

**BIO 1030**  
**Animal Behavior Unit**  
**Can Animals**  
**(especially elephants)**  
**Think?**

**April 14, 2008**

Moti Nissani  
Department of Biology, Wayne State University ([aa1674@wayne.edu](mailto:aa1674@wayne.edu))

Accompanying song--A Place in the Choir  
<http://youtube.com/watch?v=2ytzaV95HZU>

This lecture is dedicated to the memory of  
Winky, a one-time [playful](#) (or [youtube](#))  
resident of the Detroit Zoo



# Readings for this unit:

None—you are only responsible for the contents of this lecture.

# Examinations

- **Midterm Review Session:** Friday, April 18th from 11:45 - 1:45
- **As well, this coming Friday, if you have questions, I'll answer as many as time permits instead of lecturing. If no questions are asked, we'll have a regular lecture**
- **Midterm:** Monday, April 21
- **Make-up:** Tues., April 29: One exam only. If you missed one, OR want a higher grade (in that case, only higher of two grades counts).

Instead of talking about animal behavior in general, I shall only highlight in greater depth just one question: Do Animals Think?

We'll begin by watching a few videos of animals in action, starting with videos which seem to imply thinking

**First, I must make sure  
everyone here is fully  
awake**



Trumpeting

# Everyday observations which raise the possibility that animals do think:

- A dog playing the role of John Travolta

<http://www.koreus.com/video/chien-danseur.html>





A crow uses bread to lure and catch fish:

[http://www.youtube.com/watch?v=DiwjjNC\\_NV4](http://www.youtube.com/watch?v=DiwjjNC_NV4)

# The Dance Language of Bees:

<http://youtube.com/watch?v=-7ijl-g4jHg>

# A Speaking Parrot?

In performance: Alex and Irene

# Another intriguing behavior: Cooperative Human/Dolphin Fishing

A dolphin signaling to fishermen: CAST THE NET (also on youtube)

Another dolphin: A more complete sequence (also on youtube)

# Other Side of Coin: Instances of Animal Stupidity

If you have a dog, you know that, if it wraps itself around a tree, it is stuck!

A bone-chewing dog attacking its scratching paw ([video](#))

All this leaves us still undecided:  
Can elephants and other animals  
think? e.g.,

- Solve problems in their head? (or must they blindly try everything?)
- Have a concept of self?

# COMMON SENSE: UNRELIABLE

e.g., People used to believe that the sun goes around the earth (we still talk about sunrise, sunset).

So, scientists want PROOFS!

# We have reasons to suspect that elephants do think

Evidence from, e.g.:

- Art Criticism
- Music
- Anthropology
- Field Observations



# Art

Two noted artists  
felt that Siri was  
a talented, artist.



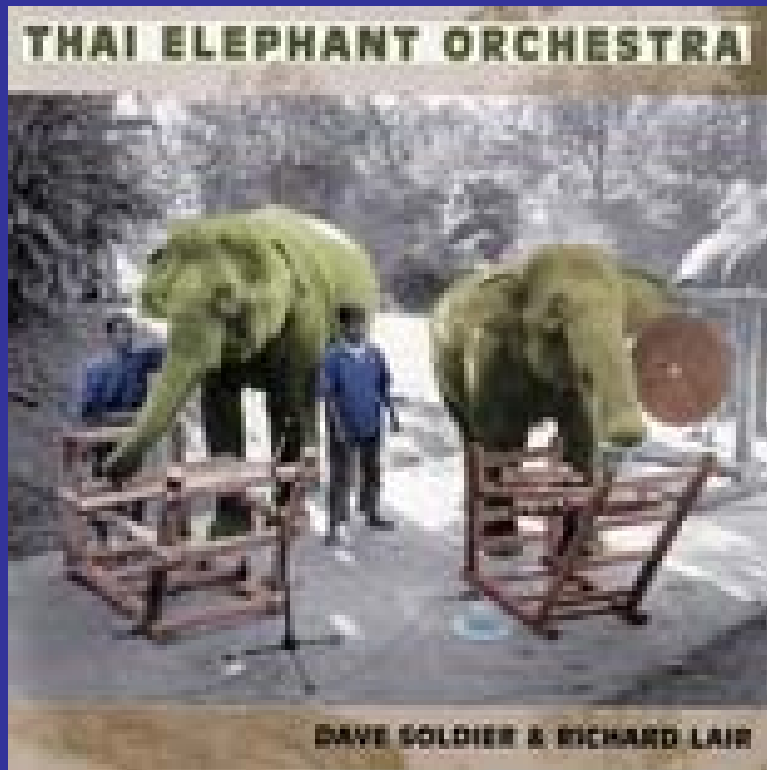
# Music

## *Thai Orchestra Elephant Band*

One six-year-old fell in love with drums, keeps perfect time and can synchronize them with cymbals.

