

# **STIMULUS CONTROL**

## **Implications for Verbal Behavior, Social Contingencies and Education**

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## ABSTRACT

Behavior analysts know about discrimination as the term functions technically, but we have yet to extend its applications to the pervasive problems of discrimination and prejudice within our culture, especially in and around our schools. Unlike other disciplines in the social sciences, however, we are in a position to clarify how discrimination and prejudice arise and to point out some hopeful directions for change. Along the way we will show how discrimination, based on actual contact with contingencies of stimulus control, differs fundamentally from prejudice, based primarily on verbal history.

We will review some basic behavioral processes, including but not limited to discrimination and generalization, attention, operant classes, verbal behavior, higher-order classes, and the distinction between contingency-shaped and verbally governed behavior. We will then consider how these categories relate to significant dimensions of human social behavior, including ethical ones. In doing so we will juxtapose examples of real-world contingencies, as they occur in classrooms and other social environments, with those observed in the laboratory.

# **ROUGH OUTLINE**

**Stimulus Control = Discrimination: An introduction**

**The ABCs of Behavior Analysis (Sloan)**

**Some personal remarks**

**Stimulus control: History, significance and properties**

**Extensions to human behavior: Why we should care**

**Attention: Contingencies that maintain discrimination**

**Selection: Phylogenic, ontogenic and sociogenic**

**Classes of behavior: Why they matter**

**Operants, equivalence classes, verbal classes**

**What conditional discriminations and other behavioral practices may have to offer**

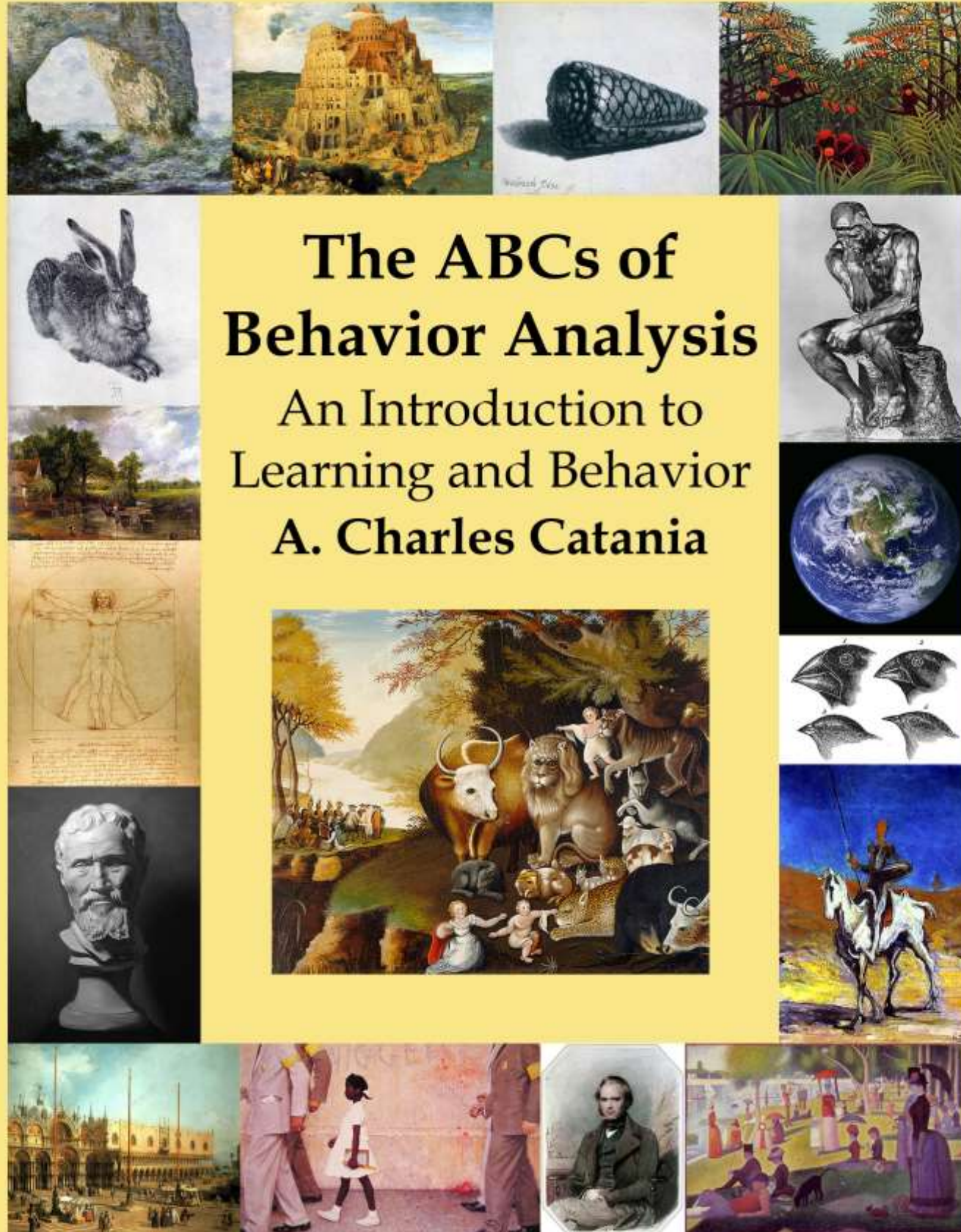
**Verbal behavior: Why it matters; its role in prejudice**

**Implications of and for diversity**

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# The ABCs of Behavior Analysis

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# The Three-Term Contingency

In presence of S1, R1 may produce C1

In presence of S2, R2 may produce C2

S = Stimulus

R = Response

C= Consequence

When R1 in presence of S1 differs from R2 in presence of S2, we say that the individual discriminates S1 from S2.





**Demonstration of discrimination reversal, with  
Eliot Shimoff, UMBC, early 21st century**

**For a while we'll talk about discrimination  
in our technical sense**

**Then we'll talk about racial and other  
varieties of discrimination**

**Before we can move on to discussing  
prejudice we'll need to talk about verbal  
behavior. But that comes later.**

# The Three-Term Contingency

In presence of S1, R1 may produce C1

In presence of S2, R2 may produce C2

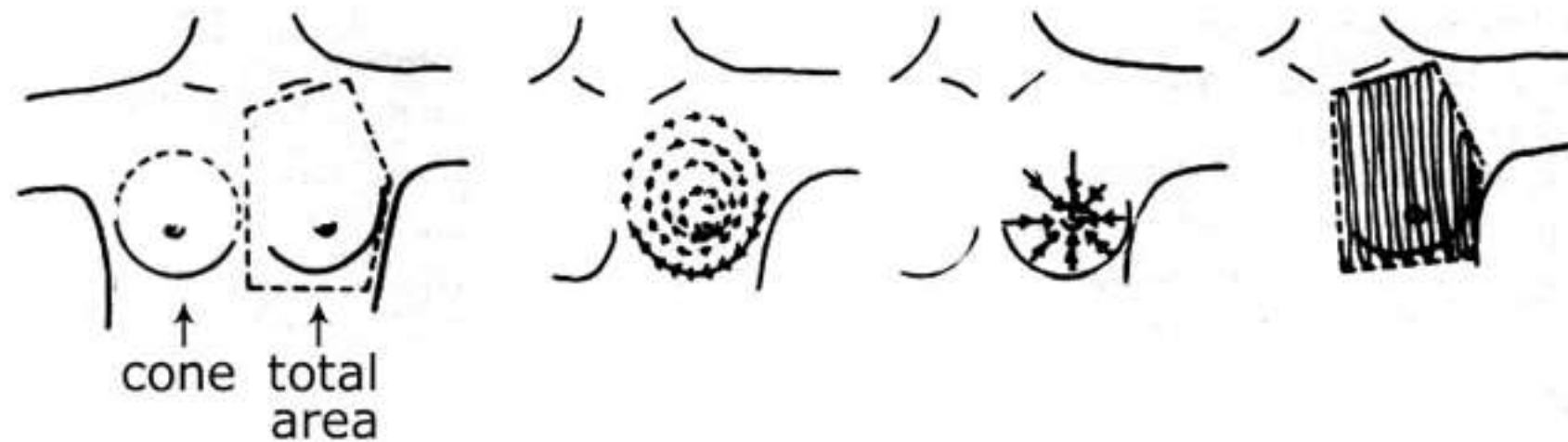
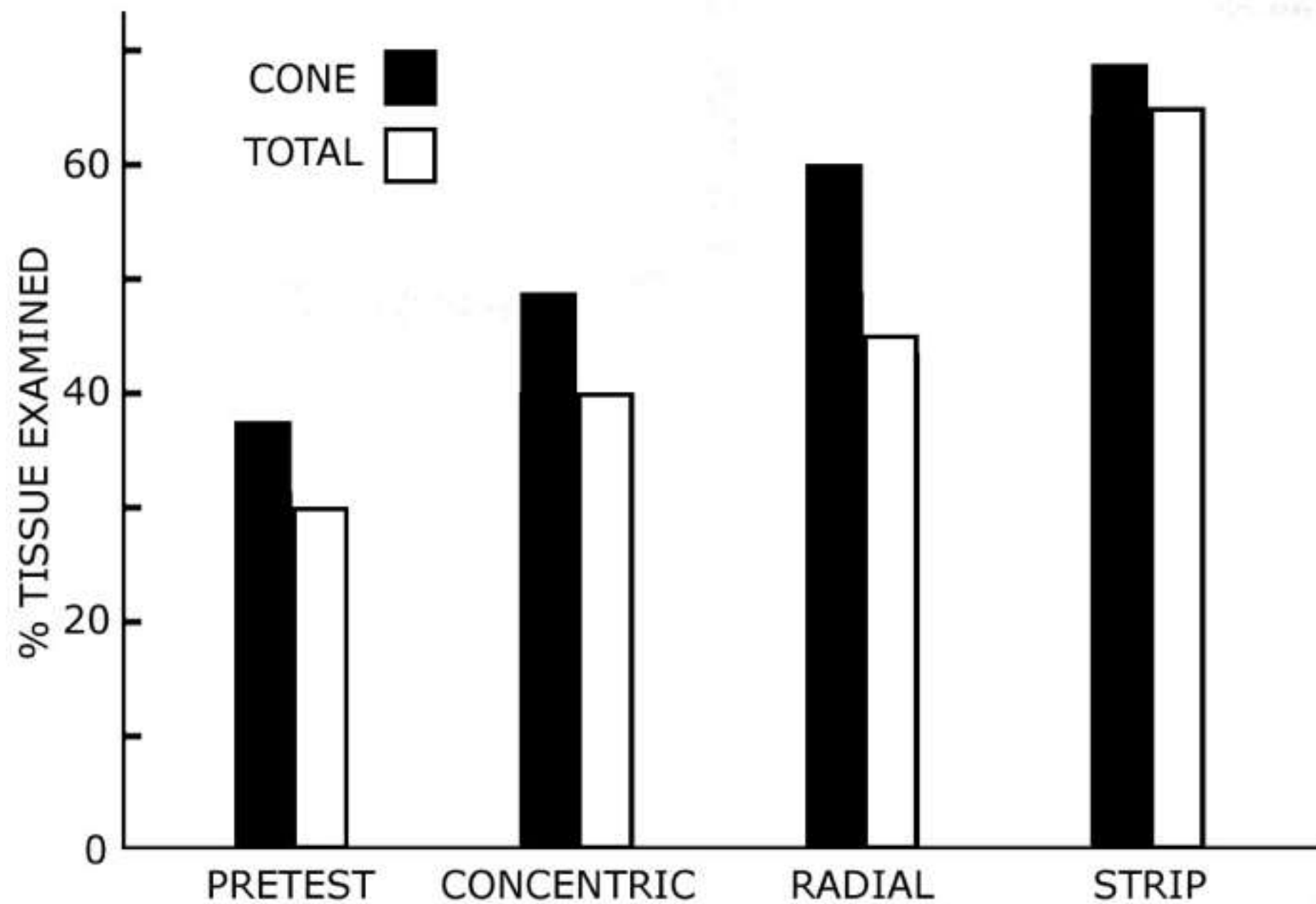
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# Signal-detection contingencies in breast self-examination.

