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In the news

Autism in Another Ape

An extraordinary baby bonobo is
a rare case study for autism
researchers

Teco shows more interest in objects than in his family—much as autistic children do.
Image: Courtesy of Elizabeth Robert-Pugh, Great Ape Trust

But perhaps because of trauma from a difficult birth (his mother was in labor for 60 hours) or a genetic predisposition, Teco is different from his bonobo peers in ways that resemble autism in young children. He could not cling to his mother or nurse the way healthy young apes do instinctively, mimicking the aversion to physical contact seen in children with autism.

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In the news

Dozy hamsters reverse the ageing process

as winter approaches, the shortening days cause it to transform. Its fur turns white, it loses weight, and its reproductive organs shrink and withdraw.

as winter progresses, they enter torpor more often.
Turbill kept 25 hamsters in his lab, giving them just 8 hours of daylight every 24 hours. Some were kept at 20 °C and others at 9 °C. Genetic testing revealed that hamsters which entered torpor more often kept their DNA in better shape. In normal ageing, the ends of chromosomes gradually lose their protective caps, known as telomeres. But the slumbering hamsters actually grew longer telomeres
Who wants to live forever if you have to spend half your time unconscious, and very cold?

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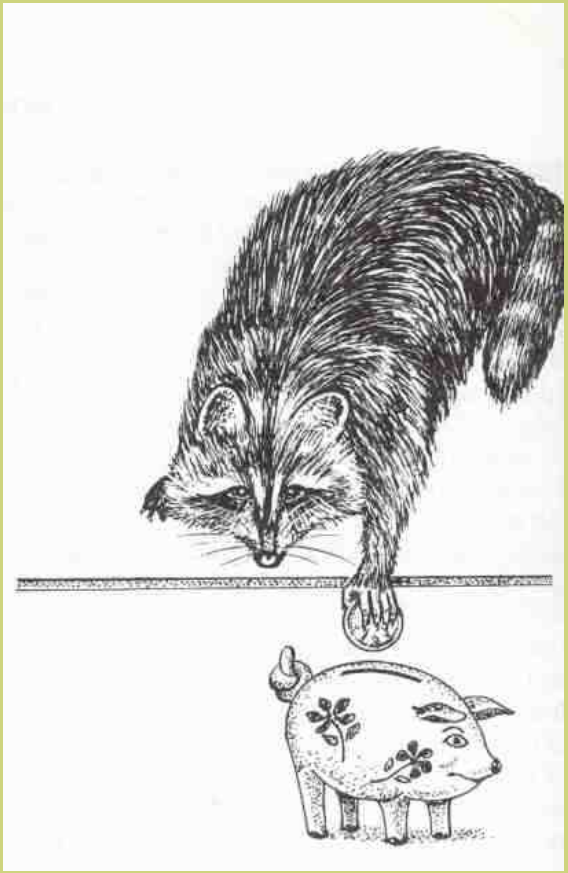
Behaviorism: flaws and cracks



Not all behaviour patterns can be manipulated

Reinforcement does not increase preening frequency

Stimuli and responses are not abstract.

Species specific reactions

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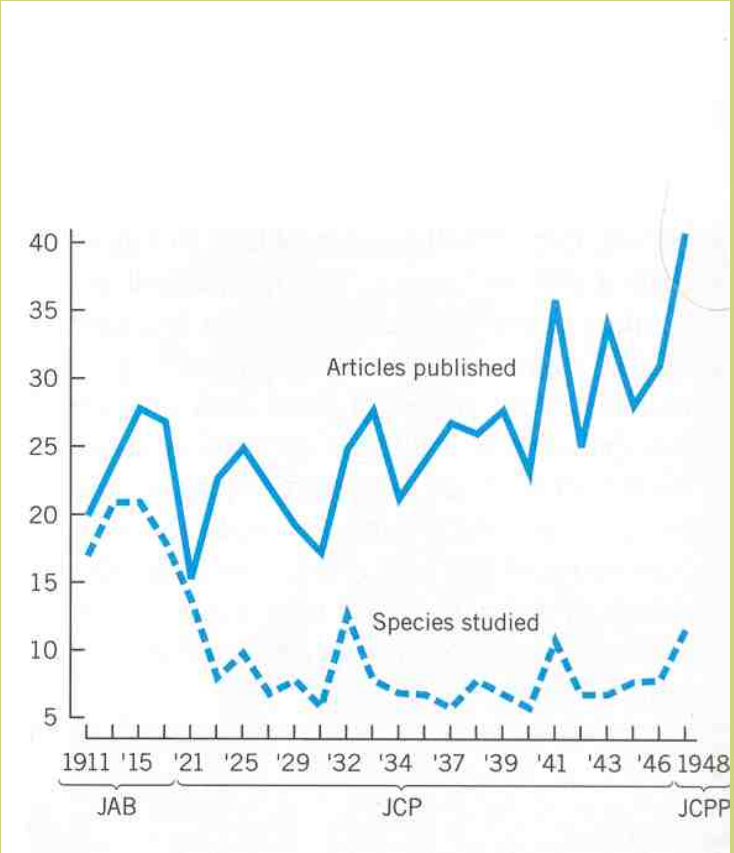
Behaviorism: flaws and cracks



Number of studied species had declined

behaviour studied were very similar

Species: pigeon, rat, mouse, human

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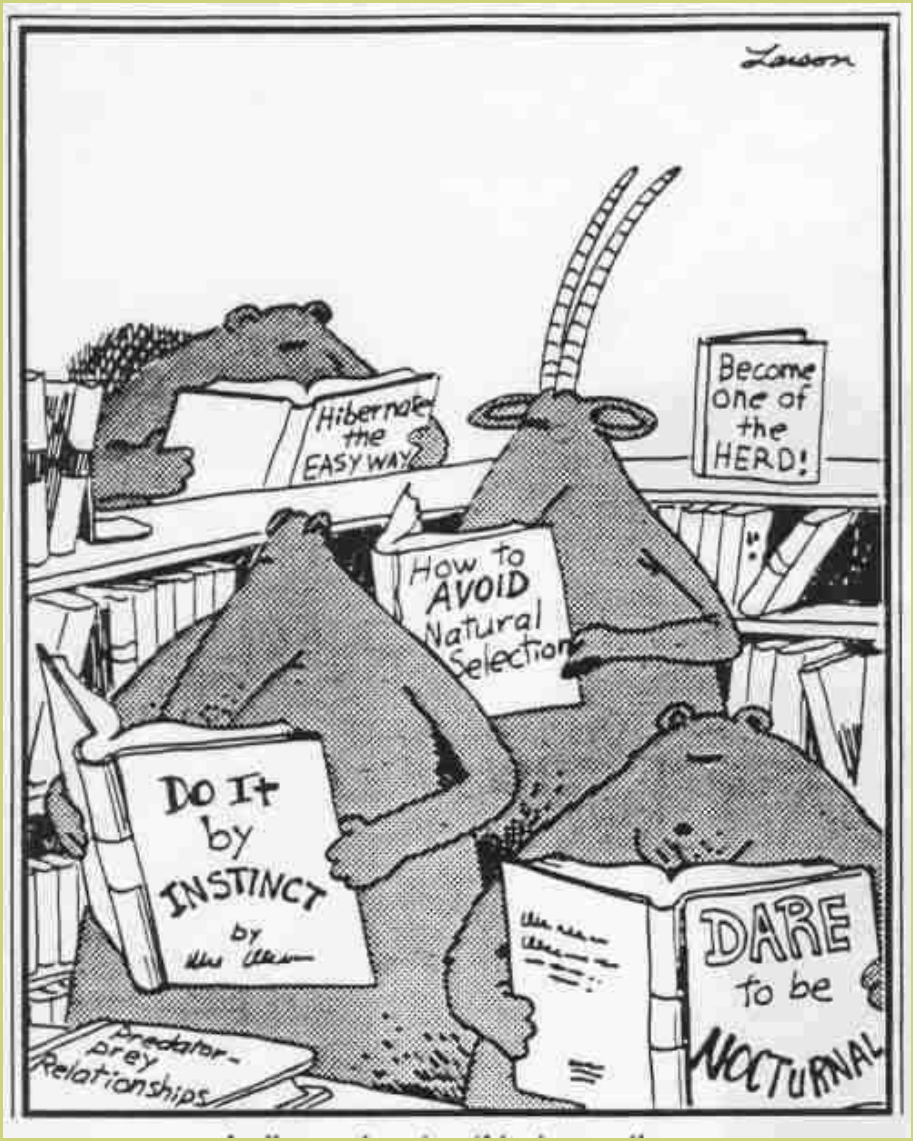
Behaviorism: flaws and cracks



Zoologists found:

Animals learn quickly in adaptive situations
(rat – maze, pigeon - pecking)

Most of the behaviour repertoir is not „conditioned”, but species specific

Inner state is important

Do it by instinct!

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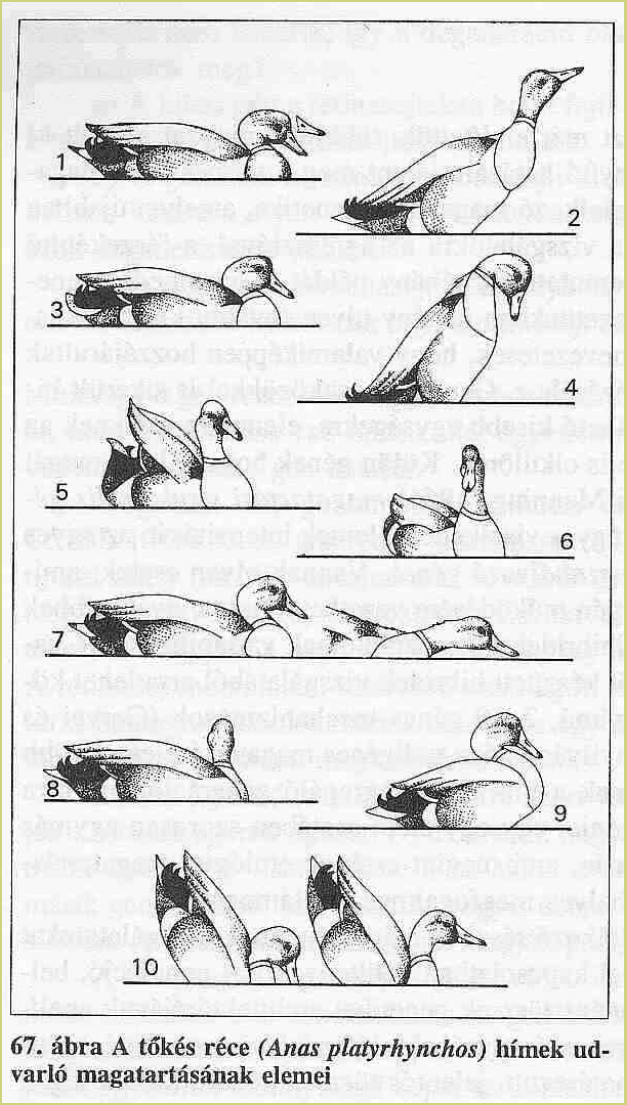
Zoologists



67. ábra A tőkés réce *(Anas platyrhynchos)* hímek udvarló magatartásának elemei

- Species specific behaviour
- Taxonomical traits
- Whitman: pigeon taxonomy
- Heinroth: duck taxonomy
- Precise descriptions
- No theoretical paradigm
- Instinct
- Instinct for every movement?

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Zoologists

Reflex theory (Pavlov)

