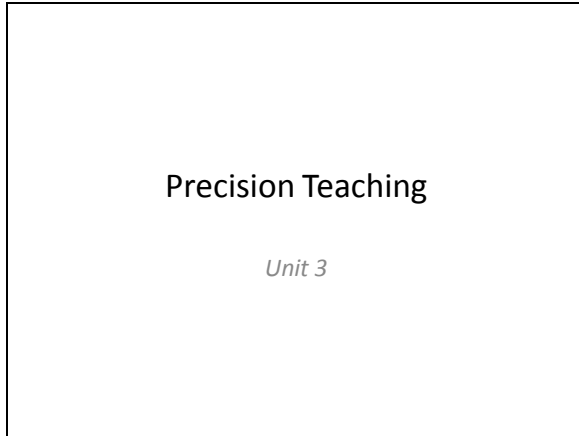
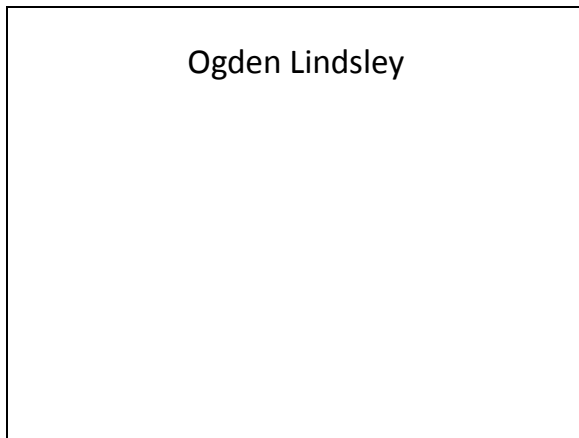


Slide 1



Bring ruler (or any straight edge object),
calculator, also good if bring:
Blue or green pen
And
Red or orange pen

Slide 2



Student of Skinner
Behavior therapy
1965: wanted to bring rate and
cumulative recorder out of lab in class

Slide 3



Influence of Pavlov and Keller

Slide 4

Basic tenets Lindsley took from Skinner

- Consequences control operant behavior
- The learner knows best
- Work with observable behavior
- Monitor frequency daily
- Use frequency as a universal, standard, and absolute measure of behavior
- Adopt a standard display for data

Guiding principles that developed Precision Teaching

Slide 5

Extending Skinner's main contributions

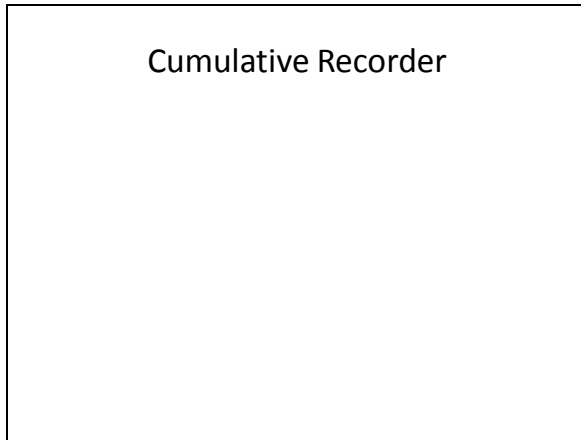
- "My most important contributions were rate of response and the cumulative response recorder." – B.F. Skinner

Slide 6

Time element inherent in behavior analysis

"An operant is strong when emitted often within a given period of time; it is weak when emitted rarely."

