

## PSYCHOBIOLOGY AS SELF-TRANSCENDENCE

Become what you are.  
Nietzsche

All mental processes are biological and any alteration of those processes is organic.  
E. R. Kandell

*Introduction.* The presiding insight of the breakthrough to modern science was the doctrine of method, which held that the natural condition of the mind with respect to knowledge is a state of chaos. The remedy was to impose rules of procedure that steered the cognitive power clear of the shoals of fancy and impulse. But since the rules were devised by the very cognitive power requiring regulation, the feat was a bootstrap reformation, which I call self-transcendence. The historical issue of this rope trick was objective knowledge, or simply, the sciences. My purpose is to compare the transcending and transcended self from the perspective of psychobiology. In doing so, one explores the interface between the two selves; and that exploration is the modest aim of this essay.

*Historical Aperçu.* Psychobiology is an umbrella term implicitly postulating the eventual synthesis of some half dozen or more brain and behavioral sciences. Since its origin lies in the future, its history can be traced only from one of the currently contributing sciences. The study of sense perception will serve our turn. Modern methods commenced when optics was synthesized with physiology to yield descriptions of perception as the end-products of neurological processes originating in the peripheral organs of sense. These studies, called "psychophysics" at the time, were pioneered by Helmholtz and Fechner in the 1850s. "Psychophysics" resonates with materialist connotations, and the new field was indeed at the center of the materialism controversy then. But before sampling that archive, let us regress to the prototype of psychophysics, Cartesian physiological optics.

Optics in Descartes' system is the link connecting the infinite mechanical universe with the transcending and the transcended subject. This it did by furnishing a scientific explanation of the central features of visual perception (image, color, space, focus, illusions) in terms of the action of particulate light rays on the eye and the sensorium. Now vision is common to the scientific subject and the naive subject, but they regard it very differently. For the latter, the world as immediately seen is an authoritative deliverance about reality, while the scientist

transcends the world as visually given by construing it according to the mechanical hypothesis. The sensed and mathematically-modeled worlds are placed in conceptual equilibrium by demonstrating sense perception, hence, the world as naively experienced, to be localized in the brains of certain kinds of animals. The equilibrium is maintained by strict application of rules that forbid *unregulated* reflection on the two worlds; for only when that condition obtains can the causal relations between them be clearly and distinctly perceived. Otherwise the transcended and transcending self mingle promiscuously and generate the murk of insoluble conundrums about the existence of the external world and the like.

The image of Descartes' optical epistemology is the pineal gland, a small organ located in the cortex. Here, he declared, is the "seat of the soul."<sup>1</sup> The pineal gland has been the butt of learned wit practically since the day Descartes brought his conceit into the Republic of Letters; but the reason why it is comic is not often noted. Surely, I think, because it so aggressively defines human finitude. The naive confidence in the reality of the sense world is brusquely up-ended by locating sensation in the dark, damp cortex. Further, assigning the self a precise space-time location in the infinite universe delivers a brutal wallop to human vanity. Yet the scientific self can—and in Descartes' case did—take pride in this staggering self-overcoming, which makes one master of his own thoughts *via* a method for knowing himself objectively.

*Psychobiology: Oedipus Beholds Himself.* The routinization of this early achievement by psychobiology does not in any way diminish our astonishment at what we discern upon looking through the many windows now open on the human mind. Here are a few glimpses.

1. The precise location of the self in space-time now includes evolutionary descent. *Homo* is a recently arrived primate who branched from the great apes 5 million B.P. The genetic divergence is not very great; we are a sibling species with chimpanzees, with whom we share 99% of our genes. Had this estimate of relatedness been available 30 years ago, it would have created a great paradox; for theory suggests that species so close ought to be very similar in behavior and psychology, although at that time evidence to that effect was not to hand. As it happened, however, the estimate of genetic distance came after primatological and other research had produced evidence of profoundly hominoid traits in chimps. They are capable of analogical, causal, and analytical thinking. They are adept at observational learning. They possess arithmetic and geometrical competences. They use tools but also make them. They—and two other great ape species—have been taught the American Sign Language. The thoughts and wishes they communicate are similar to those of human juveniles. They spontaneously invent words and use them appropriately. Excrement, for example, is disgusting to them, and they use a word for it to abuse handlers and conspecifics who displease them. They beg for treats, relish

play with any reciprocating species, and are prodigious problem-solving manipulators. Their social life also bears marked similarity to our species. They live in polygynous small bands; sometimes engage in group hunts; have a weak dominance hierarchy comprised by coalitions of a few males; assist offspring not their own; form friendship or grooming attachments; bond between mother and offspring, and sometimes culturally transmit learned behavior. Like many mammals, their social interaction assumes the capacity for individual recognition, but there is also convincing evidence that chimpanzees are self-conscious.

