

Abstract

- Our client, Dr. Emborg, studies Parkinson's disease and possible treatments through primate research. She is unhappy with the current device she uses to test motor skills, so our team redesigned the device to meet her specifications, and built a preliminary prototype that addresses her foremost concerns with the current design, which include difficult cleaning and reset, as well as high level of cognitive challenge.

Parkinson's Disease

- Parkinson's disease is a degenerative neurological condition that results in many devastating symptoms, such as tremor, bradykinesia (slow movement), hypokinesia (diminished movement), and balance and gait disturbances (Emborg, 2004; Wikipedia, 2006). Dr. Emborg performs tests on primates' motor skills to study the effects of the disease and possible treatments.

Motivation

- Dr. Emborg is unhappy with her current testing device for the following reasons:
 - Difficult to clean
 - Cumbersome to reset
 - Cognitively challenging
- She would like us to redesign the apparatus to function more efficiently

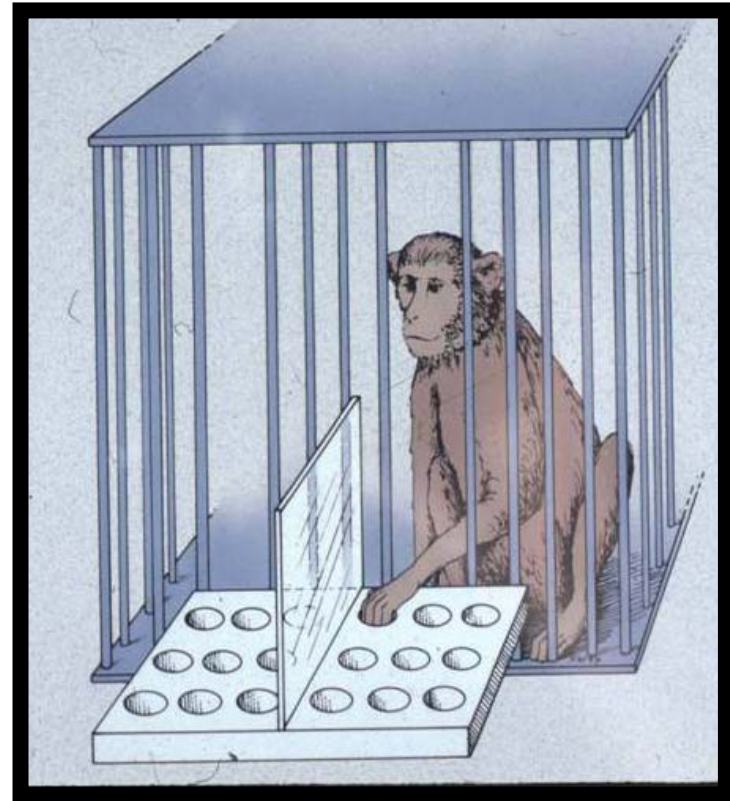
Current Products

- mMAP (Monkey movement analysis panel)
 - Cost: \$2800
 - Attached to front door of the cage
 - Food reward at the center of the device
 - Quantitative data



Current Products

- Detached Design
 - Not attached to the cage
 - Base platform with eighteen divots
 - Qualitative data



Problem Statement

- Design an apparatus to test the fine motor skills of rhesus monkeys that minimizes the cognitive portion of problem solving; should be easy to clean, durable, adjustable for human testing, and attach to cage securely.

Design Requirements

- Easy to clean
- Compatible with common cleaning materials
- Less cognitively challenging
- Durable
- Less than 11" x 13" x 13"
- 13" x 15.75" Front panel to cover door
- Secure attachment to cage
- Removable center divider

Simple Box Concept: Tester

- Two holes on either side of box to test right and left
- Two removable bases to allow for easy cleaning and standardization of reward placement
 - One with divots to force monkey to use thumb and forefinger to grab reward
 - One with marks to allow for easier retrieval of reward
- Removable center divider to keep reward within monkeys' reach
- Fixed panels to reduce risk of injury to monkey

Simple Box Concept: Adaptor Panel

- Slides into grooves on monkey cage
- Two holes placed on either side of tester
- Tester aligns with holes on adaptor panel to allow for less cognitive challenge
- Tester and adaptor panel made from $\frac{1}{2}$ " lexan to increase strength

Future Work

- Electrical diodes
- Circuit Components
- Computer testing software
- Primate testing

References

- Marina Emborg, M.D. Ph.D. Personal Communications, 2006.
- Dopaminergic Therapy Improves Upper Limb Motor Performance in Aged Rhesus Monkeys (Richard Grondin)
- Grondin, R. and Wang, A. monkey Movement Analysis Panel (mMAP) Lexington, KY. 2000.
- Wikipedia: The Free Encyclopedia. 22 October 2006. <<http://en.wikipedia.org/wiki/>>