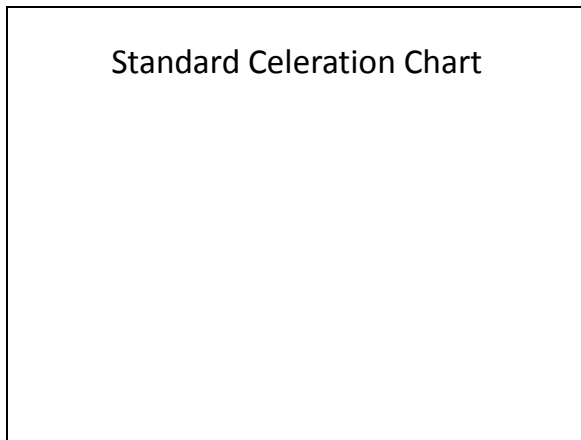
Slide 7



Cumulative Recorder

Shows moment-to-moment changes in behavior
Shows response rate over time

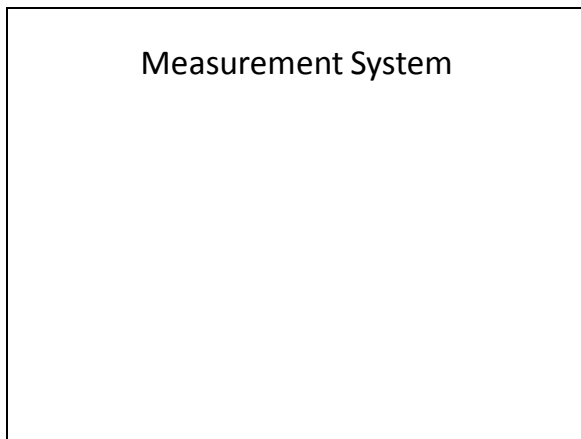
Slide 8



Standard Celeration Chart

Also shows response rate over time

Slide 9



Measurement System

Assessment rather than instructional
Learner performance compared against known standard
However, assessment is critical component of effective instruction
Decision support system

Slide 10

Importance of Data

“Where’s the data?”
Separate out assumptions from truths
Just another opinion

Slide 11

Assumptions explaining poor international academic standing

Underachieving Curriculum

Slide 12

Assumptions explaining poor international academic standing

Time allocation (8th)
US: 144
Japan: 101

Slide 13

Assumptions explaining poor international academic standing

Classroom size (8th)
US: 26
Japan: 40

Slide 14

Assumptions explaining poor international academic standing

Percentage educated
US: 82%
Japan: 92

Slide 15

Assumptions explaining poor international academic standing

Teacher preparation
Not in terms that can be counted (years of training)
Teacher attributions if kids failed: US vs. Japan

Slide 16

Combinations with other approaches

DI, PSI, CBI

Slide 17

Adjusting Instruction Based on Data

Educational decisions based on change in continuous monitoring
If desired occurs (more math calculations with less errors, reading more quickly / accurately), then instructional program is working
If desired doesn't occur, program not working (i.e. no change in behavior = no teaching). Program must be altered or eliminated
These attitudes (rat right, no change, no teach) remind not to dwell on diagnoses and factors that can't be changed.
Focus on variables that facilitate progress
Focus on current behavior rates (whatever learner's perf in past, responsibility to alter instruction to improve progress in future)

Slide 18

Brief timed samples

Brief samples (1 minute per day)
sufficient to monitor progress & make
decisions
Longer periods unnecessary

Slide 19

Favoring anecdotal reports

Causal observations do not allow
continuous flow of information about
performance changes
Cannot make informed educational
decisions
Measurement avoided for fear hurting
child
Highlighting lack of skills harmful to
child
But...

Slide 20

Count

Slide 21

Frequency / Rate

Count / time
Widely used in science, engineering,
economics, etc. No reason it can't be
applied to education

Slide 22

More critical situation, more rate is asked for

How fast talk, why, speech rehab,
normal rate
ER

Slide 23

Some examples rates in school

- Reading words / sentences correctly / incorrectly
- Generating positive adjectives to describe self
- Making factual or inferential statements about concepts from passage
- Saying steps used in solving complex problems
- Answering math problems orally or in writing
- SAFMEDS

Despite being central datum in lab, behaviorists often discarded in favor of traditional evaluation-percentage correct.

One of Precision Teaching's main contributions is to bring back rate as basic data to make decisions

Inner behaviors

Slide 24

Fluency: More than accuracy

Fluency: rate at which skill becomes so well learned that performed almost automatically and is not lost during periods of non-use (true mastery)
Note: behavior can be successfully performed at 100% correct and still not be fluent
When you're fluent, it means that performance is stable (resistant to distractions), easily applied (incorporated to more complex skills), retained over long periods with little or no practice, generalized to new situations, and shows endurance (performed for long durations without undue fatigue or loss of quality)

Slide 25

Fluency Aims

What is the appropriate rate?
Empirically developed
Oral reading (200-250 words per minute with two or fewer errors)
Typing (80-100 words per minute)
Fluency aims tells us goal
Tells us when to stop teaching
Hypothetical unit test example:
30 correct / 75 minutes (record ceiling of 0.4), 100% accurate but not fluent
Fluency requirement: 90 correct / 75 minutes (1.2)
Adjustment: 30 correct / 25 minutes (1.2)

Slide 26

Training: Thinking on Your Feet

Accurately without hesitation
Salesman
Bar pickups

Slide 27

Relation to Prerequisite Skills

Haughton
Most 40-50 correct written answers to addition problems per minutes
Some could never move beyond 20 per minute
Consequences (tokens, praise, notes to home, etc) irrelevant to breaking 20 / minute threshold

