PASCAL'S SYNDROME: POSITIVISM AS A SYMPTOM OF DEPRESSION AND MANIA

by Hiram Caton

Abstract. The present study applies results and methods of psychobiology to intellectual history. Pascal's syndrome is a depressive neurosis associated with morbid effects of scientific certainty. The syndrome is characterized by self-mortification and conversion experience that represses distressing certainties. The dynamics of the syndrome are assessed from Blaise Pascal's psychosis. The ideation of the syndrome is evaluated by reference to the neurology of altered states of consciousness and the biogenic amine hypothesis of depression and mania. The evaluation yields a description of the relation between psychogenic and biogenic factors in the syndrome's etiology.

The use of psychological, particularly psychiatric categories, is not encouraged among intellectual historians for several reasons: we are not clinicians and, even if we were, deceased persons are not available for clinical examination. This self-denying ordinance, however sensible, means that, if thought or events are in some instances substantially influenced by psychological factors, historians will not know about it—unless a Frank Manuel sets the rules aside to examine contraband facts that revise the profession's view of an Isaac Newton (Manuel 1974).

The psychology exclusion rule does not appear to banish significant facts about eighteenth-century intellectual history. Of the many writers on politics and society, only some writings by Jean Jacques Rousseau

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are manifestly permeated by neurotic ideation. But on entering the next century we encounter an epidemic of neurosis among such writers. The founders of positivism, Henri Saint-Simon and Auguste Comte, exhibit parallel psychiatric histories that include depressive psychosis and attempted suicide.[1] John Stuart Mill's description of his "mental crisis" spells out depressive neurosis with textbook clarity.[2] The same may be said of Herbert Spencer's description of his depressive neurosis (Spencer 1904, 1:494-95). Thomas Carlyle, T. H. Huxley, Henry Adams, F. W. Nietzsche, and Sigmund Freud were also self-diagnosed depressives.[3] Max Weber described his psychosis in a memoir that was destroyed to prevent its falling into Nazi hands; he has recently been diagnosed as manic-depressive (Evans 1984).[4]

Although this list includes some of the most influential minds of the last century, there has been no attempt to test the hypothesis that these individual cases indicate the presence in that period of stressors producing mass psychogenic illness. The less-demanding task of integrating psychiatric case history into man-and-oeuvre studies has been neglected as well. In the bulky Weber scholarship, for example, no effort appears to have been made to identify depressive ideation in the oeuvre, still less to assess Weber's attitudes toward contemporary events in light of his psychosis. Most scholars do not mention his illness; those who do dismiss it as a biographical detail of no analytical consequence. This uncritical attitude is very general, extending its benignity even to Nietzsche, despite his numerous psychotic episodes and his bravely indexing his philosophy under the rubric "decadence." The leading man-and-oeuvre scholar, Walter Kaufmann, superficially reviewed the medical evidence and exempted the entire corpus, minus a few letters, from psychological scrutiny.[5] Kaufmann adopted this attitude because the alternative, it seemed to him, was to dismiss Nietzsche's thought as madness. Evidently a third possibility, of identifying and critically evaluating deranged ideation, did not occur to him. This lapse was not the fault of a single scholar, since the apparatus for such an approach is not to be found in the cultural-historical disciplines.

Such an apparatus is nevertheless available (Caton 1985b), and this essay undertakes to apply it to two phases of positivism, the Comtean and Machian phases. A third phase, commencing with the Vienna circle around 1930, is not considered. Thorough analysis of these two phases is of course not intended. It is sufficient if we succeed in characterizing some main lines of positivist thought in historical-psychological context. The critical apparatus deployed here assigns distinct weightings to history and psychology. The human mind is assumed to be a set of properties of Homo's primate brain (Mendels 1973; Davidson & Davidson 1980; Kandel & Schwartz 1982). Brains,

and therefore minds, are evolutionarily stable through circumstance and historical time. The variation occurring on the historical time scale is assumed to derive largely from the polymorphism of the human genotype; that is, it does not represent any directional change of "human nature" (Lumsden & Wilson 1981). History thus investigates variations upon main themes that do not change. Such variations can nevertheless be important for human action, particularly when they achieve cultural or psychological dominance through institutions or consolidated opinion.

My thesis is that positivist philosophy of science was a symptom of depression in those who propounded the doctrine.[6] My argument will be that positivists perceived science and its technological accoutrements to be objects of anxiety. To relieve that anxiety, while yet not repudiating science, they distinguished between a wholesome conception of science and an unsound, depressive conception. To the latter they affixed an epithet of taboo, "metaphysics." The metaphysics positivists wished to banish was mechanistic materialism. The doctrine was depressive because its perceived consequences were irreligion and confusion of morals.

Platonism, Pascal, and Phase One Positivism

We commence by noting a historical accident. While most cultures levy sanctions against scoffing, heresy, and libertinage, in only one culture has there been a continuing anxiety about materialism, namely, European culture insofar as it absorbed the legacy of Greek philosophy. The reason is probably that the materialist world conception, like axiomatic geometry, is unique to the Greeks and those they influenced. Among the Greeks materialism provoked a hostile response, notably from Plato, whose strictures attained dominance in Alexandrian culture and subsequently in Christianity. Plato reproached materialism as contrary to religion, morals, and reason. His critique set out a series of oppositions, indicated in Table 1, that echo through western culture, including phase one positivism. The oppositions imply that materialism debases individuals and begets chaos and ruin upon society. The doctrine demoralizes by destroying belief in gods and the good behavior they sanction; humans become as wild beasts, heedless of restraint, devouring one another and sinking into gross sensuality (*Theaetetus* 152d-57c, 166a-68c; *Gorgias* 507a-9c, 523a-26d; *Timaeus* 46d-47e; *Laws* 903a-10d in Plato 1961). Evidently materialism was depressive in its effects upon the Platonist psyche.

A decisive feature of Platonism is its valorization of the sciences. They are conceived as belonging to an overall schema, comprehended by general principles, whose investigation is the special task of the

philosopher. The philosopher, in turn, has become the hero of an epic myth in which human weal and woe depend upon the hero's overcoming a thousand perils to attain the divine boon (vision of the good), which he passes on to lesser mortals as good instruction, or, in the best case as philosopher-king (*Theaetetus* 174c-76d; *Phaedo* 82c; *Symposium* 203c-4d, 209b-13a; *Epinomis* 973c; *Republic* 514a-17e, 473c-e, 485a-86a, 490b, 618c in Plato 1961). Since materialism was not the least of the perils the philosopher must overcome, Platonism tied inquiry to the condition that its findings should not contain anything contrary to faith and morals (*Laws* 908-10 in Plato 1961).

TABLE 1

THE PLATONISM—MATERIALISM ANTAGONISM

Platonism	Materialism
Soul steers body	Body determines mind (Epicurus)
High-minded generosity	Sensuous selfishness (Epicurus, Sophists)
Nobility and dignity	Contempt for man (Cynics)
Reason steers the world	Chance reigns supreme (Democritus)
Gods care for men	Gods are fictions (Epicurus, Sophists)
Society based on affection and duty	Society a make-shift expedient (Sophists)
Knowledge culminates in transfiguring ecstasis	Knowledge is of trivial causes (Democritus)

Pascal was among those who, in the seventeenth century, struck crushing blows to Platonism. In his formulation of the concept of scientific progress Pascal rejected, largely on Baconian grounds, the scholastic legacy as sterile and maintained that the traditional sciences had been surpassed definitively since Copernicus and Vesalius (Pascal 1954, 529-35). The engine of this progress was a materialist conception of nature—the mechanistic concept of motion as measurable quantity under strict causal determination. Moral supervision of the sciences he also rejected. The Platonic epic is replaced by a mundane conception of knowledge as satisfying the curiosity of some and providing material benefit for many more. These views were common to the scientific avant-garde of the day.

Early in 1654, at age thirty, Pascal suffered a depressive episode that continued for a year. During that time he experienced feelings of

detachment from life, failure, guilt, and abandonment by God (Bishop 1937, 168-80). In September he poured out his misery to his sister Jacqueline, whose report of their conferences exhibits a man on the threshold of psychosis (Pascal 1954, 1371-77). On the evening of November 23 Pascal experienced a two-hour ecstatic vision in which God appeared and delivered him to rebirth from mortal sin.

Thereafter the converted Pascal subjected himself to a series of self-mortifications. He withdrew from the gay society that he once enjoyed. He adopted the habits of poverty. He wore a cincture of nails that he might punish himself at the slightest thought of vanity. And he performed that heroic mortification associated with his name—the sacrifice of intellect on the altar of faith. In his fragmentary but moving *Pensées*, Pascal laid a series of indictments against his previous identity as scientist. Science, with its conceit of certainty, abounds in pride of intellect incompatible with humble acceptance of divine mysteries. Even though he may not know it, the scientist is estranged from religion and its language of the heart. Pascal set out to humble this pride by adroit skeptical anecdotes and insinuations going to show the delusiveness of reason. The strategy was not to impugn the certainty of any particular science but to subordinate the sciences as a whole to the "reasons of the heart" whenever head and heart come into competition (Pascal 1954, 1113-36, 1221-22).

