Definition and Detection

Two aspects of science is the definition of your concept and the ability to measure it (detect it).

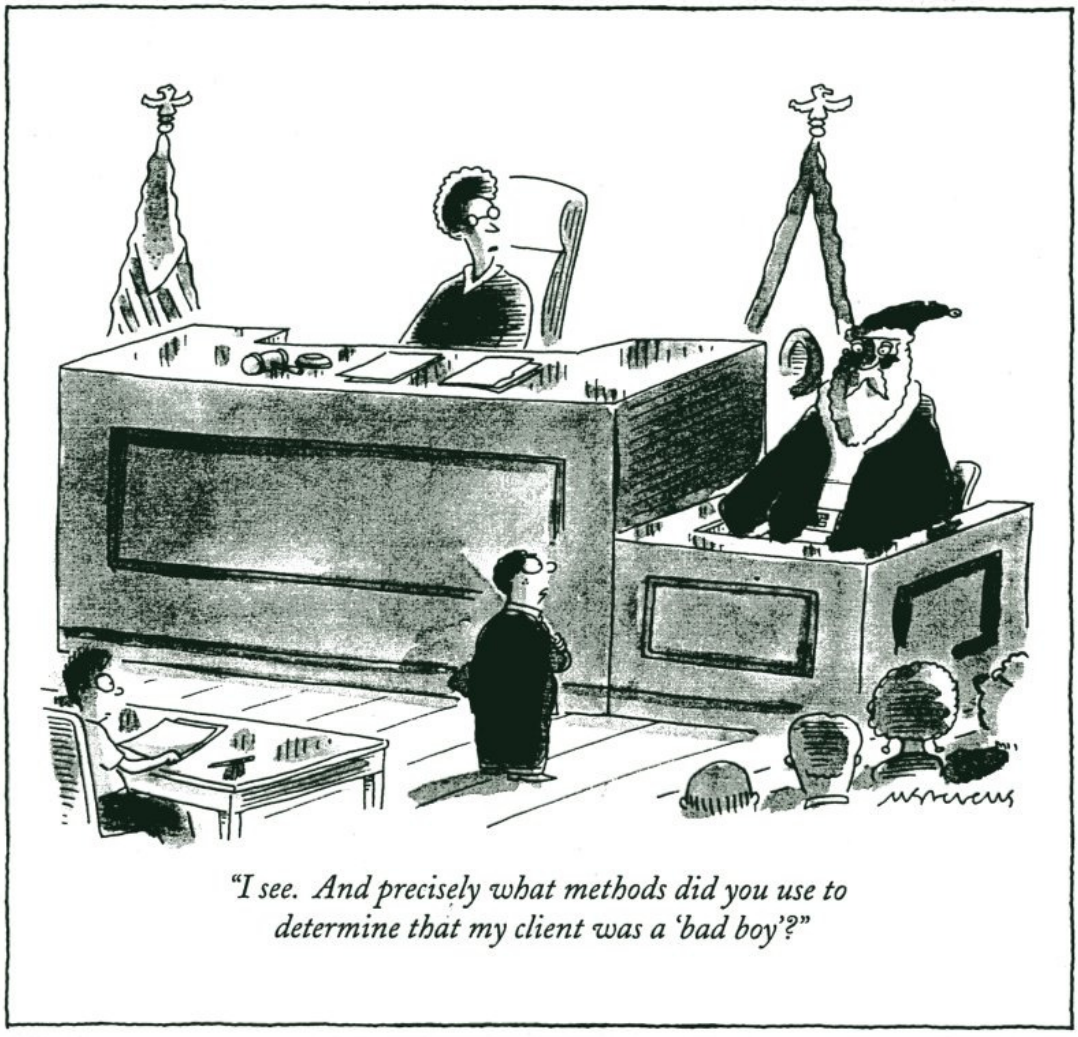
One definition of learning is:

One definition of learning is that it is a change in behavior due to experience. Changes in behavior due to drugs, injury, aging or disease do not qualify as learning (page 25).

This is our definition. Why do we need to define our concepts?

Testing claims: Operational Definitions

When the scientist tests the claim or hypothesis, they must operationally define the variables they are testing. These definitions are a relatively precise description of how the variables will be manipulated or measured. These definitions should be such that they could be assessed by anyone and produce similar results.



"I see. And precisely what methods did you use to determine that my client was a 'bad boy'?"

A "bad boy" means different things to different people. We need to define it in a way that we are using consistent definitions that allow us to identify "bad boys".

Testing claims: Operational Definitions

Examples of operational definitions:

- **Intelligence** is operationally defined as a score in the WAIS (Wechsler Adult Intelligence Scale).