Few unconditioned stimuli

Few unconditioned response

Any UC sitmus + CS = learns about any new stimulus

Behaviorism

Few US

Few UR

Trial and error + US = learns any new behaviour

Zoologists

Plenty of US and UR

Few novel behaviour species specific behaviour

species specific learning

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Ethology: simple responses

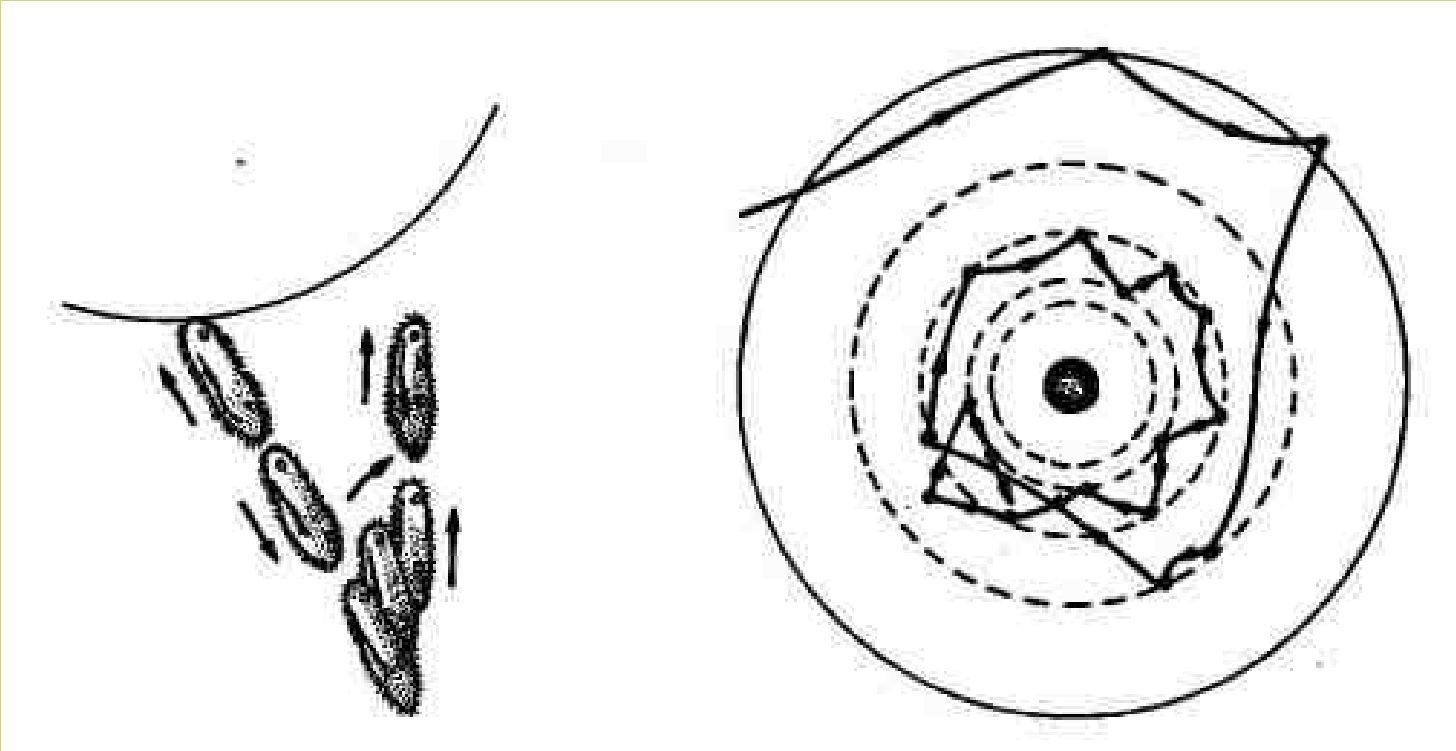
Paramecium

Stimulus

CO2 or object

Response

bumping into it, swimming backwards, swimming forward



KINEZIS

Stimulus -> response

Direction: independent of stimulus

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Ethology: simple responses

Fly larvae

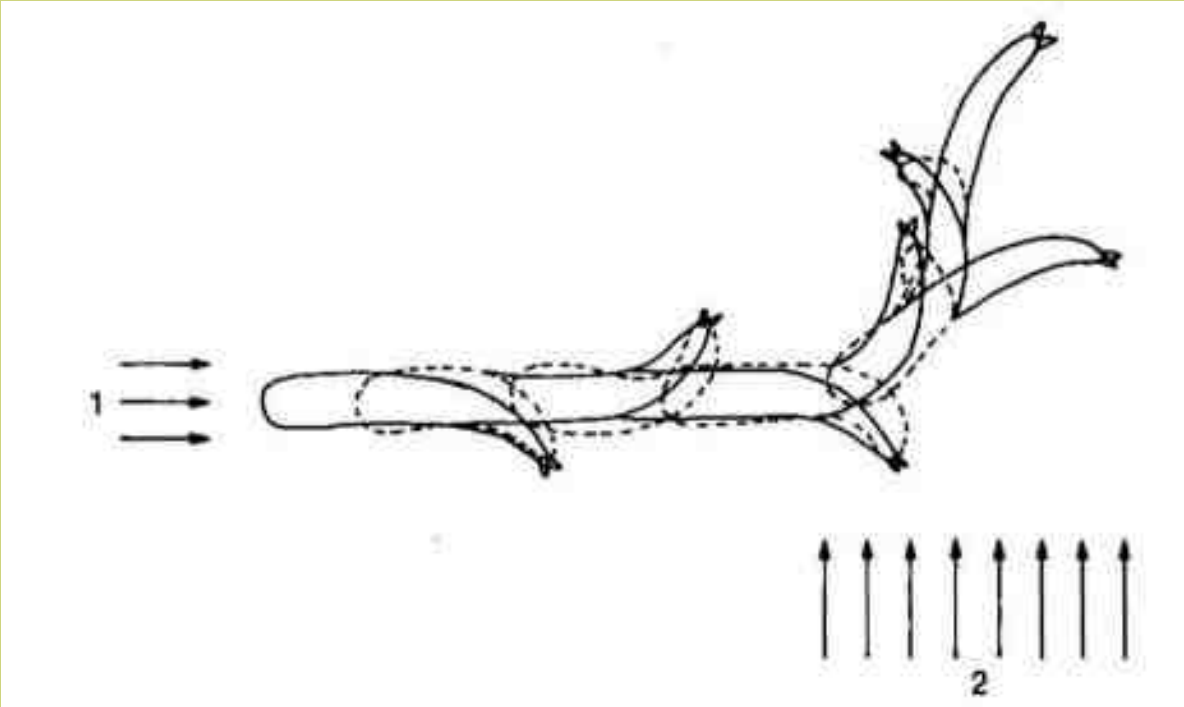
Stimulus

Light

Response

side-to-side motions of the head

Moves toward dark



Direction: depends on stimulus

TAXIS

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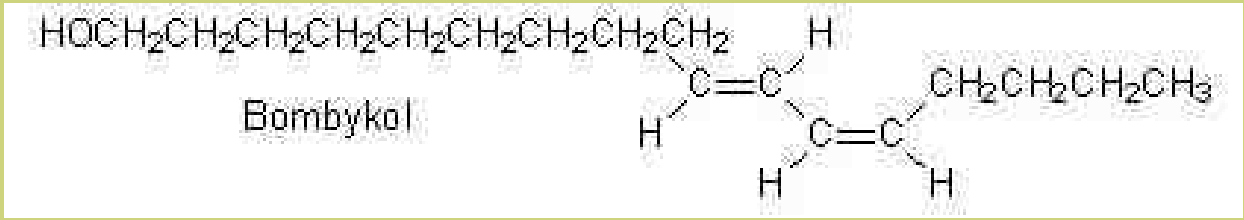
Ethology: simple responses

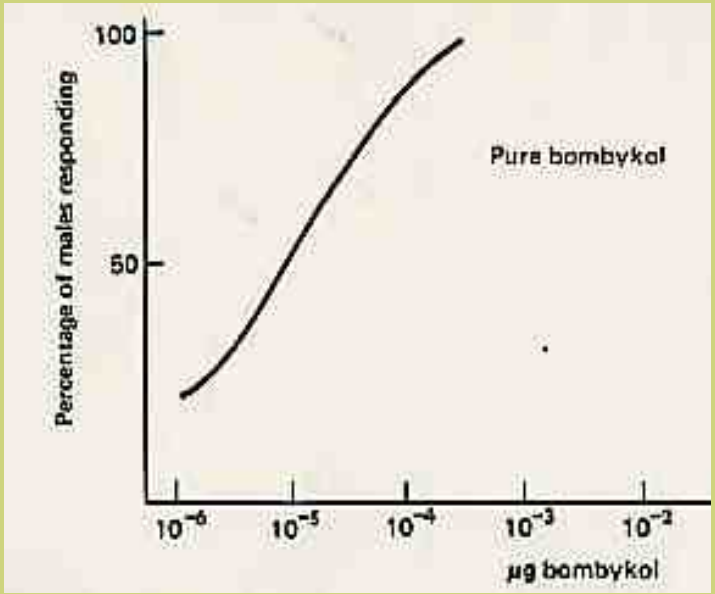
Stimulus

Bombyx
female produces bombykol



Response: approach

Érzékenység: 1 km



TAXIS

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Ethology: key stimuli

GESTALT?

Stimulus

male stickleback

Response:

aggressive pose

What releases the action?

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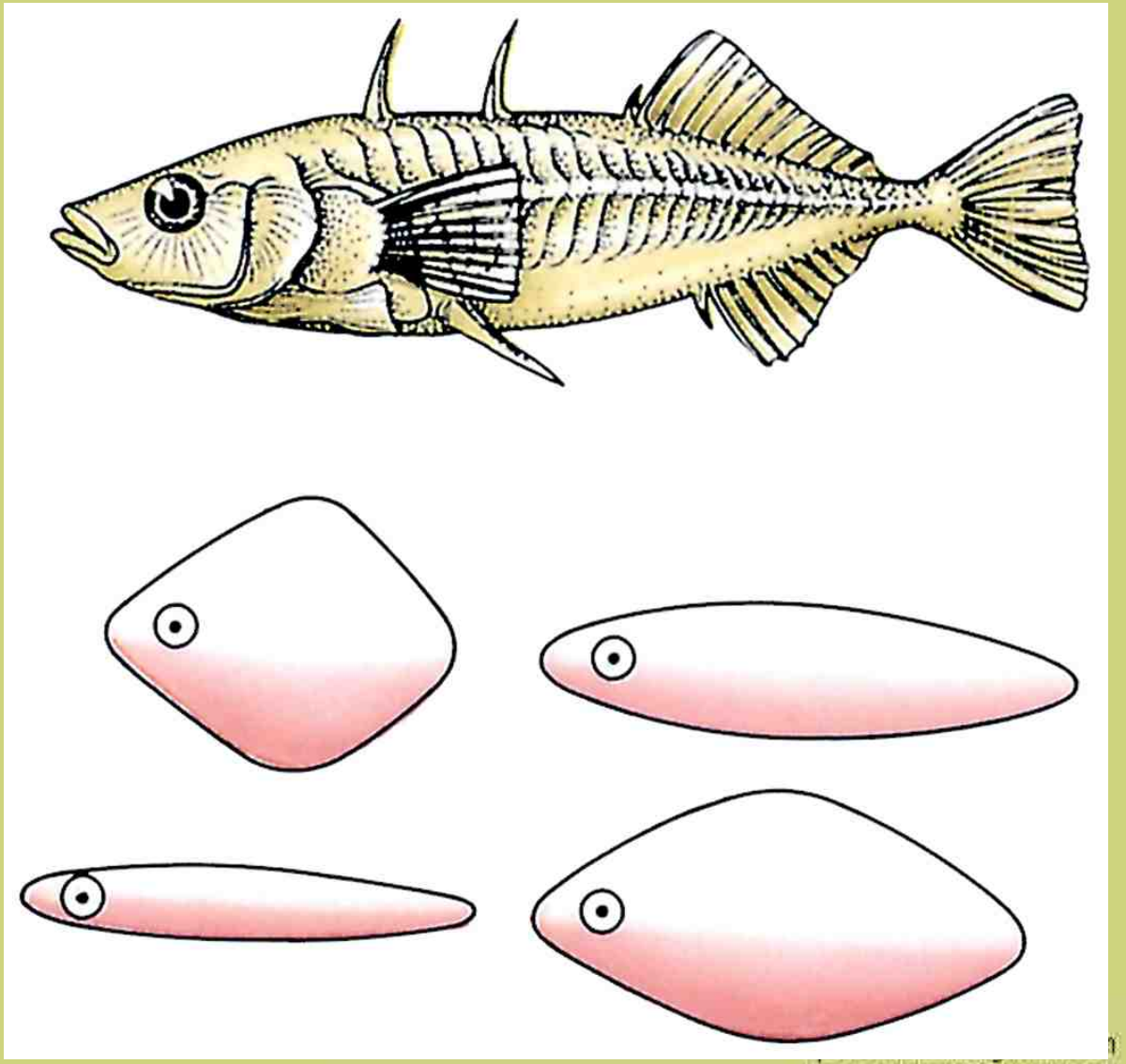
Ethology: key stimuli

Key stimuli

red belly



Ethology: key stimuli

Stimulus

seagull mother

red patch on beak

Response:

chick pecks at it

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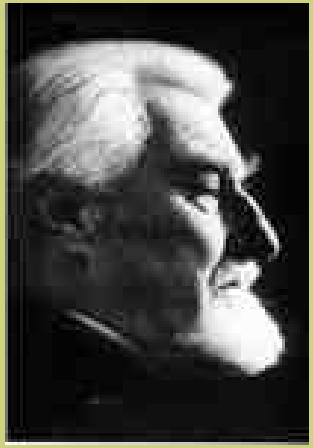
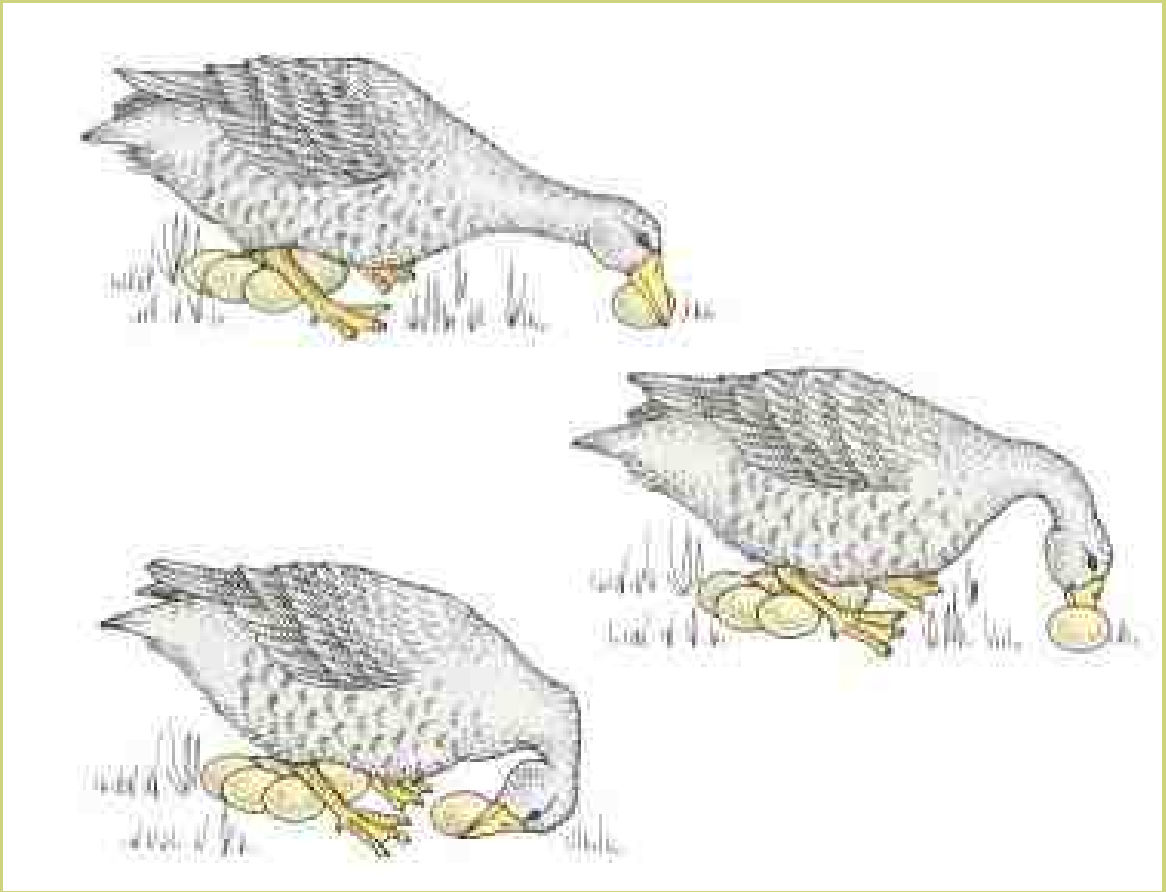
Ethology: key stimuli





Stimulus:

Egg outside of nest

Response:

Rolling it in

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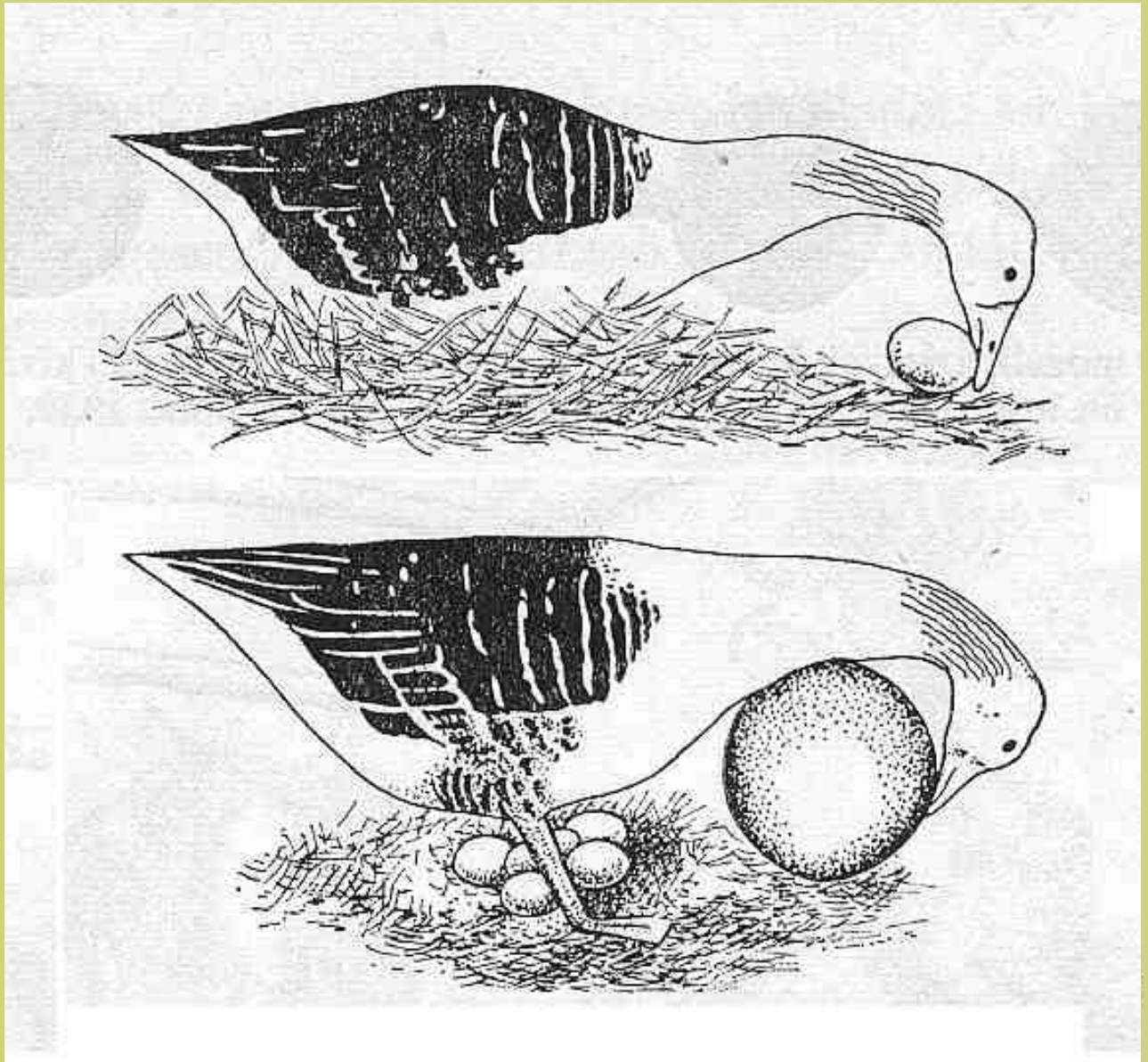
Ethology: supernormal key stimuli

Stimulus

Normal and giant egg

Response:

Prefers bigger than normal eggs



Ethology: supernormal key stimuli

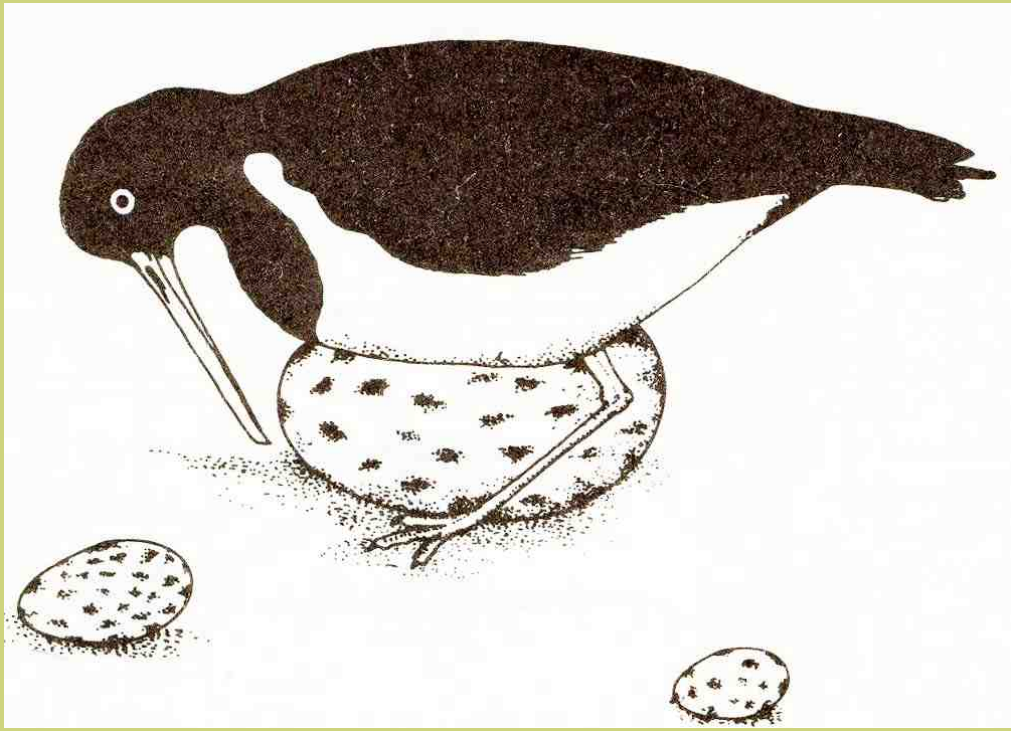
Stimulus

Normal and giant egg

Válasz:

European oysercatcher

prefers bigger than normal egg



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Venus of Willendorf is a limestone carving of a woman's body discovered in Lower Austria. It is believed to date from 24,000 BCE – 22,000 BCE. Her breasts are swollen to absurd proportions.

Willendorf Venus

Supernormal stimulus?

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Ethology: key stimuli

Egyéb példák

Europen robin (Erithacus rubecula)
red patch - attack

chick: movin object - approach

Tritonia: touch - escape

stimuli sensed: perceptual space (Umwelt)

Species specific response: key stimulus

Supernormal stimulus

Fixed part of response: Fixed Action Pattern(FAP)

Variable element: taxis

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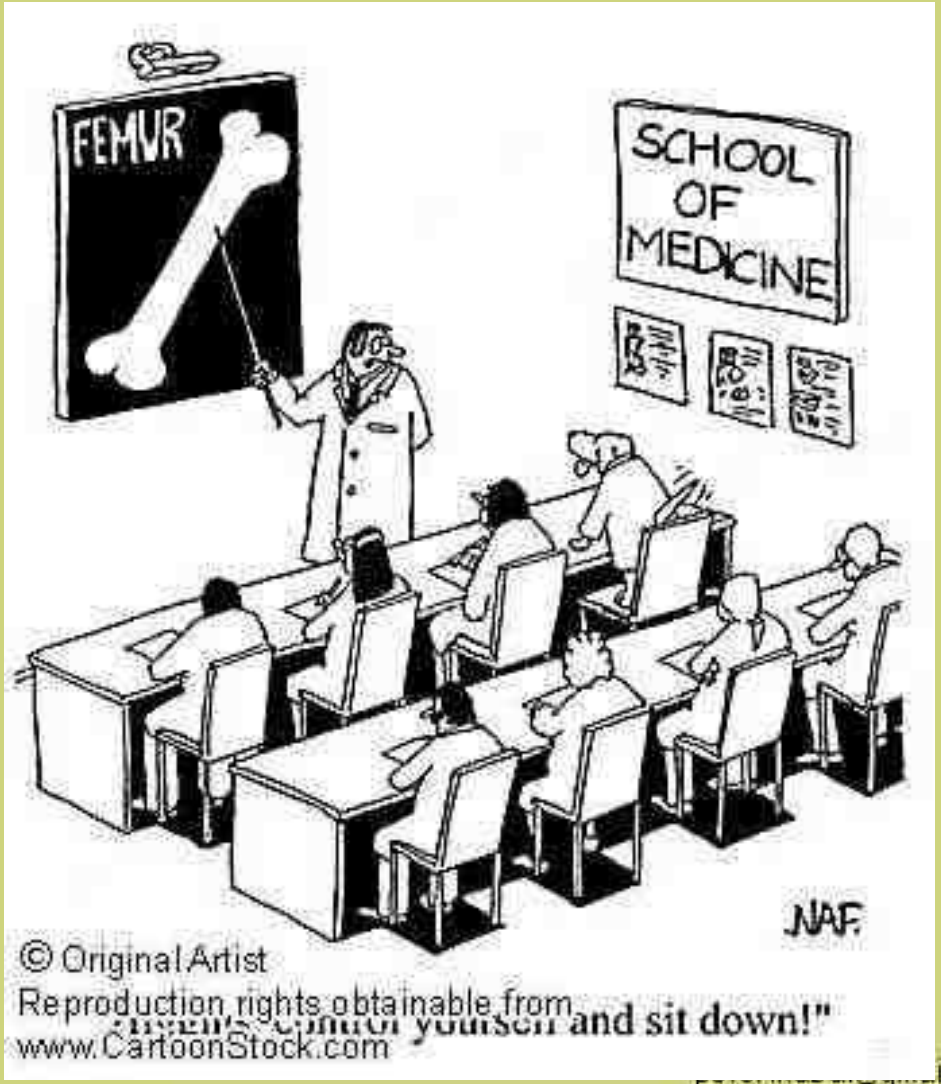
Key stimuli: species specific

Difference between vets and dogs...



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Key stimuli

Separate clues or Gestalt?

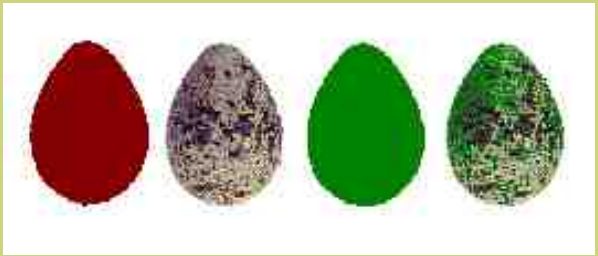
Sea gull egg preference

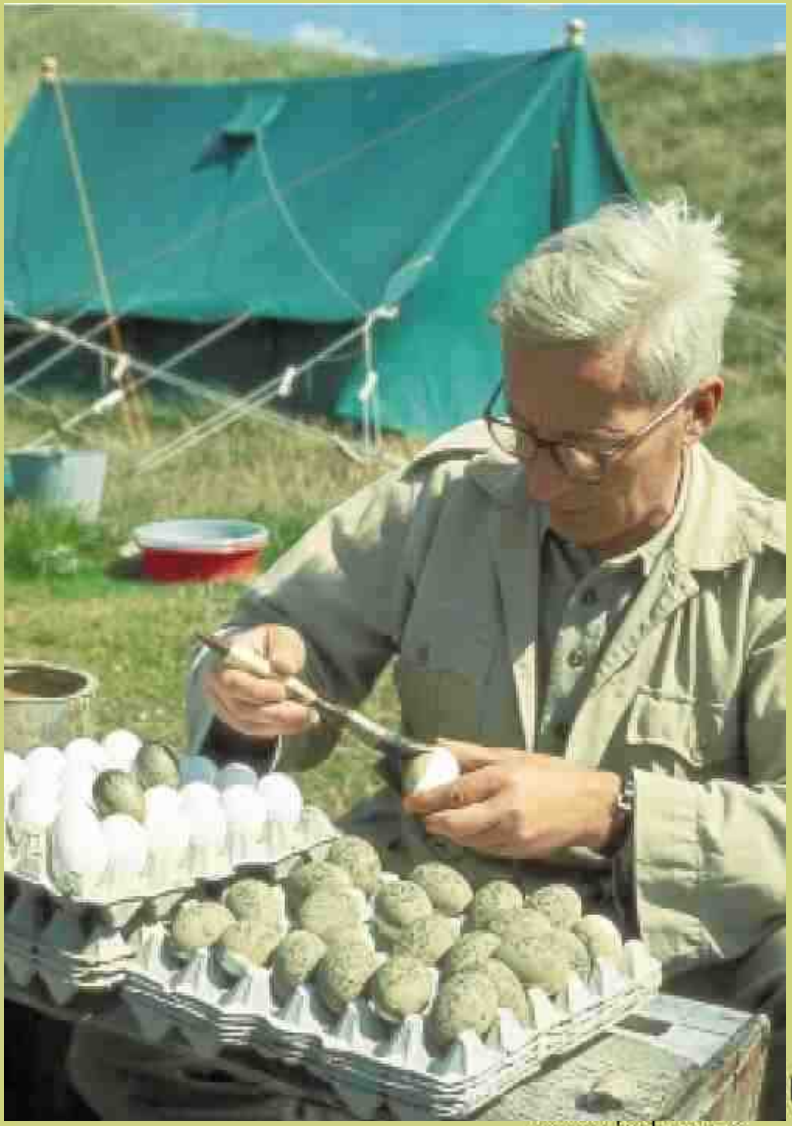
Tinbergen's experiment (follow-up by Baerends & Kruijt)

A: colour and pattern

red,
natural brown spots,
green,
brown spots on green background.