	Stimulus: A lump is there	Stimulus: No lump is there
Response: Yes, a lump	Hit (Correct Positive)	False Alarm (False Positive)
Response: No lump	Miss (False Negative)	Correct Rejection (Correct Negative)

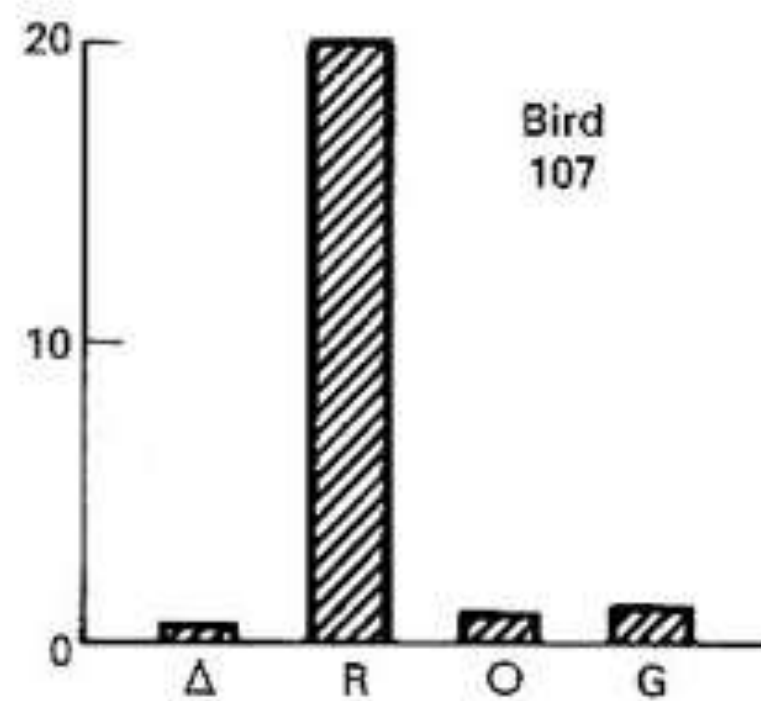
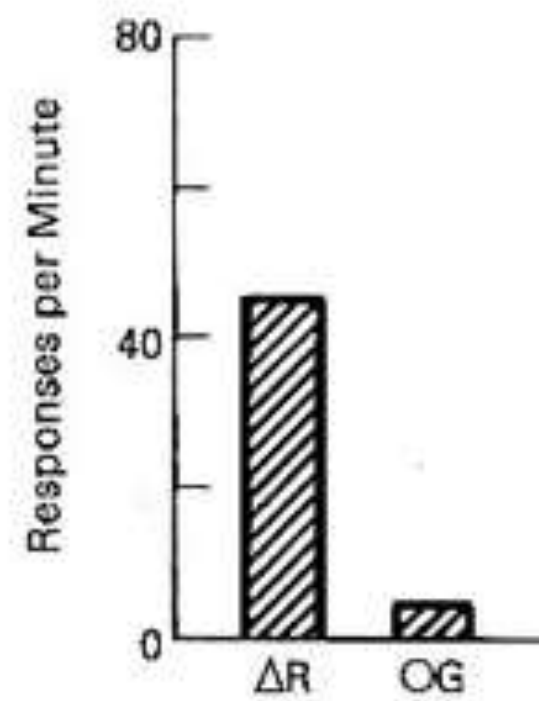
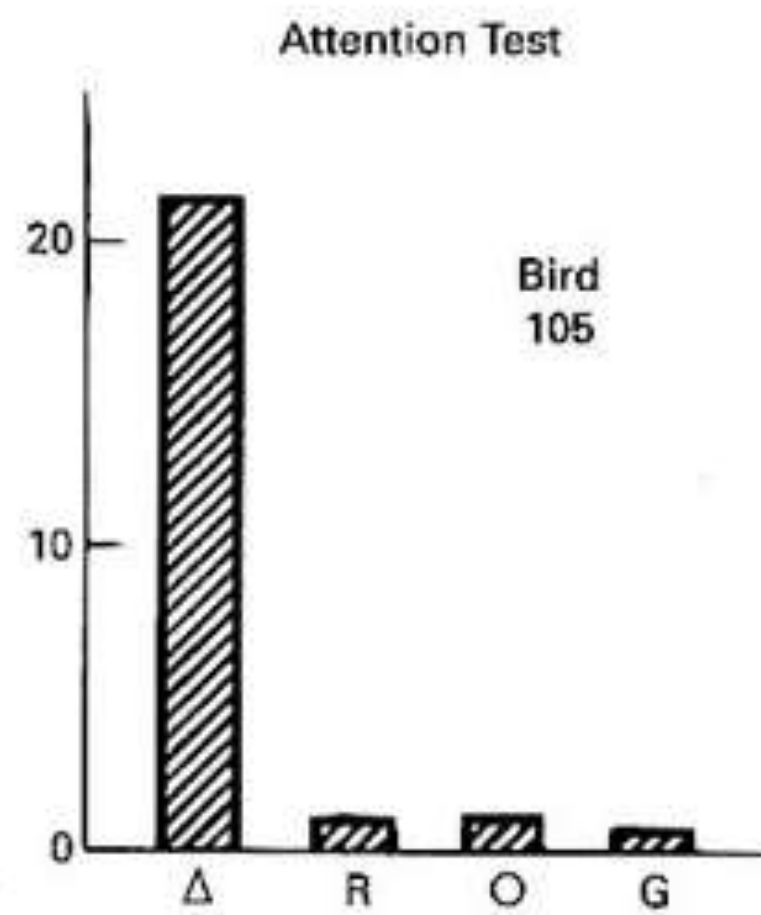
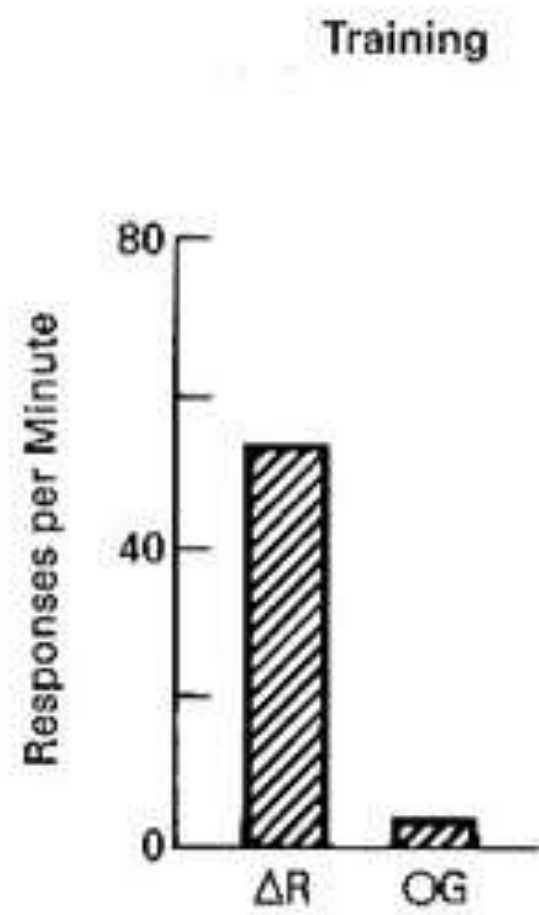
The research was conducted by a behavior analyst whose training began in the pigeon lab.

Discrimination is active, not passive: Sensing is something we do.

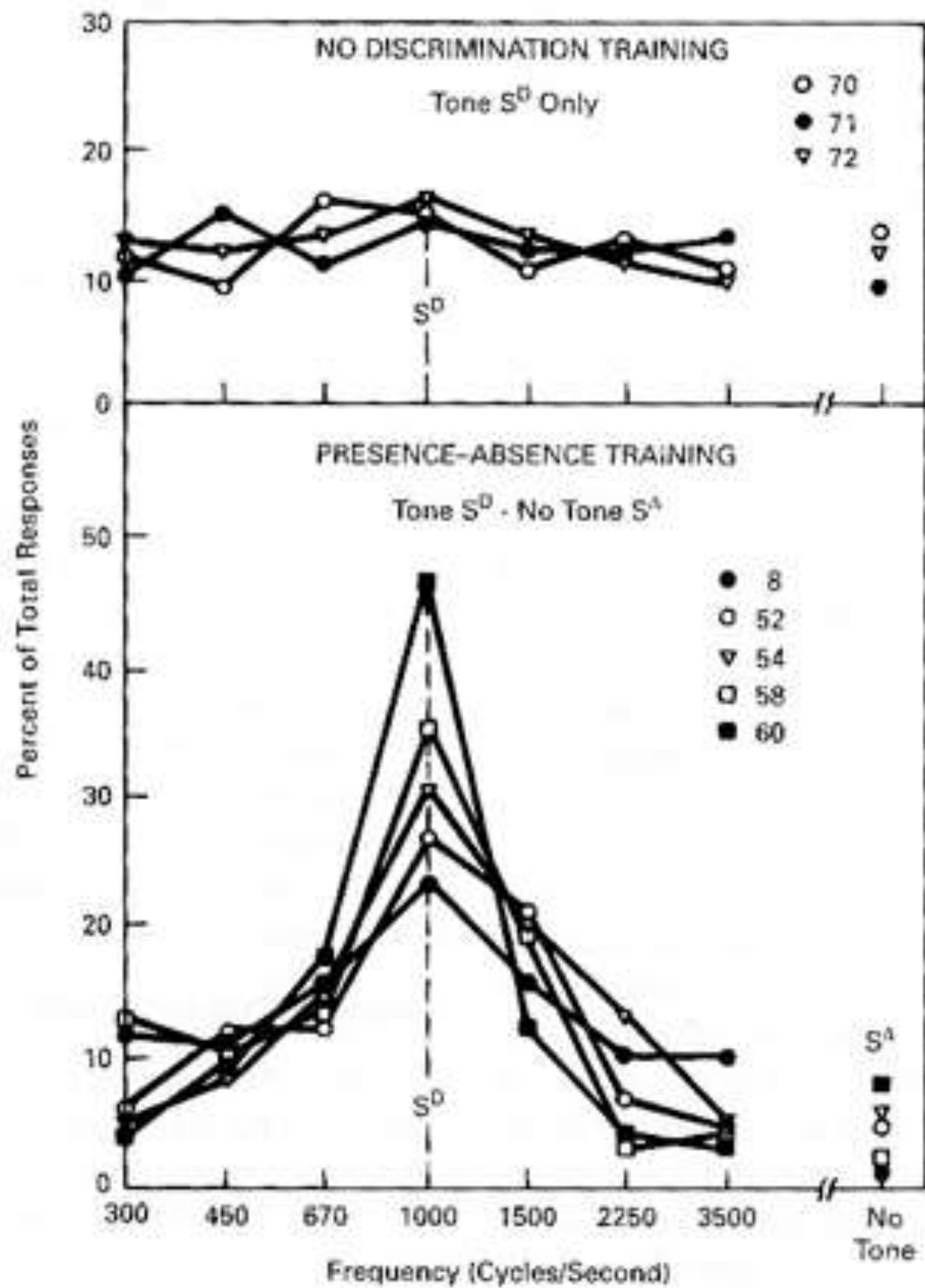
Even with regard to properties of our own bodies, we must often be taught to discriminate.

