

**Dr. Bob Bailey in Copenhagen**  
**Biological Evolution: the Origins**  
**of Operant and Respondent**  
**Conditioning**

**& the teaching of**  
**Operant & Respondent**  
**Conditioning**



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**My generalization:**

**Any** trainer, using  
**any** method, can train  
**any** animal, to do  
**any** behavior,  
given enough time!

2

**My views on human and animal**  
**behavior are different than many,**  
**maybe most, psychologists and**  
**trainers**

**I first learned about animal behavior**  
**from years of observing and**  
**recording behavior in the field**

**I learned of Darwin and Wallace long**  
**before I learned of Skinner and**  
**Pavlov**

3

**I learned to first SEE behavior**  
**before I began to INTERPRET**  
**behavior**

**I learned that an observer**  
**attempting to *interpret* behavior**  
**while viewing the behavior can bias**  
**the viewer's observations**

**A biased observer may perceive**  
**only what fits the initial**  
**interpretation**

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**My 60+ years of studying behavior**  
**and my training experience tells me**  
**my view of training is:**

**a minority view**

**difficult to teach unless**  
**student actively embraces**  
**and practices the philosophy,**  
**procedures and practices**  
**taught**

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**My objective:**

**To study, explain, simplify, and**  
**manipulate behavior in the world**  
**around me**

**Like my father, I'm a machinist at**  
**heart; I like procedures that work!**

**Natural behavior, shaped by Nature**  
**over a billion years, is my raw stock**  
**for study and change**

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## Operant and Respondent Conditioning are not “theories”

They are *descriptions* of natural phenomena of learning – how humans and other animals learn to cope with the environment

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## Classical Conditioning...also called

- Respondent Conditioning
- Pavlovian Conditioning

Organisms may associate stimuli that occur close together in time

By association, one or more stimuli may be “substituted” by one or more other stimuli

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In practical terms in training:  
Do something TO the animal (accidentally or on purpose)

The animal responds automatically because of biology or experience

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## Operant Conditioning...also called

- Instrumental Conditioning
- Skinnerian Conditioning

Behavior is changed or maintained by consequences

Behavior is most influenced by the consequences it produces

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In practical terms in training:  
The animal DOES something (accidentally or on purpose, cue or no cue)

The animal gets something good or something bad as a result of the animal's behavior.

The animal does more or less of the behavior as a result of the consequence of doing the behavior

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Very generally speaking...

VOLUNTARY behavior is changed through Operant Conditioning

AND

REFLEXES are changed through Classical Conditioning

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**Pavlov did NOT invent  
respondent conditioning  
Skinner did NOT invent  
operant conditioning  
Respondent and operant  
conditioning were not  
invented, they were described  
as natural phenomena**

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## **Continuum**

The extremes of operant and respondent behaviors lie on the ends of a continuum...



...BUT for **practical purposes** and for animal trainers, don't be confused or confounded by attempts to separate operant and respondent behaviors

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**An organism's  
behavior may appear  
totally under operant  
control, yet there is  
always an underlying  
respondent component**

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**The continuum**

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**Pavlov  
is always on  
your shoulder!**

17

**Animals behave to:**

**Get good things!**

**Avoid bad things!**

18

Translation :

**Animals do what they perceive is best for them**

(preservation of the individual and the group!)

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**What is good for an animal has changed as the earth's environment changed over time.**

**Animals survived by adapting to environmental changes.**

**Animal adaptation included physical structure and form**

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**Form dictates the limits of potential function.**

**Behavior is how the animal takes advantage of the form.**

**As animal physical forms adapted to the environmental changes behavioral changes were likely to occur.**

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**The simple idea is some animals are INHERENTLY more adaptable to environmental change than other animals.**

