

# B. F. Skinner's Analysis of Verbal Behavior

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# Alfred North Whitehead and “No Black Scorpion”

- We dropped into a discussion of behaviorism which was then still very much an “ism” and of which I was a zealous devotee [1934]. Here was an opportunity which I could not overlook to strike a blow for the cause....Whitehead... agreed that science might be successful in accounting for human behavior provided one made an exception of verbal behavior. Here, he insisted something else must be at work. He brought the discussion to a close with a friendly challenge: “Let me see you,” he said “account for my behavior as I sit here saying ‘No black scorpion is falling upon this table.’” The next morning I drew up the outline of the present study (Skinner, 1957, p. 457).

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# What is Language?

- What constitutes “Language?”
- How do we talk about it?
- How do we measure it?
- What are its parts?
- How do we assess it?
- How do we teach it?
- There are many different theories of language.

# Theories of Language

- In Chapter 1 of Verbal Behavior Skinner presents the various linguistic theories
- Linguistic theory can be classified into three general, and often overlapping views: biological, cognitive, and environmental
- Proponents of the **biological** view (e.g., Chomsky, 1965; Pinker, 1994) argue that language is innate to humans and primarily a result of physiological processes and functions, and that language has little to do with environmental variables, such as reinforcement and stimulus control
- Brain----->Words, phrases, sentences
- Nature vs. nurture
- No current applications of Chomsky or Pinker to autism

# Theories of Language

- **Cognitive** psychologists argue that language is controlled by internal cognitive processing systems that accept, classify, code, encode, and store verbal information (e.g., Brown, 1973; Piaget, 1926; Slobin, 1973), and language has less to do with environmental variables, such as reinforcement and stimulus control
- Language is viewed as **receptive and expressive**, and the two are referred to as communicative behavior that is controlled by cognitive processors
- Cognition----->Words
- Cognitive theory, and its receptive-expressive framework **dominates** the current language assessment and intervention programs for children with autism

# How is Language Measured in a Traditional Linguistic Analysis?

- The focus is on response forms, topography, and structure
- Phonemes
- Morphemes
- Lexican
- Syntax
- Grammar
- Semantics
- Mean length of utterances (MLU); words, phrases, sentences
- Classification system: nouns, verbs, prepositions, adjectives, adverbs, etc.

# Skinner's (1957) Book Verbal Behavior

- Chapter 1 of Verbal Behavior is titled “A Functional Analysis of Verbal Behavior”
- Etymological sanctions and terminology in VB
- **Language is learned behavior** under the functional control of environmental contingencies
- “What happens when a man speaks or responds to speech is clearly a question about human behavior and hence a question to be answered with the concepts and techniques of psychology as an experimental science of behavior” (Skinner, 1957, p. 5)