A musician/scientist: Possibly, real music: they exercise judgment and enjoy themselves

# Elephant Musicians: Listen— what do you think?



## **Thai Elephant Orchestra**

**Artist: David Soldier**

**Release Date: April 10, 2001**

**Genre: Classical**

**Styles: Postmodern**

# Anthropology

Tool use and modification—  
uniquely human?

**NO! Elephants can do it too!**

[MM3c3 tool use scratching Hla Htaik.mpg](#) (also on youtube)

# Culture Studies or Natural History

- Wounded Comrade
- Mourning their dead?
- Everyday tasks, e.g.

MM4b6 log leg trunk.mpg (also on youtube)

- **Rules of Conduct**
- Hanako, then a young elephant at the Portland Zoo, refused to nurse her infant, nervously pacing instead. Hanako's mother and another dominant female violently slammed Hanako against a wall, where she stayed put for 20 minutes, allowing her calf to suckle. When Hanako resumed her pacing, the two females again slammed her against the wall, and this time she let her baby feed for hours. This sequence repeated itself over the next few days, prompting the authors to conclude that elephants have rules of behavior and that they administer corrective punishment when these rules are broken. Until then, they felt, only humans would be capable of that sort of complex behavior (Schmidt, 1992; for similar observations with dolphins, see Smolker, 2001, p. 250).

# Suicide

On rare occasions an elephant has been reported to strangle itself by pressing a forefoot on the trunk. Once it begins this action, it cannot be scared or cajoled into removing its foot or relaxing its pressure on the trunk (Gale, 1974).

But, all this (and there is much more)  
does not prove thinking because:

First, sometimes animals do behave remarkably stupidly, so how do you reconcile that with real thinking?

- For instance, when a herd of elephants is caught in a stockade, they could easily escape by cooperating, together storming the wooden fence, but they never do.
- An elephant's rear leg got wedged between 2 logs that together formed a V shape. He only needed to move his leg backwards to escape. But he never did, and died after 2 weeks.



# Not necessarily thinking . . .

Second: Sometimes, observations themselves could be tall tales, wishful thinking? e.g., suicide?

Third, a seemingly intelligent behavior is not necessarily intelligent. To see that, we must say a few words about the possible origins of behavior

# Origin I. genetically programmed behavioral patterns, e.g.,

- knee reflex in human
- Courtship behavior in Drosophila

Common sense, and experiments that will be described below, suggest that this does not require thinking of any kind.



How do we know that  
this is genetically  
determined (and not  
involving thinking)

You isolate males flies from birth—they all  
do it, exactly the same way, when first  
encountering a mature female. So they  
couldn't possibly learn it from anyone!

## Origin II. Trial-and-error learning.

“Continued trial and failure, until a happy effect is reached, not by methodically planning, but by chance” (Morgan, 1920).

# How can you tell no thinking is involved?

One way: Watch how it  
had been learned.  
One famous case:

Morgan (1920)  
happened to have seen  
his dog learning to lift  
the latch through  
random actions.

