Principles for Theoretical and Methodological Issues in Behavioral Analysis

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Behavior is the last manifestation of brain function, which reflects mind. Therefore, behavioral research becomes the first and the last steps of brain research. Recently, many genetically modified experimental animals are generated along with the fast development of molecular biologic techniques. When these transgenic or knockout mice were developed, behavioral phenotyping is necessary for evaluating whether the mutant animal is really a model of the target disease. Behavioral research, furthermore, is traditionally used for elucidate fundamental life phenomena in a wide range of levels of system, such as the molecular mechanism of a drug or the law of learning.

Animals are the most appropriate subjects for the analysis of behavioral alteration because an understanding of the biological bases of behavior requires invasive techniques that are obviously unethical with human subjects. Animal behavior can be classified into two categories; the innate behavior and the learned behavior. Learning, therefore, becomes the most important issue in the behavioral analysis. Two principles of learning are generally accepted in the animal learning; the classical conditioning and the operant conditioning. Learning, exploration, motor activity and emotionality are frequent measurements in the behavioral analysis. The difficult part of the behavioral analysis is that a conclusion can not be drawn simply by one observation. A decreased learning ability can be observed in the appetitive-type learning task, but not in the aversive-type learning task. Therefore, there is no commonly applied universal rule of behavioral measurements. Choosing behavioral tasks, and detailed methods of a task are dependent on the researcher's purpose.

There are a number of behavioral tasks which are generally recognized as standard methods in the world. When we get data from an approved method of appropriate behavioral analysis, we need careful statistical analyses because usual behavioral data are extremely variable. If you want increase the power of statistical test, you should increase significance level, difference of means, sample size, or decrease standard deviation. Among these methods, decreasing standard deviation can be achievable through maintaining constancy of conditions throughout the course of an experiment.

If you want to analyze behavioral alteration induced by environmental manipulation including drugs rather than experimental analysis of behavior per se, it is better to use established behavioral tasks with commonly applied detailed procedures.