



Photo of Hans Eysenck
courtesy of Arthur R. Jensen.

Chapter 20— Hans Eysenck: Apostle of the London School

Arthur R. Jensen

Hans Jurgen Eysenck (1916–1997) was probably the world's most famous psychologist of his period, rivaled in renown only by Jean Piaget (chap. 9, *Pioneers III*) and B. F. Skinner (chap. 16, *Pioneers III*). In Britain he became a well-known public figure because of his many popular books, interviews in the mass media, and appearances on radio and television. Almost from the beginning of his brilliant career, spanning 55 years, he was a popular and controversial subject of conversation in British psychological circles. He was one of those rare individuals who become the subject of anecdotes—some apocryphal, many true—that express a gamut of emotions ranging from extravagant vituperation, to wonderment, to veneration. In this respect, with the possible exception of Sigmund Freud (chap. 4, *Pioneers I*) there probably has been no other psychologist like him. Eysenck himself would have hated any other kind of comparison with Freud, because he was a leading critic of Freudian psychoanalytic theory and practice in the second half of the 20th century.

Character and Reputation

One of his colleagues at the University of London's Institute of Psychiatry, where Eysenck spent his career, once remarked that he never thought of Eysenck as a real person but rather as some kind of phenomenon or institution. I thought it a perceptive insight. But why would anyone say this about a person who, to all appearances, was perfectly normal, steady, reasonable, decent, and kindly?

The answer undoubtedly has to do with Eysenck's incredible level of activity and productivity, emanating continuously from a seemingly quiet, introverted (but not in the least shy), even-tempered, unhurried man. The amount of work he accomplished day after day was incredible. Eysenck usually gave the impression of not being busy. Somehow it appeared that everything he did was exceedingly easy for him to do. Colleagues who might take a week or two to write a journal article, a book chapter, or a research proposal would see him routinely perform such tasks in a single morning's session of dictation to his secretary or a dictating machine. He dictated at the speed with which one normally reads aloud—without back-tracking, interrupting, or correcting. When I was in his department he dictated a complete book during his two weeks summer vacation—one complete chapter every morning! Once, when I asked how it was possible for him to do all this, he said it was a gift for which he was most grateful. He said that each chapter was already thought out before he left for work, and rehearsed while he walked to the office. There, it was simply a matter of "reading out" what was already in his head. His expository prose was notably clear and highly readable—a "natural style," he called it. Remarkably, English was not his native language, but his third, after German and French.

During his career, Eysenck wrote 61 books, edited 10 more, and published more than 1000 journal articles, reviews, and book chapters. One of the recognized measures of scientists' influence is the frequency of citations of their publications in the professional literature. According to the Institute for Scientific Information, which publishes the *Social Science Citation Index* (SSCI), Eysenck's SSCI citation count is exceeded by only three individuals: Freud, Karl Marx, and Jean Piaget, in that order. After Piaget died in 1980, Eysenck was the most frequently cited living psychologist.

In spite of his prodigious output, Eysenck's writing took only about half his daily working time. He founded the graduate Department of Psychology, with both a research division and a clinical training division, in the Institute of Psychiatry at the old Maudsley Hospital, Britain's leading psychiatric center; he was its head for 30 years, until his official retirement at age 65. Eysenck was also chief psychologist at the Royal Bethlehem (from which the word, "bedlam," came) Hospital, England's oldest and largest psychiatric facility. He founded and edited two psychological journals, *Behaviour Research and Therapy* and *Personality and Individual Differences*. He regularly taught courses for the resident physicians in psychiatric training at Maudsley and held seminars for graduate students and the many postdoctoral fellows who spent a year or two in his department.

Eysenck and his wife Sybil also held "at homes" every Wednesday evening for his faculty and postdocs to discuss their own research and the related literature. He gave countless invited addresses at psychological conferences and lectured at numerous universities, not only in Europe and North America but in such

far-flung places as Australia, Egypt, Hong Kong, India, Israel, Mexico, Singapore, South Africa, and South America. He was an excellent and memorable lecturer, a model of organization and lucidity, typically with a bit of showmanship thrown in that made his appearances events that audiences talked about long afterward. Although he was invariably polite, Eysenck was impatient with those who rejected the idea that personality could be studied objectively and quantitatively in the manner of the natural sciences. The calm, polished, and sharp manner in which he routed opponents who challenged him was legendary; it left some spectators in awe while others were amused or angered.

While working for three years (1956–1958 and 1964–1965) in Eysenck's department, I observed his daily routine. He walked to his office every day, arriving regularly at 8:30 a.m. He had a large correspondence, and as a "warm-up" dictated answers to all the letters in each day's mail, reading each one and answering it almost simultaneously. His desk was always perfectly clean; secretaries brought things in, he acted on them then and there, and then they took them out. I never saw work pile up on him. Even after returning from two weeks abroad, he would clean up a huge pile of mail in just a morning's session of dictation. If his correspondence was not enough warm-up, he would dictate a letter to the editor of one of the London dailies or a popular magazine, but not necessarily about anything psychological. One day his secretary told me he had dictated such a letter explaining his ideas for solving the traffic and parking problems in central London. A member of his staff once remarked that Eysenck had more opinions about more different things than any-one since George Bernard Shaw. After these warm-up exercises, he dictated materials for a book, a journal article, a research proposal, or a progress report to one of the granting agencies that supported him. While dictating, he seldom sat down at his desk, but paced around in his office. I asked him once if so much continuous dictation ever tired him. He gave a typical Eysenckian answer. Pointing to his jaw, he said, "Yes, I suppose this gets a little tired sometimes" (never his brain, of course!).