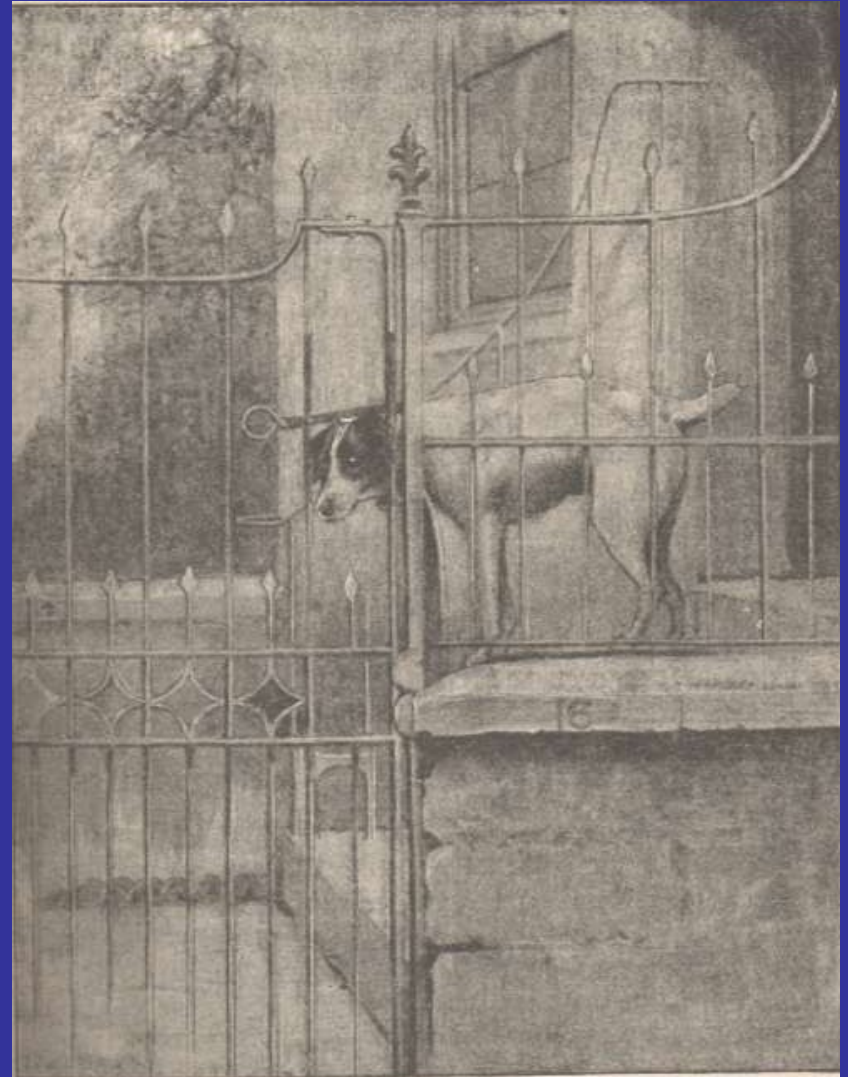


FIG. 21.—Fox-terrier lifting the latch of a gate.

# At times, the actions themselves betray their mindlessness

“One evening my friend deposited a hungry rat in each of 20 boxes outfitted with the autoshaping programs. When he returned in the morning, he looked at the printout from the rats’ workouts. All learned to press the bar regularly. But one rat had a suspiciously low rate of bar pressing because the rat would turn, rear up on its hind legs, then fall over backward, hitting the lever with the back of its head. It would then gather itself and collect its reward. The rat did this again and again and again. Apparently, the rat had stumbled (literally!) onto this original solution and it stuck” (Yoerg, 2001).

# Lesson from this:

A behavior that appears extremely wise could be anything but. Instead, it could be the result of:

- Genetic programming
- Mindless trial and error learning

Before concluding that animals think, you must exclude both possibilities

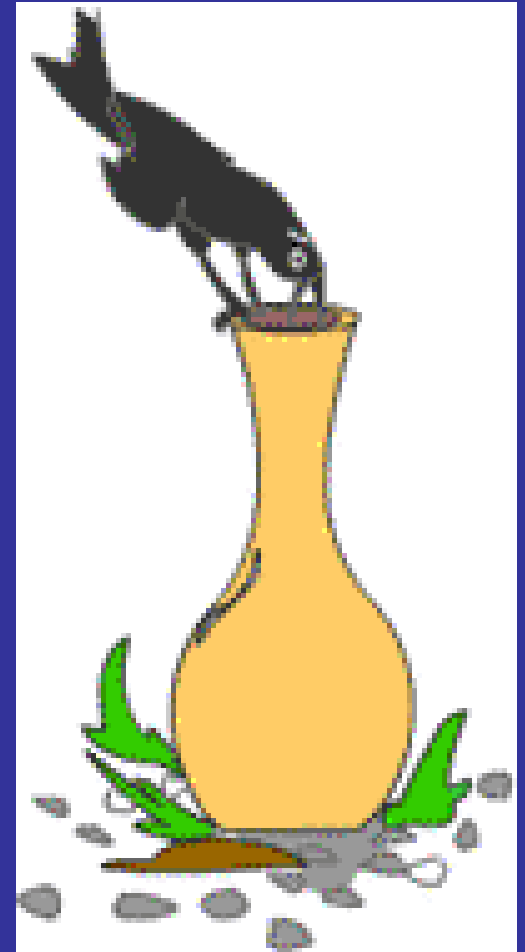
# Origins III. Actions involving thinking

Do we have any convincing proof like this?