Slide 28

Relation to Prerequisite Skills

More elementary skills (writing and reading digits) just accurate
Built to fluency
Only then did they move beyond 20 per minute on more complex skills
Rate of correct responding in prerequisite skills (not just successful performance at any rate) is limiting factor in development of subsequent skills
Thus, mastery defined by fluency, not accuracy

Slide 29

Celeration

Begin using count over time, directly measuring behavior, not some abstraction of behavior
Celeration: linear measure of the rate of performance over time
Draw line through dots. This line is celeration
Steeper celeration line: more change (instruction effective)
Flatter celeration line: less change (instruction ineffective)
Regression not necessary

Slide 30

Contrast with typical student measurement

Bell curve (artificial adjustments)
Letter grades, percentages, grade point averages
-Infrequent measures
-Emphasis on attainment of marks instead of learning
Despite high correlation, doesn't necessarily mean material is well learned

Slide 31

IQ and bias

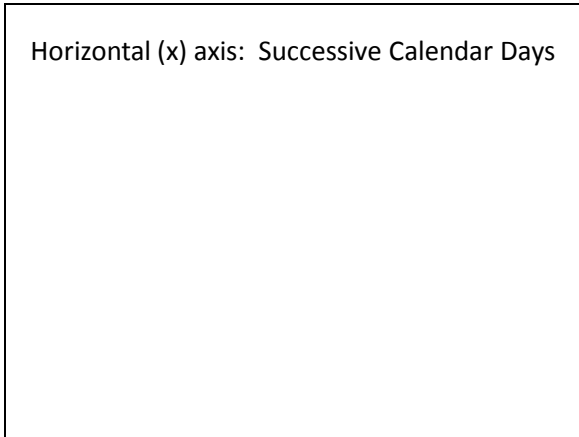
Time consuming, costly, requires person highly trained in psychometrics (may be short supply)
Biased (what IQ actually measures)
Celeration as unbiased (Koenig and Kunzelmann, 1981)

Slide 32



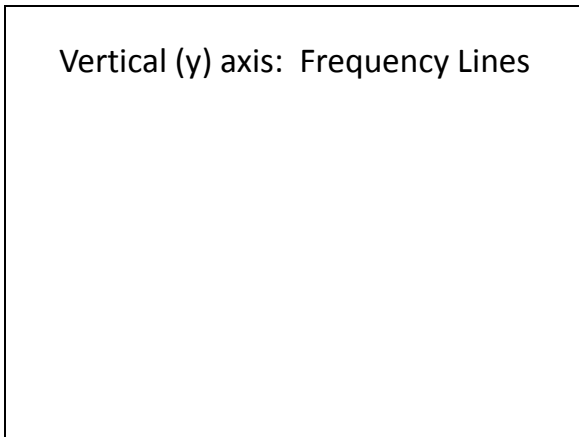
Light blue
Tested with three shades each of red, orange, yellow, green, blue, and light brown
Light blue produced highest accuracy of charting

Slide 33



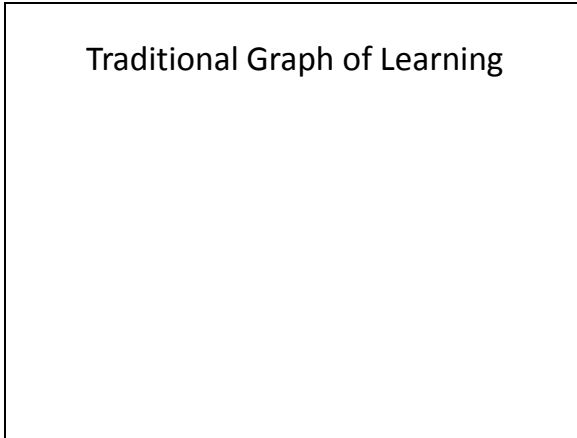
Equal interval scale
Bold blue lines are Sundays
20 weeks

Slide 34



Equal ratio scale (logarithmic)
Count per minute scale (count divided by minutes)
.1 = 1 behavior every 10 minutes (not one tenth of a behavior in one minute; no fractional behaviors)
.01 = 1 behavior every 100 minutes
.001 = 1 behavior every 1000 minutes (not quite once every 17 hours)