That primatology is now a powerful tool for understanding human behavior is indicated by the study of behavioral ontogeny. Psychologists attempting to unravel the causes of autism and other human juvenile pathologies undertook experiments in which chimpanzee newborns were placed in various degrees of isolation from their mothers and conspecifics. The result was that without the usual body contact, grooming, and pampering, the subjects suffered depressive psychosis that impaired their capacity for normal social interaction when isolation was terminated. They cringed and attacked by turns, did not respond appropriately to social signals, and avoided reproduction. Females who became pregnant could not learn to care for offspring. The obvious implications for nurture of humans were supported by ethological studies of normal human mother-infant interactions, which exhibited child development as a phased sequence of sensitive learning times during which the infant provokes in the mother the sort of handling needed to elicit the infant's responses. The infant's mind turns out to be far from a dull grey slate; intellectually and emotionally it is curious and adventurous. It can be conditioned, but only on its terms.

2. A deep layer of the human psyche is gender identity. Its probable location is the limbic system of the temporal lobe and areas of the cortex associated by neural connections. Gender self-image is produced and maintained by hormonal neurotransmitters that stimulate structures of the limbic system (hypothalamus, amygdala, hippocampus). Hormones are typically action-specific, triggering pubertal development, spermatogenesis, ovulation, erection, lubrication, menstrual tension, milk let-down, menopause, etc. They also account for the greater aggressiveness of males and predominance of nurturing in females, whose associated psychological states furnish the materials for sexual stereotypes and erotic fantasy.

Experimental knowledge of psychosexuality is of a very recent provenance—essentially the past twenty years. Like all science, sexology explains the abnormal or irregular with the same principles that explain the common occurrence. Thus, the difference between genetic, gonadal, and endocrine (hormonal) sexuality explains those mixtures and reversals of sexuality most familiar as hermaphroditism and transsexuality. Sex changes by reconstructive surgery of the

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genitalia bring the body into conformity with hormonally induced psychosexuality. Along a different track, bizarre behaviors have proved to yield to neurological ingenuity. Fetishism in epileptics disappears with the surgical destruction of neural sites of seizures. Coprophilia, a penchant incomprehensible to most normals, now makes sense as a wiring irregularity between the limbic system and the reptilian brain. Many animals clean themselves and their young by licking away filth. This behavior disappeared in *Homo*, but the basic mammalian neural diagram remains and may activate coprophilia by a slight waywardness of a neurotransmitter or synaptic connection.

Oedipus' phobia is also understood. Incest avoidance extends right through the plant and animal kingdoms for the simple reason that incestuous reproduction creates inbreeding depression unable to withstand selection pressures. Horror of incest is the quality this genetic commandment takes in human consciousness. The mechanism of its formation is approximately known, thanks to an extended social experiment in the kibbutz. In these communities, children were nurtured as siblings in common mixed-sex dormitories. Although these genetically unrelated but socially defined brothers and sisters were strongly encouraged to marry, not one of over 2,000 in a survey population did. This result is hard to explain on the supposition that behavior and psychology conform to socialization. It follows readily on the assumption that incest avoidance is imprinted through common residence, which was of course the condition of the original human social group.