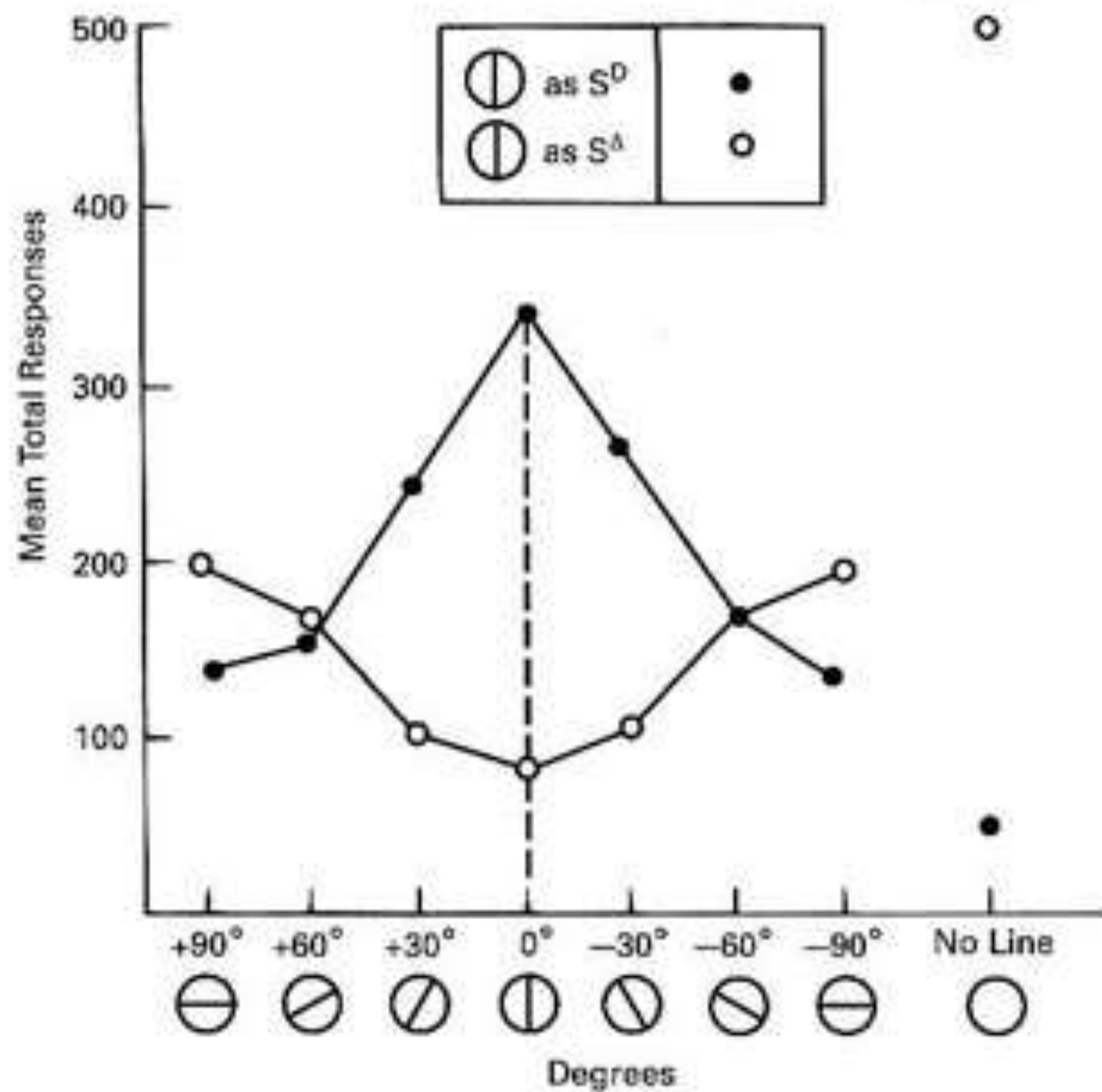
# THE ROLE OF ATTENTION





Stimulus





- **Attending to stimuli**

**Establishing a discrimination**

**Abolishing a discrimination**

**Reversing a discrimination**

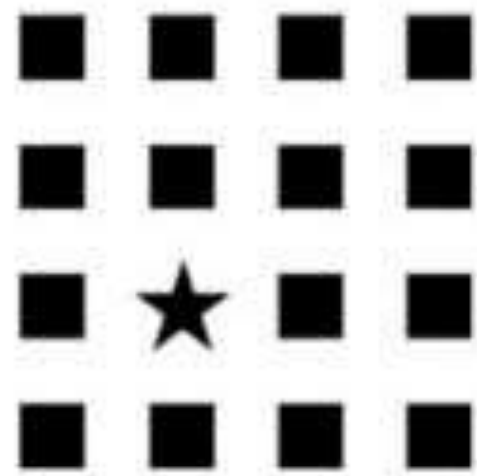
**Creating a conditional discrimination**



# **DISCRIMINATION DEPENDS ON ATTENTION**

- **Feature-Positive versus Feature-Negative Experiments**
- **Observing Response Procedures**

# Feature Positive

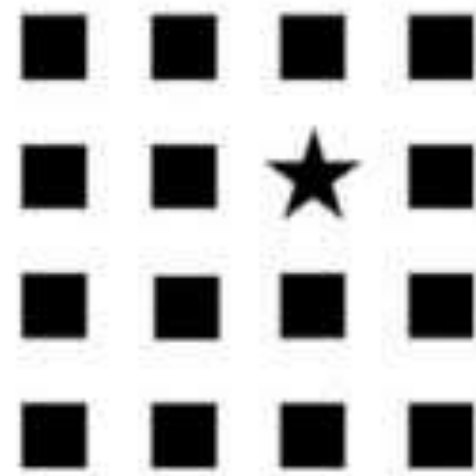


Peck → Food



Peck → No Food

## Feature Positive

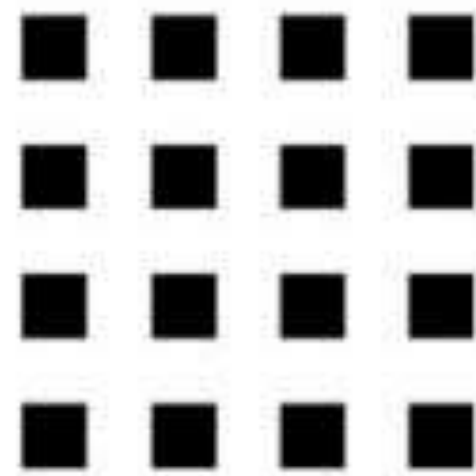


Peck → Food

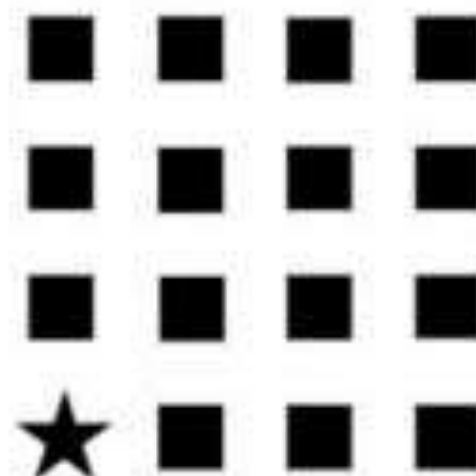


Peck → No Food

## Feature Negative

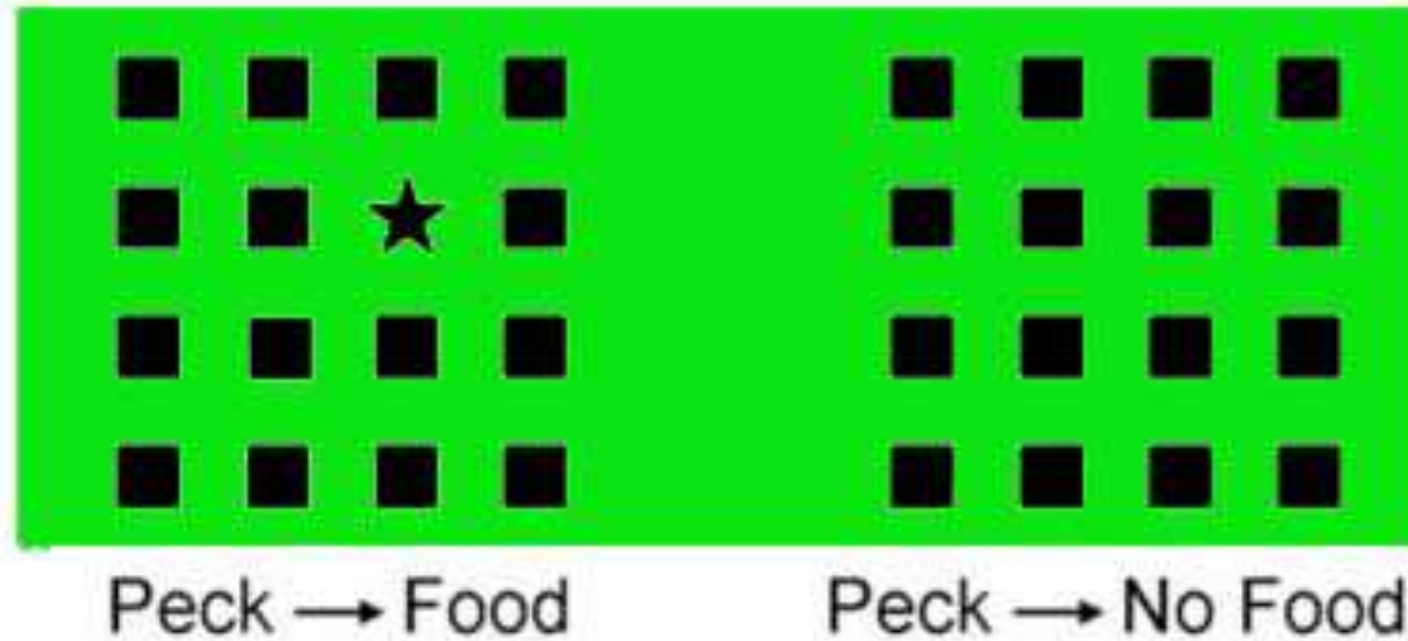


Peck → Food

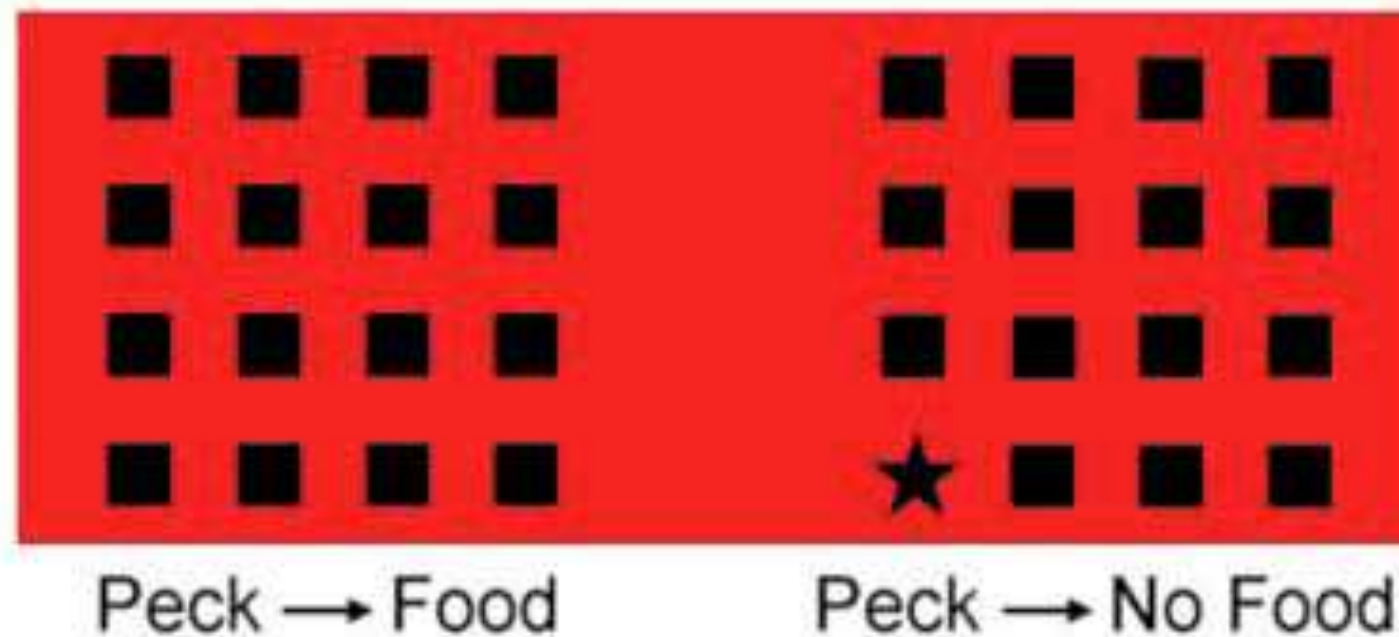


Peck → No Food

## Feature Positive



## Feature Negative





# Observing Response Procedures

- ◉ Two pigeon keys:
  - ◉ The schedule key, on which pecks may produce food
  - ◉ The observing key, on which pecks do not produce food but may change whether relevant stimuli are available on the schedule key

# The Three-Term Contingency

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S = Stimulus

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When R1 in presence of S1 differs from R2 in presence of S2, we say that the individual discriminates S1 from S2.

**A behavior analysis of discrimination in the human social sense is more concerned with the variables that produce discrimination than with its products.**

**In their human social senses, prejudice is more likely than discrimination to depend on verbal behavior.**

**Conditional discriminations provide a way to address some of the harmful effects of discrimination, because they allow new alternative discriminations to be created in new environments.**

**Now let's talk about  
selection**



# **SKINNER on SELECTION IN BIOLOGY AND BEHAVIOR**

## **Selection as a Special Causal Mode**

**“In both operant conditioning and the evolutionary selection of behavioral characteristics, consequences alter future probability. Reflexes and other innate patterns of behavior evolve because they increase the chances of survival of the species. Operants grow strong because they are followed by important consequences in the life of the individual.”**

**— Skinner, Science and Human Behavior, 1953, p. 90**

## **NATURAL (PHYLOGENIC) SELECTION**

Selection by the environment of individuals from populations, and thereby the selection of populations of genes

## **OPERANT (ONTOGENIC) SELECTION**

Selection of behavior by its environmental consequences within the lifetime of the individual organism

## **CULTURAL OR MEMETIC (SOCIOGENIC) SELECTION**

Selection of behavior as it is passed on from one individual to another

## But what about memes?

- Dawkins introduced the meme as a unit passed on from some individuals to others (e.g., as in a catchy melody or an idea), but it was ill-defined.
- He gave the transmission of memes more attention than their evolution.
- If, however, we regard memes as units of behavior, they become examples of sociogenic selection, and the most crucial example of sociogenic selection is verbal behavior.
- Phonemes provide good examples.

# Behavior is primary in each variety of selection

- Anatomies are selected because they serve behavior.
- Constraints on selection depend on both structure and function.
- Structure and function in behavior are analogous to anatomy and physiology in biological systems.
- (In analyses of verbal behavior, linguists have stressed structure whereas behavior analysts have stressed function.)