Passages of the *Pensées* depicting this competition are images of exquisite anguish. "I cannot forgive Descartes . . ." is the opening of a *pensée* in which Pascal approached that object of scientific certainty, the mechanistic universe (Pascal 1954, 1137). This object exalts the head and puffs up pride, but terrorizes the heart by the eternal silence of the infinite universe. An alternative open to him was to repopulate the world with spirits, magic, and miraculous events. This course was taken by the Platonist Henry More on his shocked discovery that the Cartesian system had destroyed the spirit world. Pascal was too much the scientist to return so frankly to what his *confrères* called "superstition." His position left the factual claims of the particular sciences unchallenged. The general orientation of science upon mechanism, on the other hand, became the occasion of a self-mortification leading to the conquest of the head by the heart, that is, the replacement of delight in scientific curiosity, wherever it might lead, by religious morbidity. Pascal's syndrome, then, is the mortification of objective cognition meant to alleviate depression stemming from a supernormal stimulus, the plenitude of scientific certainty.

Comte erected his philosophy of science in this emotional matrix. When Comte commenced writing his *Cours de philosophie positive* in 1830, he surveyed two centuries of scientific progress. The mechanical hypothesis had proved to be a fertile source of experimental design

and theoretical comprehension wherever it was applied, which now included the biological sciences and industrial technology. Comte celebrated these achievements and endorsed their extension as a basic requisite for the future progress of the race. Yet he detected a disturbing element in the great tide of progress. The critical spirit of science had overshot the mark by bringing in materialist doctrines that attacked the roots of religion and social unity (Comte 1893, 2:2-4, 253-99, 360-62, 391-94; Bridges 1957, 3-36). Materialism showed Comte many faces. In economics it was laissez-faire and the primacy of the market. In politics it was individualism and the notion of the state as arbiter of conflicting interests. In the realm of ideas it was aggressive anticlericism and materialism.

The depressive image of this condition circa 1830 was the "age of transition" idea launched by Saint-Simon and adopted by Comte, Carlyle, Mill, and Alexis de Tocqueville. The keynote is that the "spirit of the age" is in distress owing to confusions wrought by incomplete transition from the *ancien régime* to a new democratic order whose precise outline was not yet clear. Nuances of the image varied among writers. Carlyle accented the deadening effects of extending the mechanistic conception to all aspects of life; Mill and Tocqueville emphasized the social and political turmoil incident to the destruction of consensual authority. There was agreement, however, that the concept of society as an individualistic free-for-all was unendurable and that it must be superseded by return to at least some principles of prerevolutionary Europe, particularly to a broad social unity previously based on religion and social rank. But what religion and what hierarchy? Mill never resolved this question to his satisfaction; but Comte did.

Comte's philosophy of history made his own times the pivot of an epic whose hero was the mind in its wanderings to knowledge. There are three stages of this journey—religion, metaphysics, and positive science—each marked by struggles that resolve themselves into a higher stage. Metaphysics superseded religion by advancing from imagination to abstraction, while positive science superseded metaphysics by moving to empirical knowledge. A difficulty with this schema was that positive science, rather than abolishing metaphysics, seemed to infuse materialism with unprecedented vigor. Comte resolved this problem with his fundamental doctrine—acknowledged to have originated with David Hume—that the empirical laws of science do not explain the real cause of the world order, say, the world mechanism, but only describe the order of experience (Comte 1893, 1:2-14; 2:351-56). If so, materialism falls into the same basket with speculative philosophy as a naive pretension to knowledge not within the compass of the

human mind. It may therefore be repudiated in the name of science as a superseded phase of human development.

To this point the isomorphism with Pascal's emotional matrix is entire: affirmation of science is followed by experienced distress at the consequences of science; this distress is remedied by mortification of reason that humbles its expansive pretensions and subordinates natural science to the science of the heart—the positivist religion of humanity.

As in Plato, so in Comte the dramaturgy of the pursuit of knowledge culminating in crisis and redemption required that the sciences conduce to the Good (Plato) or the Heart (Comte). This meant that investigations of behavior and social dynamics were constrained by the restriction that they not overturn basic positivist doctrine. In this spirit he attacked advances in astronomy, disparaged probability theory, and rejected the use of statistics in social science (Sarton 1952). Also, Comte sometimes censured entire subdisciplines such as physiological optics (Comte 1893, 1:219-24). Bishop Berkeley and Goethe had also attacked this field, and for the same reasons that motivated Comte. Physiological optics describes the genesis of sense perceptions from physical processes and in that way defines a sharp contrast between the order of the senses and the physical world; hence, the identification of scientific knowledge with the order of sense phenomena is altogether contrary to this science's fundamental facts. As Comte became increasingly emersed in sectarian activities of the religion of humanity, his hostility to science became quite marked. He would shackle its investigations to rigidly practical problems to minimize the threat to positivism that he recognized science posed.

The Psychobiology of Redemptive Myths

Pascal's syndrome includes a conversion experience represented in a dramatic alternation from a negative to a positive state. The metaphoric representation of this opposition describes the negative state in terms of depressive feelings (guilt, worthlessness, estrangement, entrapment, death), while the positive state is described in terms of manic feelings (grandiosity, changed identity, soaring hopes, cosmic illumination, rebirth). Pascal found this ideation matrix at hand in the Davidic messianic myths. Comte imposed it on his philosophy of history, whose central illumination came to him during the psychosis of 1828 when his identity changed to "Brutus Napoleon Comte." Recent investigations of mystical states of consciousness and of conversion experiences suggest why the psychodynamics of manic depression parallel conversion experience among normals. The proposed explanation concerns effects of the autonomic nervous system (ANS). The ANS innervates

most internal organs (lungs, heart, stomach, liver, kidney, intestines; plus eyes, salivary glands, and genitalia) and regulates their activity. This is effected by the ANS subsystems, the sympathetic and parasympathetic, which respectively stimulate ergotrophic and tropotrophic activities. These subsystems are phased to inhibit one another after certain thresholds of activity are reached (Gellhorn & Loofbourrow 1963, 57-88). For example, a stressing sense impression, say of a snake in one's path, stimulates the sympathetic nervous system to the flight or fight response. The body is aroused by acceleration of heart and respiratory rates, increase in muscle tonus effected by redirection of blood from viscera to external organs, eye dilation, and so on. If these changes were uncontrolled, they would be lethal; hence, the parasympathetic system activates at some threshold to inhibit these effects, inducing a state of depletion, rest, or shock. The parasympathetic system controls body tonus for eating and digestion, grooming, sexual activity, and sleep. It too is activated automatically by certain sense stimuli such as the sight of a yawn or the aroma of food.

These systems may be "tuned" or conditioned by manipulation of stimuli (Gellhorn & Loofbourrow 1963, 96-116). Yoga exercises tune the parasympathetic system to reduce vital functions to levels normally lethal, while athletic coaches tune their gladiators' sympathetic systems toward sustained vigorous exertion. Such manipulations are achieved by stimulating sense organs or imagination by simulacra of stimulus objects to which the ANS is naturally calibrated. Thus, trance states may be induced by rhythmic repetitions based on rhythms that naturally activate the parasympathetic system (Mandell 1980, 390-93; Neher 1962, 151-61). Again, ascetic practices are means of inducing hallucinating states arising from nutritional deficiencies (Bourguignon 1970, 188).

The homeostatic equilibrium of the ANS has emotional equilibrium as its product. Exotic emotional states can result when the equilibrium is disturbed. One such disturbance occurs when the sympathetic and parasympathetic systems, though powerfully stimulated, fail to inhibit one another. Intense and ambivalent emotions may result. A familiar example is the ambivalence of estranged lovers, who experience surges of love and hate (Lex 1978, 286). Such states need not be miserable. They can also arouse euphoria and ecstatic trance, as happens in a variety of religious experiences. Rituals of revitalization sects are structured by tropotrophic symbols that activate parasympathetic dominance (death, capture, sickness, nausea) and corresponding emotions of guilt, futility, or worthlessness, followed by ergotrophic symbols (victory, life, release) that activate the sympathetic system and corresponding emotions of confidence, joy, exaltation (Wallace 1956a;

1956b; Lex 1978; Mandell 1980; Davidson 1984). The result of these mixed nervous discharges is the mixed feeling of triumph over evil or despair. In contrast to eastern religions, whose peak experience of self-obliteration is quiescent (parasympathetic), western and primitive religions culminate in mixed active ecstasy characterized by shaking, rolling, speaking in tongues, shouting, singing, dancing, copulation, violence, or all these.