Any instance of an animal understanding, say, tic-tac-toe?

Complex and novel actions?

NO





# What see the opposite

E.g., when hyena mothers move their cubs from one den to another, they make at least one extra trip to the old den, suggesting the computer-like rule of thumb: “revisit the old den until you find no more of your infants there” (Holekamp and Engh, 2002, p. 372).



# Another thing that makes scientists cautious: Clever Hans



# Clever Hans



# A Historical Note

Konrad Lorenz is not the “Father of Ethology” (Ethology=Science of Animal Behavior)

As often is the case in science, credit here is given to the wrong man. Ethologists wrongly bestow that title on one Konrad Lorenz, a self-promoting, unprincipled, mediocrity. A builder of theories based on . . . thin air.

The real (not the public relations expert) father of ethology is the little-recognized Jean-Henri Fabre (1823-1915; a working class Frenchman with too many principles, too little patience for premature “theories” and pompous scientists, and too few connections)

Wonderful writing style, e.g., 1915, *The Hunting Wasps*.

Fabre provided beautiful, solid, numerous observational refutations to the then near-universal belief, in his day, that insects think.

# Here, just a few of his experiments

His work, with digging wasp. Here, let's briefly look at the spider wasp, to grasp the setting:

Now, let's look some of his experiments, remembering though that Fabre worked with a different species of wasp, and that this wasp preys on caterpillars, not spiders.



In one case, for instance, one species of wasp habitually seized its paralyzed prey, a grasshopper, by the prey's antenna and dragged it into a burrow. When Fabre cut the antenna, the wasp unhesitatingly seized its prey by the short stumps left by the scissors. When he cut the stumps, she seized the prey by its jaw appendages. When he removed the appendages too, the wasp tried grabbing the whole head, which was too big. She fumbled for a while, then left her valuable prey and the burrow she dug for it. Understanding that she could grab one of six legs or the ovipositor instead of an antenna was “utterly beyond her powers” (Fabre, 1915).



## 2<sup>nd</sup> experiment suggesting that insects do not think:

A wasp digs a tunnel, flies away, catches a caterpillar, paralyzes it, flies back with it to the tunnel, leaves the caterpillar nearby, goes in to “inspect” the tunnel, comes out again, grabs the caterpillar, takes it all the way in, lays eggs on it, seals the tunnel, and leaves, never to return.



What will happen, Fabre ask himself—and I ask you—if, while the wasp is in the tunnel, the caterpillar is moved some distance away from the entrance?

Answer: She goes to it, brings it back near the entrance to the tunnel, and . . . goes on to “inspect.” This can be repeated 40 times!

Insects, Fabre concluded, are like “a series of echoes each awakening the next in a settled order, which allows none to sound until the previous one has sounded. What a gulf separate intelligence and instinct!”

# How do you study these questions more methodically?

In my case, I first had to get hold of elephants:

- Detroit Zoo
- Burma (Texas-size)

Burma (Myanmar) had been in the news a few months ago



Burma: Makes the USA look like a democracy (and that's saying a great deal!)





# Experiments:



A perching raven. How  
to get Salami 3 ft  
below? → Any ideas?





Now, a raven can do it: insight?  
So, how do you ask an  
elephant the same question?



→ Any ideas?

**Actually, at least two possibilities.**

**Bungee Cord:**

[MM3c2 bunjee Hla Htaik 3rd time.mpg](#)

[\(Also on youtube\)](#)

**Standing over a bridge:**

[MM4d1 bunjee wrapping and foot.mpg](#) [\(also on youtube\)](#)

Typically, most ethologists stop here. They convinced themselves that their hypothesis—that animals are brilliant—is correct, and they rest from their labors. But what happens if now, instead of resting, you apply Fabre's methodology?