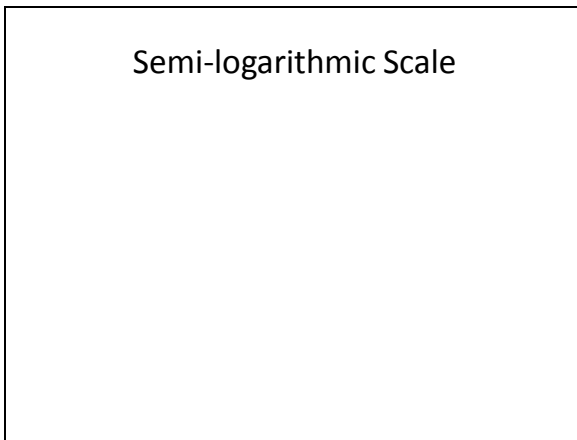
Slide 35



Traditional square graph of behavioral change produces a curved line as behavior increases or decreases (the learning curve)

When teaching, more significant to have child progress from 10 to 15 words per minute than 80 to 85 words per minute

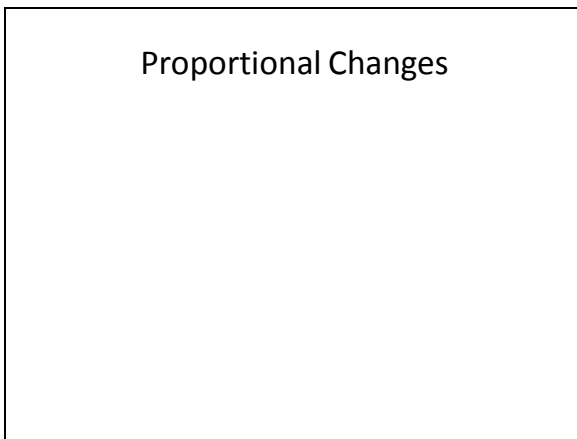
Slide 36



Logarithmic scale straightens out traditional learning curve

Advantage: Easier to visually extend and project straight line than curved line

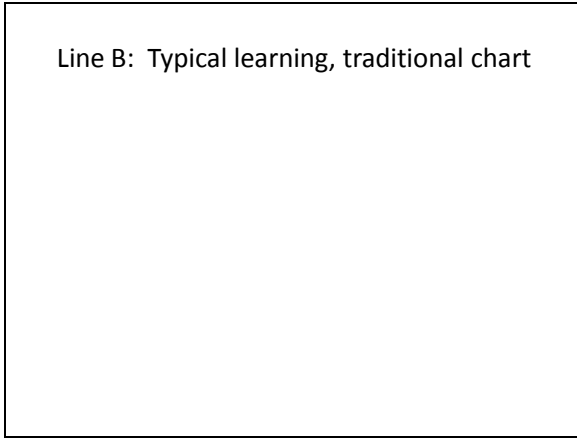
Slide 37



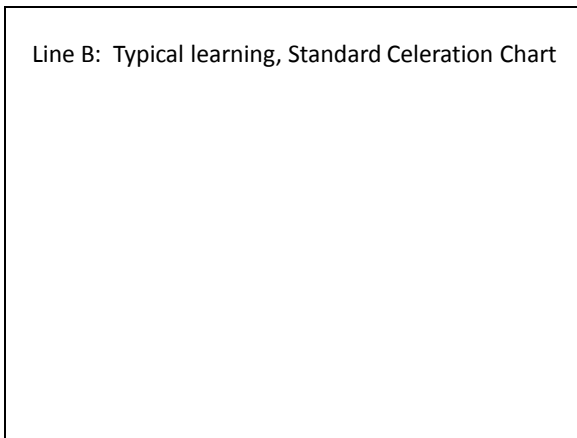
A constant celeration is an angled straight line

Chart shows proportional changes in response rate

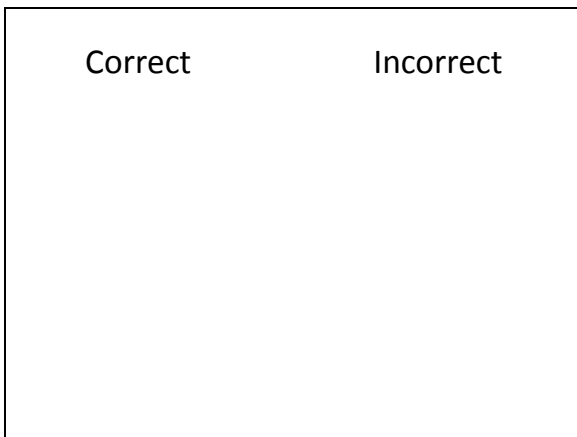
Slide 38



Slide 39



Slide 40



Rates we want to accelerate: dots (blue or green, if in color)
Rates we want to decelerate: X's (red or orange)