B: size





Key stimuli

Numbers: indicate size

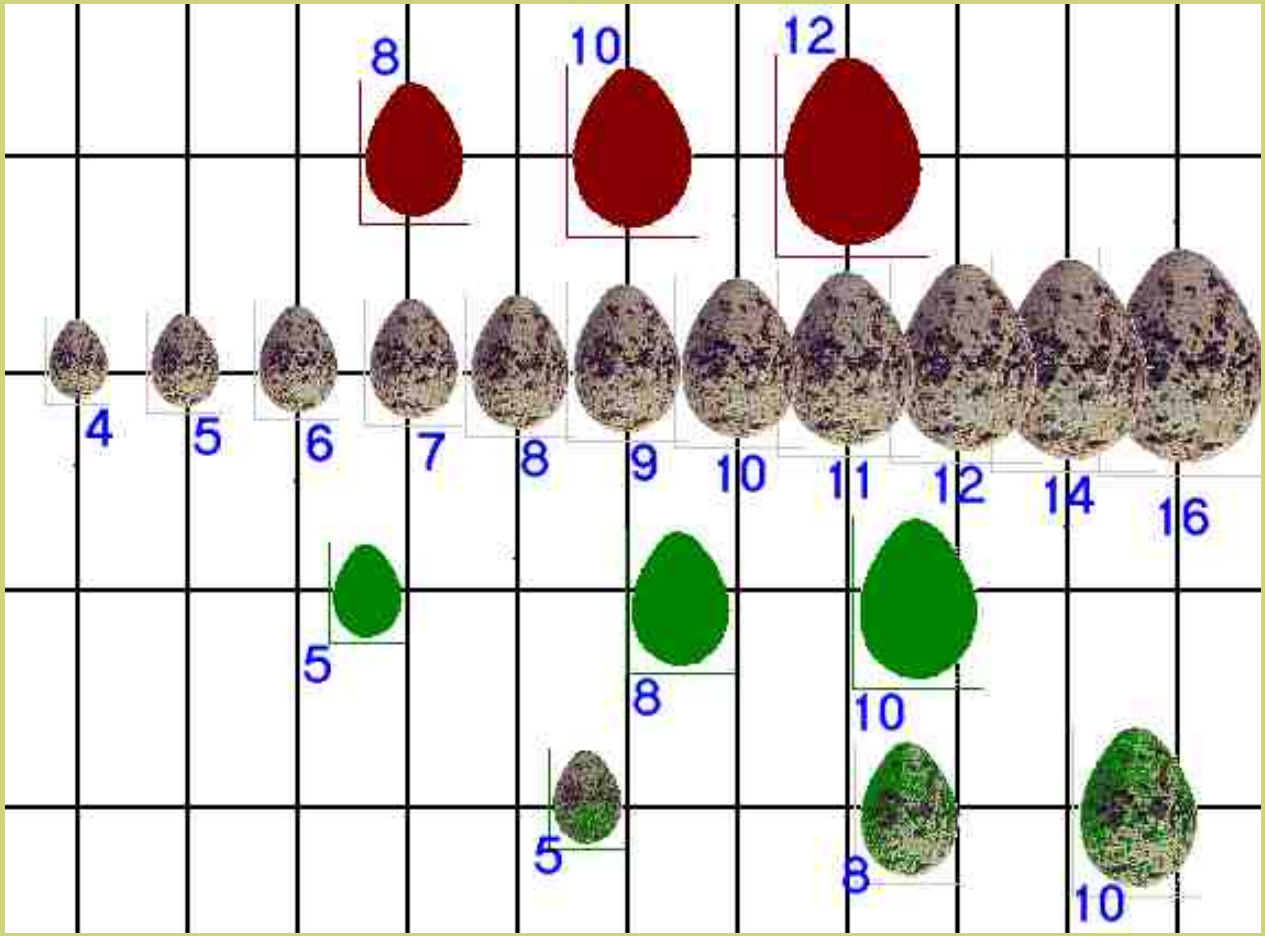
Vertival lines: equal preference

Large > small

pointed green > green > natural > red

Different factors act independently

Heterogenous summation



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Ethology: key stimuli

Tinbergen's experiment

Herring seegull

Qestion:

What are the releasing stimuli?

- Position of patch?
- Colour of patch?
- Colour of beak?
- Contrast?
- Movement?
- Experience, learning?

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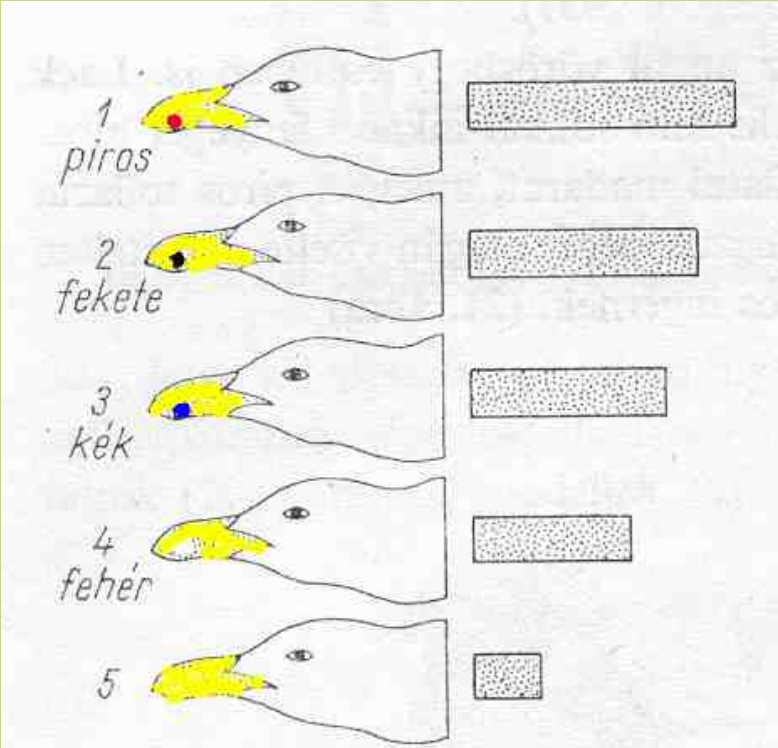

22. ábra. Ezüstsirályfej-modellek, amelyekkel a sirályfiókák táplálékkérő reakcióját váltották ki. A csőrön levő folt színe változó (1–4), vagy hiányzik (5). Az oszlopok a fiókák válaszának relatív gyakoriságát jelzik. Tinbergen után, 1949.

Key stimuli

Colour of patch

preference: red colour

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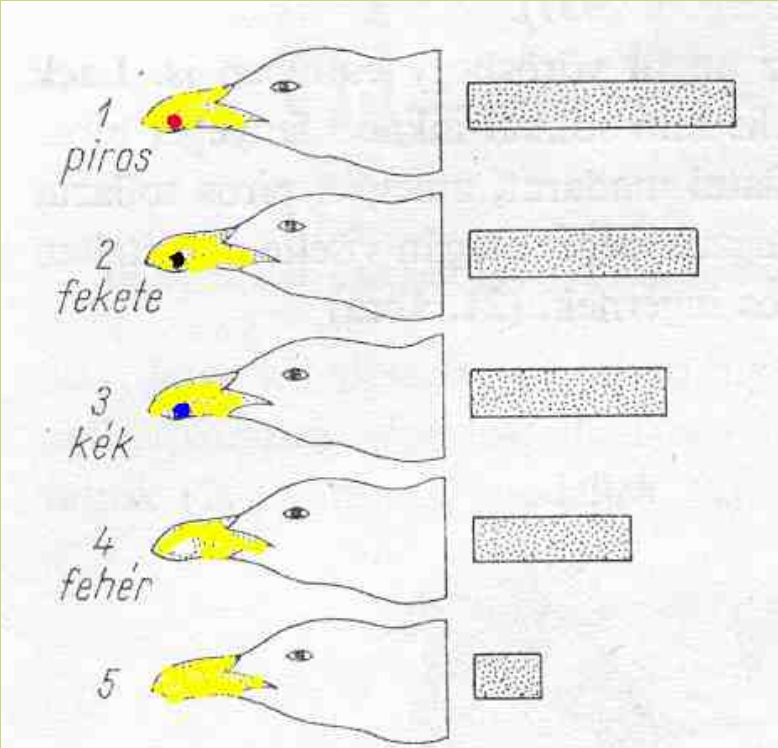

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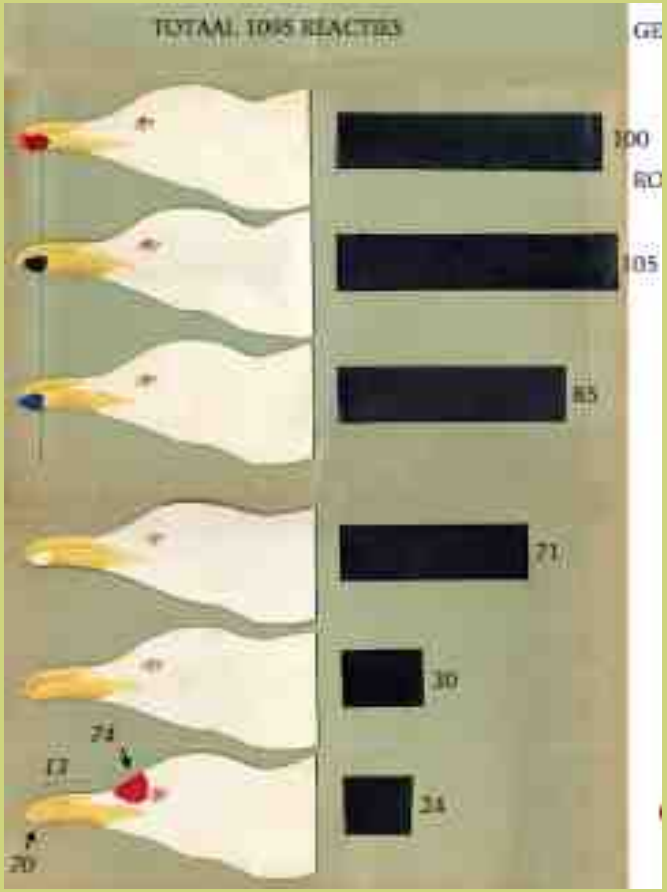

Stimulus presentation was not balanced!

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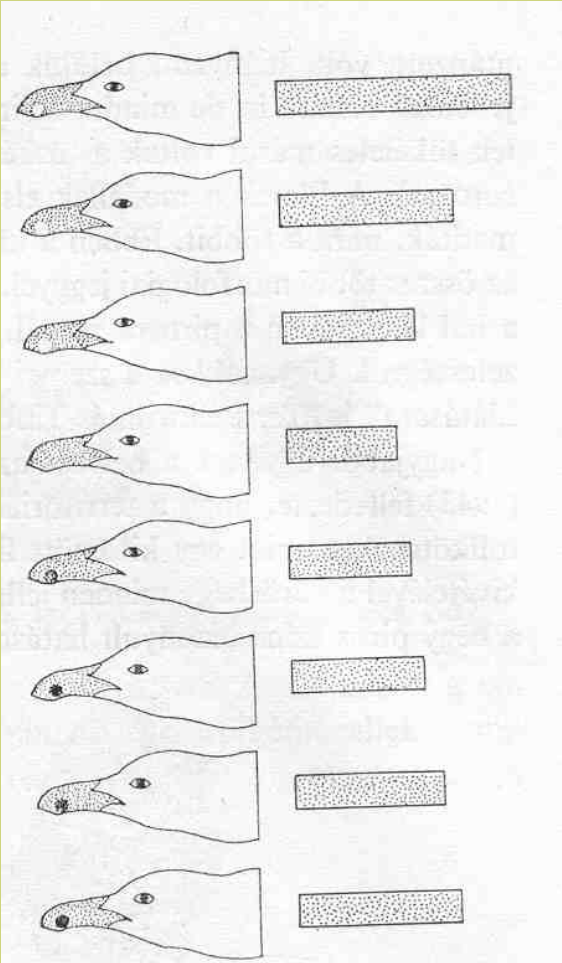
Contrast



23. ábra. Szürke csőrű ezüstsirálymodellek kiváltó hatása. A folt az egyes modelleken különböző árnyalatú. Tinbergen után, 1949.

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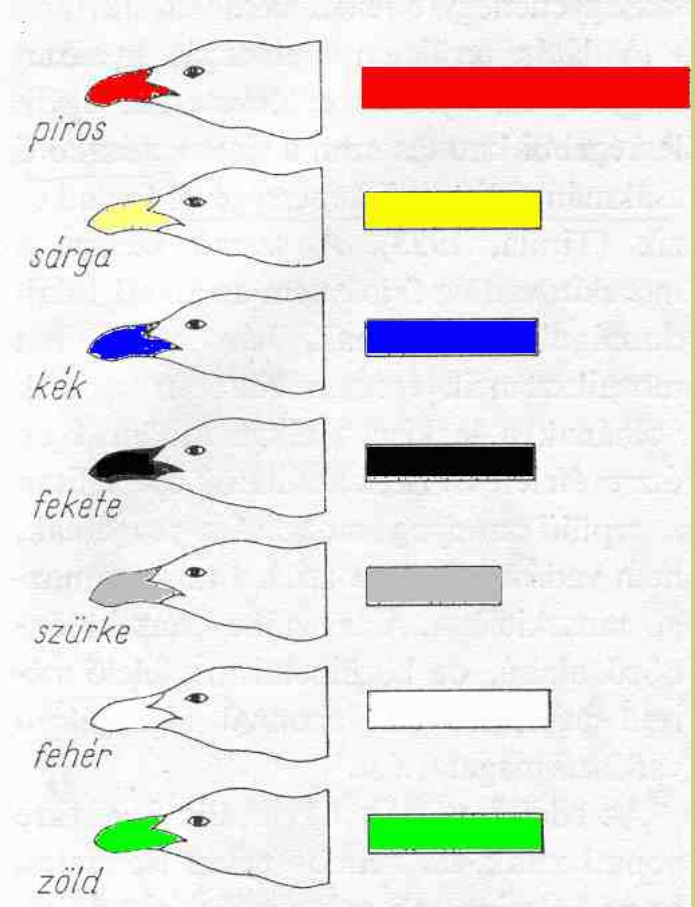

24. ábra. Különböző színű, folt nélküli csőrrel készített ezüstsirálymodellek kiváltó hatása. Tinbergen után, 1949.