This emotional matrix is related to manic depression by the biogenic amine hypothesis. Depression is believed to be caused by excessive secretion of cortisol. This happens because the cortisol inhibitors, epinephrine (adrenalin) and norepinephrine, are insufficiently supplied. These substances are released by the sympathetic nervous system; in their absence the parasympathetic system achieves overdominance and depressive moods are experienced (Mendels & Stinnet 1973; Sachar 1982). The longing of such individuals for release (salvation) corresponds to a possible source of innate medication, because the supernormal stimuli of religious rituals or ideation can stimulate the sympathetic system to produce the needed cortisol inhibitors (Mandell 1980; Lex 1978; d'Aquili 1978; Antelmon & Caggiula 1980). This is a plausible explanation of Mill's sudden remission by the stimulus of the 1830 revolution, whose rhetoric of redemptive cataclysm, or total change of state, captivated his imagination (Mill 1969, 103). Similarly, World War I was the stimulus of Weber's remission, for he perceived the event as a euphoric cataclysm (M. Weber 1975, 522).

Etiology

Manic-depressive cycles appear to effect a total alteration of the world. This implicitly delusional experience becomes delusioned when subjects postulate moral causes to explain consequences of somatic disorder. The hallucinogenic properties of neural processes underlying these and other altered states of consciousness create the experience of cosmic illumination—sudden, unimpeachable insight into the nature of things. Salvation myths are constructed to "explain" this peak experience; the beliefs associated with those myths draw their persuasive power from the ecstatic experience (Lex 1978; Wallace 1956b; Fischer 1970). Although the beliefs are represented as requisite for attaining blessedness, their effectiveness in this regard is contingent upon their becoming stimuli for the ANS. The positivist antimetaphysics doctrine against mechanistic materialism could in such circumstances act as a releasor of innate antidepressive chemotherapy. The criterion for concluding that this process has probably occurred in particular cases is its association with a salvation myth or like emotional-ideational Gestalt-switches situated around a conversion experience or cataclys-

mic event marking world transformation. This, I trust, has been established with respect to Comte's positivism. We now examine phase two positivism.

The Temper of Phase Two Positivism

The second phase of positivism commenced around 1870 with the Austrian physicist Ernst Mach, and agitated scientists until the Great War directed attention into other channels. The protagonists in this battle royal were largely physicists or biologists with physics training. In France positivism was espoused by Pierre Duhem and Henri Poincaré. The leading English exponent, biometrician Karl Pearson, was Mach's fond disciple. In Germany Wilhelm Ostwald, Hugo Dingler, and, for a time, Albert Einstein were Machians, while Emile du Bois-Reymond and a number of others held positivist views of science without particularly acknowledging Mach's influence. Positivism was also a force among philosophers, sometimes independent of Mach (Avenarius, Vaihinger) and sometimes loosely inspired by him (Renouvier, Boutroux).

A survey of the incidence of neurosis among this cadre cannot be completed at present owing to the preliminary condition of biographical studies, aggravated in some cases by the destruction or loss of personal papers and the unedited state of most literary remains. Evidence to hand gives no indication of psychosis among phase two positivists. Clear-cut evidence of neurosis is also wanting. None to my knowledge tells of the "malady of thought" in the candid manner of Mill, Spencer, and Huxley; I have not found independent reports of illness to supplement self-reporting. Although I suspect three cases of depression in this group, no assumption to this effect is made here. Attention is directed to evidence that positivists perceived metaphysics in science as an anxiety object to be purged by a Gestalt-switch that magically transformed the plenitude of scientific certainty into a mere administrative routine of organizing cognition. The purgation of certitude was the phase two positivism conversion experience; the anxiety object was the certainty that the world, including humanity, is a machine.

Anxiety is not as such pathological and its boundaries are indistinct, extending from common worry to chronic anxiety and neurosis (Kandel 1983). This slack in the concept will be taken up by accepting that the anxiety must be shown to be acute and that its dynamics are those of Pascal's syndrome. If our evidence supports these two propositions, then the data will have received a distinct and testable characterization.

For purposes of orientation it may be useful to note Maurice Mandelbaum's influential interpretation of phase two positivism

(Mandelbaum 1971, 10-20). Mandelbaum regarded positivism as a philosophical current running in tandem with pragmatism, materialism, and sundry idealisms then in vogue. The motivation of positivists did not arouse his curiosity; he accepted their profession that the doctrine is merely the outcome undogmatic reflection. He characterized positivism as a "self-limitation" of science that became a "self-critique" unfavorable to the antimetaphysical impetus; for, although positivism was an effective antidote to materialism, by 1900 it was able "to meet and merge" with idealism (Mandelbaum 1971, 28). The evident interests that animated idealists and materialists—God and the soul, as Immanuel Kant phrased it—did not in his view exercise any appreciable influence upon the formation of positivist doctrine. Soul got into the picture as the problem of mind-body identity or interaction, and in this regard positivists cared only to achieve scientific clarity about the relationship.

Mandelbaum's description ignores the controversial character of positivism and the emotions it aroused. The controversies are well authenticated and the emotions are readily described.

First, in *The Grammar of Science* (1892) Karl Pearson dramatically characterized positivism as symptomatic of a "crisis of science" arising from the circumstance that the fundamental concepts of physics were "unintelligible" and "incoherent" (Pearson [1892] 1951, chap. 10; see also Dingler 1926; Husserl 1933). Wielding Mach's broom, he swept metaphysics from the house of science as obsolete. The cleansing had the not incidental effect of substituting, as Pearson put it, "sound idealism" for "the crude materialism of the older physicists" (Pearson [1892] 1951, xiv). The Gestalt-switch from materialism to idealism was made possible by Mach's study *The Development of Mechanics*, in which the "idealistic view of mechanism" was expounded (Pearson [1892] 1951, 353).

Second, the serviceability of positivism to religious scientists seeking refuge from materialism was noticed by Duhem, who held that the neutrality of positivism between materialism and idealism meant that these ultimate questions had to be decided on the higher ground of natural philosophy. After some hesitations, he endorsed the Catholic revival of Thomist philosophy and attempted to show that Aristotelian physics accorded with modern physics (Duhem 1962, 306-11).

Third, concepts that seemed absurd to positivists were lucidity itself to the mainstream of professional scientists (Kelvin, Helmholtz, Clausius). The positivist onslaught accordingly provoked controversies whose bitterness exceeded the vitalism debates of the 1850s. For years Mach needled Ludwig Boltzmann by his skeptical objections to the kinetic theory of gases (Blackmore 1972, 207-8, 220-21). Max Planck, in a series of publications spanning four decades, reproached positivism

for denying the reality of the external world, which was the supposition, he held, upon which the whole of science hinged (Blackmore 1972, 222-27). After an initial enchantment with positivism Einstein endorsed Planck, cheerfully embraced the metaphysical component of science, and put down Mach scathingly as a "good mechanician but a deplorable philosopher" (Holton 1970, 176).[7]

Fourth, positivism's neutrality on the mind-body problem did not seem neutral to physical chemists in hot pursuit of the physical basis of life. Svante Arrhenius, Wilhelm Roux, and Jacques Loeb targeted positivism as the last refuge of vitalist romanticism against mechanism (Fleming 1964, xv, xix).

Fifth, the elimination of metaphysics was a scientifically respectable flag for the elimination of physical entities and processes. Abstruse arguments touched earth occasionally, and the score sheet is not flattering to positivism. By 1910 the physical chemists had crossed thresholds said to be impassable by the contingent of positivists who wished to eliminate matter in favor of pure "energetics."[8] Energeticists who would not yield to the evidence (Bergson, Dreisch) gave up biology to become vitalist philosophers. Further, the refusal of positivists to countenance atoms, eccentric in 1880 when the periodic law was generally accepted, became obdurance by 1895 when the investigation of subatomic particles had begun and the kinetic theory of gases was well confirmed.[9]

The atomic hypothesis was a make-or-break issue for positivists because atoms purported to be the very elements of matter that positivists said could not be known. The chemist Ostwald and mathematician Dingler were quite clear on this point in their numerous criticisms of mechanism and materialism (Ostwald 1902; Blackmore 1972, 264-67).[10] Ostwald acknowledged atoms in 1909, not without victorious crowing from his rival Loeb (Loeb 1915). Mach, by contrast, never acknowledged their existence. Nor did he concede that his critique of the kinetic theory had been off the mark. Quantum physics could not penetrate his sensational world. In a posthumous work, he repudiated relativity theory in order to remain true to his philosophy (Holton 1970, 173-74). Such obdurance did nothing to turn Planck's accusation of obscurantism.