At the midmorning coffee break, when everyone went to the cafeteria, Eysenck never drank coffee or tea. He used this time to permit students or staff to discuss technical or research problems with him. He usually skipped lunch and, during the lunch hour, played tennis or squash. A lifelong sportsman, he was a serious and intensely competitive player. Afternoons were usually devoted to receiving his many professional visitors, giving lectures, conducting seminars, editing journals, and conferring with doctoral students on their dissertation projects. For a busy man, he was amazingly accessible. He avoided faculty meetings, which he considered a waste of everyone's time, and always had an excuse to absent himself from routine academic affairs. As a benevolent autocrat, he simply ran the department in an unobtrusive and somewhat *laissez-faire* manner, once saying that he confined all his administrative chores to the last hour of every Friday afternoon. He always walked home from work between about 4:30 and 5:00 P.M.

Eysenck seldom took work home with him but spent his after-dinner hours reading. He was a voracious and speedy reader, and read widely in psychology and the other sciences (particularly physics), as well as the philosophy of science and detective novels. His lifelong habit of omnivorous reading showed in his conversation and in his writing. He was immensely erudite. His quick grasp and ready memory for everything he read were amazing, as one would discover in discussing one's own publications with him. Some colleagues have called him a genius, but he insisted that he was not. He generally applied that exalted term to the likes of Shakespeare, Newton, Beethoven, and Einstein. Genius or not, his exceptional ability, quickness of mind, and intellectual grasp were striking to all who knew him.

Biography

The story of Eysenck's life is detailed in his autobiography (1997) and in a biography by Gibson (1981). Eysenck was born on March 4, 1916, in Berlin when Germany was engaged in World War I and headed for a catastrophic defeat just two years later. Hans grew up during the turmoil of postwar Germany. Both of his parents were talented theatrical performers, his father a popular stage actor, his mother a beautiful film star. At the age of 8, Hans himself appeared as an actor in a movie in which he played the part of a boy who reconciled his estranged parents. In real life, however, Hans's own parents were estranged. Because their professional engagements required frequent travel, they left Hans in Berlin with his maternal grandmother, who cared for him throughout most of his childhood and adolescence.

Despite the generally hard conditions that prevailed in postwar Germany, Hans's parents and grandmother provided a comfortable environment that was rich in German literary and musical culture. Although Hans was amply exposed to classical and operatic music, he never took a real interest in it. I noticed in my several attempts to have conversations with him about music that he had a surprising amount of knowledge about music for a person who did not listen to it but that this knowledge was purely verbal and factual, not really musical. As far as I could tell, he neither possessed classical recordings nor attended concerts, which abounded in London, one of the musical capitals of the world. In discussing this with him in his later years, he explained that he once volunteered to take an experimental test of basic musical aptitudes, which revealed that his pitch discrimination was exceedingly poor—he could not discriminate even half-tones. It is known that individuals with poor pitch discrimination rarely become classical music lovers and, of course, never become professional musicians. Eysenck was not lacking in aesthetic sense, however. He derived much pleasure from literature, particularly the great German and English poets, whose works he began reading in his youth.

What is known of Eysenck's schooling in Berlin reveals nothing remarkable, although evidently he was a bright pupil. He skipped one grade and graduated at age 17 from Berlin's top academic high school, the all-boys Prinz Heinrich Wilhelm Realgymnasium. As a student, he excelled in sports, particularly boxing and tennis—he remained an avid tennis player and played almost daily until he was past 80. In the academic sphere, he was attracted to the "new physics" of relativity and quantum theory and considered a career in physics. Though Eysenck was apparently an all-round excellent student, there is no evidence that he was conspicuously gifted in mathematics, as were so many of the eminent physicists, particularly the Nobel Prize winners. Having discussed many issues in statistics, psychometrics, and quantitative genetics with Eysenck, however, it is my impression that he was probably near the 99th percentile among psychologists in quantitative ability, but this mathematical expertise seemed to reflect high general ability rather than a special talent.

Eysenck's famous predecessors in the London School, Charles Spearman (chap. 6, this volume) and Cyril Burt, probably possessed a special talent in mathematics, as did America's greatest psychometrician, L. L. Thurstone (chap. 6, *Pioneers III*). These three were the great pioneers of psychometric science and statistical psychology. Along with the British statistician Karl Pearson (1857–1936), they enlarged on the highly creative but embryonic ideas about mental measurement originated by Sir Francis Galton (chap. 1, *Pioneers I*).

When the Nazi party came to power and Hitler was declared chancellor in 1933, Eysenck was in his senior year in the Gymnasium. He had applied for admission to the University of Berlin to major in physics, but he seemed already to have developed a contempt for the racist doctrines and totalitarian politics of the Nazi party. When he discovered that a condition for admission to the university was joining Hitler's SS and wearing its black military uniform, he refused, certain that he could not in good conscience consent to that condition.