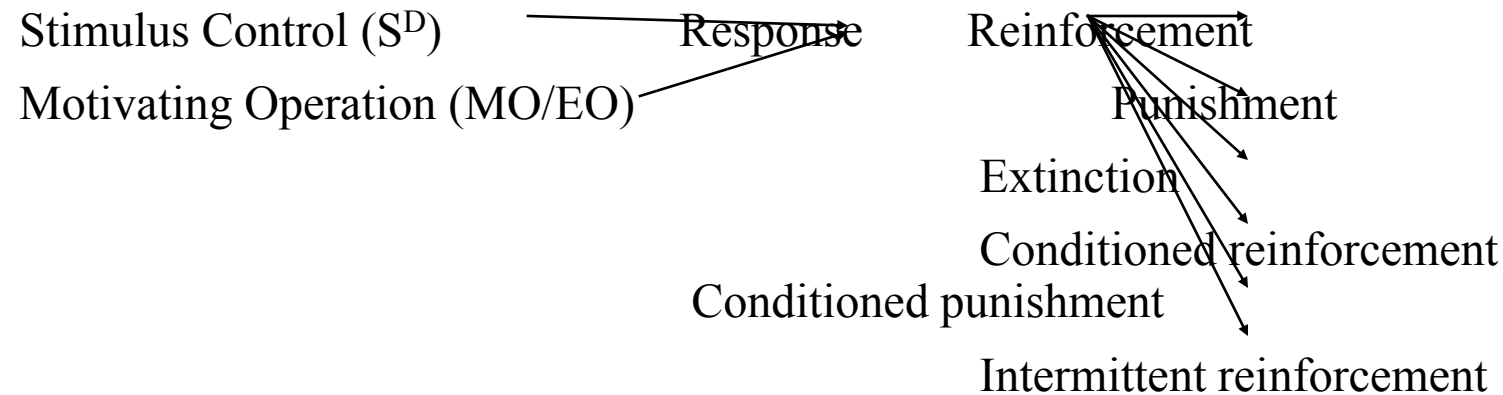
# Skinner's (1957) Book Verbal Behavior

- Definition of verbal behavior: “Behavior reinforced through the mediation of other persons” (who are trained to do so)
- The speaker and the listener (“The total verbal episode”). The speaker and listener can be in the same skin
- Form and function
- “Our first responsibility is simple *description*: what is the topography of this subdivision of human behavior? Once that question has been answered in at least a preliminary fashion we may advance to the stage called *explanation*: what conditions are relevant to the occurrences of the behavior--what are the variables of which it is a function?” (p. 10).

# Skinner's (1957) Book Verbal Behavior

- The analysis of verbal behavior involves the same behavioral principles and concepts that make up the analysis of nonverbal behavior. **No new principles of behavior** are required. There are some new terms
- In Chapter 2 of VB Skinner presents the independent and dependent variables of verbal behavior

# A Functional Analysis of Verbal Behavior: The Basic Principles of Operant Behavior



# Skinner's (1957) Book Verbal Behavior

- “Technically, meanings are to be found among the independent variables in a functional account rather than as properties of the dependent variable” (p. 14)
- What constitutes a “unit of verbal behavior?” (sounds, words, phrases, sentences)
- “...a response of identifiable form functionally related to one or more independent variables” (p. 20)
- What is the unit of analysis in language?
- In Chapter 2 of VB Skinner also presents a VB research methodology and suggests several advantages of using his analysis of verbal behavior as a foundation for language research

# Skinner's (1957) Book Verbal Behavior

- A common misconception about Skinner's analysis of verbal behavior is that he rejects the traditional classification of language
- However, it is not the traditional classification or description of the response he finds fault with, it is the failure to account for the causes or functions of the verbs, nouns, sentences, etc.
- The analysis of how and why one says words is typically relegated to the field of psychology combined with linguistics; hence the field of "psycholinguistics"
- Skinner noted that "A science of behavior does not arrive at this special field to find it unoccupied (p. 3)

# How is Language Measured in a Behavioral Analysis?

The **verbal operant** is the unit of analysis  
(e.g., mands, tacts, & intraverbals)

MO/S<sup>D</sup> → Response → Consequence

# Skinner's Analysis of Verbal Behavior

- The traditional linguistic classification of words, sentences, and phrases as expressive and receptive language blends important functional distinctions among types of operant behavior, and appeals to cognitive explanations for the causes of language behavior (Skinner, 1957, Chapters 1 & 2)
- In Chapters 3-5 of Verbal Behavior Skinner presents the “**elementary verbal operants**”

# Skinner's Analysis of Verbal Behavior

- At the core of Skinner's analysis of verbal behavior is the distinction between the **mand**, **tact**, and **intraverbal** (traditionally all classified as "expressive language")
- Skinner identified three separate sources of antecedent control for these verbal operants
- EO/MO control----->Mand
- Nonverbal S<sup>D</sup>----->Tact
- Verbal S<sup>D</sup>----->Intraverbal
- Established body of empirical support for this distinction (Sautter & LeBlanc, 2006)



# The Behavioral Classification of Language

- Four of the verbal operants...
- **Mand:** Asking for reinforcers. Asking for “Mommy” because you want mommy.
- **Tact:** Naming or identifying objects, actions, events, etc. Saying “Mommy” because you see Mommy
- **Echoic:** Repeating what is heard. Saying “Mommy” after someone else says “Mommy.”
- **Intraverbal:** Answering questions or having conversations where your words are controlled by other words. Saying “Mommy” someone else says “Daddy and...”