3. Philosophers and social critics are likely to agree that the most important finding of psychobiology is that the human mind is not a unity. The venerable distinction between reason and inclination, between rational and irrational behavior, is updated in the concept of the triune brain and its "disconnection syndromes." Primate brains are comprised by three anatomically and neurologically distinct brains widely separated in evolutionary time. They regulate numerous processes of which there is little or no consciousness and voluntary control. Regulation is accomplished by automatic processing of information from the senses or the interior of the body. Most behavior is of this description. Although we are conscious of it, and have a measure of control over its expression, our social interactions are on the whole predictable expressions of items wired into *Homo's* behavioral repertoire. From the evolutionary and neurological points of view, it could hardly be otherwise. The disunity of the mind became an adaptational problem only when *Homo* altered his hunter-gatherer existence by entering, some 6,000 years ago, the urban habitat that he created. This change considerably increased the premium on ordered cognition, for never before had material existence depended upon the maintenance of an artificial habitat. The dependence on constructive rationality for the ordering of political society created the conditions for the conflict known traditionally as reason *versus* passions. In the new

formulation, this conflict is the result of orchestrating the hunter-gatherer repertoire of behaviors—the only set available to our species—to fit the requirements of political organization: the fit is far from perfect. Atavisms, stubborn localism, ideological frenzy, and bureaucratic nepotism are examples of misfit. In general we may say that man is not “by nature” political and that in political society he suffers a disconnection syndrome that has been styled “man’s non-contemporaneity with himself.” It is that while the exigencies of the urban habitat require at least selective transcendence of the hunter-gatherer behavioral legacy, *Homo* cannot behave otherwise than as he must. Hence the chaos that perpetually menaces political existence.

*Oedipus’ Anguish.* An outstanding example of this conflict, in the domain of psychology, is the reaction against science, particularly in its aspect of self-transcendence.

Anti-science made its first substantial cultural impact when Rousseau denounced thinking man as a depraved animal and science as a corrosive unbelief menacing the common man’s moral sentiment. Although this concept was largely borrowed from Blaise Pascal, Rousseau gave its effect as counter-culture ideology in opposition to the swelling tide of expansive rationality propagated by the Encyclopedists. This reactionary movement subsequently enlisted the eloquence of Edmund Burke, Kant, Goethe, Carlyle, Thoreau, Comte, Marx, and more. It did not become attractive to a cadre of influential scientists until the mechanical hypothesis began to be applied in a serious way to man, which ignited the tempestuous debates over vitalism and materialism. The outcome of these contests was positivism. Its core doctrine, from Comte forward, was that the head of science must be subordinated to the heart of humanity. The epistemological avenue to this arrangement was the phenomenalist doctrine that scientific knowledge consists only of an ordering of sense experience by concepts and laws. This position was believed to undo mechanism and materialism, and in general any scientific realism.

Examination of the particulars of positivism shows how it defended the transcended self against the heart-rending transcendence of the scientific self. Ernst Mach’s philosophy, for example, quite destroyed transcendence as odious “metaphysics.” He denied the founding insight of psychophysics that sensations are end-products of physico-physiological processes. The very idea he rejected as “monstrous.” He claimed that the world was merely representative of a thought economy peculiar to the human animal. This completely reversed the scientific perspective in which the mind’s discovery of empirical laws represents a signal triumph over the animal limitations of sense experience. Mach’s anthropomorphic perspective was consonant with his religious outlook on the world, which was Buddhism. Maintaining the perspective, as a scientist, forced him into obscurantism. Not only did he deny the fundamental facts of psy-

chophysics, he also attacked the kinetic theory of gases, denied the existence of atoms, rejected a non-Euclidean metric of space, and in a posthumous writing repudiated the theory of relativity. Here indeed was Oedipus gouging out his eyes. The same mortification of the transcending self occurred in the writings of Duhem, Pearson, Ostwald, Dingler and other positivists.<sup>2</sup>