Eysenck's mother, who had divorced Eysenck's father and married a movie producer who was Jewish, emigrated to France when Hitler came to power. Sensing the unhappy prospects of living under the political conditions in Nazi Germany, Eysenck soon followed. There he entered the University of Dijon, where he studied French literature. Because of his defection from Hitler's Germany, many have mistakenly believed that Eysenck himself was Jewish. Actually, his parents were Lutheran Christians and he never adopted any religion. His only Jewish relatives were his stepfather and his second wife, Sybil, the daughter of a noted Austrian concert violinist Max Rostal.

In 1934, at age 18, Eysenck left France for England, where he spent a semester at the University of Exeter to improve his English in preparation for the entrance exam for the University of London. On gaining admission to University College, London, intending to study physics, he was dismayed to discover

that his high school transcript lacked certain prerequisites for enrollment in the physics department and that enrollment quotas were already filled in all the other sciences except psychology. Hence it was entirely by accident and default that Eysenck got into psychology, a field that he did not even know existed until entering University College.

The head of the Psychology Department at University College was Sir Cyril Burt, one of Britain's most noted psychologists and one of only three who were ever knighted—the other two were Sir Frederick Bartlett (chap. 9, this volume) and Sir Godfrey Thomson. The psychology that Burt taught immediately captivated Eysenck's interest and enthusiasm. In his 88th year, Burt told me that, during his long tenure, of all his students Eysenck was "the brightest and most industrious" (personal communication, July 1970). He encouraged Eysenck to study for a PhD. Eysenck did so, and also worked as Burt's research assistant. He received the PhD in 1942 at age 26. His dissertation was an experimental study of the objective measurement of the aesthetic properties of visual figures.

While Eysenck was a student, Britain went to war with Germany, and horrific times, including the Luftwaffe's nightly air raids on London, lay ahead. Because of his German background and his official war-time status as an "enemy alien," Eysenck had difficulty securing employment commensurate with his qualifications. His outstanding performance as a graduate student, however, had come to the attention of the distinguished educational psychologist Philip E. Vernon, who was employed by the armed forces personnel research department during the war. Vernon recommended Eysenck for a position as research psychologist at the Mill Hill Emergency Hospital, a large psychiatric facility serving the British armed forces during the war. Eysenck obtained a grant from the Rockefeller Foundation, which provided funds to hire three clinical psychologists as research assistants. During his four years at Mill Hill (1942–1946), he published approximately 30 research papers in areas related to its psychiatric mission—clinical assessment and psychiatric diagnosis, hypnosis, neuroses, personality differences, and social attitudes.

The chief at Mill Hill was one of Britain's leading psychiatrists, Sir Aubrey Lewis, who at the end of the war became head of the Maudsley Hospital and was appointed professor of psychiatry. Having been impressed by Eysenck's work at Mill Hill, Lewis invited him to the Maudsley as director of its psychology department which, under Eysenck's instigation and with Lewis's backing, was granted full status as a graduate department of psychology in the University of London in 1950, with Eysenck appointed as Reader (equivalent to associate professor). He was elevated to full professor in 1955, at age 38, the youngest person ever to occupy a professorial chair of psychology in a British university. With the exception of the years 1950 and 1954, when he was a visiting professor at the University of Pennsylvania and the University of California, Berkeley, Eysenck spent his entire postwar career as professor

and head of the psychology department in the Institute of Psychiatry. In number of journal publications and their frequency of citation, Eysenck's department became by far the most productive in Britain and ranked among the world's top psychology departments. To everyone who observed the inner workings of Eysenck's department, it was obvious that its unique character, ferment, air of excitement, and unusual productivity and fame were attributable in large part to Eysenck's own diligence and the powerful influence that stemmed from what can only be called his phenomenal and unflagging mental energy.

Although British universities require faculty to retire at age 65, Eysenck's retirement activities, except for teaching and administration, continued as usual. Because he needed more work space for his research, his personal secretary, his library, and his extensive reprint files than the Institute could provide after his retirement, he bought a flat near the Institute, which served as his workplace for the last 16 years of his life.

When I saw Eysenck in 1996, four months after his 80th birthday, he appeared in excellent health. He had just finished another book (his last published work, as it turned out) and was beginning another on health and personality. He was full of plans and enthusiasm for his future projects. That summer, I attended the talk he gave at the Eighth International Congress on Personality in Ghent, Belgium, in which he explained his theory of individual differences in achievement as a multiplicative interaction of cognitive abilities and personality factors. I was struck by how masterfully it was delivered—with all the clarity of thought and organization I had witnessed in his lectures some 40 years earlier. He was still the same Eysenck. But then, only two months later, while playing tennis with his son, he was troubled by double vision. A battery of diagnostic tests revealed a brain tumor, calling for immediate surgery. It proved to be malignant, and the ensuing brain operations to control the growing cancer took a terrible toll, rendering the last year of his life an absolute hell. A partial paralysis confined him to a wheelchair. He was unable to read or write and barely able to speak. Yet he fully understood everything that went on around him and was amazingly brave and dignified. In my visit to him, just two months before he died, I explained a rather complicated study I had recently completed and showed him the graphs for the article I had written about it. He studied them for a minute or so, then asked some very pointed and insightful questions about the study, albeit with some difficulty in speaking. His critical faculty was still sharp.

