This Standard Operating Procedure (SOP) was prepared by Amy Voltin and Kimberly Grant.
Purpose:
The Learning Set test has been used with both human and monkey infants to study the
development of early learning abilities. Optimal performance on this task depends on the
acquisition of a win-stay, lose-shift strategy. The strategies that a subject uses in solving
these problems can reveal important characteristics about their cognitive development.
For example, attributes such as problem solving, mental flexibility (switching strategies)
and perseveration can be ascertained from the data. Perseveration, often defined as the
inability to learn from experience and modify behavior accordingly, is studied within the
Learning Set paradigm by providing the animal an opportunity to learn from experience.
On this test, a single pair of toys is shown to the animal on six consecutive trials and one
of the toys is consistently baited with an apple bit. If Toy A is correct on trial 1, the
monkey should keep selecting Toy A on trials 2 through 6. Conversely, if Toy A is
incorrect on trial 1, then the monkey should choose Toy B on trials 2 through 6. Tests
like Learning Set allow the study of learning in normal monkeys as well as provide a
means of evaluating learning in infants at high-risk for poor developmental outcome (i.e.
prenatal drug exposure or low birth weight).

Required Readings:
36-39.
Schrier, A.M. (1984). Learning how to learn: The significance and current status of

Supplies and Equipment:
The daily schedule, testing apparatus, testing cage, small pieces of food reward, laptop
computer, timer, 240 numbered pairs of various shapes, colors, and sizes, log sheets,
extra exam gloves, black pen, diapers, disinfectant and a carrier.

Schedule:
Learning Set testing begins after the completion of the Hamilton Search series. All tests
take place five days a week, on Monday, Tuesday, Wednesday, Thursday and Friday.

General Instructions:
Go to the Daily Schedule and determine the subjects for WGTA testing for the day.
Return to the testing room and begin setting up for the appropriate test ensuring that the
WGTA apparatus is functioning properly and the appropriate learning set toys are
present.
Procedure:

Step 1. Set up the WGTA apparatus so that there are two wells showing on the presentation board. Turn to the current test subject’s log sheet in the WGTA Notebook. Record the date, your tester number, and the problem number. If the monkey is just starting on this task then a lead tester will assign a condition (problem number) for the monkey. Turn on the laptop and bring up the Learning Set electronic test form. Enter the eartag, the problem number, your tester number, the time code, and randomization on the laptop.

Step 2. Retrieve the box containing the six pairs of stimuli assigned to the animal for that day. There are 240 pairs of stimuli, boxed in sets of six pairs each. Each pair has an A toy and a B toy. Animals are assigned randomly to either A+ or B+. Depending on the condition the animal is assigned to always reward either the A toy or the B toy. So for all 240 pairs A is always rewarded or B is always rewarded. Set the stimuli up in the test room where they can be easily retrieved during testing. An animal will be run on all 240 pairs, six pairs a day. This will take approximately eight weeks.

Step 3. Go get the appropriate test subject. Transport the animal in an Igloo carrier, with the lid closed, to the testing room. Remove the monkey from the Igloo carrier and immediately put him/her into the testing cage.

Step 4. To begin the first trial, look on the test form to determine the correct side. Starting with the first stimuli pair, place either the A toy or the B toy, depending on the task the animal is assigned to, over the baited well. Present each pair of stimuli to the animal for six trials. When you are ready to begin the test open the testing door. Start the timer when the stimulus or reward is visible from the monkeys’ perspective. Stop the timer when the monkey displaces the stimulus. Allow the monkey to retrieve the reward (if the correct response has been made) and then close the testing door. Only one response is allowed per test trial. If the monkey has not responded within 60 seconds, stop the trial by lowering the testing door and use the code for a balk (code –2). Record the latency and response on the testing form. Score the response according to the codes on page 4. Reset the timer for the next trial.

Note: It is very important to avoid giving auditory cues to the animal so be sure to always randomize the order the wells are covered when setting up for a trial.

Step 5: Repeat step 4 until all 36 trials have been run. Remember to change the stimuli pair being presented after 6 trials. If an animal balks five trials in a row then testing is terminated for the day. Scroll down to the bottom of the test form and click the balk out button. This will fill in the remaining trials with –9. If the animal balks out do not present the same toys to the animal on the next test day. If the animal balked in the middle of a six-toy box, then only run the remaining toys in the box the next day. For example if the animal balked out on the fourth pair then only run the fifth and sixth pair the next day.
Step 6. Fill out the WGTA daily log form with the stimuli used, the number of correct responses, the number of times the subject chose the right side, and the number of time the subject chose the left side. Save the information on the computer before closing the form.

Cleaning:

After testing each monkey, take the toys to the cage wash room, load the toys in a designated bin, put a squirt of Dawn detergent in the bin and fill the bin with warm water. Allow the toys to soak for approximately 10 minutes and then rinse them and lay out to dry on the toy cart in the back hallway. Next, spray the presentation board with disinfectant and wipe dry with a clean diaper. Lastly, slide the back door to the cage open, spray the bars and mesh floor with disinfectant and wipe dry with a clean diaper, making sure to clean up any residual feces that might be left on the mesh floor. Dispose of the used diapers in the diaper bin in RR035. If time allows, put the toys back in the box and return to the designated spot in the box sequence.

Criterion:

There is no criterion for performance on Learning Set.

Problem Codes:

11 Stimulus “A” is rewarded
12 Stimulus “B” is rewarded

Response Codes:

(0) Incorrect
(1) Correct
(-2) Subject makes no choice within 60 seconds; after 5 consecutive balks, end testing.
(-3) Subject balks due to external noise.
(-4) Missing data due to timer/experimental error
(-9) Trial not run
Reliability:

1) The testing supervisor and each of the other testers simultaneously test one infant selected for the reliability session (by the testing supervisor).

2) For all reliability tests, the testers review the SOP prior to testing. Testers then score the infant simultaneously and do not discuss the results during the test. The SOP should be available during all reliability sessions. Once all test trials have been given (n=25), the results should be scored and tabulated for reliability.

3) All testers must have a reliability score of 85% for the latencies and 100% for the response code. For a latency to be considered correct, the value must be within 1 second of the testing supervisor's recorded value. If an individual does not pass reliability testing, retraining must take place. Retraining requires that the testers meet to discuss the basis for the differences in scoring. After the testers decide retraining is complete, reliability must be retested.

4) The testing supervisor is responsible for maintaining a consistent coding pattern (through regular meetings with the P.I. and all testers). A training period of at least one day is used for each new tester prior to the initial reliability testing.

Log of Changes in SOP

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