

SEEKING Systems and Anticipatory States of the Nervous System

"I feel saved," he would say, "resurrected, reborn. I feel a sense of health amounting to Grace. . . . I feel like a man in love. I have broken through the barriers which cut me off from love." The predominant feelings at this time were feelings of freedom, openness and exchange with the world; of a lyrical appreciation of a real world, undistorted by fantasy, and suddenly revealed; of delight and satiety with self and the world.

Leonard L. in Oliver Sacks, *Awakenings* (1973)

CENTRAL THEME

The desires and aspirations of the human heart are endless. It is foolish to attribute them all to a single brain system. But they all come to a standstill if certain brain systems, such as the dopamine (DA) circuits arising from midbrain nuclei, are destroyed. Such was the tragedy that overtook Leonard L. in his childhood, and it was not until he was a grown man that he was able to partake again of worldly delights. What allowed him to achieve the feelings of success described by Sacks was L-DOPA, the precursor of DA. This medicine had already alleviated the psychomotor problems of ordinary parkinsonian patients, who had weaker forms of deterioration in their ascending DA systems. In such individuals L-DOPA can dramatically alleviate the inability to initiate movements, allowing them to enjoy everyday pleasures. Now we know that ascending DA tracts lie at the heart of powerful, affectively valenced neural systems that allow people and animals to operate smoothly and efficiently in all of their day-to-day pursuits. These circuits appear to be major contributors to our feelings of engagement and excitement as we seek the material resources needed for bodily survival, and also when we pursue the cognitive interests that bring positive existential meanings into our lives. Higher areas of the motor cortex are also energized into action by the presence of DA. Without the synaptic "energy" of DA, these potentials remain dormant and still. Without DA, human aspirations remain frozen, as it were, in an endless winter of discontent. DA synapses resemble gatekeepers rather than couriers that convey detailed messages. When they are not active at their posts, many potentials of the brain cannot readily be

manifested in thought or action. Without DA, only the strongest emotional messages instigate behavior. When DA synapses are active in abundance, a person feels as if he or she can do anything. Is it any wonder that humans and animals eagerly work to artificially activate this system whether via electrical or chemical means? Cocaine and amphetamines are psychologically addicting because they facilitate activity in brain DA systems. When the activities of these synapses are excessive, however, in ways that we do not fully understand, people may be in the florid early phases of schizophrenia, seeking spiritual heights and philosophical insights that may not even exist. Many schizophrenics eventually become consumed by an emotional chaos that the rest of us can only imagine. Are we justified in labeling the functions and dysfunctions of brain DA systems in unitary psychological terms? I think so, if we wish to communicate effectively. But what word or phrase shall we use? Here I will call this emotional circuitry the SEEKING system of the brain, as opposed to the expectancy or behavioral activation system as originally proposed.¹

The Appetitive Motivational or SEEKING System of the Brain: A Goad without a Goal

It may be hard for us to accept that human strivings are ultimately driven by the welling up of ancient neurochemicals in primitive parts of the brain. This view does not easily fit our conception of ourselves as moral and spiritual beings. Although the details of human hopes are surely beyond the imagination of other creatures,