Less than a year before Eysenck's misfortune, the organization he was instrumental in founding—and of which he was the first president—the International Society for the Study of Personality and Individual Differences, planned a special dinner to honor him at its convention in July 1997 in Aarhus, Denmark. Eysenck's condition made it seem impossible for him to travel. But, defying all the challenges, and against his family's wishes, Eysenck insisted on going. And

of course he did go. He appeared at the convention's dinner in his honor with characteristic dignity and attentive presence. The after-dinner ceremony included encomiums by colleagues and the presentation of a handsome 800-page Festschrift of substantive commentaries summarizing his lifetime contributions to the field (Nyborg, 1997). It was an intensely moving occasion. And it was the last time I saw the great man. In less than two months, on September 4, 1997, he died at home in Herne Hill, where he had lived for 42 years, just one mile away from the Institute of Psychiatry.

Scientific Contributions

Before summarizing Eysenck's contributions to the various fields that interested him, something should be said about why he was so controversial, both in the psychological community and in the popular media. This reaction stems from several factors.

First, Eysenck typically took skeptical or contrary positions on psychological topics in which there were strong vested interests in some particular viewpoint—for example, on the nature–nurture issue. He was a doubter and iconoclast about beliefs that were held most dearly by many psychologists and the general public. His views were not rigid or dogmatic, but at any given time he would take a strong stand on an issue. He was clear, unambiguous, and did not mince words or pull his punches. He refused to straddle fences or walk fine lines on any subject. He explicated his own views cogently and with a relentless logic that frustrated those who opposed him.

Second, although Eysenck published hundreds of articles in academic journals and many technical and professional books, some of his academic contemporaries looked askance at his publicizing his views of psychology so successfully in the popular media—in paperback books, articles in newspapers and magazines, and on the radio and television. In Britain he was a celebrity. No other psychologist, and few academics in any other field, had as wide a public audience for so many decades.

Third, Eysenck's critics say that he took on too many different subjects, and in each of them stirred things up, proposed provocative theories, tested many clever hypotheses, and wrote prolifically, but too often failed to pursue a phenomenon long enough to establish a solid empirical basis for the further scientific advancement of the topic. I do not believe that this claim can be justified in the case of Eysenck's most original and most important research on the dimensions of personality.

The actual keys to Eysenck's controversial reputation are probably to be found in his totally uncompromising application to everything in psychology of five principles discussed in his autobiography: (a) Human beings are *biosocial* organisms whose behavior is conditioned by biological and genetic as well as ex-

periential and social factors. (b) Dualism, the notion that mind and body are fundamentally distinct and separate entities, must be rejected. Instead body and mind must be viewed as a continuum, just as space and time are viewed as a continuum in modern physics. (c) Psychology must be a unified science, reconciling the two major disciplines of scientific psychology—the correlational study of individual differences in behavior (*differential* psychology) and the nomothetic study of the general laws of behavior (*experimental* psychology). (d) The distinction between applied and pure science, borrowed from physics, is inapplicable to psychology, which deals with the behavior of organisms. If it is to understand such phenomena psychology must be more applied than physics. It must study phenomena at their own level of complexity rather than deducing usefully precise understandings from atomistic laws like those of physics. (e) For any assertion in psychology there should be an attempted empirical proof, preferably experimental, and no assertion should be accepted without adequate proof. Theories or hypotheses are worthless unless they are formulated in such a way as to be empirically testable, and theories must be clearly distinguished from demonstrated facts. Eysenck's outspoken adherence to these principles—which most psychologists today would take for granted but were not generally accepted in the 1950s—probably contributed to his reputation as the psychologist that most psychologists love to hate.

The London School

Eysenck's thinking and research stemmed from a particular influence in his educational background—the "London School," of which he was both a product and the leading apostle during the latter half of the 20th century. The name "London School" refers to the kind of psychology that dominated research and teaching in the first half of this century in the Department of Psychology of the University of London, under the leadership of the two most eminent professors in its history, Charles Spearman (from 1906 to 1931) and Sir Cyril Burt (from 1932 to 1950), and carried on by Eysenck at the University of London's Institute of Psychiatry.

The London School viewed psychology essentially as a branch of natural science. Its intellectual progenitors were Charles Darwin (chap. 2, *Pioneers III*) and his half-cousin, Francis Galton (chap. 1, *Pioneers I*). It emphasized the evolutionary, genetic, and biological basis of behavior, and developed the objective measurement of individual differences, or psychometrics. This field became known later as *differential psychology*, which measures and studies individual differences, to distinguish it from experimental psychology, founded by Wilhelm Wundt (chap. 3, *Pioneers III*) in Leipzig, Germany, which sought to discover general laws of sensation, perception, and behavior through controlled experiments. In this view individual differences "average out" in the behavior under investigation.

