ANIMAL BEHAVIOR

Lab

Lab Project

February & March

Domestic Animals
1st - Observation & Description
2nd - Experimentation

Field Project

April & May

Wild Animals
1st - Observation & Description
2nd - Experimentation

See Syllabus
Animal behavior research is ........

- unrelated to public TV shows
- more difficult to do than molecular biology
- quantitative and highly statistical
- usually pure (basic) research
The first ethologists?
Knowledge of Animal Behavior
Brief History of Animal Behavior Research
(early 1900s to present)

Comparative Psychology
- USA
- GOAL: study animals to understand humans
- Lab Environment
- Few species

Ethology
- Europe
- GOAL: study animals to understand animals
- Field Work
- Many species
Figure 2.17  The increasing number of articles published by comparative psychologists between 1911 and 1948 concerned a gradually decreasing number of species. (From Beach, 1950.)
Comparative Psychology

Research Focus

- Proximate causes of behavior
- Development of behavior
- Neural & hormonal mechanisms
- Learning
J. B. Watson promoted a radical new psychology...

**BEHAVIORISM**

1913 ... published the Behaviorist Manifesto

- Psychology is an objective science ... never subjective or introspective

- Discoveries apply to human and nonhuman animals

- Actual behavior should be the subject ... not consciousness

- Stimulus and Response

- Use of rigorous experimental design and data analyses
The behaviorist asks: Why don’t we make what we can observe the real field of psychology? Let us limit ourselves to things that can be observed, and formulate laws concerning only those things. Now what can we observe? We can observe behavior—what the organism does or says. And let us point out at once: that saying is doing—that is, behaving. Speaking overtly or to ourselves (thinking) is just as objective a type of behavior as baseball.

The rule, or measuring rod, which the behaviorist puts in front of him always is: Can I describe this bit of behavior I see in terms of “stimulus and response”? By stimulus we mean any object in the general environment or any change in the tissues themselves due to the physiological condition of the animal, such as the change we get when we keep an animal from sex activity, when we keep it from feeding, when we keep it from building a nest. By response we mean anything the animal does—such as turning toward or away from a light, jumping at a sound, and more highly organized activities such as building a skyscraper, drawing plans, having babies, writing books, and the like.

J.B. Watson (1934)
B.F. Skinner

- Inspired by Watson
- Helped popularize behaviorism
- Invented the Skinner Box to study learning
ETHOLOGY

3 Nobel Laureates in 1973!!

Karl von Frisch (1886 - 1982)
Konrad Lorenz (1903 - 1989)
Nikolaas Tinbergen (1907 - 1988)
<table>
<thead>
<tr>
<th><strong>Comparative Psychology</strong></th>
<th><strong>Ethology</strong></th>
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<tbody>
<tr>
<td><strong>GOAL</strong></td>
<td>understand behavior of wild animals as shaped by natural selection</td>
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<td></td>
<td>understand proximate causes of behavior</td>
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<tr>
<td><strong>APPROACH</strong></td>
<td>field observations</td>
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<tr>
<td>neural events</td>
<td></td>
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<tr>
<td>hormonal influences</td>
<td></td>
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<tr>
<td>role of development</td>
<td></td>
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<tr>
<td>stimulus-response</td>
<td></td>
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<tr>
<td><strong>STRENGTHS</strong></td>
<td>“real” animals</td>
</tr>
<tr>
<td>objectivity</td>
<td>“real” contexts</td>
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<tr>
<td>experimental rigor</td>
<td>population thinking</td>
</tr>
<tr>
<td>statistical sophistication</td>
<td></td>
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<tr>
<td><strong>HISTORICAL WEAKNESSES</strong></td>
<td>subjective observations</td>
</tr>
<tr>
<td>few species</td>
<td>uncontrolled variables</td>
</tr>
<tr>
<td>domesticated species</td>
<td>qualitative data</td>
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<tr>
<td>sterile environment</td>
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</table>
TODAY

Lines have blurred between ...