# The Distinction Between the Mand and the Tact

- Based on the distinction between the establishing operation (EO/MO) and stimulus control ( $S^D$ ) as separate sources of control
- Skinnerian psychology (“radical behaviorism,” see Skinner, 1974) has always maintained that motivational control is different from stimulus control
- In Behavior of Organisms (Skinner, 1938) Skinner devoted two chapters to the treatment of motivation; Chapter 9 titled “Drive” and Chapter 10 titled “Drive and Conditioning: The Interaction of Two Variables”
- Skinner also made it clear in the section titled “Drive (is) Not a Stimulus” (pp. 374-376) that motivation is not the same as discriminative, unconditioned, or conditioned stimuli

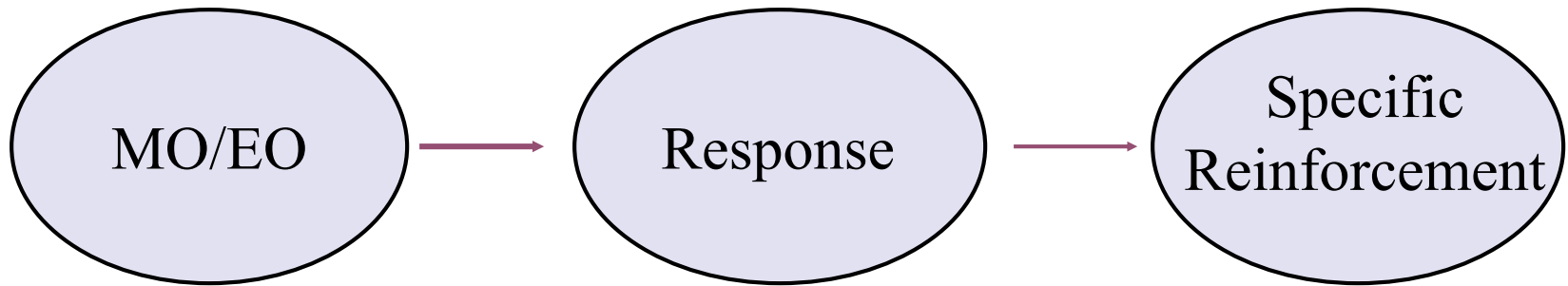
# The Distinction Between the Mand and the Tact

- Keller and Schoenfeld (1950) titled Chapter 9 “Motivation” and further developed Skinner’s point, “A drive is not a stimulus” (p. 276), and suggested “a new descriptive term... ‘**establishing operation**’” (p. 271)
- In Science and Human Behavior (1953) Skinner devoted three chapters to motivation: Chapter 9: “Deprivation and Satiation,” Chapter 10: “Emotion,” and Chapter 11: “Aversion, Avoidance, Anxiety”
- In Verbal Behavior (1957) Skinner had a full chapter on motivation and language (The Mand), and throughout the book provided many elaborations on motivational control -- **as an antecedent variable**

# Motivative Operations (MO) and Stimulus Control ( $S^D$ )

- The definition (Michael, 2007) of an MO: (a) an environmental event that increases the momentary effectiveness of anything as a form of reinforcement, and (b) increases the frequency of any behavior that has been followed by that form of reinforcement in the past
- The definition (Michael, 1982) of stimulus control ( $S^D$ ): a particular stimulus that evokes a particular behavior due to a history of reinforcement
- $MO=SR/S^r$  are effective (do you want it now)
- $S^D=SR/s^r$  are available (can you get it now)
- See Martinez-Diaz (2006) for an excellent powerpoint tutorial on the distinction between the  $S^D$  and MO

# The Mand Relation



Child wants the Dora video

“Dora”

“Here it is”

# Examples of Mand

- Mine!
- I want my mommy!
- Come on.
- Go away.
- Open it
- Who is that?
- How does this work?
- Are we there yet?
- How is an MO different from an S<sup>D</sup>?
- How do you know if these are mand

# The Importance of the Mand

- Mands are the first type of verbal behavior acquired by typical children
- Manding allows a child to get what he wants, when it is wanted
- Manding allows a child to get rid of what he does NOT want, when it is not wanted
- A parent or caretaker is paired with the delivery of reinforcement related to a mand