These two branches of psychology, founded respectively by Galton and Wundt, are what Lee Cronbach (1957) referred to in his presidential address to the American Psychological Association in 1957 as the "two disciplines of scientific psychology." Cronbach deplored the fact that throughout the history of psychology these two disciplines had taken such separate paths with so little interaction between them. Eysenck's scientific aim can be viewed as a mission to coordinate the correlational and experimental scientific disciplines in the study of behavior. In line with his responsibility at Mill Hill and later as a research professor in the Institute of Psychiatry, his studies naturally focused mainly on individual differences in personality.

Personality Research

Eysenck's most important contribution is unquestionably his work on personality, which nicely illustrates his attempt to amalgamate Cronbach's two scientific disciplines. It is the field in which he is most truly a great pioneer.

Eysenck's work on personality began at the Mill Hill Hospital, where he had access to exceptionally large samples that provided the data for his research program in the early years of his career. During his four years at Mill Hill, he gathered a wide variety of information related to personality (questionnaires, objective behavior tests and ratings, and psychiatrists' diagnoses of each patient's mental condition). Eysenck referred to this phase of his work as the *taxonomic* problem. He noted that in the history of the natural sciences the quantification or measurement of phenomena and the creation of a systematic classification of their attributes were the first steps in their development. He insisted that the science of personality should follow the same path. His approach, considered radical at the time, stood in marked contrast to the then-prevailing study of personality, which held that each individual's personality was a unique configuration of characteristics, describable only in literary terms, much as a biographer or a novelist would portray an individual.

Eysenck brought his training in the London School to bear on the problems of measurement and classification of personality by applying the psychometric methods, particularly *factor analysis*, invented by Spearman and further developed by Burt, who had used the method to develop a taxonomy of cognitive abilities. If this approach should prove successful in the domain of personality, it meant that an individual's personality could be described (nomothetically) in terms of quantitative positions on a limited number of uncorrelated dimensions instead of idiographically in terms of the individual's unique characteristics. Eysenck's aim was not to describe particular people in detail but to discover the main independent dimensions along which they differ in personality—dimensions that account for a large proportion of the total variance in a great number of descriptive characteristics (assessed by questionnaires and ratings) and behavioral tendencies (measured by laboratory tests).

In three dozen studies based on more than 10,000 research participants, sampled from both psychiatric and nonpsychiatric populations, Eysenck and his assistants applied factor analysis to extensive batteries of diverse measures of behavior. These analyses clearly revealed two large orthogonal (uncorrelated) factors, one that ranged continuously from extreme extroversion to extreme introversion, a dimension that Eysenck labeled *extroversion* (E), and another that ranged from extreme emotional instability and proneness to anxiety to extreme emotional stability and absence of anxiety, labeled *neuroticism* (N). These studies were described in Eysenck's first book, *Dimensions of Personality* (1947). Another dimension, *psychoticism* (P), which is orthogonal to E and N but not clearly latent in the set of variables included in the earlier factor analyses at Mill Hill, was a later addition to Eysenck's taxonomy of personality dimensions. It came into focus when he began studying the personalities of psychopathic prisoners and recidivists. The term *psychoticism* refers to a trait that is not limited to describing clinical psychosis. It also includes characteristics in the nonpsychiatric population, which may predispose people to psychosis and, in an exaggerated form, become the symptoms of a full-blown clinically diagnosed psychosis—but also has a relationship to such nonmalignant traits as creativity.

The three dimensions in Eysenck's theory of personality are actually superfactors, or higher order factors in a hierarchical factor analysis. Each higher order factor dominates a number of less general, or lower order, traits that characterize the three superfactors, as shown in Table 20.1. Eysenck described himself as extremely low on E, at absolute zero on N, and middling on P.

Conventional psychiatric diagnoses of neurotic patients were found to represent particular interactions of the E and N dimensions; that is, certain diagnostic groups fell into different quadrants of the space created by the intersection of these dimensions. For example, patients diagnosed as hysteric occupied the quadrant described by high E, high N. Anxiety and depressive

TABLE 20.1
The Super-Factors Extroversion, Neuroticism, and Psychoticism and Their Manifest
Traits in Eysenck's Theory of the Structure of Personality

<i>Extroversion</i>	<i>Neuroticism</i>	<i>Psychoticism</i>
Sociable	Anxious	Aggressive
Lively	Depressed	Cold
Active	Guilt feelings	Egocentric
Assertive	Low self-esteem	Impersonal
Sensation seeking	Tense	Impulsive
Carefree	Irrational	Antisocial
Dominant	Moody	Unempathic
Surgent	Emotional	Creative
Venturesome	Worrisome	Tough-minded

disorders were low E, high N. Psychopaths (particularly criminals and recidivists) were high E, high P.

Neurophysiological Bases of Extroversion, Neuroticism, and Psychoticism

After Eysenck's first book, several more quickly followed [*The Scientific Study of Personality* (1952b), *The Structure of Human Personality* (1953), *The Dynamics of Anxiety and Hysteria* (1957), *The Biological Basis of Personality* (1967)], each one breaking new ground and, assuming that the taxonomic stage was sufficiently complete, developing the second, explanatory stage of a theory of personality. These books described the formulation and experimental tests of hypotheses about the neurophysiology of E, N, and P. The hypotheses relating personality factors to their neural or physiological causes were suggested by the behavioral characteristics that showed the highest loadings on a given factor.