Slide 41

Example 1: Graphing Correct Trainee Responses

- Day one (Monday): 5 correct in 5 minutes
- Day two: 3 correct in 1½ minutes
- Day three: 40 correct in 10 minutes
- Day four: 56 correct in 7 minutes
- Day five: 960 correct in 1 hour

Slide 42

Frequencies

Slide 43

Celeration

Slide 44

Example 2: Positive Interactions

- Day 15 (M): 7 times in 8 hours
- Day 16 (T): 22 times in 8 hours
- Day 17 (W): 17 times in 4 hours
- Day 18 (R): 25 times in 4 hours
- Day 19 (F): 19 times in 2 hours

Cell phone prompts
Manager 2 for 1

Slide 45

Positive Graph

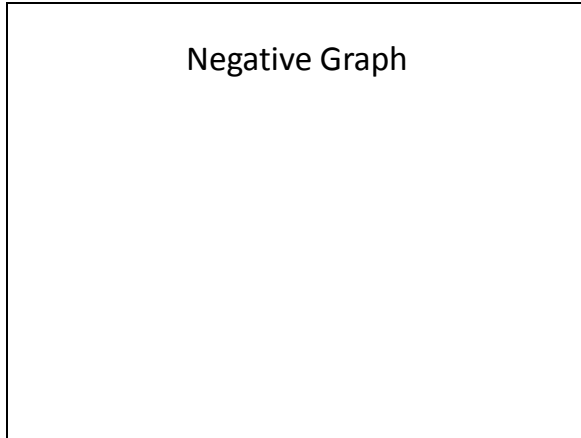
Slide 46

Example 2: Negative Interactions

- Day 15 (M): 97 times in 8 hours
- Day 16 (T): 93 times in 8 hours
- Day 17 (W): 45 times in 4 hours
- Day 18 (R): 43 times in 4 hours
- Day 19 (F): 20 times in 2 hours

Cell phone prompts
Manager 2 for 1

Slide 47



Slide 48



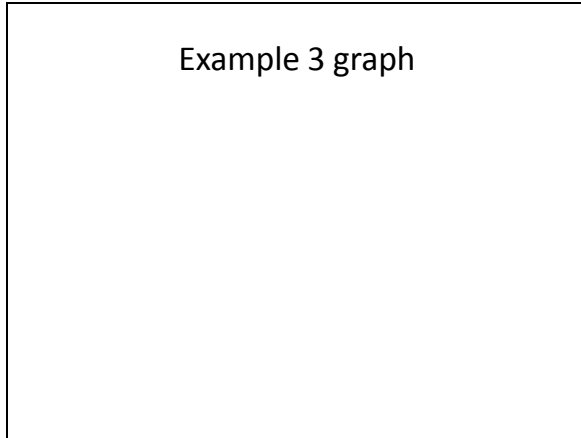
Slide 49

Example 3: Hour-long martial therapy sessions
Affectionate and criticism comments: Day 29

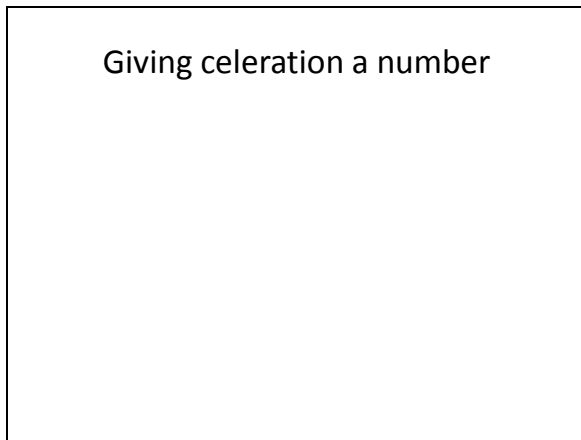
• <u>Affectionate count</u>	• <u>Criticism count</u>
• Monday: 2	• Monday: 169
• Tuesday: 5	• Tuesday: 91
• Wednesday: 21	• Wednesday: 73
• Thursday: 43	• Thursday: 35
• Friday: 65	• Friday: 12