# The Importance of the Mand

- Manding brings about desired changes or conditions
- Manding allows a child to control the social environment
- Manding is the only verbal operant that directly benefits the speaker
- Manding training can decrease negative behaviors that serve the mand function



# The Importance of the Mand

- Mand training helps to establish speaker as well as listener rolls
- For early learners, mands do not emerge by training on the other verbal operants
- Mand trials can be used as reinforcers for other forms of verbal behavior
- Manding is essential for social interaction

# The Importance of the Mand

- Manding allows a speaker to acquire new information and new forms of verbal behavior
- Neglect of the mand can impair language development
- Neglect of the mand can result in emotional impairment
- Excessive manding is a burden on the listener

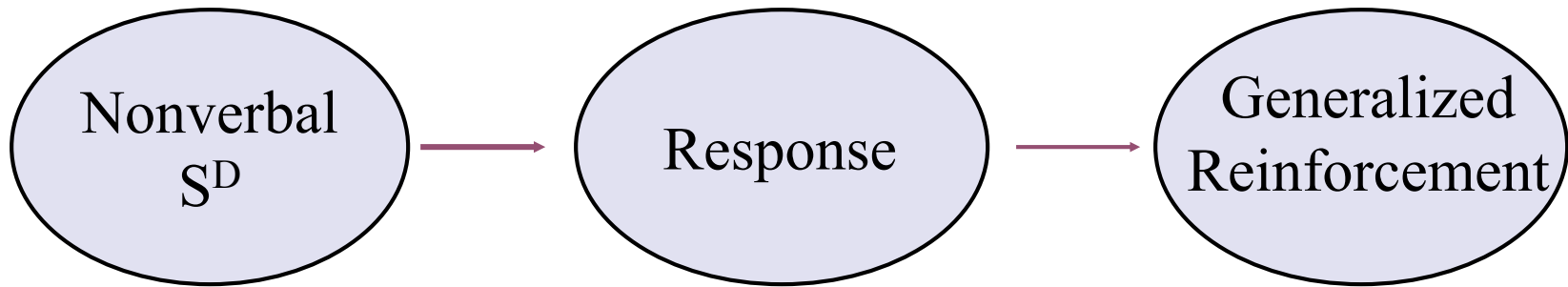
# Issues Concerning Motivative Operations (MOs) and Mands

- All mands are controlled by motivating operations
- There must be an MO at strength to conduct mand training
- MOs vary in strength across time, and the effects may be temporary
- MOs must be either captured or contrived to conduct mand training
- MOs may have an instant or gradual onset or offset

# Issues Concerning Motivative Operations (MOs) and Mand

- High response requirement may weaken an MO
- Instructors must be able to identify the presence and strength of an MO
- Instructors must be able to reduce existing negative behavior controlled by MOs
- Instructors must know how to bring verbal behavior under the control of MOs

# The Tact Relation



Child sees a poster of Dora

“Dora”

“It is Dora”

# The Tact Relation

- Tacts are always under nonverbal stimulus control
- Nonverbal discriminative stimuli involve:
  - “nothing less than the whole of the **physical environment**--the world of things and events which a speaker is said to “talk about.” Verbal behavior under the control of such stimuli is so important that it is often dealt with exclusively in the study of language and in theories of meaning” (Skinner, 1957, p. 81).
- Nonverbal stimuli can be, for example, static (nouns), transitory (verbs), relations between objects (prepositions), properties of objects (adjectives), or properties of actions (adverbs)