Eysenck focused first on extroversion. His hypothesis for E was not based on direct observation of the neurophysiology of the central nervous system but on what has been termed a "conceptual nervous system," consisting of hypothetical constructs derived from the analysis of behavior rather than from the direct study of brain physiology. The theoretical constructs most relevant to E were neural excitation and inhibition as formulated by Ivan Pavlov (chap. 3, *Pioneers I*) to explain the phenomena of classical conditioning, as modified by Clark L. Hull (chap. 14, *Pioneers I*) in his theory of learning. In Hull's theory, the Pavlovian construct, excitation, became *excitatory strength*, and inhibition became *reactive inhibition*, which tends to block the immediate repetition of the response that produces it and to reduce its magnitude to a degree that depends on the amount of work involved in that response and the length of time since it occurred. Reactive inhibition builds up with the repeated elicitation of responses and decays during periods of inactivity. Eysenck's theory postulated that there are individual differences in the rates of accumulation and dissipation of reactive inhibition: Individuals in whom it builds up more rapidly and dissipates more slowly than average are behaviorally more extroverted; those in whom it builds up more slowly and dissipates more rapidly are behaviorally more introverted.

Eysenck was dedicated to the hypothetico–deductive method of investigation, exemplified in Hull's research on learning, in which specific hypotheses are derived from theory and are tested in experiments. The methods used in studies of Hullian learning theory to test the predicted effects of reactive inhibition provided the model that Eysenck used to test his theory of E, as measured by the Maudsley Personality Inventory (in its later revision, the Eysenck Personality Inventory; Eysenck & Eysenck, 1963). Eysenck's specific predictions were that high- and low-scoring groups on the E scale should differ in the indices of reactive inhibition obtained in experiments on the conditioning and extinction of the eye-blink response, on reminiscence in motor learning, on the serial position

effect in rote learning, the gradual deterioration of performance in prolonged vigilance tasks, and the like. Many such experiments performed in Eysenck's lab substantiated his theory, but some decidedly did not.

Eysenck consistently rejected any theory, including his own, that was contradicted by empirical evidence. The failures in these tests of the hypothesis relating extroversion to reactive inhibition happened often enough for that hypothesis eventually to be discarded. Eysenck replaced it with a theory that invoked individual differences in cortical excitation, or activation, via the brain's ascending reticular formation, which influence the rate of consolidation of neural traces laid down by experience. This cortical activation theory of E proved to be more consistent with the experimental evidence, particularly that from studies of the behavioral effects of stimulant and depressant drugs, which have opposite effects on cortical activity and simulate the behavioral effects of low and high E, respectively. Extroverts had lower levels of activation than introverts, and numerous differences in their responses to drugs known to affect the reticular activating system and other forms of stimulation showed the neural activation theory to be more often consistent with the experimental evidence than were predictions from reactive inhibition theory.

Neuroticism (N) was explained as individual differences in the lability of the autonomic nervous system and the balance between its sympathetic and parasympathetic components, the sympathetic system activating emotional responses such as fear or anxiety and aggression or hostility (the so-called fight or flight reaction to threat), the parasympathetic system activating relaxation and pleasurable feelings associated with bodily functions. High N results from overreactivity of the sympathetic nervous system, as reflected by individual differences in the galvanic skin response, the pupillary response, and other indices of sympathetic activation, as well as by well-established behavioral effects of anxiety on learning and performance under varying conditions of stress.

Psychoticism (P) was a relative latecomer to Eysenck's personality theory and there was less empirical research on its causal basis than on E and N. It is also both more complex and more tentative in Eysenck's theorizing, which connects P mainly with the brain's biochemistry, particularly certain neurotransmitters such as dopamine, serotonin, and the enzyme monoamine oxidase.

Behavioral Genetics

The London School, with its roots in the Darwinian and Galtonian views of human nature, was interested in the genetic basis of individual differences, and Eysenck considered this an essential pillar in his theory of personality. Using the method of comparing monozygotic (identical) and dizygotic (fraternal) twins originally suggested by Galton to determine the proportion of genetic variance in a given trait—termed its *heritability*—Eysenck investigated the genetics, first of N and E and later P. He found that genetic factors

contributed about 50 percent of the individual differences variance in each of these personality factors. Over the years, Eysenck built up a registry of hundreds of pairs of twins who could be called on for participation in behavioral genetic studies. Heritability studies were also performed in Eysenck's lab on other traits that were of interest because of their interactions with the main dimensions of personality. These traits included authoritarianism, prejudice, conservatism, religion, sexuality, and criminality, all of which turned out to have a substantial genetic component. Virtually all of Eysenck's findings in behavioral genetics have been substantiated by other investigators in this field.

The animal laboratory of the Institute of Psychiatry, founded by Eysenck in the early 1950s, performed genetic studies involving the behavioral testing and selective breeding of rats for traits resembling some of the features of both N and E, such as anxiety and behavior reflecting reactive inhibition. The rats' response to genetic selection, creating distinct strains with respect to the selected traits, proved the inheritance of behavioral traits in rats that in some ways could be likened to "personality" differences, such as emotionality.

