Slide 1

Generative instruction is a behavioral strategy for ensuring contingency adduction, which we will talk about later.

Slide 2

Discovery Learning
--Popular in American schools

Discovery is an important outcome

Teaches child
--They are capable of discovery
--How to discover

Evidence-based instruction achieves this outcome

Slide 3

Skinner, and behavior analysis at large, have been criticized for a failure to account for behaviors like creativity, insight, innovation

Slide 4

This has been especially problematic in the field of education because these behaviors are important outcome of education

"You can't program the next Shakespeare"
--Is that really the case?

Today we will learn how a science of behavior can account for those behaviors

Slides 5-8

Need to pin down what we're talking about

What is creativity

OED: Highlights originality as a critical feature
--Novel behavior

Slide 9

Creativity appears impossible to define
--Covers a lot of different types of behaviors
--Subjective

Look at novel behaviors and the contingencies present in the environment and behavioral history that bring those behaviors about

Slide 10

Define it in terms of environmental input and behavioral output

Talk about it in terms of the contingencies that produced novel behaviors

* I.e How does the environment bring about novel behaviors

Slide 11

Contingency Adduction is a way to talk about novel behavior in terms of observable events

Contingency adduction occurs when a behavior meets the requirements for reinforcement without being directly trained in that behavior

Goes from step 1 to step 4, step 5 to step 14

Adduce means “drawing from”

Contingency Adduction was selected as a term to emphasize that the environmental contingencies, and not the organism or their thinking brought the new behavior about

Contingency Adduction is an umbrella term for more specific examples that we’ll examine soon

Slides 12-13

Generativity was first researched as a behavioral principle by Robert Epstein and BF Skinner

Skinner had not worked in the lab for quite some time

Epstein showed Skinner an article published in a prominent Research Journal

It talked about insight in the chimpanzee

It said that some notion of insight is needed in order to understand the process by which animals solved a problem

Skinner and Epstein decided to show that theories of mind were not needed to account for the emergence of new behaviors

An omission for which Skinner had long been criticized

Slides 14-15

Direct Training

Examples of direct training

Shaping

Slide 16

Flash cards

Slide 17

Monkey see, monkey do

Slide 18

Contingency Adduction is the term for behaviors that occur without such training

Novel behaviors AND responses to novel stimuli

Generative Instruction is instruction designed to ensure that contingency adduction occurs on a regular basis

Slide 19

Two Strings Example

Two long strings are suspended from a high ceiling, 10 meters apart
Participant is told they must connect tie the two strings together
Participant is given a long stick with a hook to "help"

Typical performance

- Pulls one string to other

Strings are too far apart

2. Pulls other string to first

(Obviously) too far apart

3. Picks up stick, uses stick to extend reach

Still too far

4.Ties object to string

Usually in attempt to extend reach

5. Drops object on string

Pendelum

6. Solves problem

Slide 20

Automatic Chaining, or autochaining, is when a behavior changes the environment in a way that affects the probability of another behavior

Read your own adventure

Slide 21

Stimulus Generalization

A child who learns to say red in the presence of a red toy car says red in the presence of a red bird

Note that training with red birds did not occur

A respoonse previously reinforced in the presence of one stimulus is emitted in the presence of another stimulus

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Response generalization

A young girl learns to say water when she is thirsty

Says water when she sees a puddle

Even though she is not thirsty

Slide 23

Concept formation

Dr. Johnson's lecture

Responding to members of a stimulus class differently than to nonmembers

Slide 24

Stiumulus equivilance

Learning that [vocalized] "one" = [written] one = 1

Slide 25

It's easiest to conceptualize skills as belonging to a hierarchy

The hierarchy has three levels, with the simplest skills existing at the bottom

The simplest skills are called "tool skills"

In the middle are component skills

Component skills are more complicated than tool skills but simpler than composite skills are the most complicated

It is easiest to conceptualize skills in such a way because the more complicated skills rely on simpler skills

This, by the way, is the relationship between Tool, component, and composite skills

Reiterate: Component skills rely on tool skills, composite skills rely on component skills (which rely on tool skills)

This means that when you perform a composite skill, you are, in so doing, performing a tool skill. And when you perform a composite skill, you are, in so doing, performing a component skill (and, in so doing, performing a tool skill).