Colour of the beak

Preference: red

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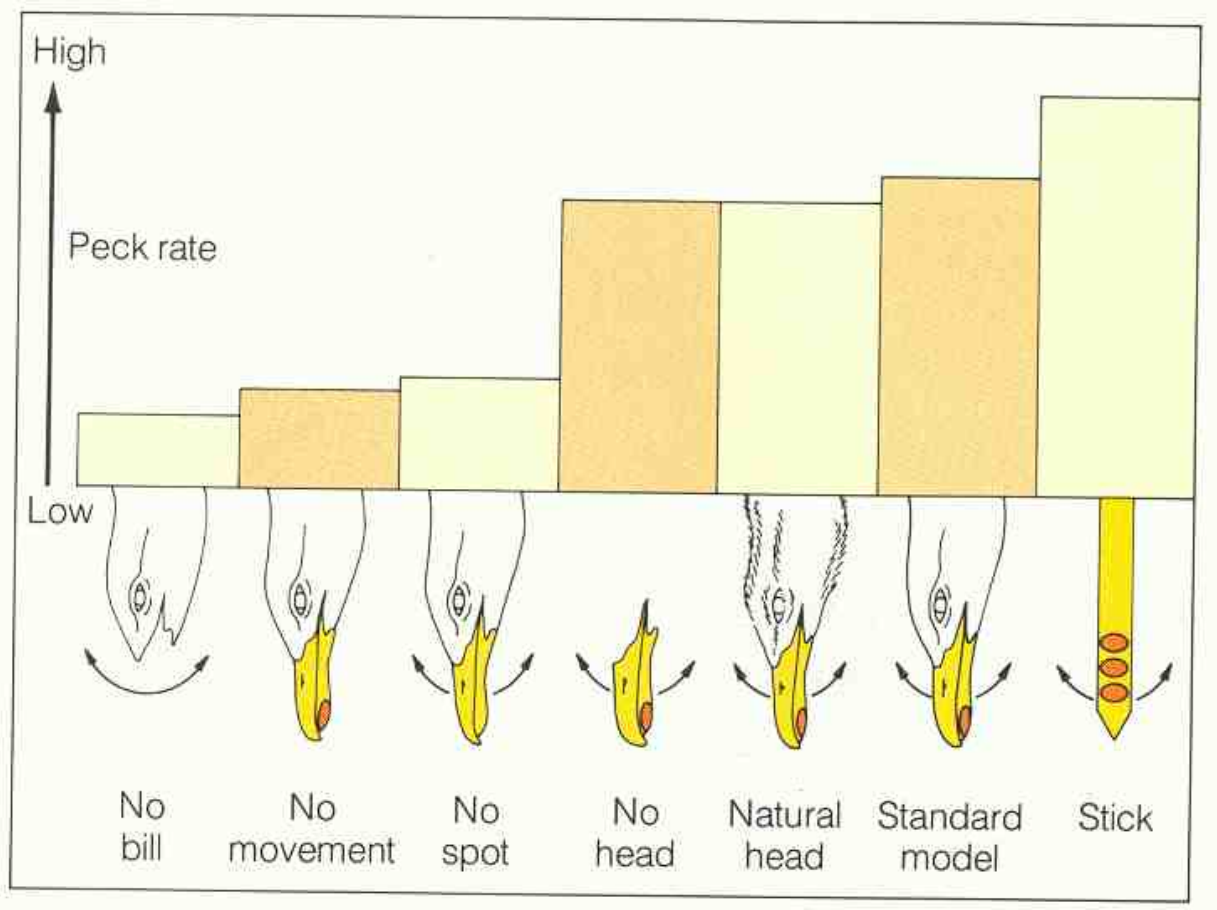

Key stimuli

movement

prefers movent

Stick: supernormal

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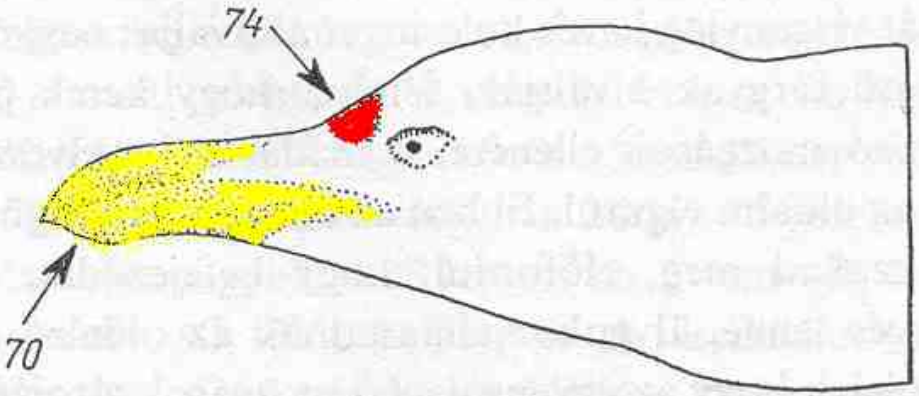
Key stimuli



68. ábra. Az ezüstsirály csőrén levő piros folt vezérlő hatása. A számok a megfigyelt esetekben a csibék csőrhegyre, illetőleg a piros foltra irányuló reakcióinak számát jelzik. Tinbergen után, 1948b.

Key stimulus

position of the patch

directing effect

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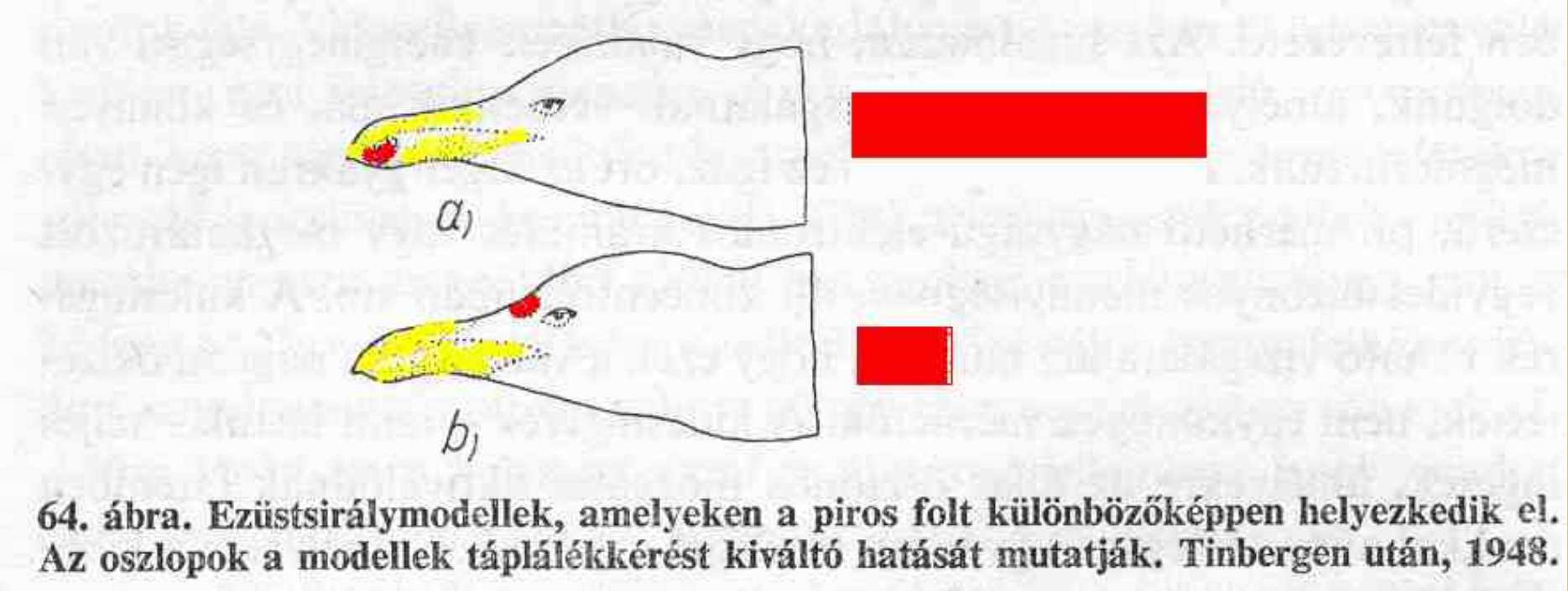
Key stimuli



64. ábra. Ezüstsirálymodellek, amelyeken a piros folt különbözőképpen helyezkedik el. Az oszlopok a modellek táplálékkérést kiváltó hatását mutatják. Tinbergen után, 1948.

Tinbergen thought position of the patch had a directing effect

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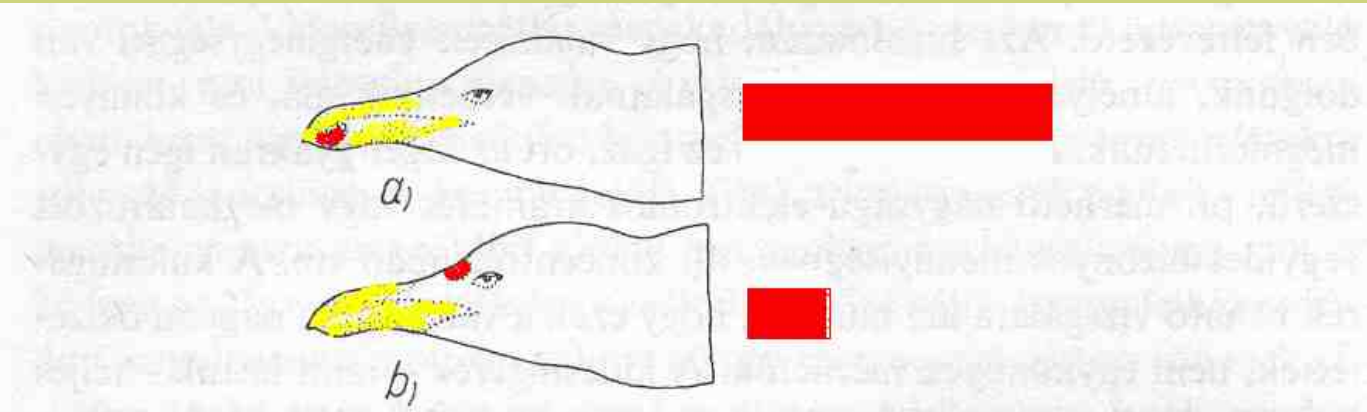
Key stimuli

Key stimuli

Tinbergen's hypothesis

Innate template: relative position of the patch



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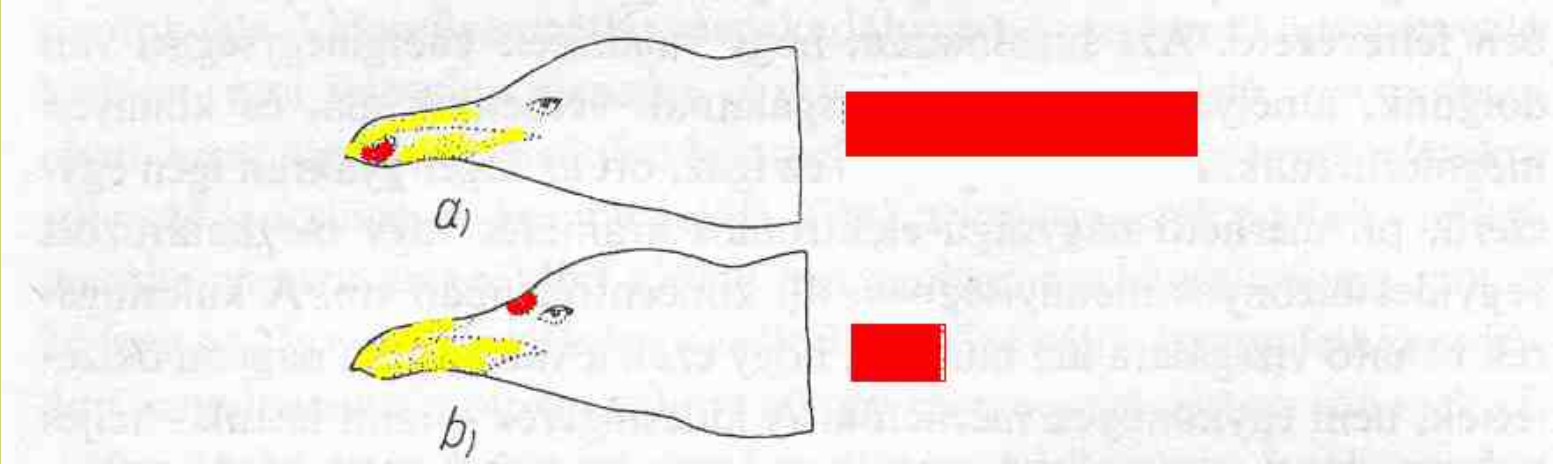
Key stimuli

Tinbergen's hypothesis: patch on beak is prefered as pattern

Hailman: no pattern preference, speed of patch on beak is bigger then on forehead



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Hailman:

1) Beak and patch are true key stimuli
2) Their effects are independent (heterogene summation rather than pattern preference)

