Topics in Behavior and cognition

ECOL496V / ECOL596V
Anna Dornhaus
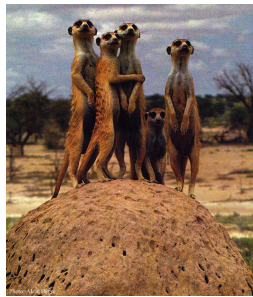

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England (Bristol) ➤ **Arizona**

Who are you?

- name
- year/degree
- your scientific interests
- your expectation for this course

Goals for this course (I)

- Krebs & Davies: Intro to behavioural ecology – **solid & comprehensive background in biological behavior research**

- Shettleworth: Cognition, Evolution, and Behavior **– same for research on comparative psychology/cognition**

Comprehensive background: why?

- **Grant proposals and papers**: general relevance & capturing reader's interest
- **Inspiration for own research**: new directions, questions, & methods
- Understanding what has been done and how it applies to your own questions
- Prelims (!) and impressing non-specialist colleagues

Goals for this course (II)

- **Practice presenting**: give clear, interesting, efficient talks
- Be bold, active and in charge: **speak in class**
- **Who's who**: get to know the relevant people

Why (II)

- **Presentations are your main face** to colleagues & (future) employers; if done well, they are also the most effective way to tell people about your results

- Only those who talk get noticed

- **Who's who**: putting a face to the research makes it easier to remember; it also helps at conferences; it is the best way to easily find out what is going on in a field, and who may work on something similar to you

What we are going to do

- Some lecturing by me (you should always ask questions/make comments when they occur to you)

- Discussions about the readings & my lectures

- You will give a lecture – presenting old or new results with a general introduction, and also encouraging discussion

- Everyone will do 5 who's who presentations (1 slide each)

Example for a who's who talk

Nigel Franks

University of Bristol
http://www.bio.bris.ac.uk/people/staff.cfm?key=687

Studies ants – *Temnothorax albipennis* and army ants, some modelling

Interesting results: proposed 'foraging for work' as task allocation mechanism in social insects; studied collective decision making in nest choice of ants, found quorum threshold mechanism

References:
Anim Behav 48:470-472 (1994);
Phil Trans R Soc 357: 1567-1583 (2002)

Presentations

- Who's who talks: just let me know the week before when you want to give one; make sure to also email me your slide; remember you'll do 5, so spread them out

- Main presentations: pick a general area (=> date) by Tues

Questions so far?

'Tinbergen's 4 questions'

Explaining behavior

Explaining behavior

- How did the behavior develop? (ontogeny)
- What was the physiological cause? (mechanism)
- How did the behavior evolve? (evolutionary history)
- What is the behavior's function? (why evolved/benefit to fitness)

Explaining behavior

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- How did the behavior evolve? (evolutionary history)
- What is the behavior's function? (why evolved/benefit to fitness) **= ultimate causation**


Example:
Why do birds sing in the spring?

proximate causation	ultimate causation
Daylength	Optimal time for mating so that breeding falls in season of abundant food

(consciousness – 'knowing about it' does not have to have anything to do with it either way)

Explaining behavior

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- What was the physiological cause? (mechanism)   **= proximate causation**
- How did the behavior evolve? (evolutionary history)
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Aristotle, ~350 BC, Greece

Social creatures are such as have some one common object in view; and this property is not common to all creatures that are gregarious. Such social creatures are man, the bee, the wasp, the ant, and the crane.

Again, of these social creatures some submit to a ruler, others are subject to no governance: as, for instance, the crane and the several sorts of bee submit to a ruler, whereas ants and numerous other creatures are every one his own master.
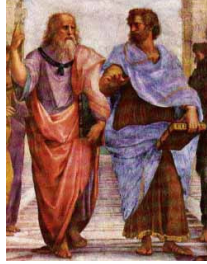
➡ **often descriptive, not 'explaining' behavior at all**

Karl von Frisch, starting ~1905, Austria/Germany

Fish can hear, bees can see color, …

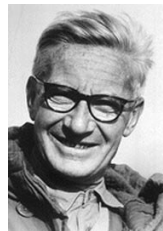➡ **'physiology' of animals includes behavior**

Konrad Lorenz, 1930s, Austria

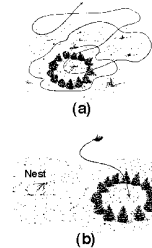Imprinting in geese & others; 'overflow' of urges, displacement activity, fixed action patterns