**Adaptable animals survive and reproduce.**

**Animals that fail to adapt die without reproducing.**

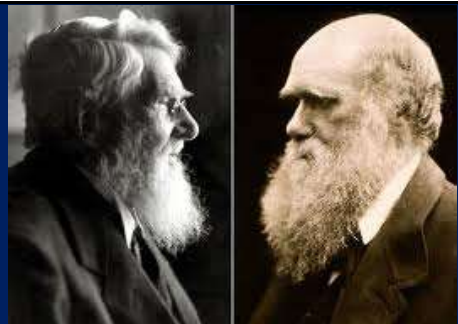
**In time the offspring of adaptive animals crowd out the nonadaptive.**

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**This process of change is called**

**Biological EVOLUTION**

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**Wallace and Darwin**

**We studied both At UCLA in the 1950's**

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**One form of adaptation:**

# **LEARNING BY CONSEQUENCE**

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**Reinforcement, and reinforcers, are the result of environmental stimuli and biological evolution**

**Reinforcement and reinforcers are tied to an animal's evolutionary history**

**The first  
"commercial" open  
ocean dolphins  
Marinelife  
Oceanarium 1965**



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**Humans did not invent operant conditioning.**

**Humans did not invent learning.**

**Animals have been learning by consequence for over a billion years (not a trainer in sight).**

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**You might not like what the animal is learning, but the animal is always learning!**

**Your choice:  
The animal learns because of you, or in spite of you!**

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**Cues are more than a trainer saying "SIT" or "COME"**

**Cues are stimuli that inform animals (including human) when to respond, or not to respond**

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**Cues are stimuli that predict reinforcement or punishment events**

**Individual response to cues have both phylogenic (genetic, species specific) and ontogenic (experiential) origins**

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When will the cat expend energy to pounce?  
When will the pigeons expend energy to fly?



What is the cue for the cat to pounce;  
for pigeons to fly away?

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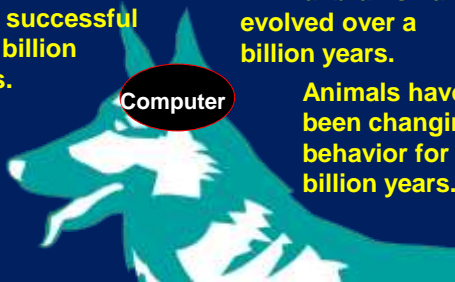
**Nature spent a billion years “building” in each animal the perception of what is “good” and what is “bad.”**

**A wise trainer uses what nature has built.**

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Animals have been successful for a billion years.

Animal brains have evolved over a billion years.



Animals have been changing behavior for a billion years.

Animals that did not learn were not successful.  
We do not have to teach animals to learn. They are learning machines.

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### Operant Conditioning Principles

(Few & Simple) – Memorize and understand them:

- 1) **Stimulation**  
Animals respond to stimuli
- 2) **Reinforcement**  
Increases rate of behavior
- 3) **Extinction (non-reinforcement)**  
Decreases rate of behavior
- 4) **Punishment**  
Decreases rate of behavior
- 5) **Generalization**  
Stimulus generalization  
Response generalization

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### Value of Reinforcement

**Why is REINFORCEMENT powerful?**

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What respondent associations are being made by babies?

Sight, smell, sounds of mother associated with food

What operant responses are reinforced?

Select teats giving the most milk (teat order)

Pursuing mother gives opportunity to nurse

Nuzzling or pushing teat give milk faster



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**What respondent associations are being made by babies?**

Sight, smell, sounds of mother associated with food



**What operant responses are reinforced?**

Pursuit of mother results in opportunity to nurse  
Nuzzling or pushing teat give milk faster

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**What respondent associations are being made by babies?**

Sight, smell, sounds of mother associated with food



**What operant responses are reinforced?**  
Nuzzling or pushing breast gives milk faster

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**What behaviors are being reinforced?**

**Observe communication between mother and infant – bonding is going on.**

Baby learns confidence (successful prediction) in “good” situations with Mother



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**The learning of how to take control of environment takes place during formative weeks and months of brain development**



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**What is the biological basis of reinforcement and stimuli predicting reinforcement?**

**Animals able to predict the success of a response have an evolutionary edge over animals that cannot predict the success of a response.**

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**Why is reinforcement and punishment powerful?**

**In street language-  
A lifetime learning what is good and what is bad and developing strategies of seeking the good and evading the bad.**

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## Here is how it works:

The maturing nervous system in young animals is especially sensitive to many stimuli.