Below average intelligence	Normal intelligence	Above average intelligence

- An **unsafe driver** is a driver who has gotten into 3 accidents within a one-year span.
- An **Oregon citizen** is one who has lived in Oregon for 3 months.
- The executive branch of the federal government wants to operationally define "fast food" jobs as "**manufacturing jobs**" (why?).
- Use of **inappropriate language**
- A **serving size** is defined as…
- **A conformist** is someone who…
- **A team player** is someone who…

If you don't have operational definitions, you run into problems such as the following results:

- 60% of surveyed high school students rated themselves in the top 10%
- 25% rated themselves in the top 1%

They used different operational definitions of what is best, such as math, sports, music, art, glee club, social friends

Testing claims: Operational Definitions

Image source: Classics of Western Literature, Bloom County 1986-1989, (1990), Berke Breathed

Operational Definitions

In the study of learning, there is basic research that is done with pigeons and rats to establish the basic psychological principles. Once they are established in animals, it is easier to attempt observations in humans.

Operational definitions

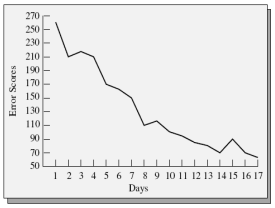
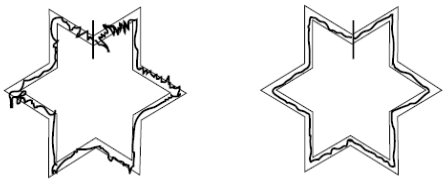
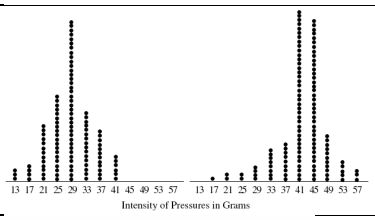
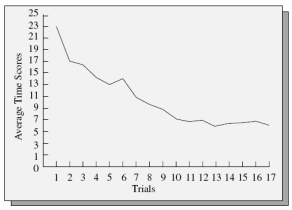
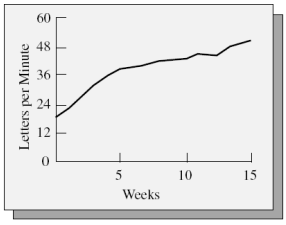
Salivating: The difference in the mass of a dry cotton ball and the mass of a cotton ball that has been placed in the mouth.

Disk peck: When an animal, such as a pigeon, strikes a disk hard enough to activate the recording device.

Measurement of Learning

How do we know if leaning has taken place? If learning is a change in behavior, we must measure changes in behavior.

Your book describes seven ways of measuring changes in behavior.

• Reduction in errors	
• Changes in the topography of behavior	
• Changes in intensity of behavior	
• Changes in the speed of behavior	
• Latency of behavior	
• Rate or frequency of behavior	
• Fluency	

Measuring Learning

Reduction in errors:
Learning occurs when there is a reduction in the number of errors.

As training progresses,

- rats can make fewer errors in running a maze,
- Ebbinghaus can make fewer errors in memorizing non-sense syllables,
- students can make fewer errors in using their flash cards,
- a cashier makes fewer mistakes in the amount of change given to customers
- A person burns fewer cookies
- At your job?

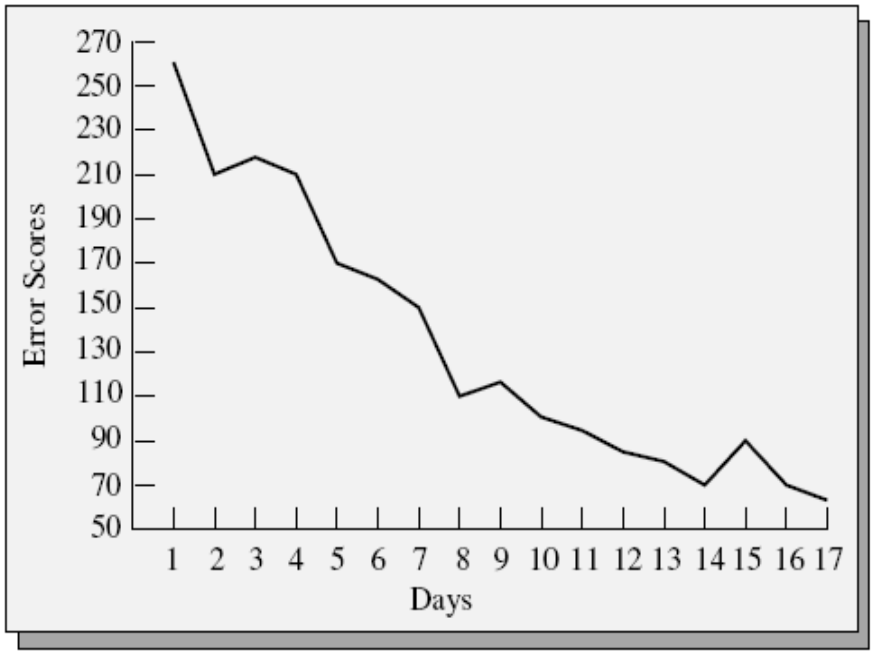


Figure 2-1 Errors as a measurement of learning. A decline in the number of errors (such as entering the wrong alleys of a maze) is a measure of learning. (Adapted from Tolman and Honzik, 1930a.)