When done, draw celeration lines

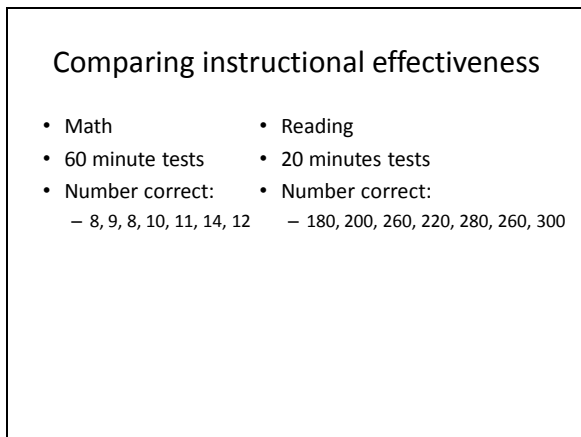
Slide 50



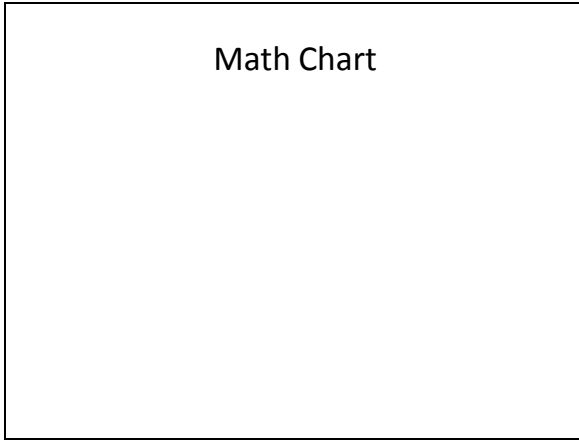
Slide 51



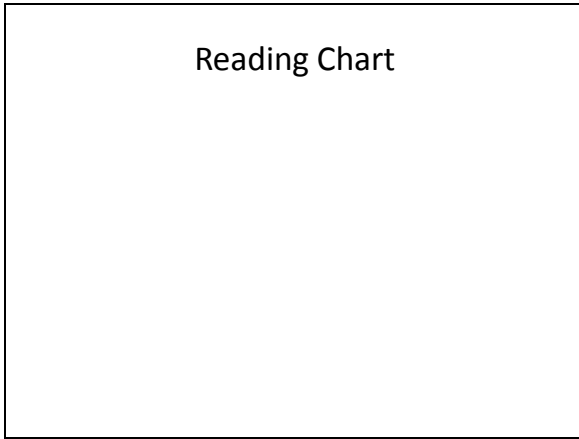
Slide 52



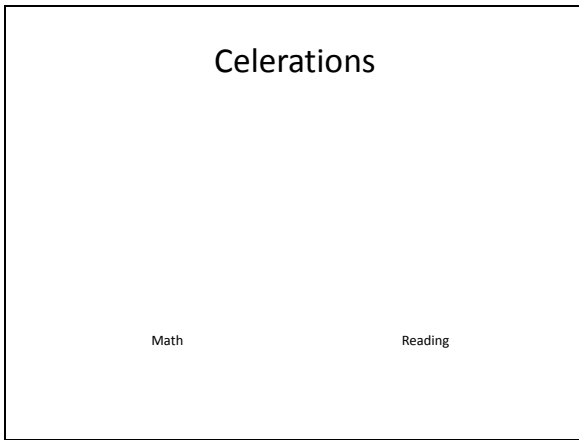
Slide 53



Slide 54



Slide 55



Slide 56

Self-charting

Grade 1
DI to teach
Combining with PSI
Lindsley: Must self-count and self-chart
(more likely to look at and consider
data)
No chart: 10%
Teacher-chart: 20-40%
Self-chart: 80-100%

Slide 57

Self-monitoring and cheating

Outside expected range
Opportunity to demonstrate
Must maintain "improvements"

Slide 58

Peer Tutoring

Slide 59

Plain English

Try to improve communication through plain English, acronyms, etc

Slide 60

Emphasis on practice

30 / 70
Threat to teachers (entertainers)
Entertainment from visible gains instead

Slide 61

Sacajawea Project

Used PT in addition to standard curricula for 15 – 30 minutes each day 1976-80
20 and 40 percentile points higher than control
Unfair group comparisons (special ed)

Slide 62

Morningside Academy

Slide 63

Final timings

Slide 64

THE END

- On Wednesday (Feb 6th)
 - Assistance hours with Megan
 - Wood Hall Lounge 5:30 – 6:30
- 28-point exam on Thursday (Feb 7th)
- Questions?