Much of the experience of young animals is limited to stimuli associated with survival

Young animals that are not exposed to certain (specialized) stimuli do not develop normally and fail to reproduce and usually die

Young animals failing to respond appropriately to stimuli die

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## How do babies influence their environment?

Babies naturally make sounds indicating discomfort (hunger)

Mothers learn the baby's sounds indicating hunger

Babies learn that a specific (insistent!) sound results in food faster than other sounds

In weeks and months, babies change behavior to "improve" or control the environment (gain access to mother)

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Isolated Soft Surrogate Wire Surrogate  
Harlow's early development studies

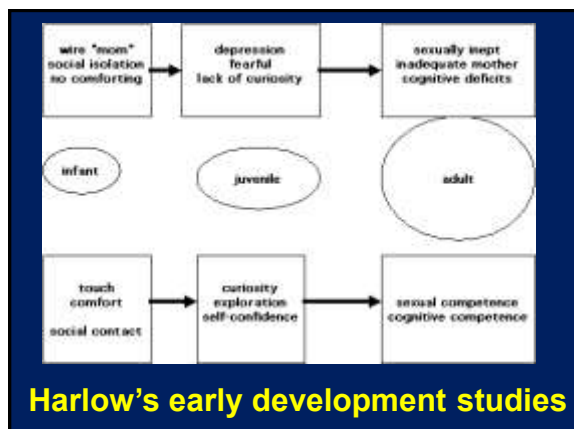
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## Infant monkey chooses soft "mother" without food over wire "mother" with food.

Harlow studies – monkeys behave differently as adults depending on early relationships with "mother."



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Some deprived animals, including humans grow up antisocial, or with limited or erroneous social skills because of poor early experience

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**Your choice to train:**

A puppy nurtured in “loving” (predictably reinforcing) environment

**OR**

A puppy raised in mixed punishment/neutral constantly changing (unpredictable) environment

Which dog is more likely to be confident in future probability of reinforcement?

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**Important to trainers:**

Evolution prepared animals to learn well and quickly

If learning occurs slowly there is a reason!

Trainers, be prepared to change your behavior!

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**Teaching Animal Trainers:**

**Keep it simple**

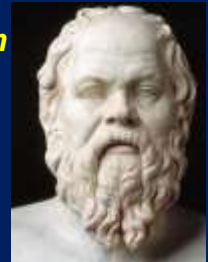
**Teach mechanical skill**

**Teach principles**

**Teach trainer responsibility**

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*“.....the highest form of excellence is to question yourself and others.”*



**Socrates 470-399 BC  
Greek philosopher**

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**Trainer’s definition of Training might be:**

**A Mechanical Skill**

Using hand-eye coordination

**And Methods**

including procedures and Rules to...

**Teach or Change Behavior**



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**Above all:**

**Animal Training IS**

**A Mechanical Skill**



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**Teach trainers to see and change behavior using simple animals doing uncomplicated behaviors**

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**Animal Training is learned by Doing!**

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**Demonstrate proprioception and improve trainer focus**

**Animal Training is learned by optimizing success *and* applying information gained through error**

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**Animal Training is learned from success *and* from failure.**

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**Animal Training is learned from the experience of others.**

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**Why is changing trainer behavior so difficult?**

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Almost any trainer can train  
Almost any behavior using  
Almost any method

**Given enough time!**

Remember, animals are  
designed to learn!

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Every trainer using  
any method can point  
to a behavior they  
have trained.

Every trainer can  
point to success!

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Trainers failed to follow  
training protocols (plans)

Trainers reinforced  
unwanted behavior or  
resorted to punishment.

Some trainers would not  
change their behavior!

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**My speculation!**

Because the old  
way is GE -

**Good Enough!**

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Animal training will never  
be better if we accept

**GOOD ENOUGH!**



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**THE END  
of LECTURE**



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