Examples:
Playing a song on the saxophone

Tool Skill: Playing a single note
Component Skill: Playing a scale
Composite Skill: Playing a song

Painting a picture

Tool skill: Making deliberate brushstrokes
Component Skill: Painiting basic shapes
Composite skills: Forming complicated and deetailed shapes from more basic shapes

Notice here how the more complicated, detailed shapes in the painting are actually recombinations of more simple shapes.

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This is a good example of how tool, component, and composite skills are related

Figure five is a picture of Wolverine

This is the product of what type of skill?

What about Figures 3 & 4

1 & 2

Recruitment is the process through which the tool skills of drawing a circle and then making it three dimensionsanal are utilized during new behaviors

When you encounter a new situation, in this example, drawing Wolverine, the situation (contingency) recruits behaviors in which you already are fluent and recombines those behaivors to form new behaviors

Look again at examples

Slide 27

Another form of contingency adduction

Describes the performance of composite skills that are made up of bits and pieces of component and tools skills recruited, recombined and connected to one another in new ways (interconnection) in order to meet the demands of a new situation.

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By way of review: generativity is the study of contingency adduction

Interconnection & recombination of skills

Learned independently
--Push box toward dot
--Climb on box
--Peck banana
Skills were combined, recombined until it met success

Stimulus Generalization
Pushing box toward something has been reinforced
--Previously pushed it toward a dot
--Now pushing toward banana
*Important difference: In previous situations, the pigeon was reinforced when the box was on top of the dot, which was located on the floor
In this new situation, the pigeon is trying to get the box close to the target

Autochaining
--Each time the pigeon pushes the box, the box is closer to the target, which strengthens pushing the box toward the banana

Pushing the box under the target (the banana) produced a situation in which the pigeon could climb onto the box and peck the banana

Slide 29

Showed that students can blend individually learned sounds, without having been directly taught the blended sounds

Slide 30

Contingency adduction is ideal

If a behavior is aquired without direct teaching, you can skip the teaching
--Faster

Also is more in line with the ideas of discovery learning
--Allows children to benefit from discovery
--Allows children to learn that they can discover
+++self-esteem

Discovery is a skill
--Generalizes to other skills

Slide 31

Engineering contingency adduction

Morningside constructs their instructional program using a logical and empirical analysis of the skills, knowledge, and relationships in a field of study and using those analyses to sequence instruction in a way that makes it likely that previously learned skills will be recruited to form new skills

logical: Looking at the performance requirements (what the student needs to do) and determining what skills are required in order to meet those requirements

By empirical is meant: testing lessons to see which skills are reliably recruited to meet the performance requirements of a new contingency

Morningside also uses fluency as a measure of performance
--Behaviors that are fluent are more likely to be recruited

Slide 32

Reading program

3 years, $5 million research program

Available over the internet
--Allows for collection of data

During the three years of research, over 10 million interactions were recoreded

These data were used to make over 10,000 data-based revisons until the program proved effective

Still collects data

Headsprout collects data on every users interaction

Over 90% of learners average over 90% correct responding

Highly Active - The learners engage in (average) 190 individual interactions during each lesson

Emit over 180 correct responses in each lesson
--9 per minute

Mastery Criteria

Each instructional segment has a specific goal and learners who don't meet that goal are diverted to a supplementary lesson

Comprehension indicators
Want to ensure that readers understand that sentences have meaning and are not just a list of words

"Look at the ceiling."

After each reading exercise, users must select a picture that goes along with that sentence

Example

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This is an example of a comprehension indicator

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Teaches to fluency

Fluency-building activities start at lesson 1

As early as lesson five, skills from previous lessons are incorporated

Counts hesitations and self-corrections as errors

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Robert Epstein, recall, did some of the earliest research on Generativity

He identified four basic skills that creative people tend to have

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When something appears to come from nothing…

Coin flip example

Creative behaviors are the result of an orderly process

Insight, discovery etc. are all the result of the interaction between past learning and the demands of the current environment