# The Tact Relation

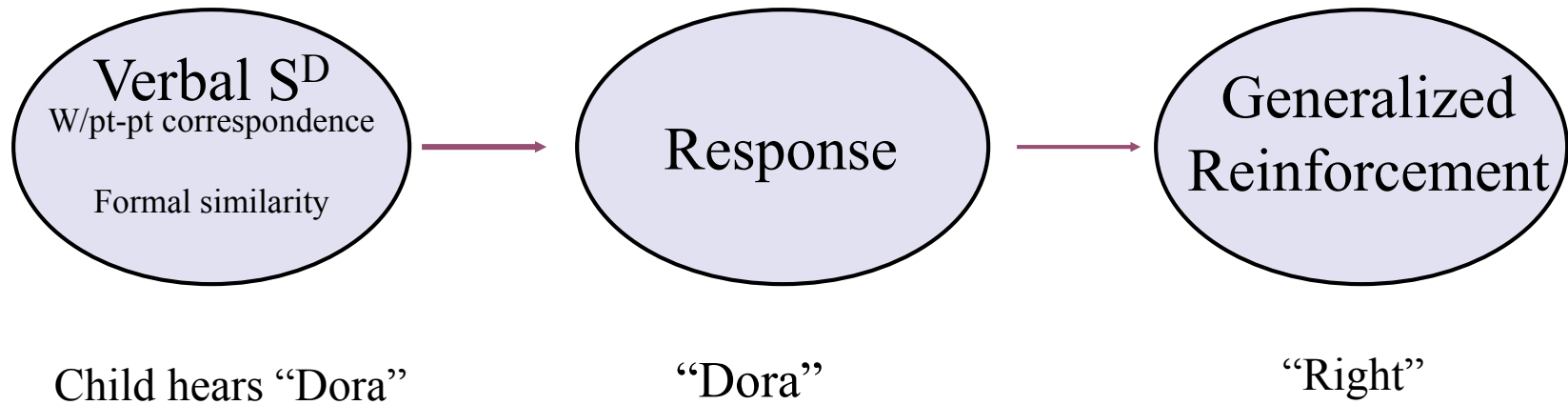
- Different sense modes (“**contact** with the physical environment”)
- Tacts can be controlled by nonverbal discriminative stimuli arising from, for example, visual, auditory, olfactory, gustatory, tactile, kinesthetic, pain, and chemo receptors
- In order for a nonverbal stimulus to become a discriminative stimulus for a tact there must be some process of operant conditioning
- The consequences for the tact involve generalized conditioned reinforcement

# Examples of Tacts

- There's mommy
- It's a car
- He's laughing
- I see red
- I feel sick
- That is a 57 Chevy
- That's inappropriate behavior
- Those guys are fast
- Were going up
- I smell gas
- What would it take to make these same responses mands?