# The three varieties of selection need not work in the same direction

- **SOME EXAMPLES:**
- Drug addiction depends on ontogenic selection, in that taking the drug is reinforced by the effects of the drug. But some drugs can damage the developing fetus and therefore can have phylogenetic consequences.
- Advances in medicine as a part of sociogenic practices may have phylogenetic effects, as in enhancing the survival of children, but other sociogenic practices such as resisting immunizations may do just the opposite.
- Sociogenic contingencies are often directed at changing behavior that would otherwise be maintained by natural contingencies, as when religions proscribe certain classes of sexual behavior, or when celibacy benefits a group while it phylogenically disadvantages individuals.

## Selection at Any Level May Have Multiple Consequences

- Sexual selection may favor the evolution of disadvantageous anatomies (the peacock's tail, the male giraffe's long neck).
- Some responses may be strengthened relative to others mainly because of differential delays (impulsivity versus self-control).
- One generation's child-rearing practices may be replicated when those children become parents (patterns of child abuse, religious traditions).
- Punishment produces more immediate change than reinforcement, so aversive practices may spread through a culture more rapidly than those involving reinforcement because the former are more easily taught.

# Higher-Order Classes in Phylogenetic, Ontogenetic, and Sociogenetic Selection

- Some classes can be nested in others in ontogenetic selection, as in our examples of generalized imitation or generalized matching.
- Such nesting also ubiquitously occurs in phylogenetic selection, of which the most obvious cases are the nesting of cells within organ systems and of organ systems within organisms, or the nesting of some organisms within others in symbiosis or parasitism.
- Verbal behavior provides the most obvious examples at the level of sociogenetic selection, with letters nested in words, which in turn are nested in sentences, and so on to paragraphs and chapters and books.
- In all of these cases, the advantage of speaking in terms of function instead of in terms of structure (e.g., frames) is that it is easier to be explicit about the contingencies that may pit some subclasses against the higher-order classes of which they are members.



# Variation and Selection

- Our emphasis has been on selection, but selection cannot operate unless variations are available.
- Mendelian genetics did not provide sufficient variations to allow Darwinian selection to work; Darwinism was rescued by research on mutations.
- Cognitive critiques (especially Chomsky) argued that operant methods could not provide sources of novelty, the variations upon which selection depends.
- But our armamentarium now includes many sources of novel behavior, and not just shaping.

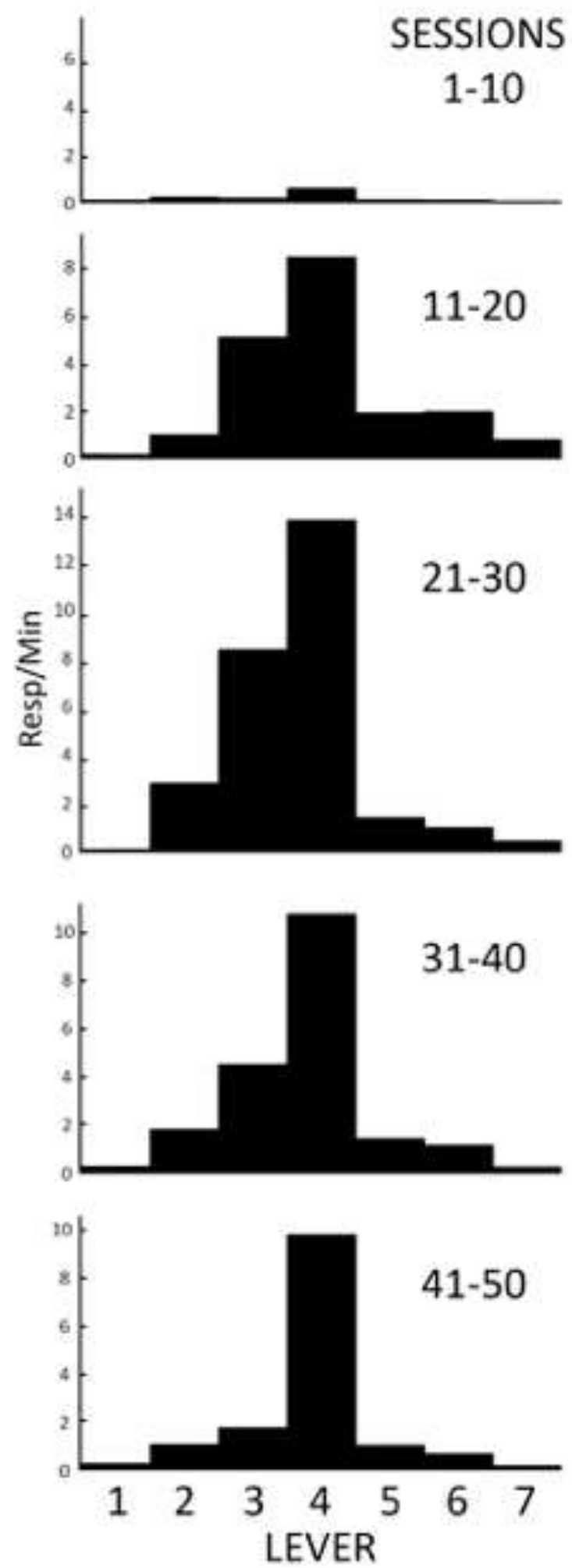
# Can Variation Itself Be Selected?

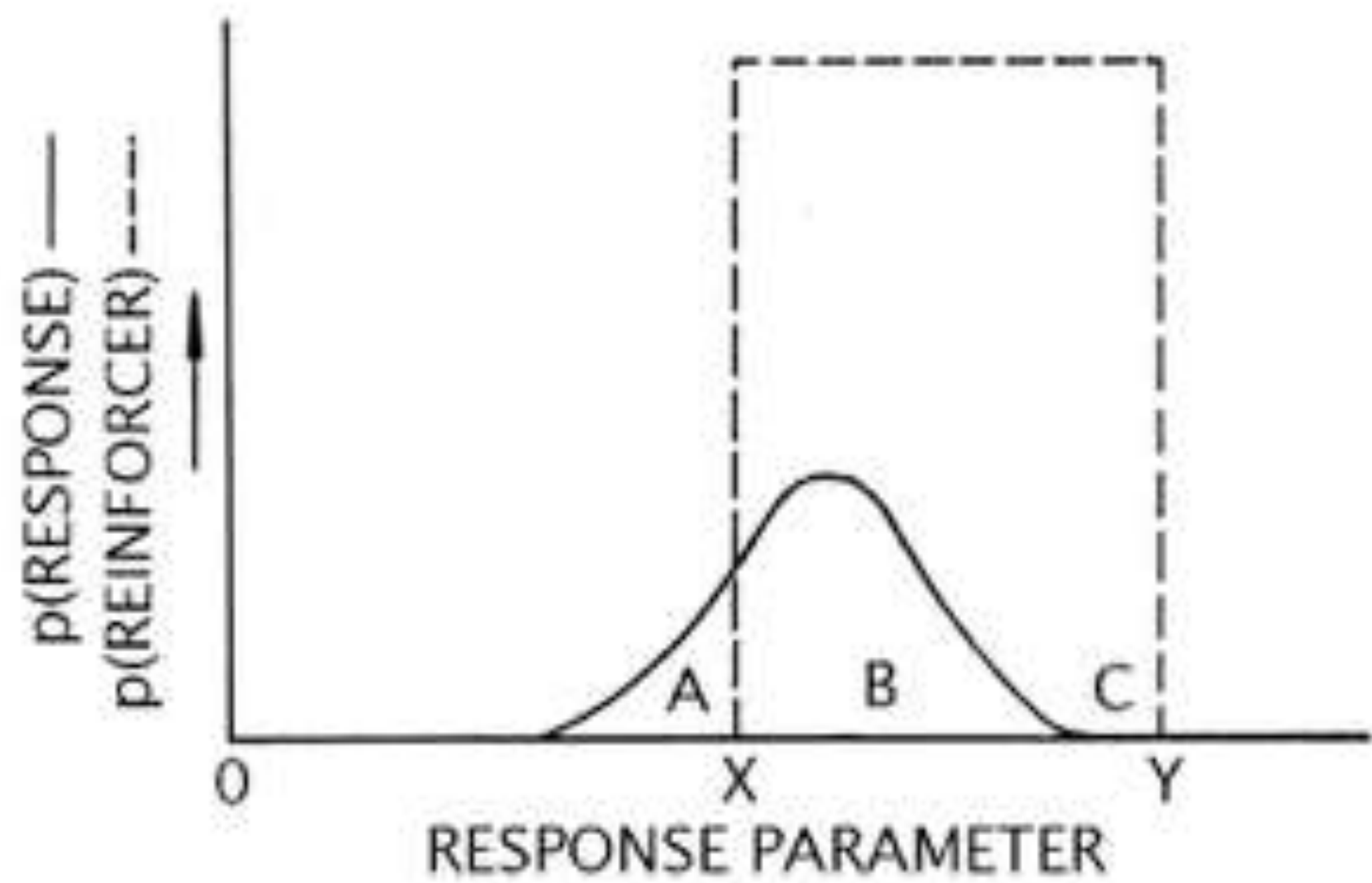
- A substantial ontogenic literature already exists (especially Neuringer).
- A phylogenetic analog: species similar in phenotype can vary in genetic diversity, and those with the greater genetic diversity have selective advantages over the others, especially in the face of changing environments. A substantial research literature in conservation biology supports this conclusion.
- See, for example:
  - Reed, D. H. (2007). Natural selection and genetic diversity. *Heredity*, **99**, 1-2; Vellend, D. H. (2006). The consequences of genetic diversity in competitive communities, *Ecology*, **87**, 304-311.

# Sources of Novel Behavior

- Through shaping and fading
- Through emergence based on higher-order classes, as in generalized imitation
- Through equivalence classes and their derivatives, as in relational framing
- Through discriminations based on common antecedent stimuli, as in joint control
- Through reinforcing effects based on similarities between one's own behavior and the behavior of others, as in parity
- Through direct reinforcement of novelty or variation

**Some aspects of the  
classes created by  
selection**





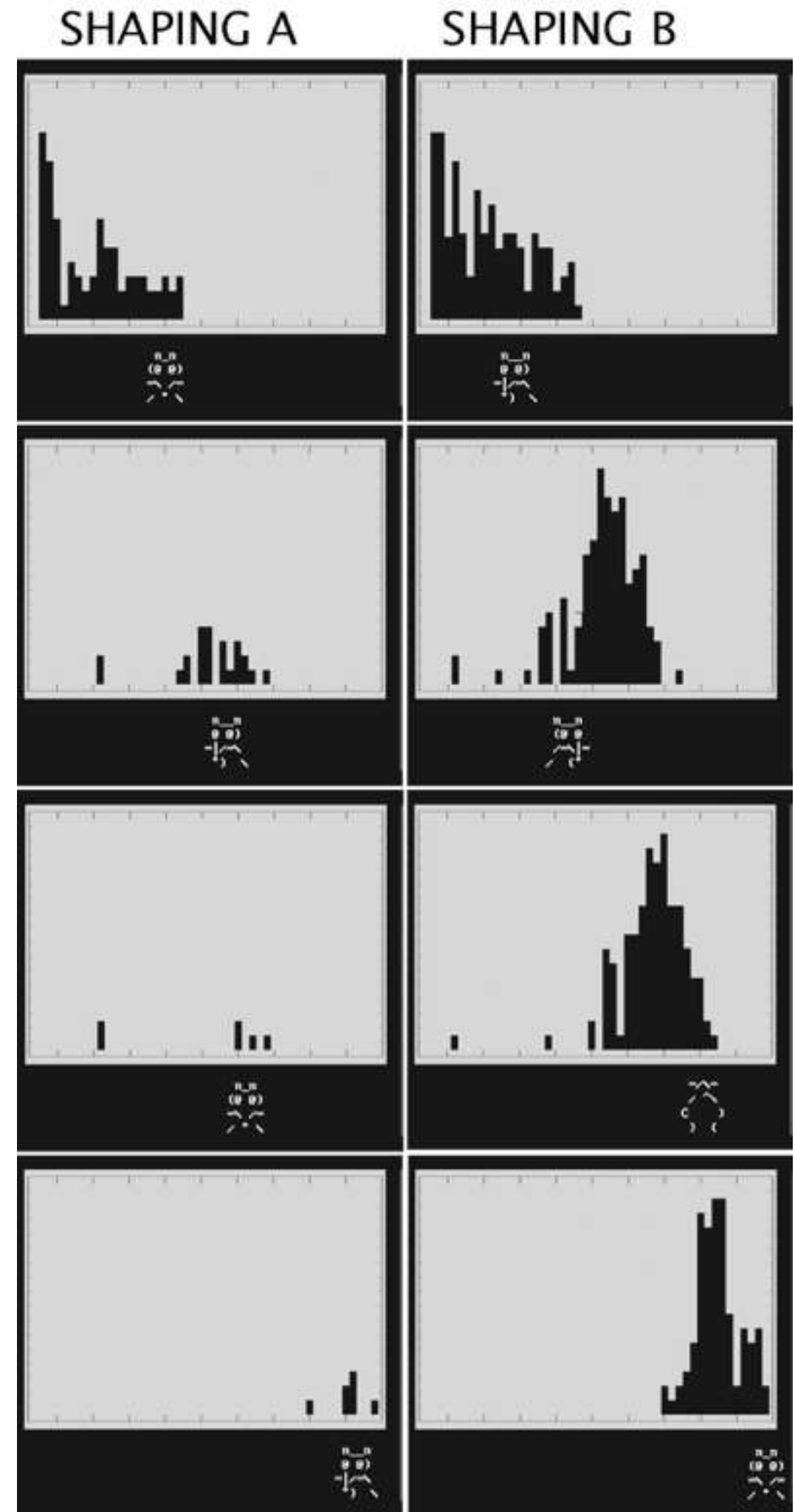
# Shaping as Selection



Shaping is our primary example of the evolution of operant behavior. Early stages of shaping reinforce responses that must later be extinguished. Create fewer of those and shaping goes more quickly, but at the risk of losing responding before shaping is complete (SHAPING A). Be more cautious and shaping uses more time and more reinforcers (SHAPING B).