*Oedipus Today.* The non-contemporaneity of the heart with the head grows ever more acute as the hiding places of *Homo sapiens* are increasingly exposed by the advance of the sciences. There has been a corresponding proliferation of philosophies whose primary aim is to rein in high-flying science. The great complaint of the Romantics that science and technology stultify life has been promoted from counter-culture to mainstream. The environmentalist and animal liberation cults, both committed to action programs against institutionalized science, are but two contemporary romantic reactions. The assiduously cultivated "sociology of science" attempts to embarrass the transcending scientific self by executing Mach's anthropomorphic reversal in the social milieu. We are supposed to believe that scientific knowledge is anchored in ideological and institutional socialities and somehow "reflects" them. In philosophy of science, The Vienna Circle's program to secure the foundations of the sciences long ago ran afoul of its implicitly self-destructive positivist orientation. The flaw here was the belief that the sciences were in need of foundations that they did not themselves supply, together with the implication that the certainty and objectivity of physics depended upon certificates issued by the philosophy departments. When several decades of diligent tinkering with logic failed to produce the goods, the muddle could no longer be disguised; but rather than interpreting it as the purely local and predictable confusion it was, philosophers gave it out as a "crisis of science" amidst much brouhaha about the relativity of belief. So it happened that the philosophers' disillusionment at failing to attain certainty was transformed into an accusation against the sciences for perpetuating the myth of certainty.

The many-faceted assault on the transcending self includes a cadre of scientists who say that the old materialistic models of mechanism and reductionism are no longer characteristic of the scientific frontier. Although this argument most frequently issues from the rarified regions of quantum physics, it is also sometimes voiced by biologists. Lately the eminent psychobiologist Roger Sperry has followed the tracks of Sir John Eccles in attempting to derive a reconciliation between religion and science from the purported negative implications of brain research against classical scientific materialism. I want to discuss a few of Sperry's suggestions as preliminary to a suggestion of my own about the present status of the transcending self relative to the immobility of mammalian brain.

*The Convergence of Science and Religion?* Sperry assumes a connection between scientific materialism and the crass values that have trapped the world in a tightening spiral of population growth, pollution, resource depletion, and violence. Public values today are not religious but secular ... and reductionist/materialist. In politics, power replaces responsibility and care for posterity. Social and economic policies strive to optimize material goods, security, welfare, and the individual freedom without attention to responsibility, respect, and reverence. Reductionist models in the social sciences have dismissed ethical and religious values as of no significance in social causation; only "gut issues" are deemed to be efficacious. This supposition, when acted upon over the longer term, has the brutalizing effect that leads to the environmental and social impasse that can be remedied, Sperry believes, only by a return to ethical and religious values. That reformation of public values would be greatly assisted if it were consonant with a conception of science alternative to reductionist materialism. Such a conception is at hand, he believes, in the doctrine of *emergent properties* and associated notion of *downward causation*. The emergent properties doctrine demonstrates reductionism as a half truth. Thus, while it is valid to describe cells in terms of their constituent proteins, and these in terms of molecular and atomic structures, such analysis does not remove the fact that molecules have properties that atoms do not; and that protein molecules form a class with distinctive properties, among them self-replication. Reductionism goes astray in denying the causal efficacy of properties emergent at successive levels. In the case of highly organized life, reductionism inspires denial of purposiveness as a causal power as well as causality downward from higher to lower levels of organization. Recent advances in psychobiology demonstrate, Sperry holds, the untenability of reductionist materialism. Consciousness is an emergent property of the brain irreducible to any level of the brain's constituent levels and capable of causally acting on many levels of the body's complex system. With this established, it becomes plausible that religious values dismissed by reductionist science and disparaged in current practice are indeed efficacious socially and that constant harping on crasser values may be symptomatic of the present predicament.

The religion sanctioned by science is the pantheist *deus sive natura* outlook of venerable standing in the archives of enlightened humanism. The dualisms characteristic of the world religions—mortal and immortal, transitory and eternal, sacred and profane, God and creatures—are replaced by the picture of the succession of generations linked in a spiralling progression of value. Nothing is without some value, and nothing is absolutely valuable or eternal. All human beings and all of nature, past and future, are in some degree sacred and merit a measure of reverence, awe, and respect.

My first comment on Sperry's reconciliation formula is to note that while it has appealed to many intellectuals and not a few clergymen, it leaves the broad masses cold. One must pause

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before the current trend toward “fundamentals” in religion: the personal God and immortality, the efficacy of prayer, individual and community moral values, often enunciated in markedly absolutist language, and sometimes in express repudiation of sacral relativism.