# The Echoic Relation



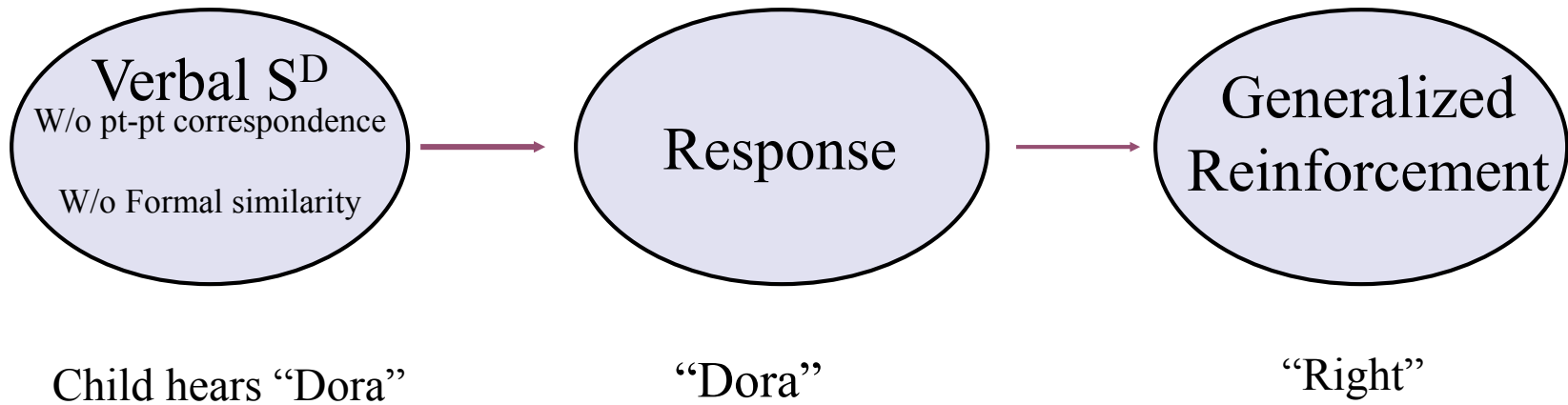
# The Echoic Relation

- **Verbal stimulus control:** “Product of someone’s verbal behavior functions as a discriminative stimulus” (Michael, 1982)
- **Point -to-point correspondence:** “subdivisions or parts of the stimulus control subdivisions or parts of the response” (Michael, 1982)
- **Formal similarity:** “the controlling stimulus and the response product are (1) in the same sense mode (both are visual, or both are auditory, or both are tactile, etc.) and (2) resemble each other in the physical sense of resemblance” (Michael, 1982, p. 2)”

# The Echoic Relation

- **Motor Imitation** Motor imitation can have the same verbal properties as echoic behavior, as demonstrated by its role in the acquisition of sign language by children who are deaf
- **Copying-a-text** also has the same defining properties as the echoic
- Michael (1982) suggested the term “codic” for these three verbal relations
- The consequences for the echoic involve generalized conditioned reinforcement
- The ability to echo the phonemes and words of others is essential for learning to identify objects and actions
- The echoic consists of a “minimal repertoire”

# The Intraverbal Relation



# The Intraverbal Relation

- **NO Point -to-point correspondence:** The verbal stimulus and the verbal response do not match each other, as they do in the echoic relation.
- **NO Formal similarity:** the controlling stimulus and the response product can be in the the same or different sense modes and **DO NOT** resemble each other in the physical sense of resemblance
- Like all verbal operants except the mand, the consequences for the intraverbal involve generalized conditioned reinforcement (Skinner also uses “non-specific reinforcement,” “educational reinforcement,” and “contiguous usage” to identify the consequences for the intraverbal

# The Intraverbal Relation

- Verbal behavior evoked by other non-matching verbal behavior
- It prepares a speaker to behave rapidly and accurately with respect to verbal stimulation, and plays an important role in continuing a conversation
- There is a huge variation in speaker's intraverbal repertoires, especially when compared to the mand and the tact
- Typical adult speakers have hundreds of thousands of intraverbal relations as a part of their verbal repertoires
- An intraverbal repertoire allows a speaker to answer questions and to talk about (and think about) objects and events that are not physically present

# What is Intraverbal Behavior?

- An intraverbal repertoire facilitates the acquisition of other verbal and nonverbal behavior
- Intraverbal behavior is a critical part of many important aspects of human behavior such as social interactions, intellectual behavior, memory, thinking, problem solving, creativity, academic behavior, history, and entertainment