Sixth, although antimetaphysics was often mistaken for irreligion, trained observers classed positivism with *fin-de-siècle* movements against scientific rationalism. This view was put by Antonio Aliotta, a Thomist philosopher, in his study, *The Idealist Reaction Against Science* (1914). Aliotta described the temper of the times this way:

> The mind of man, which could not rest content with a simple transference of results attained by the methods of the natural sciences to the realm of philoso-

> phy . . . sought within itself other and deeper activities which should throw open the portals of mystery. Art, morality, life, and religious belief were called upon to fill the void left by scientific knowledge; and the reaction went so far as to extend to the human intellect as a whole a distrust that should have been confined to scientific naturalism and its claim to be able to comprehend the infinite riches of mind and nature within a few mechanical formulas (Aliotta 1914, xv).

Mach's philosophy was for Aliotta a halfway house to idealist metaphysics—halfway because, while it destroyed the old certainties of mechanism and the referential veracity of scientific theory, it hypostasized sensations as constituents of the world.

The historian Henry Adams concurred in this general view but took it a step further. Recognizing the "crisis of science" that Pearson had announced, Adams diagnosed it as the self-destruction of scientific rationality induced by its commitment to understand the mind materialistically. Positivism betrayed itself into irrationality by attempting to juggle things so that it could retain the scientific world view while jettisoning materialism (Adams 1973, 491-98). The spectacle of this disaster subdued Adams's lifelong search for scientific history; he turned instead to religious meditations.

The philosopher Hans Vaihinger had produced a version of positivism by ruminating on the philosopher who was also Mach's main inspiration, Kant. In *The Philosophy of "As If"* Vaihinger touted science without metaphysics as a higher stage of enlightenment, in which the mind becomes aware that its best knowledge is an elaborate web of illusions, that is, subjective concepts and principles that construct reality from the chaos of the senses. Vaihinger cited Nietzsche at length in support of this view (Vaihinger 1924, 341-62). Nietzsche, in turn, believed that his world-creation epistemology was supported by the positivist abolition of the distinction between appearance and reality (Nietzsche 1968, 261-331). The scientist who occupied this space was Poincaré, who substituted for Machian sensations and economy of thought constructive imagination playing with ideas to please its aesthetic sensibility.

Seventh, if Aliotta's classification of positivism with antirationalist trends is correct, incidence of religiosity among positivists should be high. Aliotta did not assess this implication; but the evidence confirms it. Duhem, Charles Renouvier, and Pierre Boutroux were religious Catholics. The scientific religion of humanity, that polymorphous offspring of Deism, was also around. One form it took was a sort of socialist freemasonry, manifest in ethical culture and the German Liberal Party under the leadership of the cellular biologist Rudolf Virchow. Mach, Poincaré, and du Bois-Reymond were of this persuasion. Although ethical culture could warm the heart and stir the vigor-

ous emotions, it lacked the pizzazz needed to attract youth. This was provided by Ernst Haeckel's Monist League. Monism resolved the head/heart conflict by embracing nature in its sensuous, flora-fauna aspect. Here nature merged with the traditions of romanticism (Haeckel was himself an artist) and touched the chords of Oneness with the All. The ideational representation of these feelings was the doctrine of panpsychism, as Haeckel called it, or energeticism. Monist cosmology was Darwinian, displaying nature in its timeless majestic splendor, including the awesome drama of the struggle for existence. The eugenics component of this drama embued Monism with religiopolitical content. The idea of race suicide through laissez-faire breeding conjured great peril and morbidity, calling forth solidarity, vigilance, and propagation of true doctrine: in one blow the dramaturgy of the great world religions was established on a "scientific" basis (Gasman 1971, 10-26, 90-100). None was a more ardent or eloquent apostle for national eugenics religion than Pearson, although in England it never became a popular movement. Ostwald, Hans Dreisch, and, for a time, Mach were Monists. Mach's disavowals not withstanding, positivism functioned as an antidote to materialism and thus as a releasor of religious emotions.

Finally, Pascal's syndrome includes self-mortification that humiliates pride of intellect so that it may obey the heart. Henry Adams detected this behavior, but he assessed it as the apocalyptic disintegration of scientific rationality rather than the local disturbance it was. Nevertheless, the self-inflicted wounds are spectacular. Let us sample this exotic anguish. In *The Analysis of Sensations* Mach wrote that "the assertion is correct, then, that the world consists only of our sensations"; that "bodies do not produce sensations, but complexes of elements (complexes of sensations) make up bodies"; that "for us, colors, sounds, spaces, times . . . are provisionally the ultimate elements, whose given connection is our business to investigate. It is precisely in this that the exploration of reality consists"; that the notion of atoms as causes of sensations was "monstrous" (Mach 1959, 12, 29, 311).

From Pearson we hear that mechanics does not causally explain motions of bodies and that biology does not explain the growth of cells; that empirical laws are not discoveries but are mental creations in which laws are a shorthand expressing sequences of sense impressions; that science deals with introspective data only, with a view to enhancing animal existence; that the mind is limited entirely to one source of knowledge, sensations; that the cause of sensations is unknown and that the nature of physical reality is inscrutible; that the existence of the external world cannot be proved; that the nature of matter is unintelligible; that the nature of the universe varies with the scientific perception of it (Pearson [1892] 1951, 15, 47-48, 61-67, 86, 108, 114-15, 356).

Duhem set himself the heroic ascetic task of finding a philosophy of science that left common sense and religious dogma intact as statements about actual existence, while denying that scientific statements assert anything about actual existence. The solution was to classify all statements about existence as metaphysical and then to argue, from observations on the structure of physics, that it makes no statements about existence. Thus Duhem declared that "hypotheses do not claim in any manner to state real relations among the real properties of bodies"; that "metaphysical and religious doctrines are judgments touching objective reality, whereas the principles of physical theory are propositions relative to certain mathematical symbols stripped of all objective reference"; that "for us the principle of the conservation of energy is by no means a certain and general affirmation involving really existent objects. It is a mathematical formula . . . permitting us to deduce a series of consequences furnishing us a satisfactory representation of the laws noted in our laboratories"; that "the system we have expounded gets rid of the alleged objections that physical theory would raise to spiritualist metaphysics and Catholic dogma" (Duhem 1962, 20, 283, 285).[11]

These views gained currency among scientists at about the same time that the linkup between physical and biological sciences appeared to sanction thorough-going materialism. Critics as diverse as Planck, Adams, and Lenin believed that positivists had deeply compromised objective rationality. Positivism was not motivated by attention to previously ignored facts, but, as its spokesmen declared, by repugnance to metaphysics, that is, to the materialism implicit in the natural sciences. In denying facts assumed by any science whatever (e.g., the existence of matter, or the "external world"), or facts assumed by particular sciences (e.g., that sense impressions originate from physioneurological processes), positivists put themselves through a self-mortification that sacrificed intellect on the altar of sundry idealisms, from phenomenalism to the *Ignorabimus* of du Bois-Reymond.[12] The mechanism involved appears to be the taboo. Taboo quarantines facts perceived to be stressful but irremovable. It discredits such facts by making them unmentionable, or mentionable only as disgraceful. The taboo on metaphysics operated to discredit materialism and to discourage scientists from consciously embracing the materialism implicit in science.

Gross Stress Effects: Positivism and Cultural Pessimism

The application of psychological concepts to cultural phenomena requires bridging concepts to link individual psychopathology to normalcy. The link previously discussed was the intersection of the

psychobiology of religious experience with the biogenic amine hypothesis of the manic-depressive etiology. A second link is established by the phenomenon of gross stress as an inducer of mass psychogenic illness. Gross stress methodology begins with the abnormal behavior of a group or with the high incidence of abnormalcy in a well-defined group, and it seeks to identify stressors that might have occasioned the epidemic. Essentially, this methodology is a search for specific environmental or social toxicities (Cawte 1978; Colligan, Pennebaker & Murphy 1982).

The application of gross stress methods requires a well-defined group, such as employees in a workplace, for effective isolation of symptoms and causes. This requirement is missing when the group in question is merely scientists or intellectuals. Nevertheless, an approach analogous to gross stress may be used to inject analytical concepts into intellectual history (Caton 1985b). As a symptom providing evidence of gross stress operating on intellectuals in the period 1870-1914, I nominate the phenomenon of cultural pessimism. Ostwald's Spengler's *Decline of the West* (1918) is the archetypal expression of cultural pessimism because this work depicts the affliction as universal and the decay as irremedial. Other expressions were fear of racial and national decline (the eugenics movement); the preoccupation with "decadence" in the arts, letters, and manners; and apprehension for the decline of religion and patriotic feeling. The kernel of the matter, however, appears to have been a sense that the cultural and political initiatives dominating the nineteenth century under the banner of progress had become futile or witless (Caton 1983; Stromberg 1982). The writings of Nietzsche, Henry Adams, and Freud gave powerful expression to different versions of this view. That such forebodings were not wholly captious would appear to be supported by that catastrophic event, World War I. Whether the war was to some extent a response to the same stressors that produced cultural pessimism is an interesting question that will not be pursued here, even though some evidence to this effect will appear in what follows. My object is to array positivist thought in the ambience of cultural pessimism, considered as a gross stress symptom. This I will do by examining some particulars of the thought of Mach, Pearson, and Weber, who are representative of three configurations of positivism.