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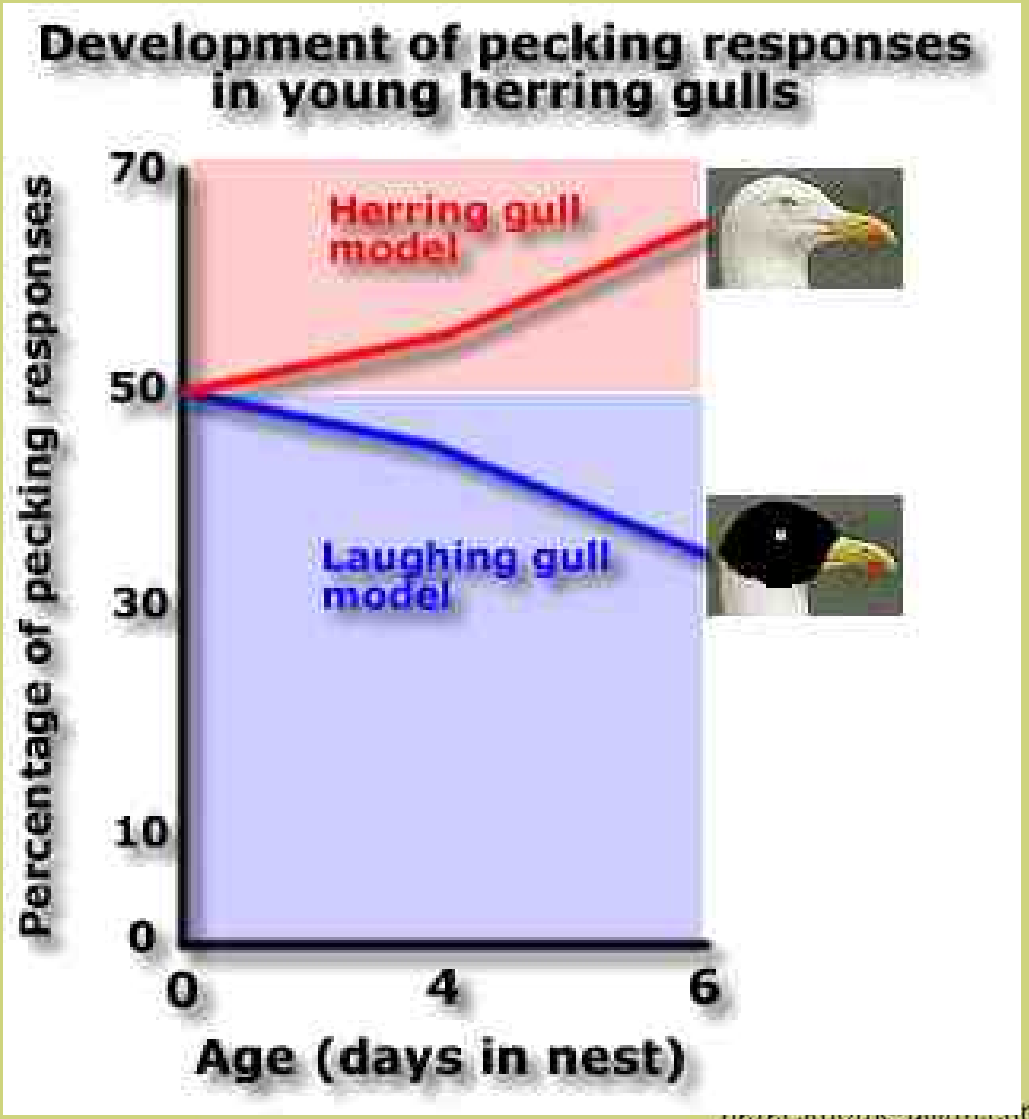
Key stimuli

Tinbergen's finging:

- Preference for conspecific mother
- He worked with 8 days old chicks



Hailman:

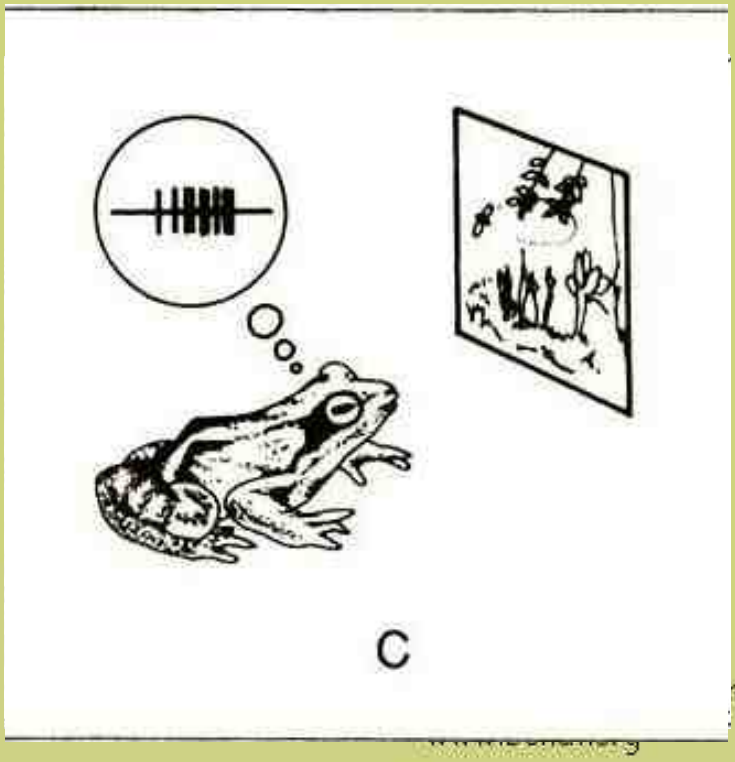
1) No preference at the age of 0-3 days
2) Imprinting learning

Key stimuli

Take away message

1) Perceptual space (world, Umwelt)
2) Key stimuli act independently (heterogene summation)
3) No evidence for pattern preference (Gestalt)
4) Prewired capacity for specific learning
5) Sensory filtering

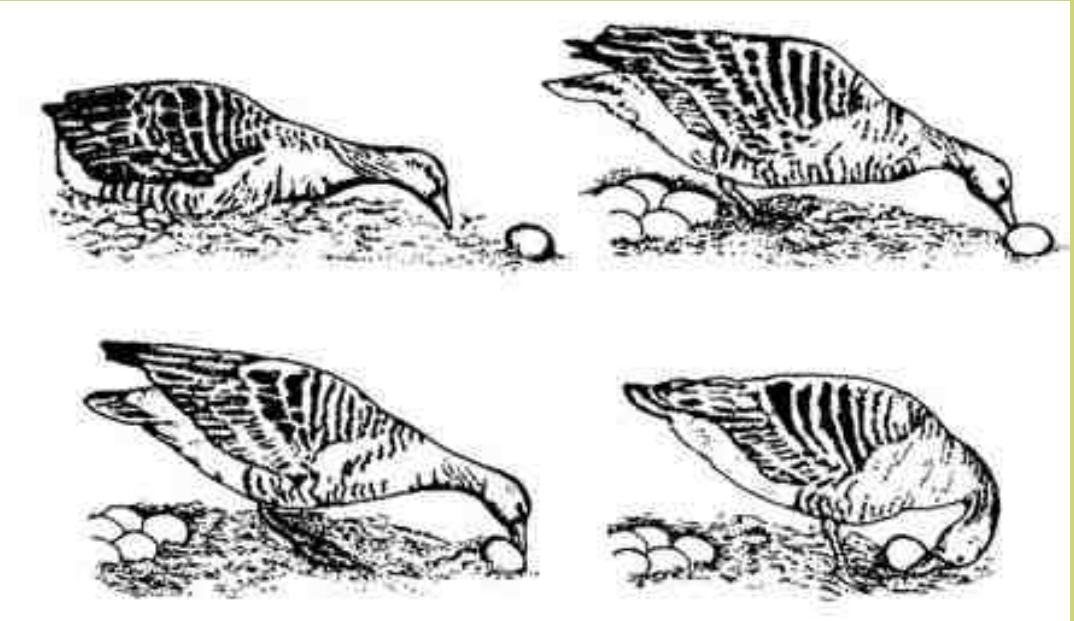
Example: „bug detector” of the frog



FAP

Fixed Action Pattern (FAP)

1) Key stimuli
2) Species specific
3) Fixed form
4) Variable component (taxis)
5) Once started will be finished
6) Vacuum activity



Example: egg rolling by grayleg geese

Taxis + vacuum

Yawning: you cannot stop in middle

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FAP

Fixed Action Pattern (FAP)

Prefers round objects.

Would roll beer can
(but would not sit on it)

Rolling and incubating are directed by distinct stimuli

Behaviour sequences are built of distinct elements
(comes handy when describing behaviour)

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Function of behaviour?

- Niko Tinbergen's experiments

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Proximal question

European beewolf (Philanthus triangulum)

How does she find her nest?

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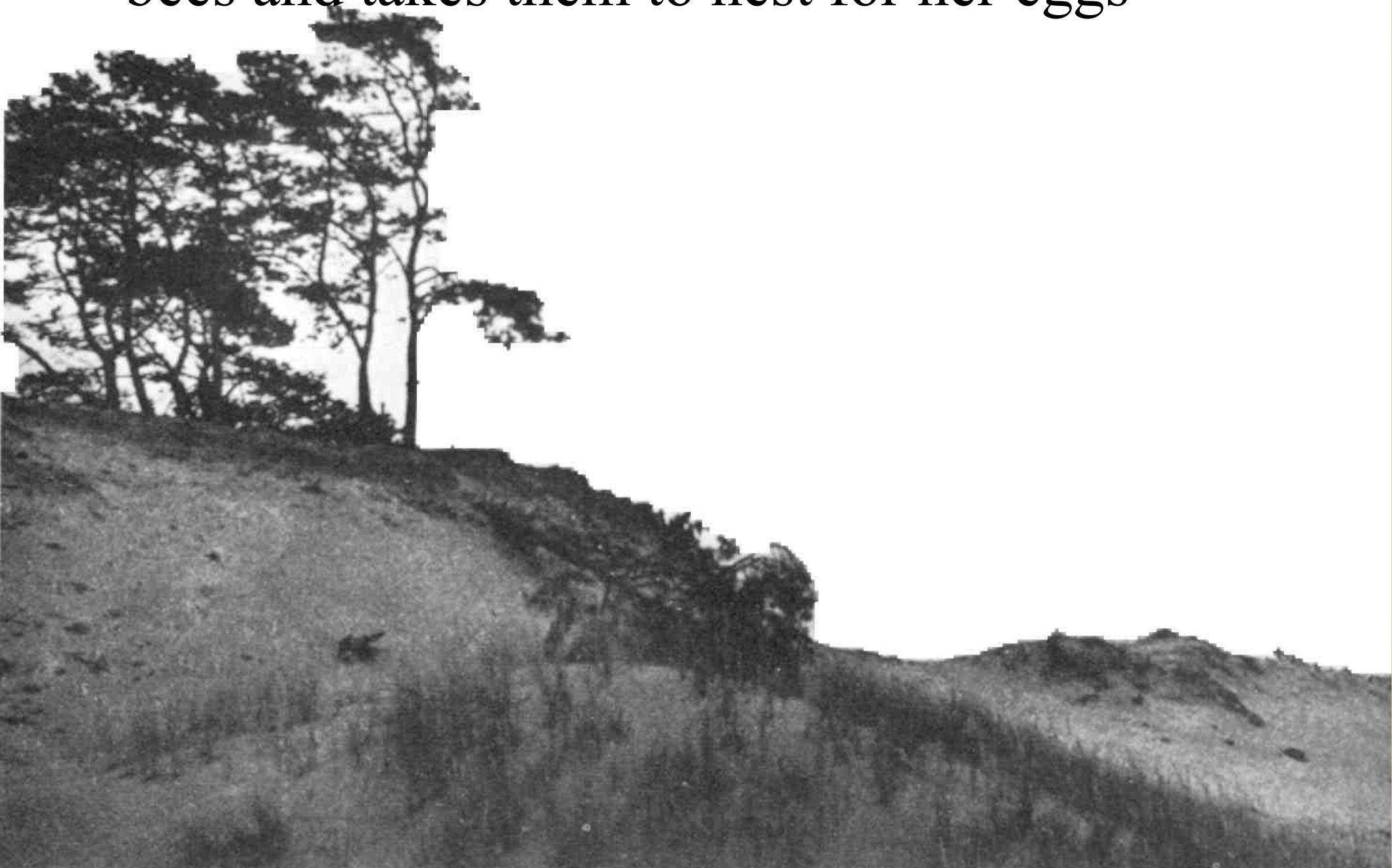
nav.org

Beewolf digs a nest in sand, catches caterpillars bees and takes them to nest for her eggs

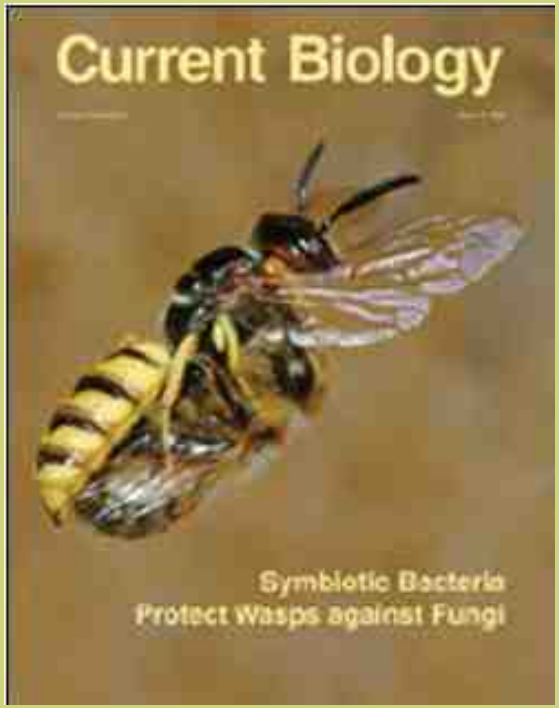


Beewolf

- When leaving the nest she covers the entrance
- How does she find back?

Beewolf

- She circles above nest before leaving.
- Learning about what?
- How can we study that?