Neuroscience
Genetics
Endocrinology
Molecular Biology
Ecology
Psychology
Wildlife Biology
Animal Behavior Research at YCP is alive and well
Behavioral Responses of the Green Anole (*Anolis carolinensis*) to Citric Acid Gustation

Adam Batog

Cannibalism in blue crabs, *Callinectes sapidus*: with emphasis in varying stressors and differences between sexes

By: Alex Crouse

Learning and long-term spatial memory of food patch locations in male and female Mongolian gerbils (*Meriones unguiculatus*).

Kim Doll

Behaviors of Minnows (Cyprinidae) in Response to Alanine and Histidine in a Field Setting

Katie Fessler
Predation on guppies (*Poecilia reticulata*) by oscar cichlids (*Astronotus ocellatus*): effects of varying prey color and prey size

Jason Fowler

Can Mice Make Friends? Social Behavior of Phenotypically Autistic Mice

Samantha Giordano

The Use of Olfaction by Neonatal Mice for Navigation During the Blind Stage of Development

Nicholas Corbin Hilker

A comparison of habituation to an auditory stimulus by male and female mallards *Anas platyrhynchos* in urban, rural, and isolated habitats.

Laura Holborow

Effect of Lunar Cycles on Nocturnal Activity of White-tailed Deer in South Central Pennsylvania

Ryan Hunsicker
Predators and the Strength of Preferences for Familiar Schools in the Fathead Minnow, *Pimphales promelas*
Jessica A. Jadlocki

The Effect of Oddity in Prey Selection of Largemouth Bass (*Micropterus salmoides*)
Nate Keller

Differences in Predation Responses of Native and Invasive Freshwater Turtles
Victoria Kentner

The effect of eye patching on cortisol release in *Anolis carolinensis* during territorial aggression
Andy Kohlman
Effects of low pH in spawning water on aggression of resulting female fry in *Betta splendens*

*M. Lotocha*

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**Does the Male’s Seductive Song Overpower His Appearance? Sexual Selection in Zebra Finches, *Taeniopygia guttata***

*Erin Moore*

---

The Effects of Caffeine on Learning and Memory in Zebrafish (*Danio rerio*)

*Erica Pantelich*
The time that female mouse pups (*Mus musculus*) spend with their mother: effects on F2 litter size, pup weights and sex ratio

Dawn Rose

Tree selection for antler rubbing by white-tailed deer (*Odocoileus virginianus*)

Matt Shaffer

Learning and memory in intact and newly-regenerated planarians

Jaclyn Strickler

The impact of fluoxetine hydrochloride on aggression in zebra fish (*Danio rerio*)

Molly Wasik
The Effects of Plumage Coloration and Cooing on Mate Attraction in Diamond Doves (*Geopelia cuneata*)

Victoria Hope

---

The Behavioral Responses of Mice to Olfactory Cues from Natural Oils

Jen Thomas

---

Painted lady butterfly (*Vanessa cardui*) preferences for amino acids in solution

Elliot Martin
The Impact of Predation Threat by Cichlids (*Petenia splendida*) on Reproduction in Guppies (*Poecilia reticulata*)

*Stephanie Bauernfeind*

The Effects of Water Flow Rate and Swim Time on the Escape Response Distance of Golden Shiners *Notemigonus crysoleucas*

*Chris Broking*

How Exposure to Imidacloprid Affects the Return Rate of Honeybees (*Apis mellifera*) to the Hive

*Chad Brillhart*
Ideally, you want animals that ......

- don’t die

- are active ... when you are

- are industrious

- might produce offspring

- can be manipulated
<table>
<thead>
<tr>
<th>GOOD</th>
<th>LESS GOOD</th>
<th>BAD</th>
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</thead>
<tbody>
<tr>
<td>Mice</td>
<td>Fish</td>
<td>Turtles</td>
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<tr>
<td>Rats</td>
<td>Anole lizards</td>
<td>Snakes</td>
</tr>
<tr>
<td>Hamster</td>
<td></td>
<td>Guinea pigs</td>
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<tr>
<td>Gerbils</td>
<td></td>
<td>Spiders</td>
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<tr>
<td>Zebra finches</td>
<td></td>
<td>Komodo dragons</td>
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<tr>
<td>Society finches</td>
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<tr>
<td>Hermit crabs</td>
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Lab Assistant:  Kelly Hanson

Kelly will ..... 