Ernst Mach and the Materialism Stressor

Until the rise of modern science, the proscription of materialism in western culture affected few individuals and no institutions. Around 1700 fideism and Deism functioned to legitimate religious professions tolerably consonant with the scientific orientation that recognized

niether occult causes nor miracles. If Deism was an important step toward the legitimation of materialism, it was not the thing itself. Materialism was not then essential to science because the materialism implicit in the physical sciences became unexceptional after the defeat of superstition in the aforementioned struggles. This situation altered when the biological sciences matured sufficiently to make the assumption of the materiality of life phenomena requisite for the institutional pursuit of numerous sciences. At that point materialism ceased to be a private opinion and became a public doctrine; and in becoming a public doctrine, it achieved the potential to stress a mass public.

This change of status may be dated to about 1850; of this change there were several indicators. First, in 1845 four rising German scientists—Hermann Helmholtz, Carl Ludwig, du Bois-Reymond, and Ernst Brücke—swore an oath to remain steadfast in the resolve to explain physiology exclusively in terms of physiochemical processes (Loeb 1964, viii).

Second, between 1852 and 1856 four German chemical and medical scientists published tracts advocating the materialist conception of life. Two of these authors, the chemist Jakob Moleschott in particular, admitted being aroused by opposition to the mystifying evasions of materialism published by leading scientists. These tracts commenced the materialism debate in Germany.

Third, Charles Darwin's *Origin of Species* (1859), although it scarcely mentioned Homo sapiens, presented a vast panorama of origins based entirely on materialist principles. Darwin's research promptly became the stimulus for the materialism debate in England, there called naturalism (Turner 1974).[13]

Fourth, in 1869 Helmholtz took the podium at a scientific conference in Vienna to sketch a picture of the world as seen by the sciences at that time. His sketch confirmed the materialists of the 1850s, who had arranged all life processes under the conservation of energy principle. Helmholtz produced a direct proof of the nonexistence of the soul from the second law of thermodynamics (Helmholtz 1908, 2:369-97).

Fifth, with the publication of Helmholtz's *Physiological Optics* (1856) and Gustav Fechner's *Elements of Psychophysics* (1860), experimental psychology was founded on the materialist proposition that sense impressions and other mental events are the end products of stimulation of the peripheral organs of sense.

As a gifted young physicist with a bent toward psychology, Mach fell into the orbits of Helmholtz and Fechner. In 1864 he lectured at Graz on Fechner's *Elements* and in 1866 published his *Introduction of Helmholtz' Theory of Music*, based on the latter's work on physiological acoustics. Helmholtz and Fechner were of opposite minds about the implica-

tions of science for human self-understanding. Although Helmholtz never repaired to the materialist banner, his views are a comprehensive statement of scientific materialism. He was a leading advocate of atomic theory, the hallmark of materialism since Democritus. He was a forceful critic of vitalism and of its inspiration in *Naturphilosophie* and other misunderstandings, such as Goethe's aesthetic approach to science. His concept of the aim of science was ultra-Baconian: science, he said, is out "to establish supremacy of intelligence over the world," to win "new victories . . . over reluctant matter," to "grapple victoriously with time and space and the forces of the universe . . ." (Helmholtz 1980, 1:23, 29, 59, 152, 156). Fechner, on the other hand, was concerned to rescue the immateriality of the mind from the clutches of the discipline he was so instrumental in creating. To do so he set up a theory of psychophysical parallelism, reminiscent of Gottfried Leibniz, that attributed soul to all living things. He was also an antiatomist.

Mach never hesitated in preferring Fechner, with whom he shared the fundamental agreement that matter could not be the cause of sensations. But he rejected Fechner's dualism for the more radical doctrine that matter and natural laws do not exist (Blackmore 1972, 25, 29).[14]

From scattered comments on his intellectual development, one may reconstruct the emotional origin of Mach's philosophy. It sprang from two trance experiences. The first occurred at age eighteen. He had for several years meditated upon the Kantian philosophy that had made a "powerful and ineffacable impression" on him. The problem with which he grappled was the unknowable *Ding an sich*. This problem resolved itself "one bright summer day in open air, [when] the world with my ego suddenly appeared to me as one coherent mass of sensations" (Mach 1959, 301n.). Here at a stroke was the ecstatic illumination to which his subsequent doctrine would refer. As he matured into a student of physics, Mach found himself struggling to retain his cosmic intuition. The second illumination, which occurred in 1865 at age twenty-seven, resolved the tension between mind and body inherent in Fechner's parallelism. Mach declared that in this experience "I set myself free from the greatest intellectual discomfort of my life, and I attained thereby a certain satisfaction" (Mach 1959, xli).

The doctrine supportive of these experiences is set out in the first chapter of *The Analysis of Sensations* (1886), titled "Antimetaphysics." The chapter commenced with a reproach to the "unwonted prominence" of physical investigations of the senses and invoked the methods of Goethe and Arthur Schopenhauer to achieve an expanded horizon that included physics as a *subordinate* part (Mach 1959, 1).[15] This horizon is Mach's ego. The ego can be expanded so as to "embrace

the entire world." Metaphysical thinking, by contrast, assigns the ego to a determinate body and imagines that sensations are end products of stimulation of peripheral organs by independently existing bodies. This conception "contracts" the ego, "completely separates" it from the world, and removes it an "infinite distance away" (Mach 1959, 12). The ideation of expanded and contracted ego is bound up with an emotional matrix. Mach illustrated ego expansion by reference to virtuoso mastery, as in music or oratory. Illustrating contraction he wrote: "In conditions of depression . . . such as nervous people often endure, the ego contracts and shrinks. A wall seems to separate it from the world" (Mach 1959, 13).

Common experiences of life reinforce perception of the entrapped ego and its depressive feelings. One is self-recognition in mirrors, which on two occasions startled Mach by the disgusting image presented. Another is appetites—vanity, domination, revenge, and other qualities associated with the egotistical. The pursuit of science did not purify these gross traits: "the ways even of science still lead to the mouth" (Mach 1959, 23n.). Yet another limiting experience is intimations of immortality and fear of hellfire (Mach 1959, 24).

The remedy for these depressive limitations was contained in the original vision, where the ego was fully at one with the "mass of sensations." In this trance state external objects cease to mark boundaries of the human body, and the ego too disappears into the flux of sensations. There is no ego; the apparent ego is merely a "practical unity" synthesized to meet animal needs.

This view implied renunciation of the egotistical. "The ego must be given up," he wrote. "It is partly the perception of this fact, partly fear of it, that has given rise to the many extravagances of pessimism and optimism, and to numerous religious, ascetic, and philosophical absurdities." Ego renunciation furnishes a "freer and more enlightened view of life, which will preclude the disregard of other egos and the overestimation of our own" (Mach 1959, 25).

The experience Mach described corresponds to the trance state of samadhi Buddhism (yoga). Experimental investigations of yogin show that they obliterate ego boundaries by drifting from space-time motor verification of objects and body image into a dream-like parasympathetic immobility and breakdown of perceptual constances of space-time (Fischer 1970; Lex 1979; d'Aquili 1978; Mandell 1980). Mach was aware of the Buddhist character of his philosophy, which he acknowledged in publications and private correspondence. In an autobiographical fragment prepared for Ostwald but not meant for publication, Mach identified his illumination experiences of 1856 and 1865 as Buddhist: "After I recognized that Kant's *Ding an sich* was nonsense, I

also had to acknowledge that the 'unchanging ego' was also a deception. I can scarcely confess how happy I felt, on thus becoming free from every tormenting, foolish notion of personal immortality, and seeing myself introduced into the understanding of Buddhism, a good fortune which the European is rarely able to share" (Blackmore 1972, 289). To rid himself of fear of death and punishments, Mach made away with the materialist conception of the relation between mind and body, with its depressing conception that egos are confined to particular bodies which are their cause. Thus, this son of a free-thinking Austrian school teacher, whose exotic perceptions of spatial relations and of himself began at age three, presents the curious spectacle of a scientist who opposed materialist physics and Christianity for the same reasons.

Mach stated that his philosophy was based on a single "aperçu" around which all argumentation revolved (Mach 1959, xxxvi-xxxvii).[16] For others to attain to it required that they undergo a Gestalt-switch in a trance experience of ego obliteration (Mach 1959, 356-57, cf. 33-37). Mach warmed to the Buddhist identity of the aperçu because it showed that the insight might be shared by many. Indeed, he seems to have thought that his philosophy represented a higher stage of this ancient religion, because it had overcome corporeality from within the precincts of natural science. The elimination of matter and force from physics must eventually lead, he thought, to their elimination from practical life as well, and to the realization of the humanist ideals of pacific cooperation that Mach shared with many scientists.

