

Automating Analysis of Behavior: Development of a Computer-Controlled Training Apparatus and its Application to the Investigation of Learning and Memory in planarians.

Abstract

Progress in several important open problems in neurobiology and cognitive science requires the development of a molecularly-tractable model of learning and behavior, and would be greatly facilitated by automated analysis of behavior and the availability of a robust learning protocol. To answer this demand, we have designed an Automated Training Apparatus that is capable of training small organisms on a number of operant and classical conditioning paradigms. In this paper, we develop an introductory prototype that eliminates current study constrictions including operator bias, tedium, and small sample size, and enables on-line access to real-time study data. Subsequent trials analyzing the effect of pharmacological compounds on planarian behavior show that a scaled-up version of this technology will not only reveal much about the cognitive properties of many different species, but will also provide efficient methodology for high throughput screens of novel neuroactive compounds of basic and biomedical relevance. Further, we show successful application of the device's automated training technology by using it to provide evidence of long-term memory storage of an operant conditioning task in planarians, thereby re-establishing the flat-worm as a viable model system with which to study memory.

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