Sometimes shaping leads to dramatic changes in topography, as when a rat surpasses its own body weight in the shaping of presses on a weighted lever.

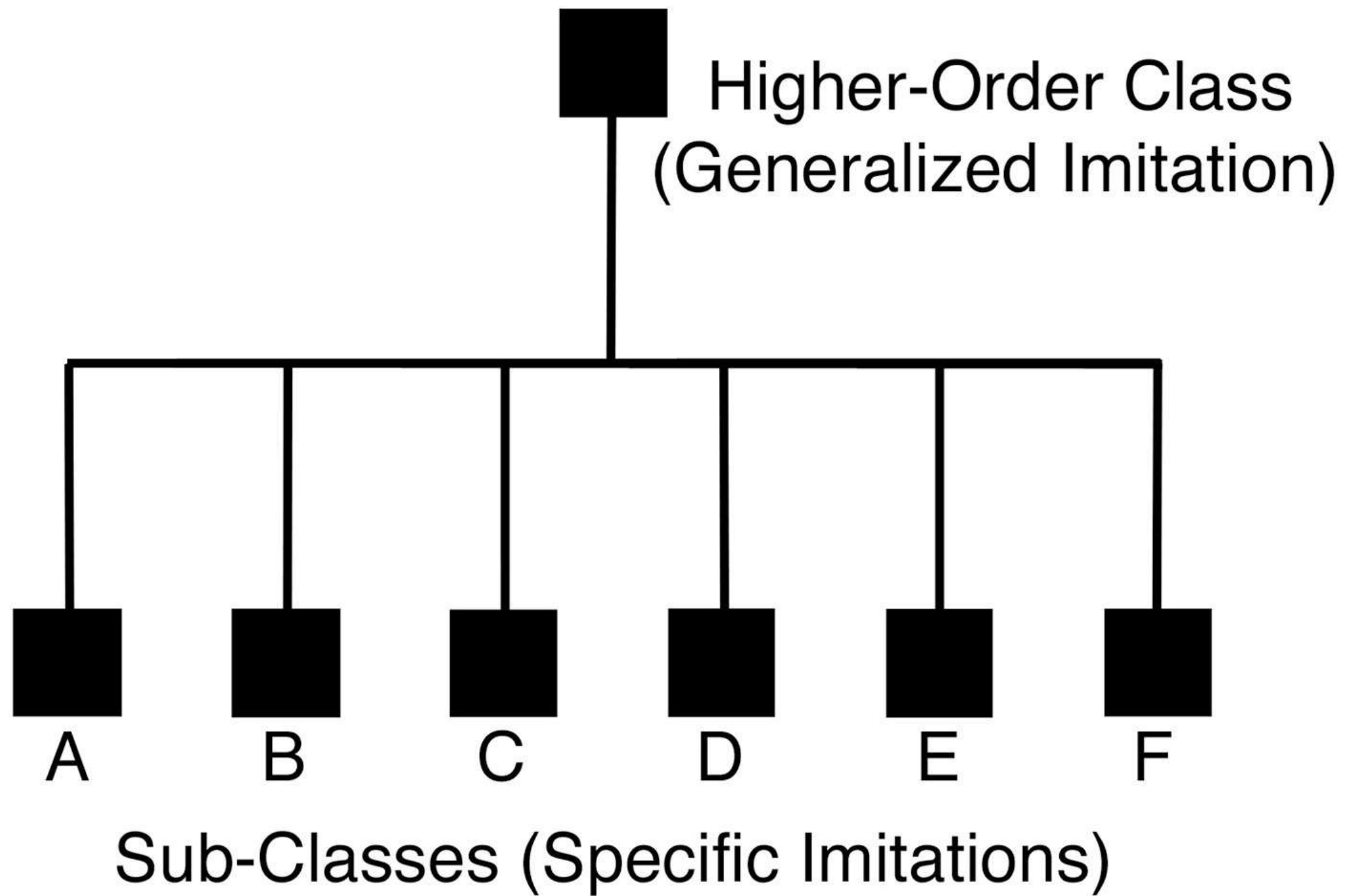
A phylogenetic analog is in the difference between gradual and saltatory evolution, where the latter follows from the opening of new environmental niches after a cataclysm. A cultural analog lies in the difference between peaceful change and revolution.



# The Significance of Classes

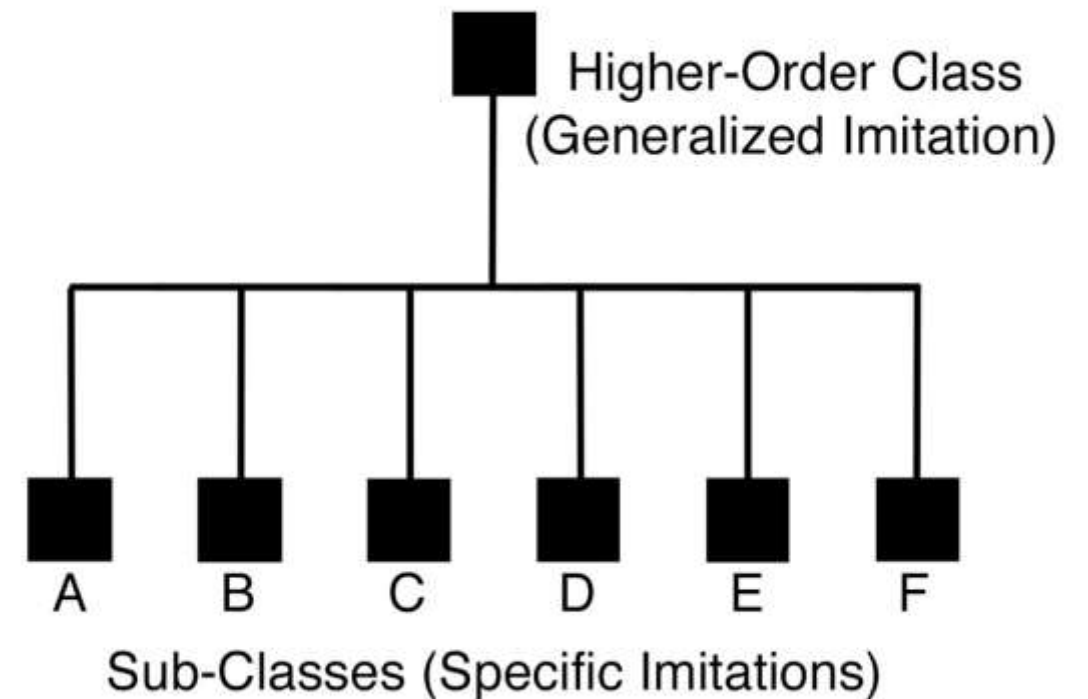
- The selection of behavior
- Shaping as a skill and (sometimes) as an art form
- Function versus form or topography in the creation of operant classes
- Lever presses and key pecks versus shifts of attention
- SIB, attention-getting and their variants
- Higher-order classes

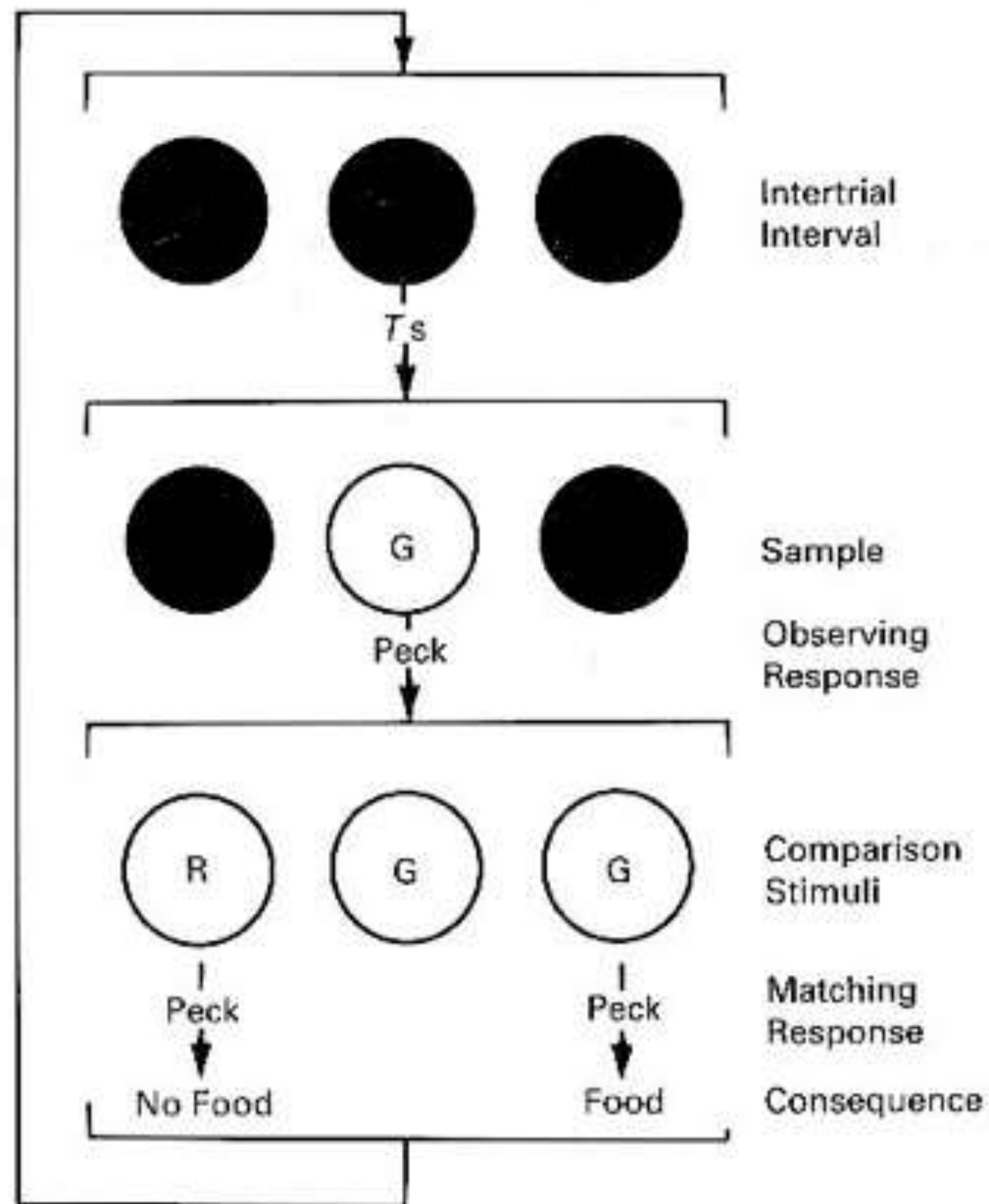
- **Why the lever press as an arbitrary class mattered**
- **How about higher-order classes?**
- **And how about the other classes — the stimulus classes and the reinforcer classes?**












































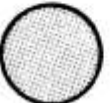






# Higher-Order Classes of Behavior

A higher-order class includes within it other classes that can themselves function as operant classes (as when generalized imitation includes as subclasses all component imitations that could be separately reinforced). A higher-order class is sometimes called a generalized class, in the sense that contingencies arranged for some subclasses generalize to all of the others (e.g., generalized matching, verbally governed behavior).





	Matching comparison key	Sample A	Nonmatching comparison key	Matching comparison key	Sample B	Nonmatching comparison key
<b>REFLEXIVITY</b>						
Color match						
Form match						
<b>SYMMETRY</b>						
Arbitrary match (color-form)						
Reversal test (form-color)						
<b>TRANSITIVITY</b>						
Arbitrary match 1 (color-form)						
Arbitrary match 2 (form-intensity)						
Transitivity test (color-intensity)						
Combined reversal- transitivity test (intensity-color)						

**Now we turn to  
discrimination as it appears  
in our colloquial vocabulary**



# **SOME TOPICS WE'LL REVIEW**

## **(not necessarily in this order)**

**The language of discrimination**

**How language turns continua into dichotomies**

**Talk about causes versus talk about thresholds**

**How equivalence relations are created, how they work,  
and how new ones can cut across existing ones**

**The distinction between contingency-shaped and  
verbally governed discriminations**

**The role of diversity**

**Conditional discriminations**

**What can we do? What tools are at our disposal?**

# Continua versus Dichotomies

Even though human features such as skin color typically vary along continua, prejudices usually reduce individuals to membership in a small number of classes characterized by sharp divisions.