Historically speaking, the want of concord between secular humanism and revealed religions is not surprising. Secular humanism was from the beginning an enlightened teaching meant to reconcile the stark differences of rituals, values and beliefs that led to persecutions and wars in the wake of the Reformation. Humanists meant to espouse tolerance and benevolence, while retaining the positive values of religion, by subordinating sectarian particularity to the cosmopolitanism of “reasonable religion.” It is no disparagement of the benevolent intentions of secular humanists to observe that they underestimated the endurance of life conflicts that the doctrine and ritual of traditional religions addressed. However much one may represent the cosmos as the harmonious music of evolutionary ethical orthogenesis, life still abounds with vicissitude, conflict, uncertainty, anguish, pain, rigors, tedium, and fear of death. The dogmas and rituals jettisoned by reasonable religion assist passage through such tribulations by uplifting, disciplining, and consoling. Indeed, recent psychobiological discoveries throw light on how God got into the brain and why he is likely to remain there.

Briefly stated, “God” is an affect of the drive-arrest-release sequence actioned by psychotropic neurotransmitters in the temporal lobe limbic structures. This hypothesis is based on quite varied experimentation with meditation and trance states, sleep, psychotropic drugs, and psychopathology, especially manic depression. We needn’t enter upon details further than to say that the mystic’s dictum that heaven has many gates appears to be experimentally valid: many gradations of ecstasis and loss of spatio-temporal boundaries, combined with endogenous hallucinogens, make for a multitude of exalted states of consciousness. The basis of religious experience is naturally-occurring hypomania, which is paired psychologically and neurologically with the opposite state, depression.

Why did these mood structures evolve? They appear to function as signals analogous to pleasure and pain, signifying, through emotions, the limbic system’s evaluation of the probable relative advantage or disadvantage of a *perceived situation*. This is suggested by studies of depression induced by isolation of chimpanzee juveniles. Although the animal’s physical well-being is not impaired, isolation *in vivo* is life-threatening, and the animal responds with a sequence of vocalizations that would normally elicit maternal attention. Physiological indices of anxiety appear in the initial phase, followed by depressive symptoms and corresponding physiology. The cries for help are the animal’s attempt to cope with the perceived threatening situation. The onset of depressive symptoms are, on this interpretation, additional innate danger signals—red



alert, as it were. Analogous reasoning holds for the euphoric state.

In *Homo*, this basic mammalian psychobiology evolved a special twist owing to our greater capacity for situation choice. Sensory information and cognitive processing produce situation images—called “mazeways” by Anthony F. C. Wallace—which are graded by a limbic quality detector on a prosperity-to-danger scale. Wallace’s cross-cultural studies of revitalization cults isolated a sequence described as (a) perceived mismatches between an existing mazeway and an actual situation; (b) increasing disorientation and anxiety, accompanied by search for a new or modified mazeway; (c) synthesis of a new mazeway prescribing an altered set of responses that subdue (objectively or subjectively) the antagonistic situation. Subsequent investigations have shown that Wallace’s revitalization sequence is supported by the psychobiology of religious experience and of manic depression. One cannot but observe that Sperry’s argument exhibits the revitalization sequence: perceived breakdown of the materialist reductionist mazeway is followed by search for a new mazeway, issuing in the synthesis of religious values with the emergent properties doctrine.

My explanation of the psychological basis of religious values is meant to contrast with Sperry’s advocacy. Sperry disparages scientific Self-transcendence to embrace those values, whereas my materialist explanation is meant to exhibit the mind’s power to achieve mastery of powerful limbi persuaders by describing their qualities and functions. In that contrast, I trust, the noncontemporaneity of cortical and limbic ideation is apparent. It would yet be more evident in a description of a materialist approach toward a solution formula for the current predicament of *Homo sapiens*. I will remark on it no further than to say that one must entertain the possibility that the institutional consequences of the mismatch between “reason” and “passion” have developed into a tension so severe that modern civilization as we know it may have become unviable.

Hiram Caton

#### NOTES

<sup>1</sup>The function of this small organ was unknown until recently, when it was discovered to be one of the baby’s biological clocks, calibrated in this case to seasonal change.

<sup>2</sup>That positivism was at once pro- and anti-science is one of the best kept secrets of modern philosophy. Details of its anti-science are given in my “Pascal’s Syndrome: Positivism as a Symptom of Depression and Mania,” *Zygon*, in press.

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