took up as chairman, and Pfau's detailed account of this episode is the most significant part of the book. Strauss disliked Oppenheimer for personal reasons, but Pfau argues that Strauss's position derived essentially from objective evaluation. Oppenheimer's opposition to the super-bomb program genuinely convinced Strauss that the scientist, "whether consciously or not," was working against the American interest.

According to the author, Strauss ultimately believed that Oppenheimer was a Soviet agent, and "several times in those December days . . . he wondered aloud whether Oppenheimer might flee behind the Iron Curtain" (p. 159). Pfau personally endorses the Security Board's majority finding against Oppenheimer, but he criticizes Strauss's conduct. "The FBI listened to [Oppenheimer's] telephone calls, followed his movements, and invaded the privacy of his relationship with his attorney, all with the approval and encouragement of Strauss" (p. 181).

What Pfau wants us to see in this behavior is patriotic defense of the national interest, not political paranoia, and certainly not personal vindictiveness. If Strauss erred, it was from excessive zeal on behalf of patriotic principle. (There is a symbolic message in the red, white, and blue book jacket.) Moreover, Pfau argues that Strauss paid a price for these excesses. The enemies he made in both the scientific community and the liberal press contributed to his downfall. In 1959 the Senate rejected his nomination as Secretary of Commerce, and Strauss was forced to make an ignominious retreat from public life. Pfau's basic theme is that Strauss sacrificed his own career in the cause of guarding U.S. security interest.

It is a pretentious argument. Even if we grant that liberals, eager to think the worst, unfairly maligned Strauss, even if we accept Pfau's interpretation of Strauss's motives, there is still no need to cast Strauss as a tragic hero. Moreover, the argument has little relevance to subsequent sections of the book where Strauss is shown creating additional "enemies" in struggles over commercial development of nuclear energy. These were essentially partisan, interest-group affairs in which Strauss, a conservative Republican, conducted himself with no more or less patriotic honor than anyone else. Moreover, as Pfau notes with some disappointment, Strauss proved disingenuous under critical questioning during these events and generally "vain, arrogant, and self-righteous in defense of his record" (p. 234). Strauss simply alienated a lot of senators and came up short on votes.

Pfau's inflated interpretative device gets in the way of a more critical evaluation of the evidence. It also pulls the analysis too often into moral categories. Pfau needed just a little more distance on his materials to write a fully satisfying biography.

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Ocolomotor Adaptation

Adaptive Mechanisms in Gaze Control. Facts and Theories. A. BERTHOZ and G. MELVILL JONES, Eds. Elsevier, New York, 1985. xxviii, 386 pp., illus. $109.25. Reviews of Oculomotor Research, vol. 1.

When the head rotates in one direction the eyes move in the opposite direction at the same speed, stabilizing vision. The circuitry of this vestibulo-ocular reflex is rather simple as neural systems go. The vestibular apparatus acts as a transducer and sends signals coding the angular velocity of head rotations to the brainstem via the vestibular nerve. Central neural pathways in the vestibular nucleus and reticular formation further process the movement signal and in turn project to the motor neurons innervating the eye muscles that move the eyes. The reflex is very rapid but is "open loop" with no direct feedback of performance for the reduction of error during its operation. However, the wearing of magnifying spectacles that double the size of the retinal image will in a matter of hours nearly double the size of the vestibulo-ocular reflex. An adaptive mechanism not in the main line of the reflex has monitored performance and in this case adjusted parameters within the direct reflex pathway to maintain a stable retinal image during head movements.

Since adaptive mechanisms often act on simple systems such as the vestibulo-ocular reflex, they are ideal models for understanding the neural mechanisms of learning in mammals. The recent explosion of work on these mechanisms and their relevance to learning makes this book a timely addition to the literature.

The first half of the book is devoted primarily to behavioral and psychophysical studies of adaptive processes in various gaze control systems. The diversity of topics covered indicates how universal adaptive mechanisms are to neural control systems. There are excellent chapters on adaptive processes for saccades, accommodation and vergence, the vestibulo-ocular reflex, head-eye coordination, and the integration of vestibular, optokinetic, and pursuit mechanisms. Several chapters consider the rapid compensation that occurs after disturbance of the vestibular input, either through lesion of the vestibular apparatus or nerve or through experimental plugging of the semicircular canals. Zee and Optican point out that deficits that occur following lesions to oculomotor systems are generally transient, the result of adaptive repair. On the other hand, longer-lasting disorders can occur from lesions remote from the direct eye movement pathways when the lesions involve structures concerned with accomplishing adaptation such as the cerebellum. What emerges from this collection of reviews, then, is that adaptive mechanisms play an important role in recalibrating neural systems during growth, after muscle or neural damage resulting from disease, trauma, or aging, or in response to changes in the environment that may range from the mundane (such as small changes in magnification with a new pair of prescription glasses) to the unusual (such as weightlessness during space flight).

The second half of the book explores neural mechanisms underlying adaptation. It includes sections on neural recordings and newer theoretical models of adaptive processes. Several of the chapters present evidence that the cerebellum plays a key role in adaptation. Adaptation implies a change in synaptic trans-