Examples:

Race

Gender

Socioeconomic Classes

Ethnic or Other Classes Based on Cultural Criteria

# **An Equivalence Class Experiment in Northern Ireland (McGlinchy & Keenan, 1997)**

**Distinctions between Catholic Nationalists (N) and Protestant Unionists (U) have created well-established classes in Northern Ireland.**

**Given relations such as A1-B1-C1 and A2-B2-C2, members of class 1 are connected by common node B1 and those of class 2 by common node B2.**

**It is more difficult to create new classes 1 and 2 if the nodes connect N and U symbols than if they connect symbols within a single N or U class.**

**Most research on equivalence classes has been about ways to build them.**

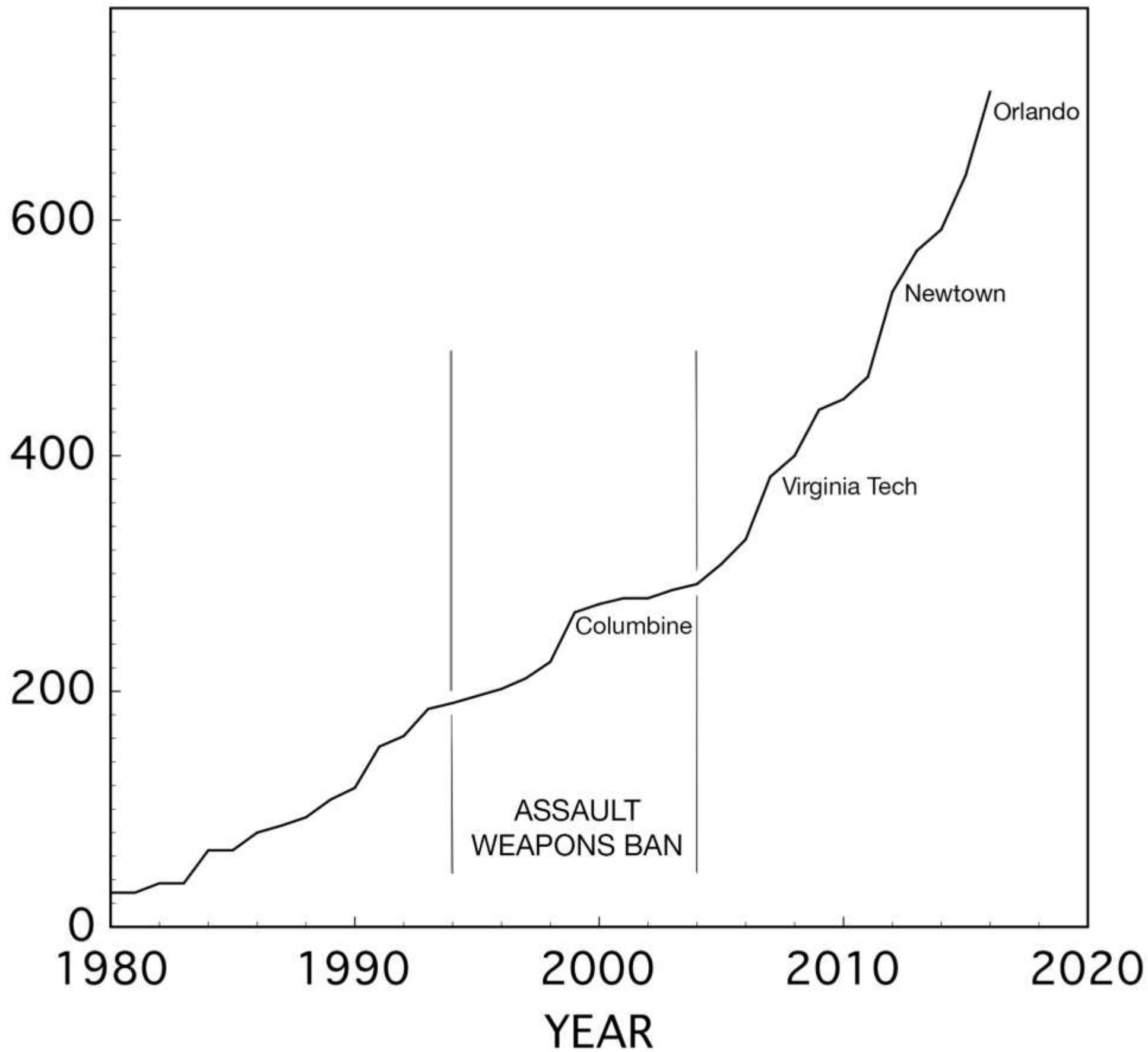
**We know less about effective ways of breaking them down.**

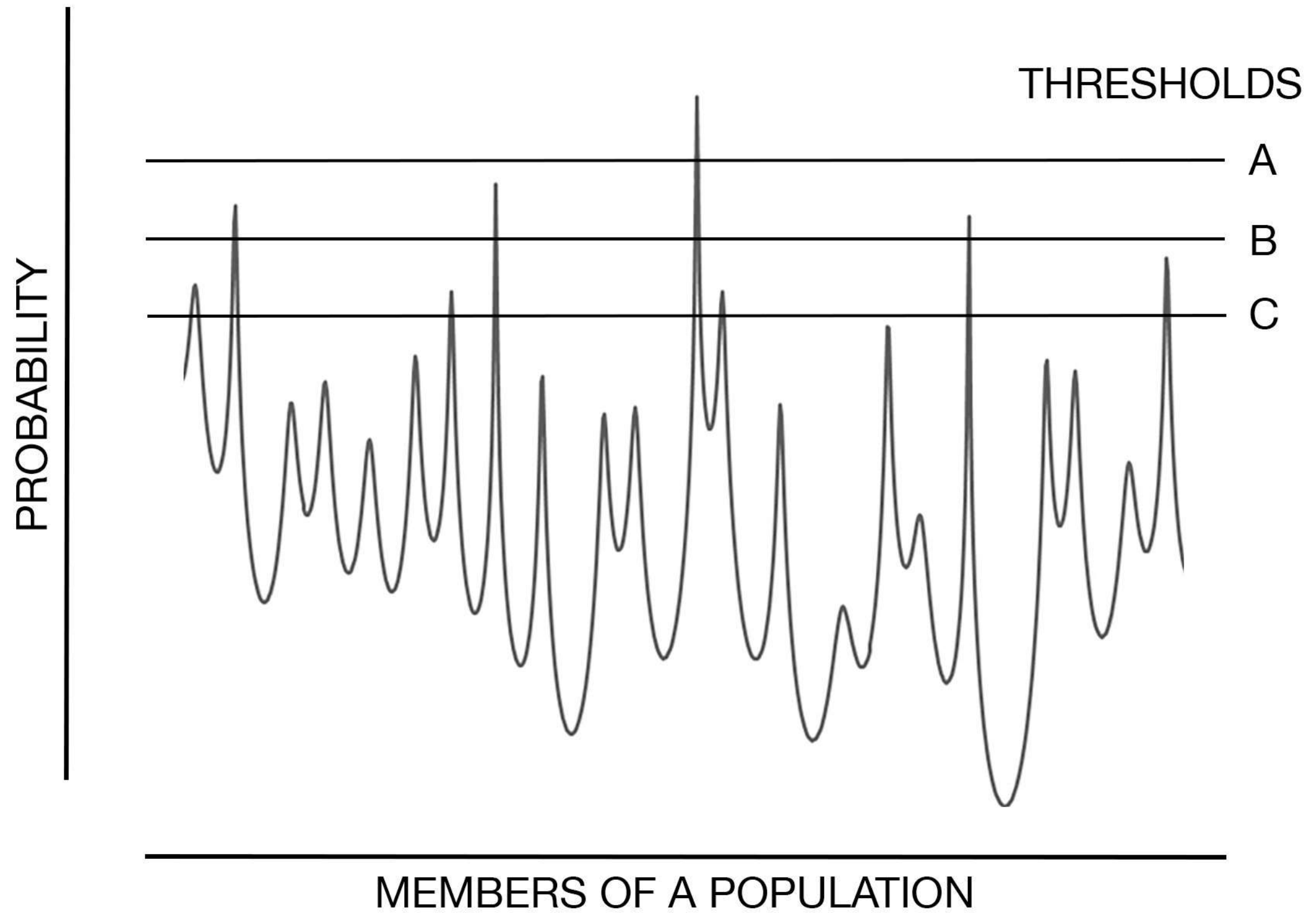
**Perhaps by creating new classes that cut across the boundaries of existing classes?**

**Perhaps by creating incompatible classes by teaching new discriminations among the members within a class (so that they no longer “all look the same to me”)?**

**Our prejudices aren't  
just about people.**

CUMULATIVE POST-WW II GUN DEATHS





# Multiple Causation

**An example from Verbal Behavior:**

**ordering at the fast food counter**

**lunchtime as an establishing operation;  
sights and sounds of food occasioning tacts;  
menus occasioning textual behavior; orders  
placed by others occasioning echoic  
behavior; server as audience occasioning  
manding; ....**



# **CIRCULAR REASONING IN EVERYDAY ACCOUNTS OF THE CAUSES OF BEHAVIOR**

**Attitudes**

**The language of emotions and feelings**

**Anger as a cause of behavior**

**Skinner's pecking-order demonstration**

**Conditional discriminations provide a way to address some of the harmful effects of discrimination, because they allow alternative discriminations to be created in new environments.**

**Consider the inner city versus the university.**

**Can enclaves within with conditional discriminations operate serve as hubs from which new social practices spread?**

(see Meyer & Brysac, *Pax Ethnica: Where and how diversity succeeds*;  
Appiah, *The honor code: How moral revolutions happen*.)

**But can this lead to isolated communities, and if so how can their pitfalls be avoided?**

# **RESIDENTIAL SEGREGATION AND UNINTENDED CONSEQUENCES**

**Even relatively benign preferences can create problems. For example, those who try to create integrated neighborhoods must contend with the finding that when people move into a neighborhood, a preference for having at least one or two neighbors matching your own racial or ethnic identity usually leads to segregated areas. This happens even among those actively seeking diversity. Unintended consequences hide around every corner and integration calls for careful planning.**

**And now we are ready to  
turn to verbal behavior,  
as a prerequisite for  
talking about prejudice**

- “The human species took a crucial step forward when its vocal musculature came under operant control in the production of speech sounds. Indeed, it is possible that all the distinctive achievements of the species can be traced to that one genetic change”

p. 117 in Skinner, B. F. (1986). The evolution of verbal behavior. Journal of the Experimental Analysis of Behavior, 45, 115-122.

# THE PRIMARY FUNCTION OF LANGUAGE

- Not for conveying emotion
- Not communication of ideas
- Not information sharing
- Not an instrument of reason
- We humans have evolved a very efficient way in which one individual can get another individual to do something

# Verbal behavior is “effective only through the mediation of other persons” (Skinner, 1957, p. 2)

- The irreducible function of verbal behavior is that it is an efficient way in which one individual can get another individual to do something
- Sometimes the effects are nonverbal, as when we ask someone to do something; sometimes the effects are verbal, as when we change what someone has to say about something
- All other functions of verbal behavior (e.g., communication, truth, logic) are derivatives of this primary function and gain their significance only through it

# The Functions of Verbal Behavior

- Some examples:
  - We communicate items of information or convey our thoughts or ideas because a consequence is that others may act upon them
  - We express our feelings and emotions because a consequence is that others may then behave differently toward us
  - The thoughts or ideas or feelings or emotions do not travel from the speaker to the listener. Only the words do - and that only in a special sense



# The Origin and Evolution of Verbal Behavior

Verbal behavior requires all three varieties of selection:

- Phylogenetic selection, as populations of organisms (and their genes) are selected by evolutionary contingencies
- Ontogenic selection, as populations of responses are selected within lifetimes
- Sociogenic selection, as populations of responses are passed on within groups and across generations

We must take into account the contributions of each and the ways in which they interact.

# The Origin and Evolution of Verbal Behavior

- Verbal behavior can emerge only in organisms whose behavior is sensitive to social contingencies
- Consider the advantages of a single vocal releaser functionally equivalent to “Stop!”
- A minimal repertory of fixed action patterns elicited by vocal releasers may evolve into a richly differentiated repertory
- Once in place, ontogenic contingencies may begin to supplement this rudimentary vocal control

# Phonemes are good examples of culturally selected or sociogenic units

- In ordinary development, infants have heard the sounds of their caregivers, and some of those sounds have become reinforcers.
- They also hear their own voices, and closer approximations to caregiver sounds will be more reinforcing than more distant ones.
- In other words, infant vocalizations, shaped by automatic reinforcing consequences, come to resemble those heard in the verbal environments created by their caregivers (e.g., Skinner, Risley, Palmer).
- Echoic behavior, a product of this shaping, is defined by correspondences of phonetic rather than physical units.