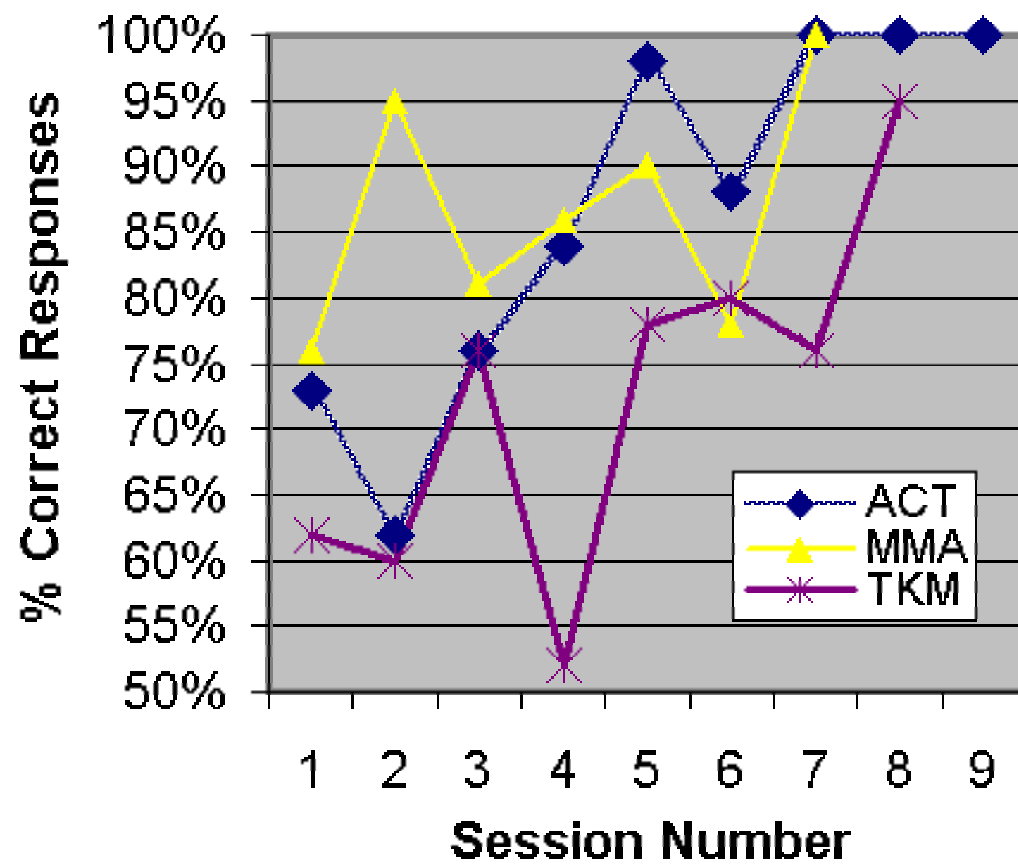
Here is what happens: (also on youtube)

# Another approach: Lifting a lid off a bucket and retrieving a reward

Our next example comes from the simple maneuver of lifting a lid off a bucket to get a reward inside the bucket. Now, an elephant can be taught to do this well in some 30-60 minutes. It looks like this: [video](#) ([also on youtube](#))

**Do they understand what they are doing? Is there a point where the elephant says to herself: I need to remove lid to get the food? Probably not:**

- **Learn gradually**



After an elephant learned to lift a lid to retrieve food from a bucket, the lid was placed alongside the bucket while the food was simultaneously placed inside the bucket. All elephants continued to toss the lid before retrieving the reward, raising the possibility that they have no understanding of this simple causal relationship



**If lid is placed on ground,  
they still move it first:**

[MM5b2 TS, 3 no lid, 3 lid top, 3TS-.mpg](#)

[\(Also on youtube\)](#)



**You Got to Know when to suck them!**

Another experimental setup: Two elephants competing for food, and they can either suck or blow. When alone, they either suck or blow. But together, only sucking, suggesting task comprehension

[Competition.mpg](#) ([also on youtube](#))

# The Povinelli Paradigm

A more recent application of Fabre's ingenious approach to animal behavior comes from Louisiana researcher Daniel Povinelli. The question he asked is simple yet ingenious, and can be best demonstrated with a one-act play:

We need 3 volunteers

**We carried out similar experiments with 16 elephants**



And, modifying Povinelli,  
observed chimps

Here is Beauty (also on youtube), from  
the Detroit Zoo

# Povinelli's Paradigm: Elephant and Chimpanzee Results

- At times, elephants and chimps understand perfectly well, e.g., back / front.
- At times, about 65-80% correct response rate
- At times, pure chance: 50%

CONCLUSION: Most likely then, chimps and elephants DO NOT KNOW THAT PEOPLE SEE

# Importance of Question: “Do Animals Think?”

Clearly, one of *the most* fundamental questions of comparative psychology, animal behavior, philosophy

This question shapes in part our view of the world, ourselves, our uniqueness, e.g., how should we interact with our dog?

# The End

([Elephant Music](#): )