Mach lived to see his highly idiosyncratic philosophy become a powerful current in European thought. He welcomed followers; but even more he welcomed philosophers and scientists who had arrived independently at similar views, for to him it signified that scientists had at last come to recognize the inadequacies of the materialist philosophy dominant among scientists for 150 years (Mach 1976, 3). But clearly the relationship was the other way around: scientists and intellectuals rejected materialism in order to make room for convictions incompatible with the facts about the material world, as one sees nowhere more clearly than among the Russian Marxists who enraged Lenin by reading serene Machian immaterialism into Marx's texts of economic materialism and political violence (Cohen 1970, 156-60; Blackmore 1972, 232-46). To sample the burden of the materialist conception of the world, we turn to Karl Pearson and Max Weber.

The Degeneration Anxiety

Pearson was a man zealous for the public good at a piquant moment in European politics. The great nations had amassed political, economic,

and technological powers on unprecedented scales. Such preponderance would normally support a sense of confidence and optimism in public life, which indeed was present in the form of multiple enthusiasms for progress. But notes of unease and disquiet, here called cultural pessimism, were also prominent. Statesmen wrestled with a multitude of daunting problems: the governance of rapidly growing, highly mobile domestic populations, preferably by democratic means; the administration of far-flung colonies; political and economic competition among great powers that had led to an arms race and to the frightful prospect of a European war. Pearson's publicist activities were animated by such political concerns; he energetically put the case that science, in its informational, organizational, and technological aspects, was the resource needed to resolve these problems (Pearson 1901; 1897a, 1:140-72). His great passion was for a national eugenics policy, based on the new science of human reproduction, that would furnish a corps of superior men to conduct public affairs. Borrowing the phrase that Nietzsche had coined to characterize his similar objective, Pearson prophesied that the new goal would consummate a "transvaluation of all values" (Pearson 1915, 30).[17]

My object is to describe the anxiety present in Pearson's eugenics advocacy. There were two anxiety objects: the "cosmical" process of evolution and "race suicide." As to the first, knowledge that the human species evolved by natural selection seemed to imply that the improvement of the race was not the consequence of man's higher ethical nature but quite the opposite, that the species made headway by brutal intraspecies competitions eliminating the unfit. T. H. Huxley had wrestled with this dilemma for a lifetime. In his Romanes Lectures (1893) he resolved it by supposing that the species had attained to its ethical dignity by learning to oppose the cosmical process through the arts of peace and cooperation. To Pearson it seemed that Huxley had by fiat created a loophole in the fabric of nature that exempted humanity from its laws; and he determined not to duplicate this flight from reality (Pearson 1909, 22). But this meant accepting the "war of nature" that exhibited Homo sapiens a predator red in tooth and claw. Pearson alleviated tormented conscience in two ways. First, his descriptive panorama of conquest and extinction is rendered with a tragic eloquence that invests them with the grandeur that poets use to stir ardour for great causes (Pearson 1901, 20-23). In this way he reversed Huxley's negative valuation of the cosmical process. Second, there were civilian features in Pearson's evolutionary scenario. He argued, contra Huxley, that the human species was gregarious; consequently, lethal competition was primarily between groups, not between individuals. This enabled him to assert that, within the group, ethical values were adap-

tive; and as the species progressed, force and guile were increasingly less adaptive than organizational and technical skill (Pearson 1909, 2-8, 19-20). The operation of these traits at length produced the modern state, whose multiple powers enabled it to shelter many from the rigors of natural selection.

Yet this high ethical property of the modern state gave rise to the second anxiety, fear of degeneration. The extension of medical services, the relaxation of the rigors of criminal law, and so on, meant that the diseased and degenerate elements of society were propagating their kind; and Pearson's calculations persuaded him that the breeding rate among degenerates must soon ruin the state unless countermeasures were taken: "if we spend our days over statistics of the insane, the mentally defective, the criminal, the tuberculous, the blind, the deaf, and the diseased, the inevitableness of it all is apt to reduce us to the lowest depths of depression. But this is only one side of the picture. . . . If the iniquity of the fathers be visited upon the children to the third and fourth generation—assuredly so is their virtue" (Pearson 1897, 1:12, 39). The phrase "the lowest depths of depression" exposes a feeling that received more telling expression in that sign of apocalyptic anxiety, "race suicide." The possibility of this dire outcome was prominent in Pearson's voluminous writings on eugenics. It suggests that the degenerates/wellborn pairing is potentially a manic-depressive polarity. In the writings of Nietzsche, the pairing undoubtedly assumed manic-depressive qualities in his violent revulsion to the mutilated "Last Man" and in his rapturous anticipation of the eugenic *Übermensch*. Moreover, the plot line of the drama was about the same in Pearson and Nietzsche: we are shown a panorama of the historical development of the species, viewed from the perspective of the summit. We see a gradual, painful progress from brutishness and folly to the peaks of power and intellectual refinement; yet the entire achievement is in imminent peril owing to ignorance of heredity and sentimental attitudes toward the agents of decay. Then enter the new man—Superman, as G. B. Shaw dubbed him—to redeem the impending chaos.[18]

These were not the private fantasies of a few individuals. "Race suicide" was the catch-cry of the eugenics movement. By 1914, eugenics societies were established in Britain, the United States, Germany, and Russia, usually with the support of distinguished scientists and public figures (Cravens 1978). Eugenics doctrine was the best advertised advice of science to the political public in that period. The feelings that the movement expressed and evoked signify the presence of mass anxiety. What was the unconscious or half-conscious anxiety figured in the concept of degeneracy?

The usual answer is racism or, more generally, race, class, and national xenophobia (Hofstadter 1944). While xenophobic ideation is undoubtedly present in eugenics literature and programs, repugnance to race, class, or nation cannot have been the primary anxiety. Eugenics was international, in character with science. It was not the ideology of a social class: the aristrocracy largely spurned it as another outrageous scientific idea, while socialists were quite as ardent for eugenics as those of liberal persuasion (Christen 1981; 1982). Racism is not the answer because the degenerates of greatest concern were white Europeans, especially those of noble blood (Galton 1925, 331, 337, 344-45).

Pearson's positivism provides the clue. On its face eugenics is a thoroughly materialistic conception of human traits. Learned British statesmen of the day, notably Lord Salisbury and Lord Balfour, reproached scientists about their forwardness with the whole Darwinian concept, which insinuated materialism into the public mind and confused it about ethical precepts vital to everyday existence. At about the same time the conservative St. George Mivart attacked the *Grammar of Science* for its covert "practical materialist" doctrine. Such allegations stirred Pearson to a spirited reply (Pearson 1897, 1:379-88). Materialism, he claimed, was a vanishing creed among scientists, who had advanced to the new enlightenment that expelled even matter from physics. Scientists, as he saw them, were high-minded and far from atheism and materialism. The issue was not between religion and irreligion but between ancient superstitions and scientific religion, namely the religion of national eugenics espoused by Francis Galton. Pearson read significance from the circumstance that the first thinker to advocate eugenics, Plato, was the paragon of noble ideals and enlightened religion (Pearson 1901, 22-23).[19]

The identity of degenerates may be read by collating positivism with high-minded eugenics. Positivism cancelled the certitude that the world is a brute machine. Because the new eugenics man will occupy the postmaterialist future, his actions and ideals will escape the harshness of brute thought and action that spoiled man's works during his long march from troglodyte origins. Degenerate man, then, is Homo sapiens as seen in the full light of science. He is the savage Fuegians whose playful ferocity so shocked Darwin. He is John Lubbock's Polynesian nobles, who ate their enemies as a point of honor and practiced infanticide as moral duty. He is the object of Huxley's vision of "the unfathomable injustice of the nature of things." He is Galton's earls and dukes, decaying from a string of dysgenic marriages. He is Mach, shocked by his disgusting mirror image. He is Pearson's vigorous Anglo-Saxon, driving the Indian from North America and the Negro from Africa.

Eugenicist xenophobia registers the shock of recognition of man as he is. Eugenics man registers the mind's revulsion to Homo's hateful qualities. Oedipus had riddled the Sphinx and must now put out his eyes with fantasies about a new world and a new humanity.

This trauma had been experienced by Pascal and Nietzsche. Pascal wrote: "If one does not know himself to be full of pride, ambition, concupiscence, weakness, pettiness, and injustice, one is very blind. And if, knowing this, a man does not desire to be delivered, what can one say of him?" And Nietzsche said: "We are from the bottom up illogical and therefore unjust creatures, and we know it: this is one of the greatest and irresolvable disharmonies of life."