Intelligence

Eysenck claimed that his first interest in psychology was in intelligence, because it was the first mental trait that was actually susceptible to measurement. Because he was employed at the Institute of Psychiatry, however, research on personality, abnormal psychology, and therapy had to take precedence. His contributions to intelligence research did not surface importantly until the late 1960s. Eysenck's position on intelligence was entirely consistent with the London School's view of intelligence as a biologically based, genetically conditioned, general ability. Although giving due credit to the role of factor analysis in the study of mental abilities and to Spearman's discovery of the *g* factor, Eysenck emphasized the importance of focusing on the physiological basis of individual differences in *g*. He suggested methodologies for advancing the field in this direction. He offered the hypothesis that mental speed, measured by reaction time and the latency of evoked brain potentials, is the probable causal basis of individual differences in general ability, or Spearman's *g* factor. His lab took up studies of the average evoked potential (AEP) and found that not only the speed and latency of the AEP but also the complexity of its wave form are correlated with IQ. Moreover, statistical analysis showed that the AEP is correlated specifically and exclusively with the general factor (*g*) of the battery of eleven diverse subtests used to measure IQ. This is especially interesting because the *g* factor accounts for only about 50 percent of the total variance in the 11 subtests. Eysenck later concluded that mental speed is a function of a phenomenon that is more basic than *g*—namely, errors in the transmission of neural impulses in the CNS,

which are reflected not only by the person's average reaction time (RT) but also by its trial-to-trial consistency, which is correlated even more highly with IQ than is the median RT.

Although Eysenck himself did comparatively little original work in the field of intelligence, he wrote numerous articles and several comprehensive books about it that were highly influential and are still among the best expositions of the subject. His last book, written for a general audience and published posthumously in 1998, provides a highly readable summary of his views on intelligence, creativity, and genius.

Behavior Therapy

In 1952, Eysenck became psychology's *enfant terrible* when he reviewed all of the existing evidence on the therapeutic efficacy of psychotherapy and psychoanalysis and concluded, in an article published in the *Journal of Consulting Psychology*, that existing evidence failed to prove that these therapies had any beneficial effect that was greater than the recovery rate of control groups who had received no treatment. This claim immediately aroused great antagonism toward Eysenck from clinical psychologists and psychotherapists the world over. Although Eysenck's conclusion has since been disputed by comprehensive meta-analyses performed years later, after more and better evidence on the effects of psychotherapy had accumulated, Eysenck never abandoned his original conclusion and even used the meta-analyses that claimed to contradict him to bolster his original claim. Eysenck is now in a minority, but he is not alone in this position. The issue is still open. It may well be unanswerable in any general sense.

In place of psychotherapy, Eysenck advocated what became known as *behavior therapy*, and he was among the pioneers of its theory and practice. Conventional psychotherapy—commonly called "talk therapy"—is based on the theory that neurotic symptoms reflect complexes hidden in the unconscious that can be brought to awareness and dealt with through some form of verbal interaction with a therapist. In contrast, behavior therapy rejects the notion of unconscious complexes, claiming that the symptoms themselves constitute the neurosis. It treats the symptoms directly and changes the patient's behavior and attitudes by methods derived from such behavioristic learning theories as those of John B. Watson (chap. 12, *Pioneers I*), Ivan Pavlov (chap. 3, *Pioneers I*), Hull, and Skinner with the aid of such processes as experimental extinction, reciprocal inhibition, desensitization, and reinforcement. Behavior therapy was widely used with patients at the Institute of Psychiatry and was also studied with experimental methods, about which Eysenck wrote six books and countless articles. In 1960, he founded and for 18 years edited the journal *Behaviour Research and Therapy*.

Glimpses of Other Topics

Eysenck did research on a number of other subjects that can be classified under seven headings, about which he wrote innumerable articles and 13 books, 7 of them with coauthors. If all his work were judiciously divided among a dozen academic psychologists, each of them could claim a distinguished career. In the space available, it will be possible to say just a few words about each of these contributions. Pro and con discussions of Eysenck's main contributions are given in a volume edited by Mogdil and Mogdil (1986).

Reminiscence

The phenomenon of reminiscence, which occurs most clearly in motor learning, denotes a gain in level of performance after a period of rest that follows a practice session. Theorists in the Hullian tradition attribute it to the dissipation of reactive inhibition during the rest period. Eysenck did much research on reminiscence and explained it as the result of the consolidation of neural traces during rest, a theory that better accorded with the experimental evidence than the theory of reactive inhibition.

Crime and Personality

Eysenck hypothesized that many types of delinquency and criminality result from undersocialization and that individuals differ in personality factors that determine susceptibility to the socializing influences of the family and society. Because personality factors all reflect genetic components, delinquency and criminality are also influenced in part by genetic factors. Laboratory and behavior–genetic studies of prisoners and recidivists have generally borne out predictions from Eysenck's theory.

