CHAPTER IV:

THE UTILIZATION OF PUPILLOMETRY IN THE DIFFERENTIAL DIAGNOSIS AND TREATMENT OF PSYCHOTIC AND BEHAVIORAL DISORDERS

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"DRY" AND "WET" CONCOMITANTS OF THE FUNCTIONAL PSYCHOSES

A vast literature has accumulated over the last three decades implicating the central autonomic nervous system in the functional psychoses and other behavior disorders. Any attempt to crystallize conclusions from this prolific field of inquiry necessitates a categorization which hopefully possesses heuristic value. Laboratory parlance makes the distinction between "dry" and "wet" investigatory efforts. The first term generally refers to physiological investigations while the latter refers to chemical, pharmacological investigations of the juices of life-processes. Interestingly, these approaches to the problem of the role of autonomic mechanisms in psychoses have developed in a parallel fashion with little or no interaction. The following presentation attempts to converge these parallel modes of inquiry by demonstrating that pupillometry may serve as a useful transfer operator function.

Autonomic Dysfunction in Schizophrenia

Hoskins (1946) and his collaborators played a major role in establishing that central autonomic responses were aberrant in schizophrenia. Many peripheral components reflecting central autonomic activity were diminished in chronic schizophrenic patients as shown by studies on cardiovascular reactions, responses of blood sugar to stress, and temperature regulation on exposure to cold. Lesser reactivity of the hypothalamic-hypophyseal system was also noted, particularly under conditions of psychological stress. Shattock (1950) demonstrated that schizophrenics showed a lower skin temperature on exposure to cold than other psychotic
groups. The diurnal rhythm of body temperature was less than in normals, and on exposure to cold some chronic schizophrenics failed to show a fall in temperature while others showed paradoxical reactions (Buck, et al. 1950). Eysenck (1956) found that the skin resistance of chronic schizophrenics was higher than that of normals or neurotics at rest and after exposure to emotional stimuli. Earle and Earle (1955) and Igersheimer (1953) found the blood pressure rise in the cold pressor test to be less than in the control group or absent. Freeman et al. (1944) reported that the blood sugar curve in the glucose tolerance test ran higher in chronic schizophrenics than in normals. Under the physical strain of exposure to heat, Pincus and Elmadjian (1946) found that the hypothalamic-hypophyseal response leading to the liberation of ACTH and reduction of lymphocytes was less in chronic schizophrenics than in the control group. These observations led Hoskins to propose that; a) there were systematic differences in autonomic homeostasis between schizophrenics and normals as regards the resting functional level which in schizophrenia is characterized by "sluggish sympathetic reactivity"; b) schizophrenics were unable to "hold to the steady state" under ordinary conditions of existence; c) schizophrenics were characterized by "defective autonomic reactivity to stimulating agents"; and, d) their autonomic homeostatic process was dilatory in correcting imposed distortions. Thus, there is presumptive evidence of long standing for the existence of central autonomic imbalance in schizophrenia.

These quantitative differences in autonomic reactions emphasized by Hoskins and his group were further elaborated by the Mecholylyl and noradrenaline tests employed by Gellhorn (1961) and Funkenstein and his colleagues (1948, 1950). Mecholylyl is an effective blood pressure lowering drug. The induced fall in blood pressure reflexly releases the sympathetic centers and leads to the restitution or even overshooting of the basal blood pressure and an increased heart rate, depending on the sympathetic reactivity of the sympathetic division of the hypothalamus. By plotting blood pressure and heart rate changes derivative measurements of sympathetic responsiveness to Mecholylyl are obtained. Similarly, injections of noradrenaline have been employed as an index of parasympathetic reactivity. For, following the initial increase in blood pressure, there is an increase in parasympathetic outflow accompanying reequilibration. Both research groups found statistically significant differences between normals and neuropsychiatric patients in sympathetic activity as disclosed by the Mecholylyl test and in parasympathetic activity as revealed by the Noradrenaline test. The tests for reactivity of each autonomic division demonstrated that the schizophrenic groups contained significantly more hypo- and hyperreactors. These findings are not in accord with Hoskins assertion that chronic schizophrenics are all characterized by sluggish sympathetic activity. The nature of autonomic