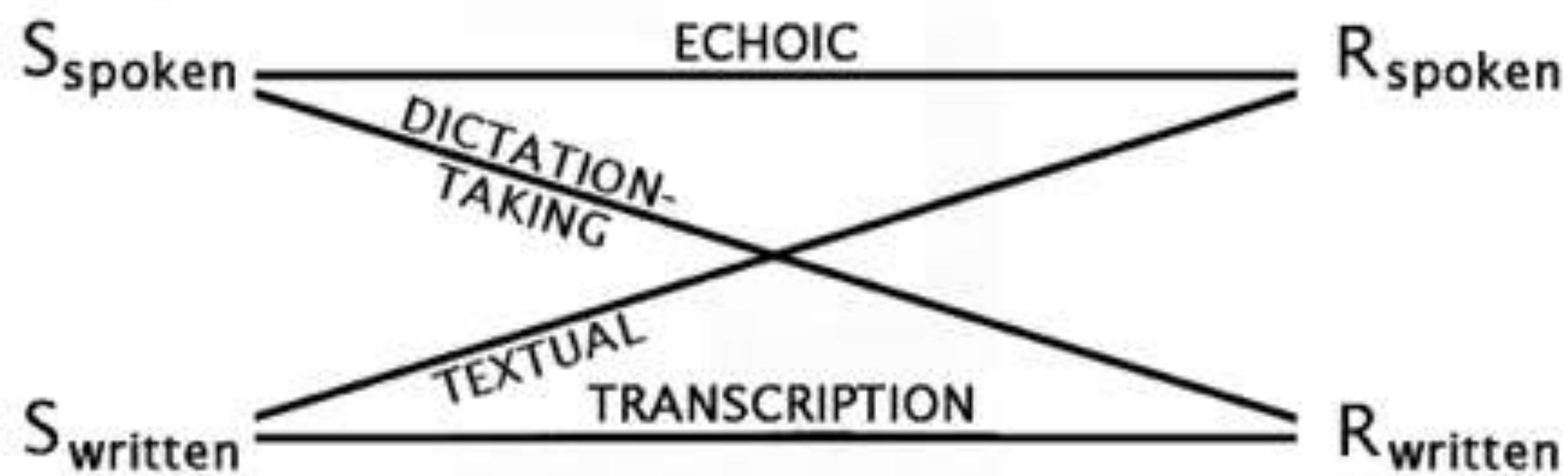
# **Phylogenetic and Ontogenic Factors in the Evolving Development of Auditory Capacity and Vocalizations**

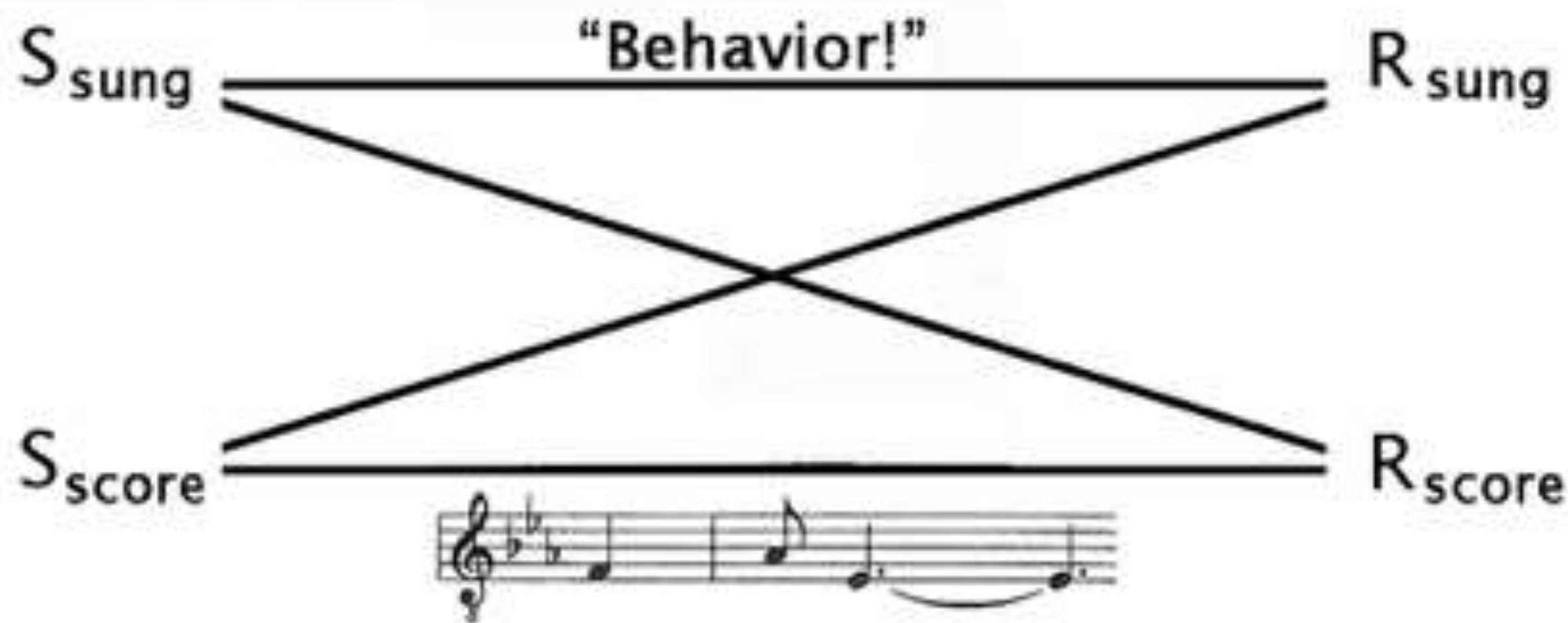
- **As maternal auditory capacity varies, selection will shape responsiveness to properties of infant vocalizations.**
- **As maternal behavior is shaped by infant vocalizations, those vocalizations will be shaped in turn by maternal behavior directed toward the infant.**
- **The sharpening of auditory capacity allows for further differentiation of vocal articulations, and vice versa.**
- **This co-evolution of auditory capacity and vocal differentiation leads to increasingly sophisticated vocal productions and discriminations on the part of both speakers and listeners.**
- **These then are the precursors of echoic behavior.**

**ANTECEDENTS**

**BEHAVIOR  
(WORDS)**

**CONSEQUENCES**



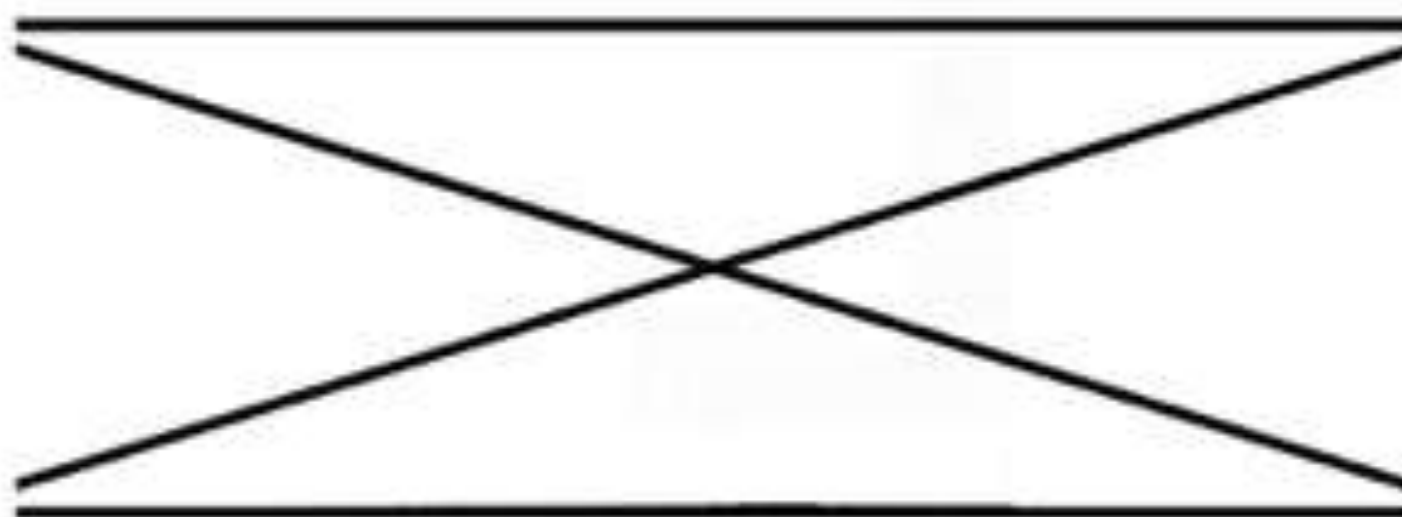


$S_{\text{nonverbal}}$   
*RAIN*

$R_{\text{nonverbal}}$   
*UMBRELLA*

$S_{\text{verbal}}$   
"It's raining"

$R_{\text{verbal}}$   
"It's raining"





## Some VB quotations on tacting and abstraction

- (p. 107) The verbal community...reinforces responses in the presence of a chosen stimulus property and fails to reinforce, or perhaps even punishes, responses evoked by unspecified properties. As a result, the response tends to be made only in the presence of the chosen property
- (p. 109) Abstraction is a peculiarly verbal process because a nonverbal environment cannot provide the necessary restricted contingency
- (p. 110) ...all tacts are pinned down, if they are pinned down at all, via the same process. The verbal response chair is as abstract as red

# The Tact and Naming

- Naming: a higher-order class that involves arbitrary stimulus classes (things or events with particular names) and corresponding arbitrary verbal topographies (the words that serve as their names) in a bi-directional relationship. Naming requires tacting, echoic behavior and listener behavior

## Verbal classes, like other operant classes, are defined by function, not by form

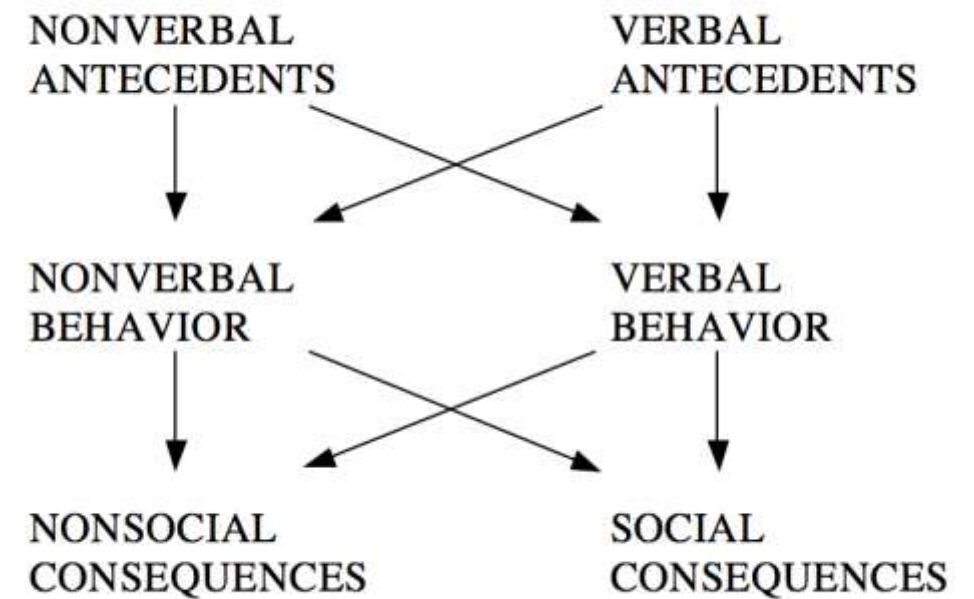
- (p. 186) ...we cannot tell from form alone into which class a response falls. Fire may be (1) a mand to a firing squad, (2) a tact to a conflagration, (3) an intraverbal response to the stimulus Ready, aim..., or (4) an echoic or (5) textual response to appropriate verbal stimuli. It is possible that formal properties of the vocal response, especially its intonation, may suggest one type of controlling variable, but an analysis cannot be achieved from such internal evidence alone. In order to classify behavior effectively, we must know the circumstances under which it is emitted

# The Multiple Causation of Verbal Behavior

- A ubiquitous property of verbal behavior is its multiple causation. A particular verbal utterance is likely to be determined jointly by nonverbal discriminative stimuli, prior verbal responses, possible reinforcing or aversive consequences, the nature of the listener, and the condition of the speaker (including establishing or motivational operations). In the technical vocabulary of verbal behavior, the effects of these variables might be treated as interactions of tacts, intraverbals, mands, audiences, and autoclitics

# Four Functional Properties of Verbal Behavior

- The Shaping of Verbal Behavior
- Verbal Governance of Both Verbal and Nonverbal Behavior
- Differential Attention to Positive or Aversive Verbal Stimuli
- Replication (Echoic Behavior, Textual Behavior, and so on)



# Verbal Shaping:

Verbal behavior may be shaped by both social and nonsocial consequences.