Measuring Learning

Changes in topography:

Learning is measured by changes in topography of the shape. The form of behavioral learning occurs can change after practice.

- In a mirror tracing task, the tendency to draw a line between the two boundaries becomes better.

Learning →

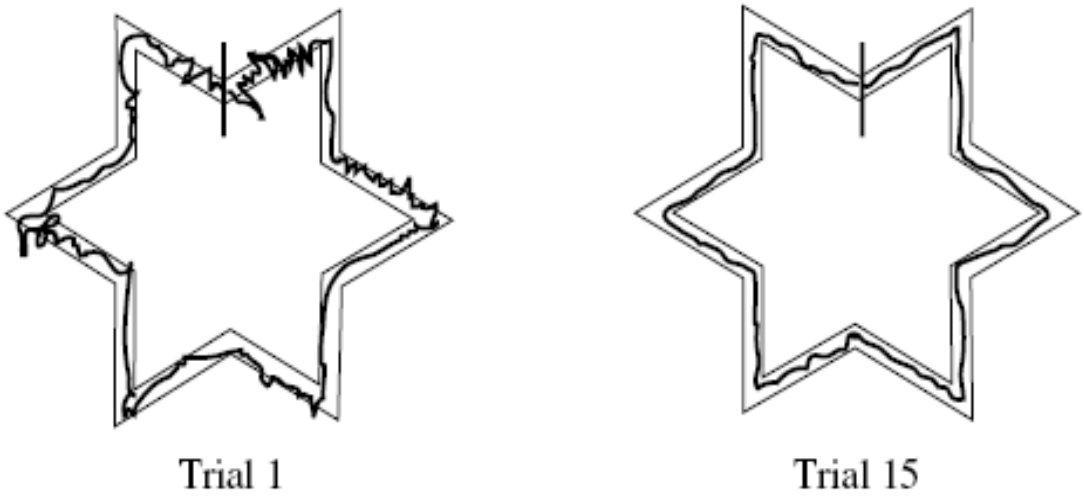


Figure 2-2 Topography as a measure of learning. A person attempted to trace between the lines of a star while looking at the figure's image in a mirror. On the first trial the participant's performance was shaky and erratic; by trial 15, the performance was much improved. The change in topography is a measure of learning. (Adapted from Kingsley and Garry, 1962, p. 304.)

- A person can change gears in a stick-shift car smoothly.
- A person makes cookies that are more delicious and prettier cakes.
- Illustrations are more precise.

Measuring Learning

Changes in intensity of a behavior:

Learning is measured by changes in intensity of a behavior.

- A lab rat presses a lever on the average with more pressure (29 grams versus 43 grams of pressure).

