

Product Design Specifications

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Title: BME 301 - Olfactory Stimulation of Monkeys

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Function: Apparatus should provide quickly interchangeable pairs of stimuli to a caged monkey. It should then allow the monkey to choose between two possible solutions, each corresponding with one of the stimuli. The device must then provide a reward for the correct solution.

Client requirements:

- a. Te should allow for the presentation of both tastants and scents to the monkey (not necessarily simultaneously).
- b. The tastants will most likely be standard water bottles, and the scent will come from filter paper.
- c. The device should present the monkey with two options for an action that will allow the monkey indicate its choice in tastant/scent.
- d. These two options must clearly separate and must clearly correlate to a specific stimuli.
- e. After monkey has chosen one smell/tastant, choice should be final.
- f. A reward should be provided for the correct solution; an incorrect solution will earn no such reward.
- g. A light should also indicate that the correct choice has been made. It must be possible to turn off this light mechanism for the duration of testing.
- h. Apparatus should be readily moveable from cage to cage.
- i. The apparatus should work at two height levels: about 1 foot from the ground, and about 5 feet from the ground.
- j. The device must easily accommodate an operator who is responsible for switching stimuli and moving the device from cage to cage.
- k. The replacement of stimuli between tests must be out of sight and smell range of ALL monkeys within the immediate vicinity (i.e. testing room).

Design requirements:

1. Physical and Operational Characteristics
 - a. *Performance requirements:* Device should operate continuously, should handle extreme forces from angry monkeys. It should not break or fail if dropped or knocked off of the cage. The device should withstand moisture, fecal matter, and urine.
 - b. *Safety:* Product should not cause harm to monkeys. There should be no risk of monkeys to electrocution, shock, extreme heat or cold, fast-moving blunt objects, or pinching of fingers.
 - c. *Shelf Life:* Device should be functional indefinitely, stored in temperatures ranging from 0°C-37°C.

- d. *Operating Environment:* Temperature range should ideally be around standard room temperature and pressure; the device should handle large amounts of dust, humidity, vibration, resist all corrosion (due to water and/or monkey urine), should be easily handled by people and monkeys.
- e. *Size:* The device should have dimensions that will allow it to slide into the available feeding bin slot on the front of cage (about 6 inches by 10 inches). The device will attach to the outside of the cage and be a size that is easily manipulated by both the caged monkey and the operator. The monkey should not have to strain his reach to operate the device or receive its reward.
- f. *Weight:* Should not weigh more than 20 lbs; optimum weight should be around 10 lbs.
- g. *Materials:* Materials should consist mostly of metal. This metal could be stainless steel or aluminum. Any material that is either subject to corrosion or easily breakable should not be used.
- h. *Aesthetics, Appearance, and Finish:* The device should not be colorful, highly reflective, or distracting in any way to the monkey. One or two indicator lights may be attached to the cage-facing side of the device to indicate to the monkey when a correct choice has been made. Another light or indication device should be on the back of the device to inform the operator if monkey has or has not made a choice yet. No particular finish is required.

2. Production Characteristics

- a. *Quantity:* Begin with one prototypic device. If successful, several machines will be made, to be used simultaneously.

3. Miscellaneous

- a. *Customer:* All recommendations from client will be incorporated into design.