- Verbal shaping involves treating successive verbal responses as varying along semantic or other verbal dimensions.
- Audiences set occasions on which verbal behavior has consequences and provide reinforcers that shape verbal behavior. Different audiences set the occasion for different verbal classes.
- Greenspoon, Keller, etc.: Verbal shaping of plurals, in the Introductory Psychology course, on psychiatric wards....

# Verbal Shaping: Some examples from Greenspoon through Keller and beyond

- Verbal shaping of plurals
- Verbal shaping in an introductory psychology lab
- Verbal shaping on a psychiatric ward

# Verbally Governed Behavior

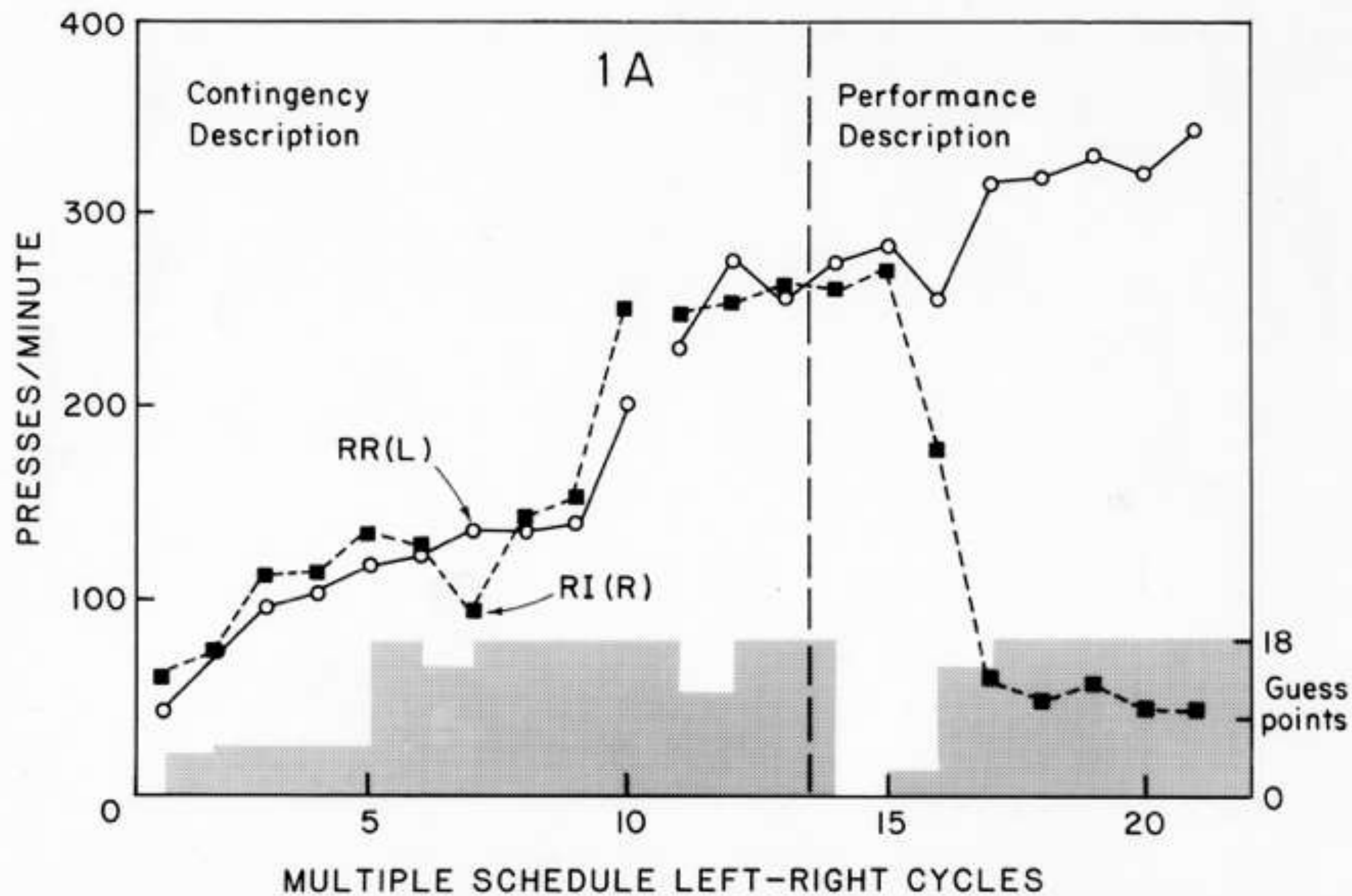
- Behavior, either verbal or nonverbal, under the control of verbal antecedents. It has also been called rule-governed behavior or instruction-following. Verbally governed behavior is an example of a higher-order class. In a higher-order class, the local contingencies that maintain particular instances may differ from the contingencies (often social) that maintain the higher-order class



# Instruction Following (Verbal Governance)

Verbal antecedents that specify behavior may produce that behavior.

- Verbal governance is maintained by potent social contingencies involving either reinforcing or aversive consequences (the military provides an obvious example).
- Verbal governance may operate on verbal as well as nonverbal behavior.
- Verbal governance is a higher order class. The local contingencies that operate on specific instances need not be consistent with the contingencies that maintain the higher-order class. Either may dominate, i.e., behavior may be more sensitive to changes in one than in the other.





**GETTING PEOPLE TO SAY IT  
MAKES THEM MORE LIKELY TO DO  
IT:**

**Say-Do Correspondences and  
the Shaping of Verbal Behavior**

# **Attention to Verbal Stimuli: We attend to verbal stimuli based on their correlation with reinforcing or aversive consequences**

- **A message's effectiveness depends more on whether its content is reinforcing or aversive than on whether it is correct or complete or consistent**
- **What needs explanation is that humans attend at all to bad news. It may be relevant that bad news sometimes allows effective avoidance behavior and that stimuli correlated with sufficient reinforcers may maintain attention even when also correlated with aversive events**

# **Attention to Verbal Stimuli:**

**Verbal stimuli are differentially correlated to reinforcers, and therefore we differentially attend to them.**

- **Individual differences in reinforcement history imply individual differences in attention.**
- **We attend to verbal stimuli, as to nonverbal ones, not based on the information they carry but rather as a function of their correlation with reinforcers.**
- **The effectiveness of a message depends more on whether its content is reinforcing or aversive than on whether it is correct or complete or consistent.**
- **What needs explanation is that humans attend at all to bad news (it may be relevant that bad news sometimes allows effective avoidance behavior).**

# **Replication (not just echoic behavior):**

**We tend to repeat what we and others say or write.**

- **Replication may allow verbal governance to be extended both spatially and temporally.**
- **Once some individuals begin to repeat what others say, verbal behavior can be maintained by sociogenic as well as ontogenic contingencies and can survive across generations.**
- **The listener's repetitions create conditions under which instructions are followed in the speaker's absence, later and elsewhere. In effect, governance is transferred from the speaker's verbal behavior to the listener's replication.**
- **Effects of replication may summate.**

## VERBAL SHAPING

VERBAL R's --> CONSEQUENCES

NEW VERBAL R'S --> VERBAL S<sup>D</sup>'s

## VERBAL GOVERNANCE

VERBAL S<sup>D</sup>'s --> VERBAL / NONVERBAL R's

VERBAL / NONVERBAL R's --> CONSEQ's

## DIFFERENTIAL ATTENTION

VERBAL / NONVERBAL R's --> VERBAL S<sup>D</sup>'s

VERBAL S<sup>D</sup>'s --> VERBAL / NONVERBAL R's

## REPLICATION

VERBAL S<sup>D</sup>'s --> VERBAL R's

VERBAL R's --> VERBAL S<sup>D</sup>'s



**THESE ARE NOT THEORIES.**

**THEY ARE PROPERTIES  
OF VERBAL BEHAVIOR.**

**More implications**

# WHAT IS TO BE DONE?

Creating contingencies that will help conditional discriminations to spread

Changing from talk about causes to talk about thresholds

Changing dichotomies to continua

Changing equivalence relations by creating new ones that cut across existing ones

Distinguishing between contingency-shaped and verbally governed discriminations

# What are the implications for general ethical issues?

- You can shape using reinforcers, but not using punishers: punishers reduce rather than expand the range of variations (stopperants).
- Therefore reinforcers are preferable to punishers if it is assumed that a wider range of variations makes a population more viable under changing contingencies. Species at risk are especially those in very specialized but potentially changeable environments.

# Teaching Reinforcement versus Teaching Punishment

- The effects of punishers show up more immediately than those of reinforcers, so punishment is usually easier to teach.
- That is probably why punishers are so pervasive in human cultures.
- It should follow that the use of reinforcers must be carefully taught.

- **With regard to:**
  - **Aversive Control:** You cannot shape with it; it reduces rather than enhances variations
  - **Freedom:** It allows for variations (consider our recommendations for least restrictive procedures)
  - **Truth and Disclosure:** Might the truth enhance options while a lie reduces them? (look at what happened to Romeo and Juliet or to Othello and Desdemona)
  - **Verbal Behavior:** Instructed behavior is often less sensitive to contingencies than behavior that has been directly shaped by them

# Selection for Variation in Biological Systems

- The parallel in biology is that species otherwise seeming similar in phenotype can vary in their genetic diversity, and those with the greater genetic diversity have selective advantages over the others, especially in the face of changing environments. A substantial research literature now supports this conclusion. See, for example:
  - Reed, D. H. (2007). Natural selection and genetic diversity. *Heredity*, **99**, 1-2.
  - Vellend, D. H. (2006). The consequences of genetic diversity in competitive communities, *Ecology*, **87**, 304-311.

# What are the implications for general ethical issues?

- A wider range of variations makes a population more viable under changing contingencies. Species at risk are especially those in very specialized environments.
- These populations may exist at any level of selection -- phylogeny, ontogeny, or sociogeny -- though selection at one level need not support selection at another.



- And if capacities for variability and preferences for free choice have been selected in phylogeny, then environments that allow them (least restrictive) are those in which adaptive (reinforced) variations are likely to emerge.
- But what about truth, disclosure, etc. Getting there may seem like a stretch, but consider what we know about verbal governance: verbally governed behavior is typically more constrained, less variable, than contingency shaped behavior.

- With regard to the selection of variations within cultural practices, consider that cultures that celebrate diversity have some advantages over those that engender conformity. Hitler tried to remove Jews and others from German culture (espousing a flawed social Darwinism, which may be one source of the anti-Darwinism that lingers in our contemporary culture). But in so doing, fortunately, he deprived Germany of the skills of Einstein and many other physicists.

- During WW 2, the US military had to learn to fight, but then and since it was said that one aspect of American troops was their ability to improvise in the face of unanticipated contingencies, and that this capacity eventually provided advantages over enemies who largely followed orders.

- Compare Mao and his cultural revolution and his proteges in Cambodia and North Korea, the rigidity of Leninist and Stalinist states, the practices of Islamic fundamentalist organizations and other totalitarian regimes. We may say they suppress freedom, but perhaps the most crucial underlying reason for us to care is that their suppression of the variations (here mainly in individual behavior shaped by cultural and verbal practices that include substantial aversive contingencies in their maintenance) will be less likely to adapt to changing contingencies.

- Mao allowed a thousand flowers to bloom so that he could cut them down. Many cultures limit variations by various prohibitions: diet, marriage, verbal behavior (blasphemy and heresy), graven images, social practices. However much problematic issues such as de facto segregation and other prejudicial practices may persist within Western Culture, the limitations on how people can live out their lives (or, in other words, how they may behave) are far more drastic in much of the rest of the world.

# Selection for Variation in Cultural Systems

- A wider range of variations makes populations more viable under changing contingencies. Classes at risk are especially those in very specialized environments.
- If capacities for variability and preferences for choice have been selected in phylogeny, then environments that allow them (least restrictive) are those in which adaptive (reinforced) variations are likely to emerge.
- What about verbal behavior, as in issues of truth, disclosure, etc.? Consider verbal governance: Verbally governed behavior is typically more constrained, less variable, than contingency-shaped behavior.

# Cultural Diversity and the Sociogenic Selection of Variations

- Cultures that celebrate diversity have some advantages over those that engender conformity.
- Example: Hitler tried to remove Jews and other populations from German culture (espousing a flawed social Darwinism, which is one source of the anti-Darwinism that lingers in contemporary culture).
- In so doing (fortunately), he deprived Germany of scientific skills, including those of Albert Einstein among many others.
- Diversity matters.



# What does behavior analysis have to offer?

- We know more about how behavior actually works, so when it comes to questions about using aversives, or even about doing research on aversives, we may be able to make better judgments about the consequences.
- We know more about verbal behavior, so when it comes to questions about truth, we may be able to make better judgments about the functions of different varieties of talk.
- Educating broadly about behavior and its functions may well be an ethical imperative for behavior analysts.





# **The ABCs of Behavior Analysis**

An Introduction to  
Learning and Behavior  
A. Charles Catania