The Burden of Guilt

Weber was among the handful of scholars whose labors uncoupled the social sciences from natural science underpinning to create the autonomous social science of this century. There is now available detailed study of how and why Freud created a psychopathology independent of neurology, and how and why Franz Boas obliterated anthropology's Darwinian orientation (Sulloway 1979; Freeman 1983b). Despite their common cause, Weber, Freud, and Boas worked in isolation from one another. There is little evidence that phase two positivism made any impression upon them. Certain segmented commonalities are nevertheless noteworthy. Freud and Mach revolted against the psychophysics in which they took their training. Boas, trained as a geographer, conceived a strong antipathy to Darwinian biology under the tutelage of cellular biologist Virchow and Kantian philosopher Benno Erdmann. When Mach deployed evolutionary concepts, they were invariably Lamarckian. Challenged by August Weismann's experimental disproof of Lamarckian inheritance, Mach evaded the evidence, as he evaded the evidence for atomic theory.[20] Boas, in his battles with eugenicists, attempted to annul the implications of genetics by recourse to imaginary biology (Freeman 1983a, 140-41). Freud's Oedipal theory, Lamarckian in its assumptions, displaced the real confrontation of Oedipus with the Sphinx—advanced specimens of Homo sapiens aware of themselves as a primate species in Darwinian nature—by an imaginary tale of sexual competition. The effect of Freud's story was to parlay incest avoidance, a common phenomenon in the animal kingdom, into a fund of guilt.

Weber's writings also evince an acute sense of guilt. Guilt first appeared in his writings in association with hitherto unrecognized borrowings from Comte's philosophy, in works completed during recovery from psychosis. The best known is *The Protestant Ethic and the Spirit of Capitalism* ([1904] 1958), whose thesis is that modern capitalist

institutions were constructed by men animated by the Calvinist doctrine of good works as a sign of election or salvation. In subsequent writings, the thesis became an instance of the generalization that the central achievements of all civilizations are executed under the stimulus of a religious conception of existence that embues the world with meanings that direct the action of coordinated multitudes (Weber 1974, 267-301). Such holistic conceptions Weber deemed to be functionally necessary for associated groups and psychologically necessary for individuals. The Protestant conception, he maintained, was marked by a certain tragic flaw that became apparent only when its effects were irreversible. Protestantism placed a premium upon rationality as a means of glorifying God and achieving salvation; in economic terms, this meant unlimited acquisition as the effect of devotion to calling, that is, strenuous commitment to improving the soul by the ascetic of hard work. In intellectual terms, it legitimated uncompromising pursuit of science to know God through his works. The tragic flaw is that the Protestant variety of rational action "disenchants" the world by expunging all trace of divine influence. The capitalist system of science linked to unending productive expansion thus at length entraps men in an "iron cage." The entrapment is that the hard daily struggle for existence can no longer be elevated by belief in ideals, and men are thrown back on the stoney ground of private and group interests. Life becomes a "loveless," "unbrotherly" competition for bread in the "boiling heat of modern capitalist culture" (Weber 1958, 182, 105; 1974, 289-90, 332, 334, 339).

The corollary of the "mechanical petrification of life" is the guilt feelings of the intelligentsia who in their vocational capacity perpetuate world "disenchantment"—a decidedly negative term for enlightenment. Weber discerned in intellectuals a "godless feeling of sin," a "secret anguish" at the moral suffering their improving efforts have unwittingly inflicted on their fellows (Weber 1968, 1:575; 1974, 352-57). To compensate for this devastation, they can do nothing more than to follow Weber's own course. They are obliged by conscience to make a frank confession that the rational values they espouse are incapable of supporting the high norms required by public life. Not only do they devalue themselves by perpetuating a godless world, but it is now understood that all values spring from the emotional search for meaning, even as the drive to rationality sprang from the impulse to salvation.[21] The intellectuals thus apprise the public that from their point of view the value field is a battleground where "warring gods" or ideals, religious and political, compete for the allegiance of men. Since enlightened rationality is no longer in the contest, there is no active force to impede the coming of new "prophets" and "charismatic leaders"

inaugurating a new table of values for humanity to whom capitalist rationalism has become intolerable.

Weber's narrative is a rewrite of lesson fifty-six of the *Cours de philosophie positive*. There Comte describes the "essor systematique de l'industrie" under the auspices of the "ethique protestante et l'esprit de capitalisme" (Comte 1975, 2:517). Comte coupled Protestantism not only with capitalism, but also, more explicitly than Weber, he traced the critical spirit of scientific rationality to the Reformation revolt against the Church (Comte 1893, 2:269-70, 277, 288, 297-99, 345). This development eventuated in the distress of the "age of transition," as previously discussed. Comte's way out of this impasse was to subjugate the head to the heart in the religion of humanity. Weber accepted that the intellectual must submit to the heart. But he did not believe that intellectuals could substitute an artificial enlightened religion, however sentimental, for the old-fashioned prophetic religions of charismatic heroes (Weber 1968, 1:516). This was one reason why Weber did not share Comte's confidence that a way out of the impasse had been found. There was another reason more important still. In two essays of his postpsychosis period, Weber projected, from economic and geopolitical considerations, a catastrophe scenario in which the era of progress would be terminated by a genocidal general war that would destroy Europe's liberal political institutions (Weber 1958, 60-62). The loss of Weber's memoire on his illness deprives us of evidence from that time whether this scenario played any role in the etiology of his psychosis. But there is evidence from a later date—August 1914. Weber experienced the commencement of hostilities as a euphoric event: "despite its hideousness," he remarked to his wife, "this war is great and wonderful and worth experiencing." This was the common response, for the publics of all belligerent nations were swept by a wave of national feeling and solidarity (Stromberg 1982). But Weber, a semiinvalid since 1898, experienced remission from his symptoms and requested active duty at the front. In terms of his psychological self-description, his guilt as an intellectual was extinguished by unconditional submission to an armed god demanding the supreme sacrifice. For a moment at least, Weber's great torment—the perception that the most sublime ideals "always operate in opposition to themselves"—was extinguished by abandonment of cosmopolitanism for service to the fatherland. However, the god was stymied in the trenches, then finally capitulated. Weber tracked these events by becoming a critic of the war effort; and, finally, in the postwar period he reverted to the depressive vision of moral chaos mendable only by the despotic imposition of a new faith by charismatic leaders.

Conclusion

The Greek imagination invented rich icons of humanity's grappling with knowledge and ignorance. The Delphic Oracle placed its sacred seal on the quest for self-knowledge; but the quest led Socrates to be executed for criminal impiety and Oedipus and Prometheus to the limits of anguish. In more recent times, Martin Luther's inner conviction, Galileo Galilei's telescope, and Pascal's sacrifice of reason have been added to the store of icons. Such images signal perceptions of Homo sapiens's incomplete adaptation to *sapientia*. One knows that the cognitive apparatus of the neocortex is an add-on to a more primitive brain calibrated to basic animal functions, while unassisted sense perceptions reveal only a fragment of natural processes. Factual knowledge today as in former times pierces fictions fabricated to encourage the weak, to defend power, to conceal error, to evade responsibility, to mislead and demoralize enemies, and to buffer the mind against the shock of self-knowledge. In such moods the mind typically invokes the idea of wicked knowledge to effect a taboo or, as may happen, to legitimate punitive action (Wilson 1978; Caton 1985a).

Pascal's syndrome is perhaps a basic mechanism for repairing damage done by knowledge and preventing its recurrence. The syndrome is of particular interest as further evidence of stereotypy in psychobehavioral pathology. Studies of induced neurosis in chimpanzees have revealed the existence of stereotyping in behaviors that probably never occur in the natural habitat. In the present case, psychobehavioral elements of Pascal's syndrome are readily identified as elements in Homo's behavioral repertoire; self-mortification is plainly a specimen of appeasement behavior, while dismissal of knowledge of the origin of sensations as "metaphysics" (i.e., wicked knowledge) exhibits the operation of taboo. The common occurrence of such psychobehavioral elements in religion and political rhetoric, with or without neurosis, might provide a point of departure for an ethology of cognitive culture.

Notes

1. Saint-Simon was hospitalized in Charenton at age fifty-two (1812). Since 1805 he had been impoverished, having previously squandered his fortune. During the 1805-1812 period, he directed numerous communications to Napoleon and to high officials drawing attention to his schemes for reforming social institutions. The silence these overtures met drove him to grandiose confabulations of his self-importance. Obsession with glory amidst penury eventually turned to rage and breakdown. In 1814 he was again active and experienced no further disturbance until his attempted suicide in 1823. Comte, who had been Saint-Simon's assistant, collapsed at age twenty-eight (1826) from "moral pain" and overwork, he said, and was hospitalized in the psychologist Dr. Esquirol's institution. After nine months Esquirol pronounced Comte incurably ill, his symptoms

being mania and rage. In April of 1827 he attempted suicide, but by late 1828 the incurable Comte resumed regular activity. His condition was stable until the death, in 1845, of Clothilde de Vaux. From this time Comte commenced his cult of Clothilde the Feminine, which became ever more bizarre (Manuel 1965, 110, 113, 117-18, 261-63; Comte 1973, 186-87, 192-93; Lange-Eichbaum 1956, 293).