➡ **behavioral programs, 'instincts'**

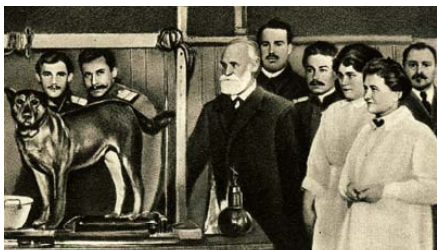# Niko Tinbergen, 1950s, Netherlands/Britain

Orientation in digger wasps, stickleback mating behavior, gulls pecking at red spots…

(a)

Nest

(b)

➡ **promoted scientific, i.e. experimental, studies of animal behavior**
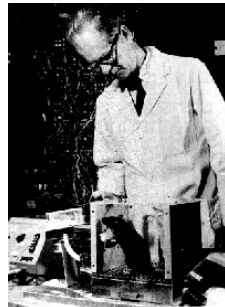
Ivan Pavlov, ~1890, Russia

➡ **experimental studies of learning in laboratory settings**

Fred Skinner, 1940s, USA

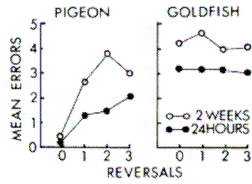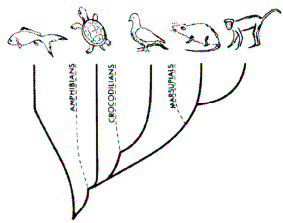Rats learn to press levers for food, walk mazes…

➡ **experimental studies of learning in laboratory settings**

M.E. Bitterman, 1970s, Hawaii

➤ **standardized tests for learning/intelligence in different model species**

Nature and nurture, or, instinct and learning

Lorenz, Tinbergen:
researched 'instincts', and found species-specific and apparently innate behavior patterns

Pavlov, Skinner, Bitterman:
researched learning, and found similar properties in various animals

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Nature and nurture, or, instinct and learning

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"ethology"

Pavlov, Skinner, Bitterman:
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"comparative psychology"

Different traditions...

Ethology (historically)	Comparative psychology
• Many species studied	• Few model species
• Mostly insects, fish, birds	• Mostly rats (and primates)
• Usually in the field or	• Experimental studies

Both fields emphasized reproducible patterns, not 'intelligence' as such.

account	conditions
• Mating, parental care, foraging	• Learning, logical tasks, empathy
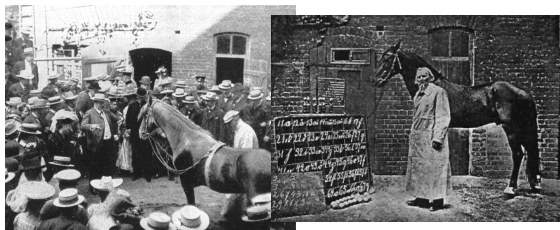
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Popular opinion, ~anytime

➤ **my own animal can reason just like you and me!**

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"Behaviorism"

John Watson et al. ...
- Controlled experiments!!
- "Mind" is a black box - only incoming stimuli and outcoming responses are researched
- No need to assume conscious processes or higher cognitive ability: everything can be explained by complex stimulus-response rules.

Nature and nurture: immediate implications for humans?

Give me a dozen healthy infants, well-formed, and my own specified world to bring them up and I'll guarantee to take any one at random and train him to become any type of specialist I might select--doctor, lawyer, merchant-chief, and yes, even beggarman and thief, regardless of his talents, penchants, tendencies, abilities, vocations, and race of his ancestors." (John Watson, USA, 1930)

Nature and nurture: immediate implications for humans?

…this view was not shared by everyone:

The second obstacle to self-knowledge is our reluctance to accept the fact that our own behaviour obeys the laws of natural causation. (...) The reluctance of many people to recognise the causal determination of all natural phenomena, human behaviour included, undoubtedly comes from the justifiable wish to possess a free will and to feel that our actions are determined not by fortuitous causes but by higher aims. (Konrad Lorenz, 1963)

Evolutionary Psychology

- is the name today of the field that studies human behavior, and how it may be influenced by learned or innate factors

E.g., are mate preferences genetic or purely cultural? (attractiveness, homosexuality)

- Comparative psychology
- Ethology
- Behaviorism
- Evolutionary psychology

Behavioral ecology

The study of the ultimate reasons for behavior: its fitness consequences in an ecological context.