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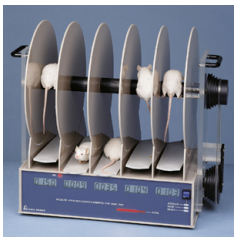
Behavioral Core Protocols and Training

Rotarod

Basics

This is a test of motor coordination and motor learning [1-4]. In addition, it can be used to assess intoxication [5], sedation and strength / stamina [6].



The latency to fall from a rotating rod is scored automatically with infrared sensors in a Rotamex 5 rotarod (Columbus Inst; Columbus, Ohio). Motor coordination can be tested by comparing the latency to fall on the very first trial between treatment groups [7]. Motor learning can also be assessed by comparing the first trial with subsequent trials and is evident as an increased latency to fall over time [3, 4, 8-13].

Motor coordination can be tested by comparing the latency to fall on the very first trial between treatment groups [7, 9]. Motor learning can also be assessed both within and between subjects by comparing the first trial with subsequent trials and is evident as an increased latency to fall over time [3, 4, 8-13].

Procedure

The acceleration step and time should be determined empirically. A rough starting point is : increased by 0.5 cm./sec. every 5 sec. If the step is too fast and too soon, there will be a floor effects (the controls will not be able to stay up or get better) and if it is too slow and too long between steps you will have a ceiling effect (deficits will not be detected because the task is too easy).

In general, the mice require 4-6 trials per day for 3-6 days to see significant improvement in controls.

Data Analysis and Illustration

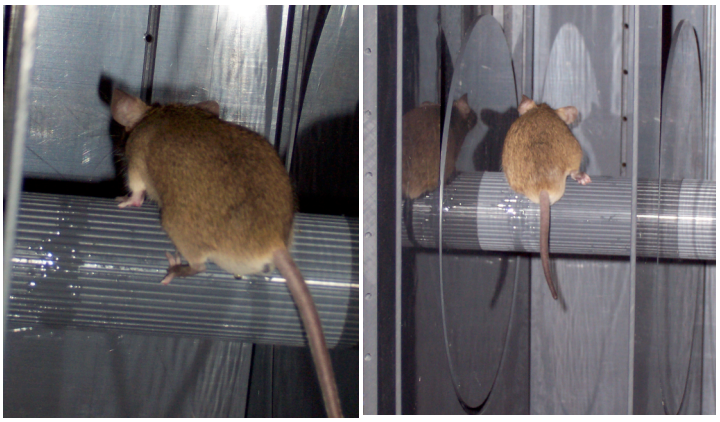
There are numerous ways of dealing with these data – some common ones are below

1) mean latency to fall (all trials) per day
2) best (or worst) latency to fall per day

3) All trials represented individually

Variants

There are numerous procedural variations to those stated above [11]. It is also possible to test reference motor memory (long term, skill or procedural memory) by stopping the trials for a period of time and then testing the animals to see if the latency to fall when re-introduced is significantly lower than it was on the last trial. In some instances, a single speed (non-accelerating) protocol is also used [14].



Data Analysis

The most common form of analysis for these data is repeated measures ANOVA. Although this test is very powerful, it can be complicated (or impossible) to perform the test if all subjects have not completed all tests (i.e. missing variables). The basis of a repeated measures (within subject design) test is that the data are essentially paired and thus statistical programs cannot handle missing variable in such tests without interpolation.

Useful References

Variations

[9, 14-16]

Other

[8, 17-23]

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