- Take your top 2 requests for animal species

- Purchase your animals and bring them to the animal room

- Check out animals, equipment, & supplies to you

- Distribute additional supplies as needed

- Act as a consultant

- End of project: process returns of animals, equipment, & supplies
Lab Project Grades

5  -  Office visit 1

20  -  Office visit 2

140  -  Written report

35  -  Oral presentation of experiment

200  -  Total points
Locomotion activity in the zebra finch (*Taeniopygia guttata*) under unpredictable food Interruptions

Christopher Hartzler

Have these lab animals adapted to a risk-free environment?

Will unpredictable food interruptions cause locomotion (perch movement, etc.) to change?

1. Will they become less active (perform less strenuous behaviors, more “relaxed behaviors)?

2. What, if any, new behaviors may they show during days of food interruption?

**Null hypothesis:** There will be no change in locomotion behavior in finches subjected to unpredictable food availability, compared to those with constant food availability.
Materials/Methods

- Digital camera w/ tripod
- Computer software w/ time-lapse for viewing video

Environment:
- Isolated from people/animals in 70 degree room
- Natural light/dark period
- 13”X15”X21” cage, w/ newspaper
- 4 “branches”
- Nest w/ bedding material
- Separate food/water troughs
Methods (Cont.)

4 Observational Periods during each day of study:
7:30am - 10:30am (Morning)
10:30am - 1:30pm (Early Afternoon)
1:30pm - 4:30pm (Late Afternoon)
4:30pm - 7:30pm (Early Evening)

Observational duration for each period: 35 minutes

-Videos played back at a later time and the following observations recorded for both male/female separately:

1.) # of perch changes (active behavior)
2.) Time spent in nest (inactive behavior)
3.) Time spent on cage bottom (active period, seed searching/nest building)
Experimental Phase for 4-day period

- New finches used
- Range of food interruption considered 8:30am – 6:30pm
- Random # table provided start of 2-hour period without food
- 2-hour period began with food/trough being replaced
- Spilled seeds removed and newspaper changed
- Water remained
- Identical observational periods recorded, same observations made, but with particular attention paid to observing new behaviors

*For consistent reaction to human involvement, Control periods had regular daily cage cleanings anyway.
Results

Average Locomotion Activity with Constant Food

Time of Day

Morning | Early Afternoon | Late Afternoon | Early Evening

Male

Female
Results

Average Locomotion Activity with Food Interruptions

Time of Day

Perch Changes

Morning  Early Afternoon  Late Afternoon  Early Evening

Male  Female

- Male
- Female
Results

*Male IF had an average 39.5 fewer perch jumps over the course of a day’s observations

*Female data unrelatable

Average Locomotion of Constant Food Vs. Food Interruptions

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>Male CF</th>
<th>Female CF</th>
<th>Male FI</th>
<th>Female FI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morning</td>
<td>200</td>
<td>150</td>
<td>175</td>
<td>125</td>
</tr>
<tr>
<td>Early Afternoon</td>
<td>185</td>
<td>130</td>
<td>150</td>
<td>110</td>
</tr>
<tr>
<td>Late Afternoon</td>
<td>160</td>
<td>110</td>
<td>130</td>
<td>100</td>
</tr>
<tr>
<td>Early Evening</td>
<td>50</td>
<td>25</td>
<td>35</td>
<td>20</td>
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Perch Changes
Results

Average Time Spent on the Ground by CF and FI finches

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>Male CF</th>
<th>Female CF</th>
<th>Male IF</th>
<th>Female IF</th>
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<tbody>
<tr>
<td>Morning</td>
<td></td>
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<tr>
<td>Early Evening</td>
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Results

*FI males spent 1.1 minutes more (on average) in the nest over the course of a day.
Conclusion

*No new behaviors were observed

Data supporting Hypothesis:
- Male IF had fewer perch jumps (on average) over the course of the day than did the CF Male (39.5).

Data nullifying hypothesis:
- No significant differences between average time spent in nest in nest by Males

Corruption of data
- Female data irrelevant?
- Time spent in nest (active AND relaxed behavior?)
- Lost data

Final conclusion: Males reject null hypothesis, Female results need further research.