The Psychology of Politics

Eysenck showed that social and political attitudes and party affiliation are associated with personality traits that can be mapped in the quadrants of two dimensions: (a) tender-minded versus tough-minded and (b) radical versus conservative. Eysenck's controversial finding that communists and fascists have certain predisposing traits in common (both are extreme on the tough-minded dimension) but fall at opposite positions on the radical versus conservative dimension (communists are radical; fascists are conservative) provoked attacks from both extremes of the political spectrum.

Creativity and Genius

In his last major book and one of his best, *Genius: The Natural History of Creativity* (1996), Eysenck summarized his theory and research on creativity and genius. He argued that the kinds of achievement that society recognizes as creative genius depend not only on high general ability or exceptional special talent but also on certain personality traits: unusual zeal and persistence through thick and thin, as first suggested by Galton. But, according to Eysenck, the unique creativity that characterizes works of genius also reflects a higher than average level of the P factor, trait psychoticism. He cites examples

of high P among some of the greatest geniuses in history and explains the psychological nature of the causal connection between P and socially significant creativity. It is a fascinating theory.

Smoking and Health

Eysenck's research on smoking examined the hypotheses that a tendency to smoke is related to high E (borne out by his studies) and that the same individuals are more predisposed to developing lung cancer. After reviewing the entire scientific literature on the effects of smoking, Eysenck challenged the prevailing belief in a direct *causal* connection between smoking and cancer. Because the vast majority of smokers never develop lung cancer, and because lung cancer also occurs in nonsmokers, he concluded that the evidence did not prove that the correlation between smoking and lung cancer is the result of direct causation. Instead, he suggested that it might reflect genetic predisposing factors, some of which are traits of personality (particularly high E), that caused people to smoke. Many investigators in the area considered this theory not only highly controversial but also detrimental to the efforts of public health workers to persuade people to quit smoking. But at the time, the evidence was equivocal and, strictly speaking, was in fact inadequate to reject the null hypothesis regarding direct causality.

Some people have wondered whether Eysenck himself was a smoker who was trying to rationalize his habit. Actually Eysenck was a nonsmoker; he even said he hated smoking. On two occasions when I was in his company and someone asked if anyone minded if they smoked, Eysenck emphatically said, "Yes, I hate it. Please don't smoke!" He also advocated and did studies on the use of behavior therapy to help people give up smoking.

Toward the end of his life, Eysenck collaborated with medical researchers on the relationship of personality factors to health and risk for cardiovascular disease and cancer and found evidence that E is positively correlated with the former and negatively with the latter. He suggested that the modification of predisposing personality traits by means of behavior therapy might prove prophylactic against these forms of disease.

Parapsychology and Astrology

Consistent with his conviction that scientists should be skeptical of all explanatory theories yet remain completely open-minded about any phenomena for which there was objective evidence, Eysenck took an interest in the claims of parapsychology and astrology, subjects generally considered beyond the pale by the majority of scientists. He believed some data purporting to show extrasensory perception and psychokinesis actually met the same standards of experimental and statistical acceptability as would be required to establish the reality of any other kind of phenomena in science. He insisted on making a clear and essential distinction between data (or phenomena), on the one hand, and their theoretical explanation, on the other. He believed that when the data of parapsychology gave no

reason to be suspect, they should not be dismissed out of hand. Rather, they should somehow be explained in naturalistic terms, even if that might mean fundamentally revamping our conception of the nature of the physical universe.

As for astrology, Eysenck's investigations found that its theoretical predictions regarding personality traits were no better than chance. But he also came across correlations between birth dates (related to certain astrological signs) and occupational choice that were statistically significant and were replicated on different samples. These data remain unexplained, by Eysenck or anyone else. But Eysenck believed that such phenomena are worth pursuing. He of course would have sought a naturalistic explanation, which he believed might open new vistas in science.

Conclusion

A succinct summing up of Eysenck's long and remarkable career is provided by the citation accompanying Eysenck's election, in 1994, as a William James Fellow, the highest honor bestowed by the American Psychological Society, "In Recognition of a Lifetime of Distinguished Contribution to Psychological Science":

For more than fifty years, he has led the struggle to bring science to bear on the most significant psychological issues of our times. A skeptic who insists that human aspirations conform to fact and not vice-versa, he brings phenomena from the penumbra into the light. At the age of fifteen [Eysenck actually emigrated from Germany in 1934, at age 18] he fled Hitler's Germany and within twenty years he became one of England's most prominent scientists. His seminal early work on individual differences focused on extroversion, neuroticism, and psychoticism as the underlying dimensions of personality. He led and won the battle to put therapy on a scientific behavioral footing. With a version of human nature as biosocial, he breathed life into the study of the genetics of personality. He has allied himself with unpopular positions, such as the attack on psychoanalytic therapy, the selective contribution of cigarettes to cancer based on personality, the genetics of intelligence, the benefits of behavior therapy for physical health, and the puzzling but strong predictive power of planetary position at birth on career choice. He is an articulate, moderate, and stable voice raised to defend positions in need of a defender. Time and again, the accumulation of facts has vindicated him.

For the reach of his visionary intellect, for the grasp of his scholarly achievements, for his students who have fanned across the globe to lead the next generation, for his good sense, for his vigorous voice, for his devotion to fact, and above all for his unflagging courage, we recognize Hans Eysenck as a leader in psychological science.

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