# Examples of Intraverbal Behavior Emitted by Children

## Verbal Stimulus

## Verbal Response

*Twinkle twinkle little...*

*Star*

*A kitty says...*

*Meow*

*Mommy and...*

*Daddy*

*Knife, fork and...*

*Spoon*

*What do you like to eat?*

*Pizza!*

*What's your favorite movie?*

*Sponge Bob Square Pants!*

*Can you name some animals?*

*Dog, cat, and horse*

*What's your brother's name?*

*Charlie*

*Where do you go to school?*

*Harvest Park*



# Examples of Adult Intraverbal Behavior

## Verbal Stimulus

## Verbal Response

*How are you?*

*I am fine.*

*What's your name?*

*Mark*

*Where do you live?*

*Concord, CA*

*What do you do?*

*I'm a behavior analyst...*

*What is ABA?*

*B F. Skinner...*

*What do I do about SIB?*

*The first step...*

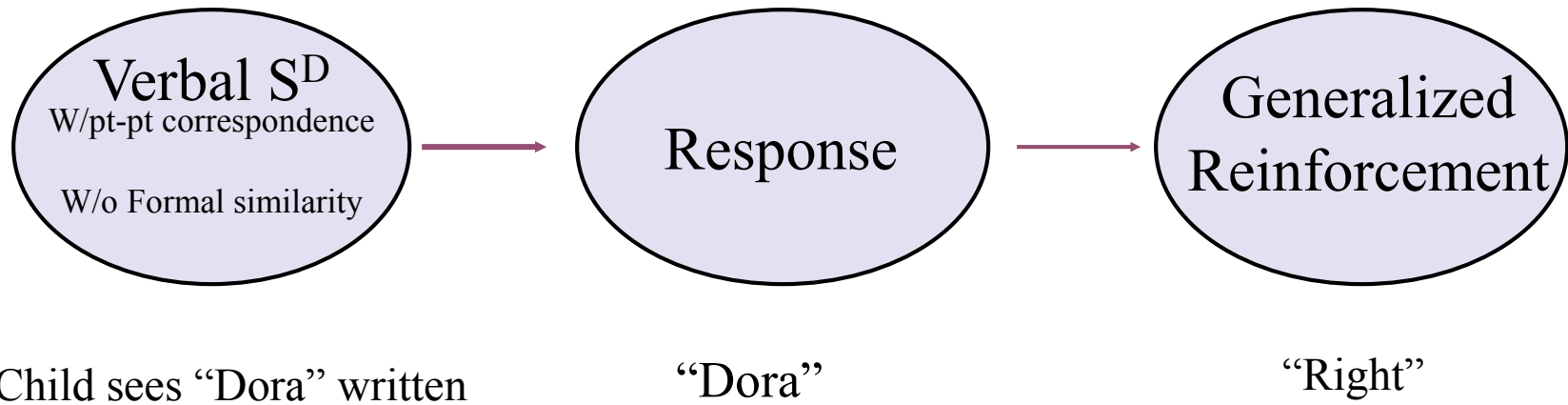
*Should I attend Dr. Iwata's talk?* *Yes, Dr Iwata...*

*Is there research to support ABA?* *Yes, there is...*

# How is the Intraverbal Relation Different from the Mand, Tact, & Echoic?

<u>Antecedent</u>	<u>Behavior</u>	<u>Consequence</u>
• Motivation (EO)	Mand	Specific reinf.
• Nonverbal S <sup>D</sup>	Tact	Social reinf.
• Verbal S <sup>D</sup> with a match	Echoic	Social reinf.
• Verbal S <sup>D</sup> without a match	Intraverbal	Social reinf.

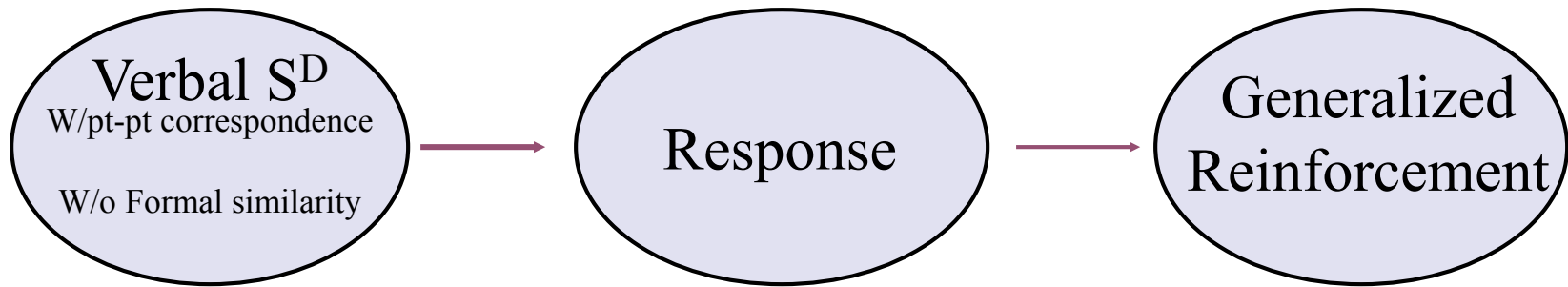
# The Textual Relation



# The Textual Relation

- **Verbal stimulus control**
- **Point -to-point correspondence**
- **No Formal similarity:** The controlling stimulus and the response product are not in the same sense mode and do not resemble each other

# The Transcriptive Relation



Child hears “Dora” spoken

Writes “Dora”

“Right”

# The Transcriptive Relation

- **Verbal stimulus control**
- **Point -to-point correspondence**
- **No Formal similarity:** The controlling stimulus and the response product are not in the same sense mode and do not resemble each other