2. Mill's depression commenced in 1826; he experienced remission in 1830 when he was revitalized by "utmost enthusiasm" for the revolution in Paris. Of his condition he wrote: "I was in a dull state of nerves... unsusceptible to enjoyment or pleasurable excitement; one of those moods when what is pleasure at other times, becomes insipid or indifferent; the state, I should think, in which the converts of Methodism usually are, when smitten by their first 'conviction of sin'" (Mill 1969, 80-81). The reference to Methodist converts was shrewd, for depression usually involves feelings of guilt or worthlessness. On the psychological and biochemical linkages of depression and rage, see Hamburg, Hamburg, and Barchas 1975.

3. In his "Goethe" essay, Carlyle described the "malady of thought"—despair about "the whole scene of life"—that Mill and Huxley appreciated as clairvoyant of their own condition (Paradis 1978, 14-17, 63, 77). Henry Adams, another Carlyle admirer, devoted much of *The Education of Henry Adams* ([1918] 1973) to analysis of the relationship of his depression to the "sickness of the age." Its companion volume, *Mont Saint Michel and Chartres*, celebrates the healing powers of the feminine in the fashion of Comte. Nietzsche's self-analyses are abundant in letters and published writings. The megalomania he admitted is the subject of an entire book *Ecce Homo. Dawn of Day and Gay Science* (1911). These "works of recuperation," written after nervous illness forced his resignation from his Basel chair in 1879, wrestle with the manic depression that afflicted him from an early age. See note 9 below. Freud's depression, which he suffered between 1894 and 1900, appears to have been the idiopathic consequence of high ambition colliding with his inability to make the seduction hypothesis stand up as the font of psychoanalytic theory. Freud abandoned the hypothesis in 1897, the worst year of his depression, when he experienced self-doubt, morbidity, gastrointestinal pains, and tachycardia (Sulloway 1979, 215-16).

4. Weber suffered a depressive episode in August 1898; in December he was institutionalized. By 1902 he was able to work privately but did not resume regular activities until after his sudden remission in 1914 (M. Weber 1975, 234-58; Baumgarten 1964, 635, 642).

5. Kaufmann denied the presence of aberrant ideation in the Nietzsche corpus; Nietzsche's writings, he maintained, were "lucid" and contained "startling depth of insight" right up to his madness. These views are ill-informed. The "insights" of *Ecco Homo* and *Antichrist* are those of a man in the grip of the delusion that he was the god Dionysus, rival of Jesus (vide "ecce homo"). Kaufmann quoted letters in which Nietzsche described his mental and physical symptoms (suicidal thoughts, feelings of worthlessness, fear of madness, manic delusions, insomnia, semiparalysis, gastrointestinal disorders, migraines, fatigue, etc.), and acknowledged taking "immense doses" of opium. Of these letters Kaufmann remarks only that they show "what state of mind" Nietzsche was in (Kaufmann 1974, 58, 67, 70). For Nietzsche's descriptions of his moods and complaints, see correspondence: to Rohde, 27 March 1871; to Gersdorff, June 1875, 13 December 1875, 18 January 1876; to Otto Eisner, January 1880; to Peter Gast, 14 August 1881; to Franz Overbeck, 24 March 1883. Wilhelm Resenhofft's study *Nietzsche's Zarathustra-Wann: Deutung und Dokumentation zur Apokalypse des Übermenschen* (1972) combines biography with psychological analysis to interpret the Zarathustra fable. The author establishes the identity: ecce homo = antichrist = Übermensch = Dionysus. Zarathustra is the epic-allegorical representation of this identity.

6. It is not, of course, a *diagnostic* symptom: not all positivists were depressive.

7. In 1917 Einstein wrote Michele Besso, an old Zurich friend and Mach disciple: "I do not inveigh against Mach's little horse; but you know what I think about it. It cannot give birth to anything living; it can only exterminate harmful vermin" (Holton 1970, 185).

8. Pearson was an energeticist at the time he published *The Grammar of Science*. In that work he rejected Clerk Maxwell's conjecture that the mechanism of heredity is molecular (Pearson [1892] 1951, 307n.).

9. The basis of atomic theory was Avogadro's hypothesis (1811) that equal volumes of substances contain the same number of molecules. In 1865 Loschmidt calculated the number of molecules in a cubic centimeter of gas (Avogadro's constant). This number was subsequently deduced from Planck's quantum equations (1900) and was accurately computed by Perrin (1908) as 6×10^{23}. In 1881 Helmholtz had suggested the atomic theory of electricity by proposing that in electrolysis each monovalent moving ion carries an indivisible unit of electrical charge. The calculation for this charge contains Avogadro's constant thanks to Planck's quantum unification of chemical and electron theory. It is apposite to note that Planck trained in Berlin under Helmholtz and Boltzmann (Anderson 1964).

10. Ostwald's *Vorlesungen über Naturphilosophie* (1902) was dedicated to Mach. Ostwald was aware of the continuities between Comtean and Machian positivism; see his *August Comte: Der Mann und Sein Werk* (1914). Dingler's essay *Grenzen und Ziele der Wissenschaft* (1910) drew Mach's unstinting praise.

11. Arthur Eddington subsequently followed Duhem's philosophy with a view to making place for values and the idealist spirit (Passmore 1968, 332). Mach praised Duhem lavishly (Mach 1976, 1).

12. Du Bois-Reymond was not a phenomenalist but took the Kantian line that there were limits to human knowledge. The unknowables according to him were: matter and force, the origin of motion, the origin of life, the origin of sensations, the nature of free will, and the nature of thought (du Bois-Reymond 1884, 77-97). Pearson studied with du Bois-Reymond in Heidelberg.

13. Turner's study exhibits scientists and scholars in travail about the materialism they recognized as implicit in science. Of the numerous expressions of anguish quoted by Turner, we may mention George Romanes's statement at the conclusion of his *Candid Examination of Theism*: "I am not ashamed to confess that with this virtual negation of God the universe to me has lost its soul of loveliness . . . when at times I think . . . of the appalling contrast between the hallowed glory of that creed which once was mine, and the lonely mystery of existence as now I find it . . . I shall ever feel it impossible to avoid the sharpest pang of which my nature is susceptible" (Turner 1974, 113-14).

14. In correspondence with Fechner, Mach confessed his preference for pure phenomenalism. Fechner reacted coolly to this suggestion, which so upset Mach that he kept *The Analysis of Sensations* in his desk for twenty years (Mach 1959, 20).

15. See also Mach's disparagement of the "high reality" status of physics (Mach 1959, 8). Helmholtz is criticized for his "deluded" belief that psychophysics can explain sensations, whereas du Bois-Reymond's *ignorabimus* is commended because it confesses the inconceivability that mind could spring from matter (Mach 1959, 306, 370, 313).

16. This was recognized by Robert S. Cohen. Calling Mach's philosophy a "vision," he writes: "The vision is . . . metaphysical, as it articulates a profound feeling of tranquil self-absorption in the vastly larger world, the deadly 'oceanic feeling' of mystical religion. And it carried out this articulation solely as feeling, without cognitive criteria or practical test—as all mysticism finally must" (Cohen 1970, 155).

17. The phrase is used to characterize Francis Galton's project for the "conscious uplifting of man by himself." Nietzsche never mentioned Galton or the German eugenicists, although Ernst Haeckel and the Monists must have been known to him. I know of no direct evidence that Pearson read Nietzsche.

18. Pearson and Nietzsche were in accord on the urgent need to train a cadre of exceptional men for the conduct of government. "The training of an oligarchic class in statecraft is the first and perhaps hardest task of the modern state" (Pearson 1919, 16). See Nietzsche (1968, 382-402, 457-519).

19. Pearson shared the common apprehension that science posed a threat to the human spirit. The eugenics religion was his mature choice of a faith for which he vainly sought as a young man (Pearson 1938, 4, 8, 46, 106).

20. Mach adopted Hering's Lamarckian theory of memory, which was crucial for the interpretation of association. For his evasions of Weismann's evidence, see Mach (1959, 77-78, 308).

21. See Mach (1959). This view was first announced in Weber's methodological tract of 1904, *Die "Objektivität" sozialwissenschaftlicher und sozialpolitischer Erkenntnis*, in which he

wrote: "Only positive religion . . . is able to endow the content of cultural values with the dignity of unconditionally valid ethical prescriptions. The cultural ideals pursued by individuals, and the ethical duties they undertake to fill, are of fundamentally different dignity. It is the fate of a cultural epoch that has eaten from the tree of knowledge to know that we cannot read the *meaning* of the world out of the plenitude of facts about it, but that we must create its meaning; we must further know that world views can never be the product of progress in empirical knowledge, so that consequently the highest ideals, which move us most powerfully, are for all times embattled with other ideals that are just as sacred as our own" (Weber 1973, 154).

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