Beewolf

Tinbergen removed some objects around nest, beewolves had difficulty to find home

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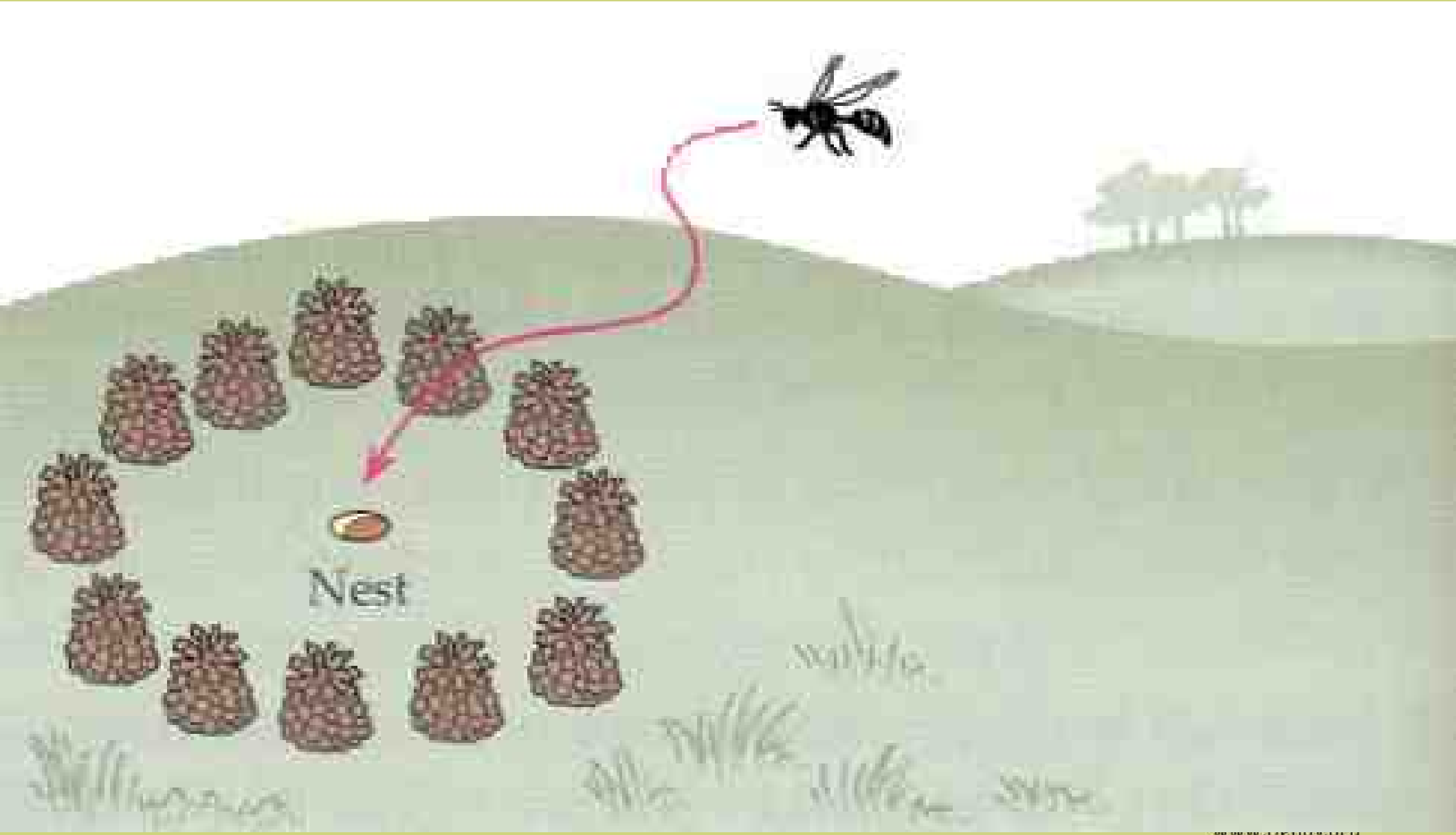
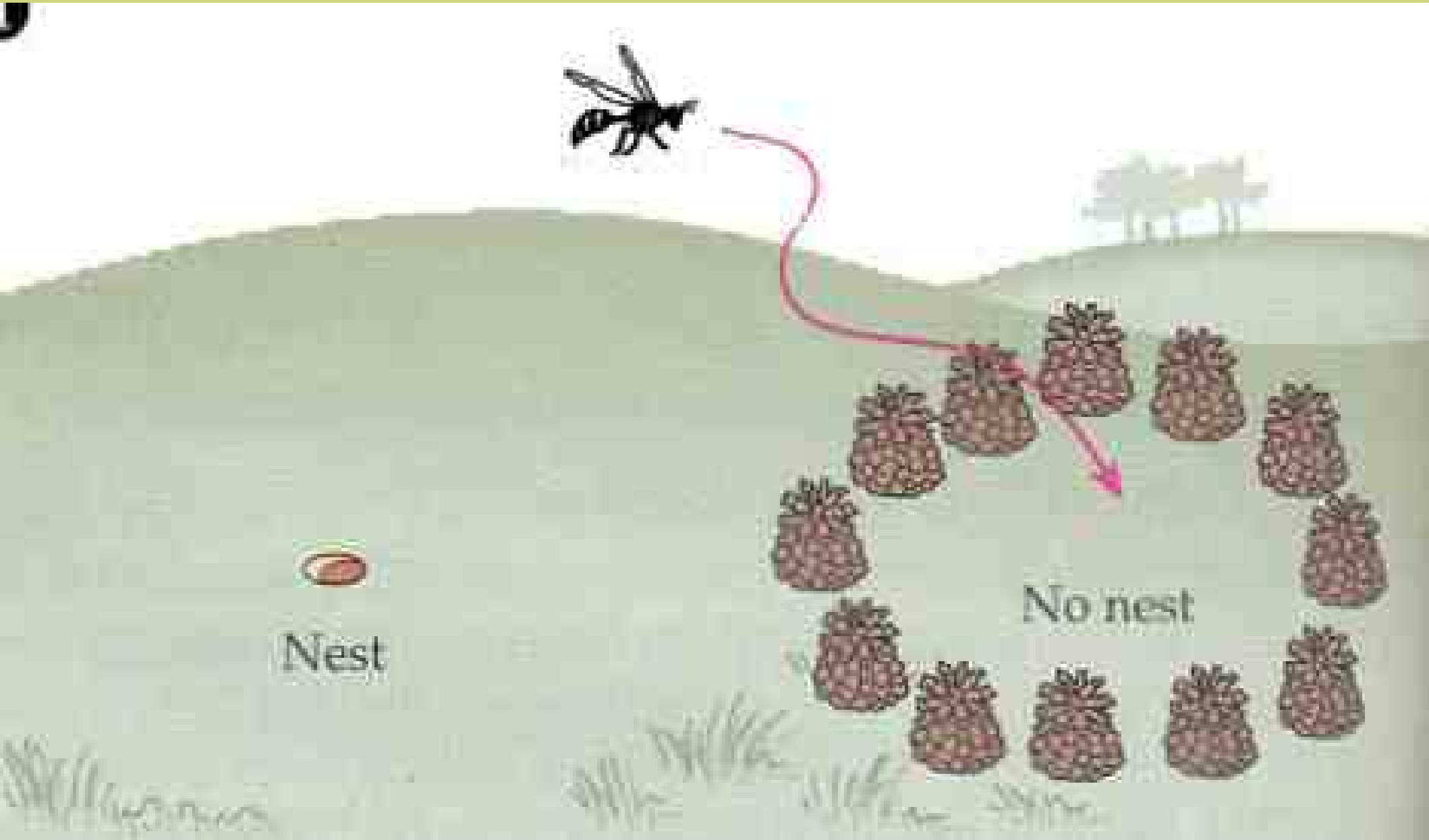
Tinbergen positioned objects around nest entrance



Moved the obejcts. Beevolves searched for entrance at new location



Ultimate question: why do gulls remove eggshell from nest?

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Eggshell removal

- Tinbergen' hypothesis:

Disease, parasites

White inner side of egg is conspicuous, might attract predators

- Removal is antipredatory
- How could we test this?

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Experiment

- Eggshells positioned at nests at different distances.
- Any relation with survival of nests?

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Eggshell removal

Distance between shell and nest	% of predated nests
15 cm	42%
100 cm	32%
200 cm	21%

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Eggshell removal

- Conclusion:
  CONSEQUENCE of eggshell removal diminishes predation, increase fitness.

FUNCTION: consequence of behaviour

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Eggshell removal

- Comparative study:
- Look at related species
- Cliff dwelling bird
- Colony nests
- No shell removal

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Eggshell removal

American Avocets and Black-necked Stilts remove eggshells.

"Although some shells were disposed of by dropping them over land, both species tended to carry shells to nearby water and submerge them"

Sordahl (1994) http://elibrary.unm.edu/sora/JFO/v065n04/p0461

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FAP and inner state

Is FAP a simple reflex, or depends on inner state?

Courtship by male guppies

P:	posing	- low intensity
Si(med):	medium sigmoid	- higher
Si(high):	high sigmoid	- highes

(Baerends)

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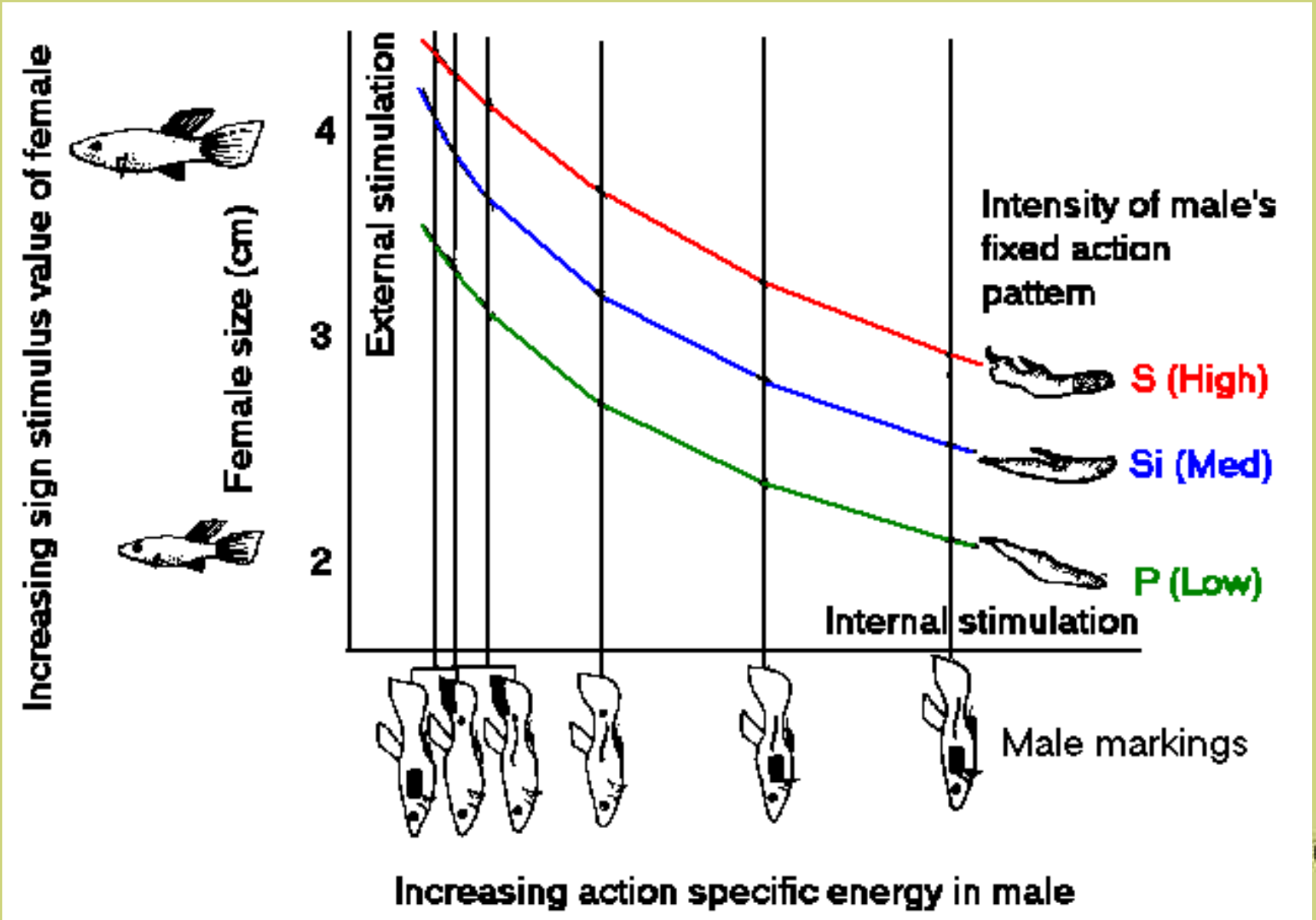
FAP and inner state



