

Department of Psychology

Distinguished Emeritus Lecturer Series



DR. RICHARD BENINGER, Queen's University

TALK: Linking dopamine-mediated reward-related learning with schizophrenia

ABSTRACT

The brain has a number of memory systems often divided into declarative and non-declarative types. Rewarding stimuli produce a type of non-declarative memory as a result of incentive learning, defined as the acquisition by neutral stimuli of an increased ability to elicit approach and other responses. Incentive learning is mediated by the neurotransmitter dopamine. Incentive learning can be observed in animal studies using a number of tasks including lever pressing for food, conditioned place preference, conditioned activity and conditioned avoidance responding. In each case, dopamine receptor antagonist drugs impair the acquisition of incentive learning; if learning has already taken place and testing is carried out with dopamine receptor blocking drugs, responding is transiently resistant to the drugs but gradually declines with repeated testing. In animal and human studies cooperative social interactions also appear to lead to dopamine-mediated incentive learning. Pharmacological and neuroimaging studies have linked hyperactive dopaminergic neurotransmission to schizophrenia. This raises the possibility that schizophrenia may be characterized by excessive incentive learning, i.e., a broader spectrum of stimuli than those that normally would elicit approach and other responses may come to do so. The delusions of grandeur or persecution that commonly occur in schizophrenia may result in part from the activity of relatively intact declarative memory systems influenced by excessive incentive learning. Since this putatively excessive incentive learning will have taken place before treatment with an antipsychotic medication, the learning can be expected to be transiently resistant to the effects of the drug, accounting for the observation that these medications have a delayed onset of action.

BIOGRAPHY

After completing his BA at Western University and PhD at McGill, Rick spent 3 years as a post-doctoral fellow at University of British Columbia before coming to Queen's in 1980 where he joined the Department of Psychology. For most of his 35 years employed at Queen's, Rick was a Joint Professor of Psychology and Psychiatry before retiring as Professor Emeritus in 2015. The research he and his students carry out in the Neurotransmitters and Behavior laboratory covers a range of topics but always has dopamine and learning as a central theme. With continuous funding from NSERC since 1981 and periodic funding from other federal, provincial and private sources, Rick and his students have published regularly in peer-reviewed journals. Research has included studies of learning in humans with schizophrenia or Parkinson's disease, both disorders associated with altered dopaminergic neurotransmission. Rick is best known for his studies of the role of dopamine in reward-related incentive learning.

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