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Circadian Rhythms and the Variable Interval Response Function

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CIRCADIAN RHYTHMS AND THE VARIABLE INTERVAL RESPONSE FUNCTION

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There has been considerable controversy over the empirical form of the function relating response rate to reinforcement on simple variable-interval (VI) schedules. Some studies have found monotonic functions, such as those predicted by theories based on the matching law. Other experiments have found bitonic functions, such as those predicted by economic and regulatory theories. Currently, the variables responsible for these differences are unknown. The present experiment attempted to discover what role circadian rhythms have in determining the response function. In particular, the experiments examined whether tight circadian entrainment might produce bitonic functions because reinforcers are "predictable" under such circumstances, while the absence of circadian entrainment might produce monotonic functions because such situations force the organism to behave opportunistically. Six rats were conditioned to press a bar for food on three VI schedules (7.5, 30, and 480). Half of the rats were conditioned at one of three variable times each day (8:00 a.m., 11:00 a.m., or 4:00 p.m.). Then, the conditions were counterbalanced across subjects. Rats that were previously conditioned at varying times were conditioned at a fixed time and those previously conditioned at a fixed time were conditioned at varying times. The results indicated bitonic functions in five out of six rats. However, when data were analyzed according to between interval feeding lengths, bitonic functions became increasingly more monotonic as the time interval decreased. Presently, experiments are being conducted in which the light-dark cycle of the rats' normal day has been disrupted to further examine the effects of circadian rhythms.