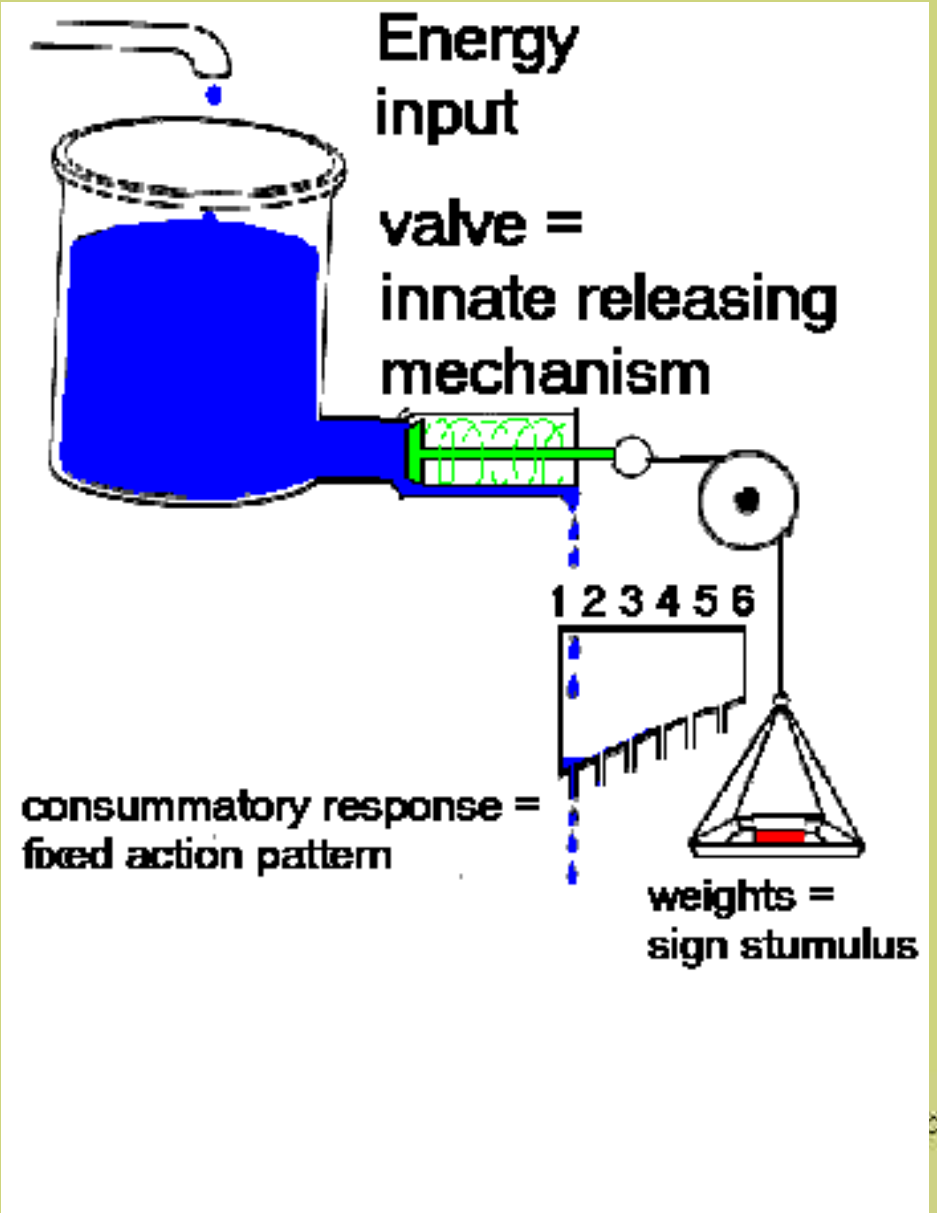
FAP and inner state

Konrad Lorenz

hydraulic model

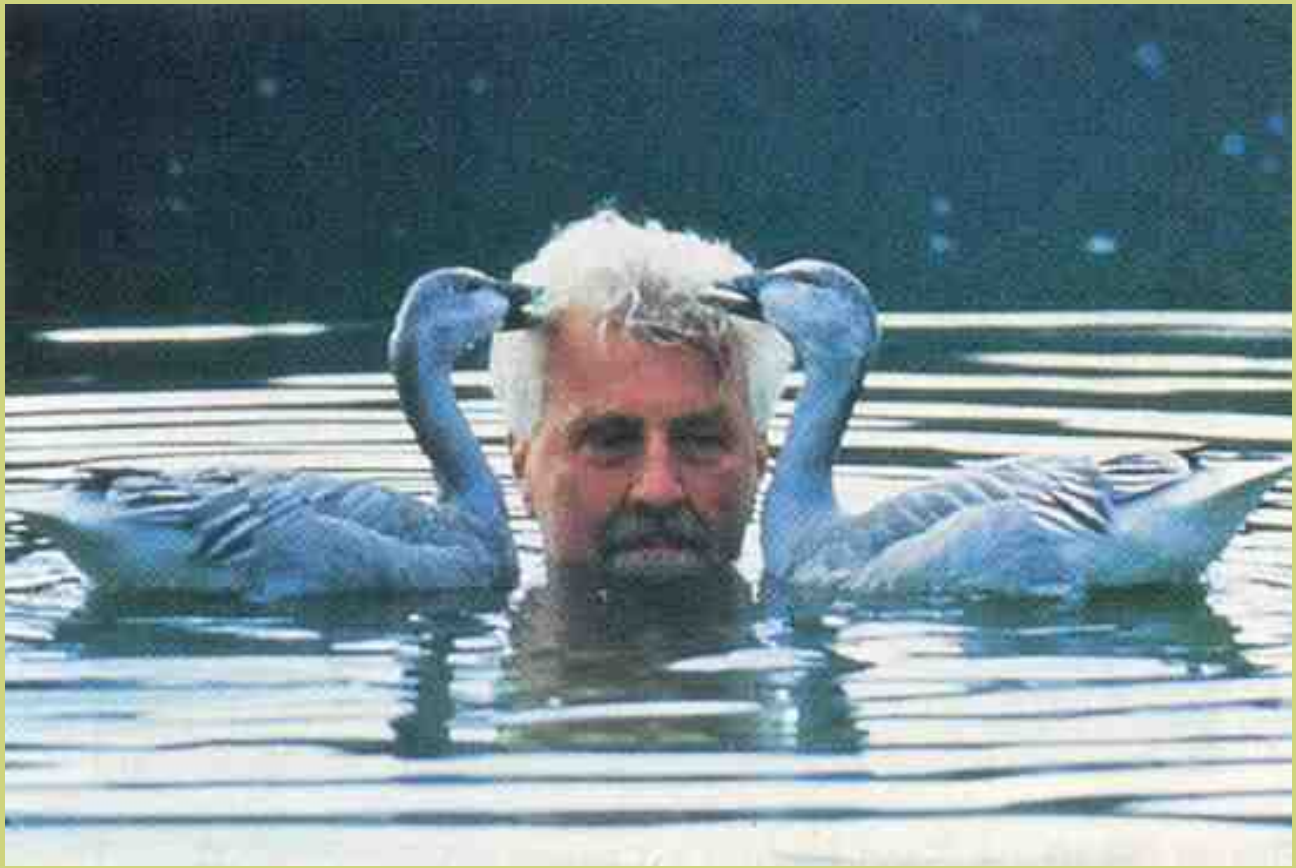
Specific centres for behav. patterns
Action specific energy increases
Behaviour under inhibition
key stimuli removes inhibition
FAP

Intensity of reaction depends
1) Level of energy
2) Intensity of stimuli
3) (can run in vacuum)



Organisation of behaviour

Konrad Lorenz



Ethology vs. behaviourism

1) Animals are not reflex automats
2) Specific drives – specific actions

Problems:

Naive neural model. What is in the brain?

Elements of behavious are not independent. How is complex behaviour organised?

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Organisation of behaviour

Niko Tinbergen

Action of individual *A* is key stimulus for individual *B*

Example: zig-zag dance of stickleback

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Organisation of behaviour

Niko Tinbergen

- Approach
- Zig-zag dance
- Showing nest entrance
- Tail shaking
- Fertilization

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Organisation of behaviour

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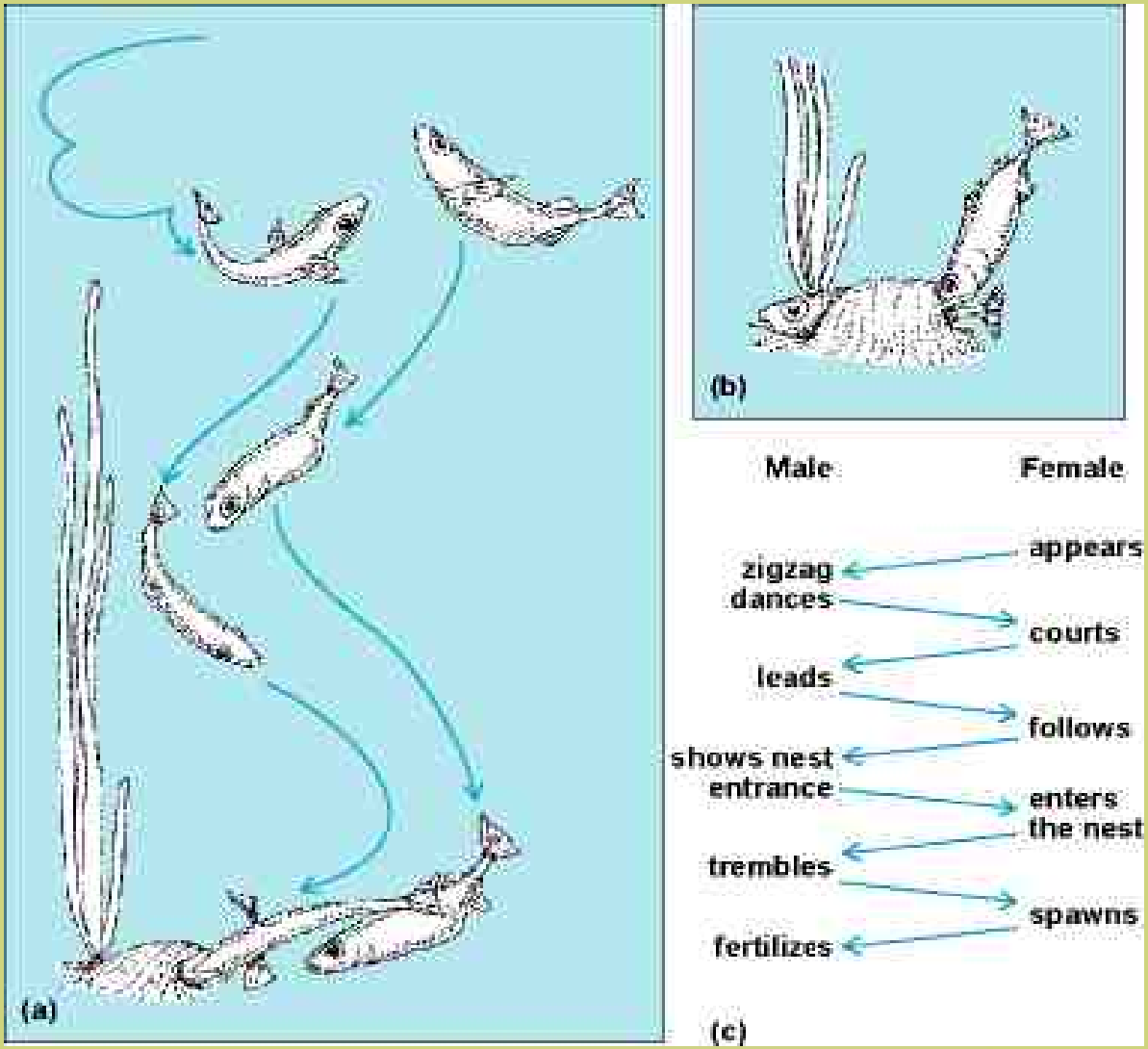

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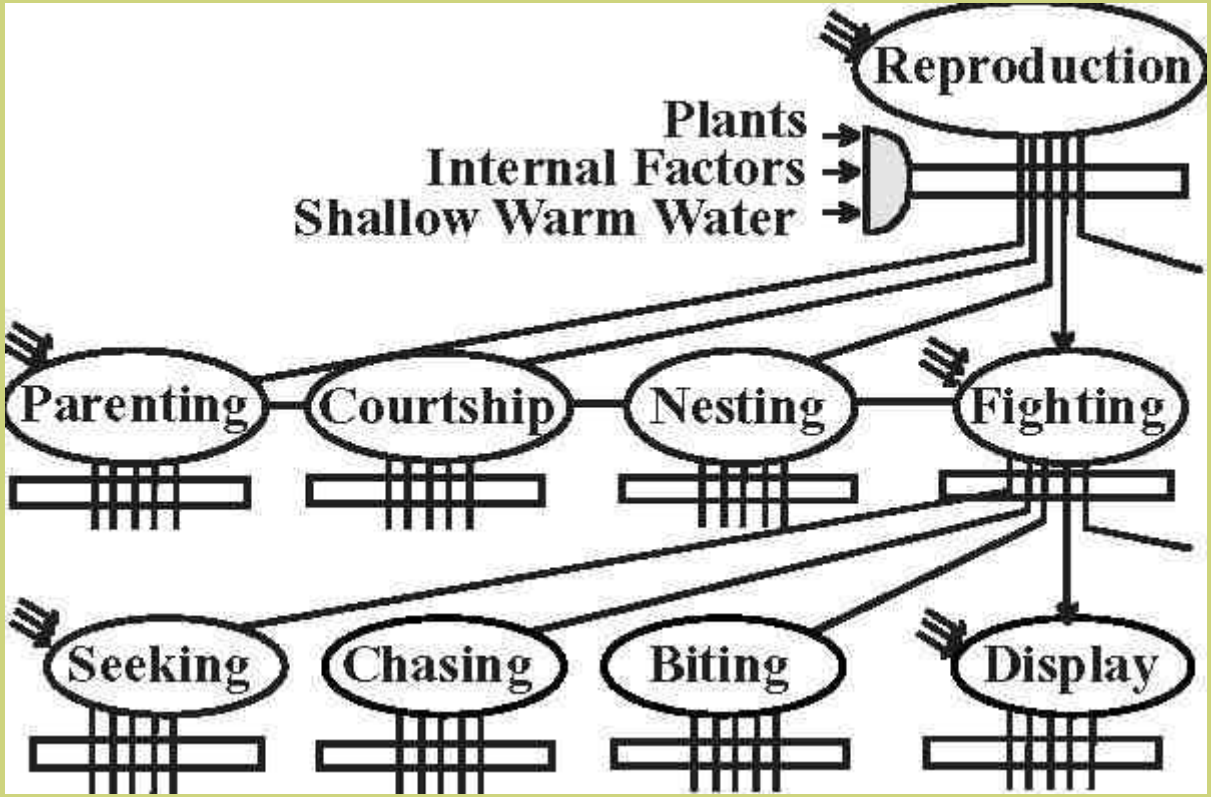
Organisation of behaviour

Hierarchy
Centers under inhibition
Stimuli remove inhibition



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Early ethologists

Lea (1984) described six characteristics of fixed action patterns.

1 Stereotypy The behaviour always occurs in the same form.

2 Universality The behaviour is found throughout the species.

3 Independence of experience The behaviour is not learnt.

4 Ballistic The action can not be changed, once initiated.

5 Singleness of purpose The behaviour is used in one context only, and can not be used elsewhere, even if the behaviour would have been useful.

6 Triggering stimuli The behaviour is triggered by certain known stimuli.

http://www.garysturt.free-online.co.uk/tinbergn.htm

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Early ethologists

Debate with behaviourists

Imprinting learning (Lorenz)

critical period

Releasing stimulus: moving object (mother)
FAP: approach
Learning: visual pattern of mother

Any reinforcement?

Warmth, food ???

Joseph Kovach: chick receiving electric shock

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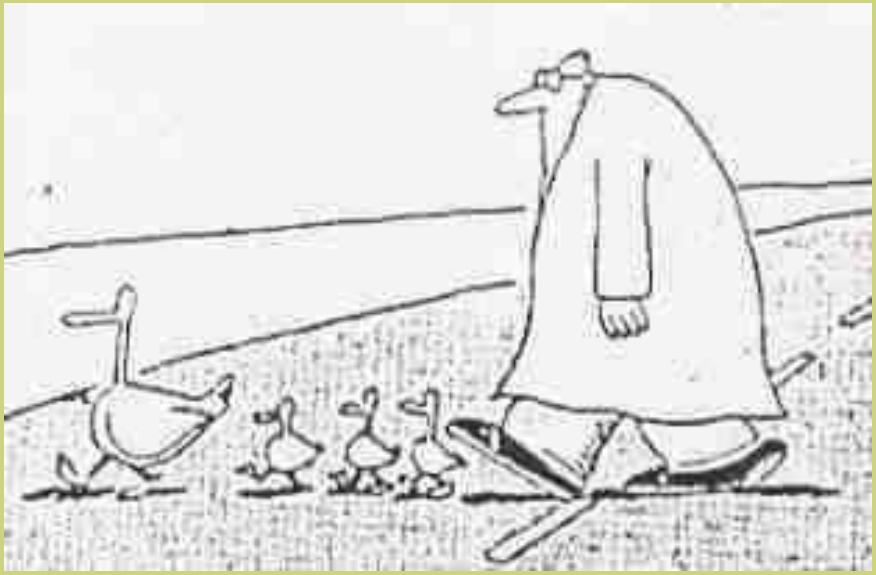
Early ethologists



Lorenz imprinted to geese

Lorenz and Tinbergen: observation and experiments

Konrad Lorenz

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