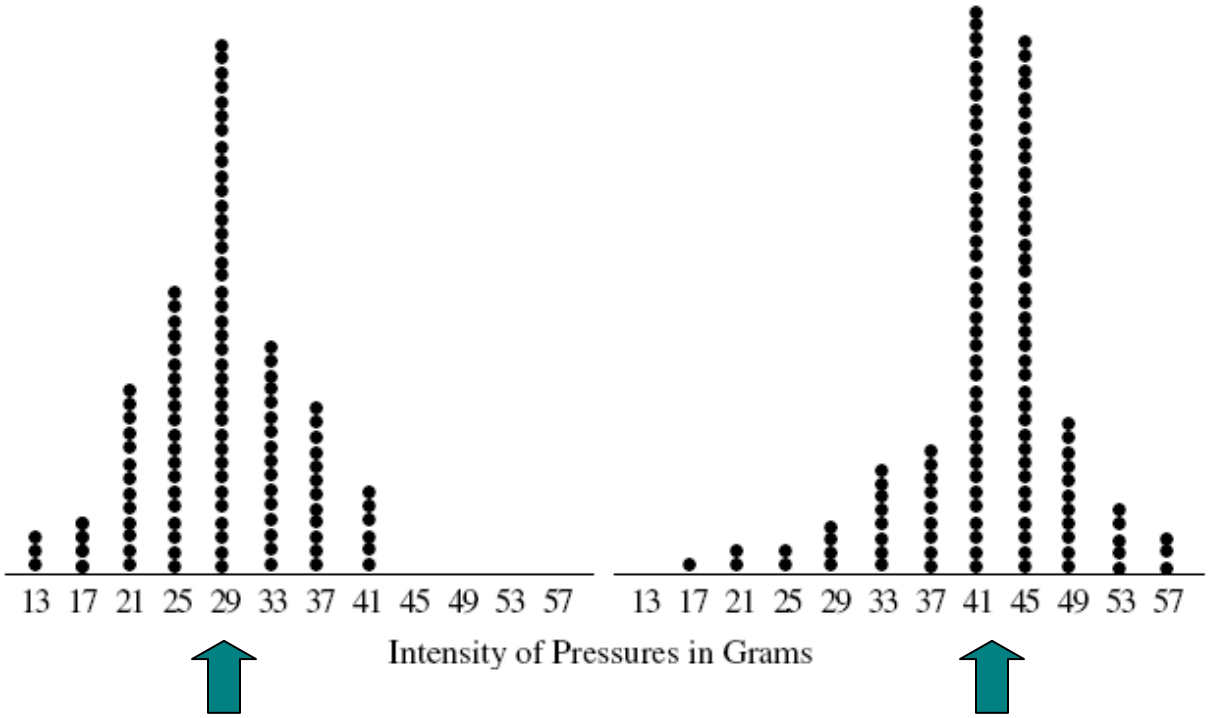


Figure 2-3 Response intensity as a measure of learning. These frequency distributions show variations in the force exerted by a rat in depressing a lever. The left shows the distribution when all lever presses with a force of at least 21 grams produced a food pellet. The right shows the distribution when the requirement was raised to 38 grams. The increase in force exerted is a measure of learning. (After Hull, 1943, p. 305.)

- A dog barks louder or softer
- A person checks their email more often
- You text more often

Measuring Learning

Changes in speed of their behavior:

There is a change in the speed of behavior. As time goes by with more practice (more trials), the speed at which you complete the maze decreases (the time goes down).

- A rat learns to run a maze much quicker

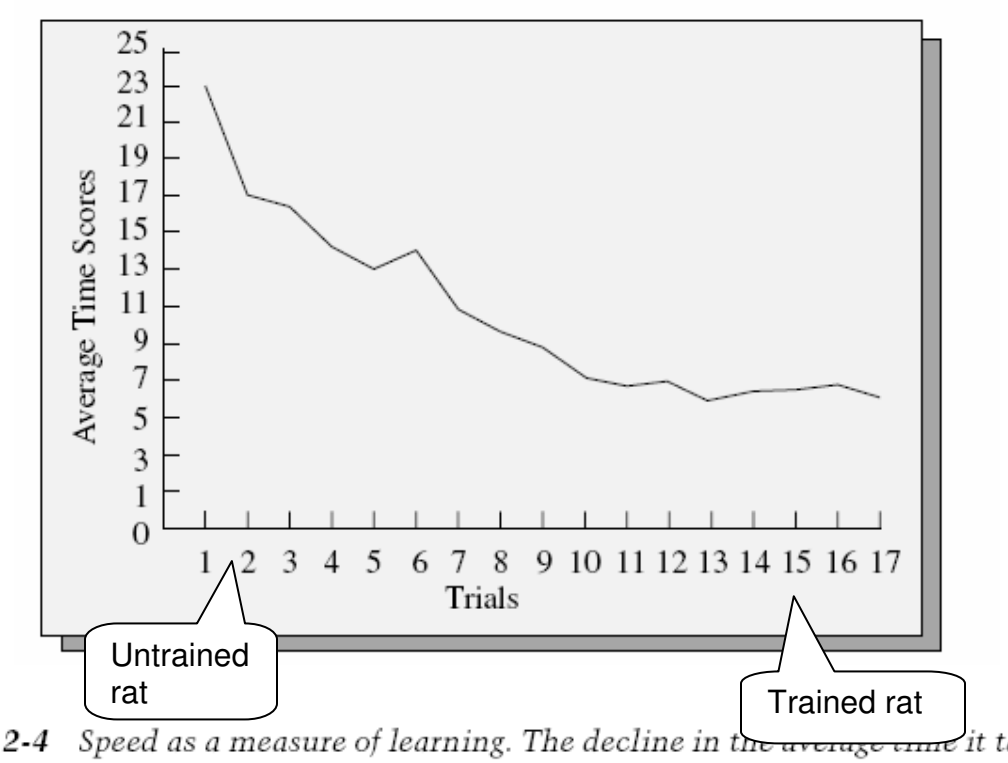


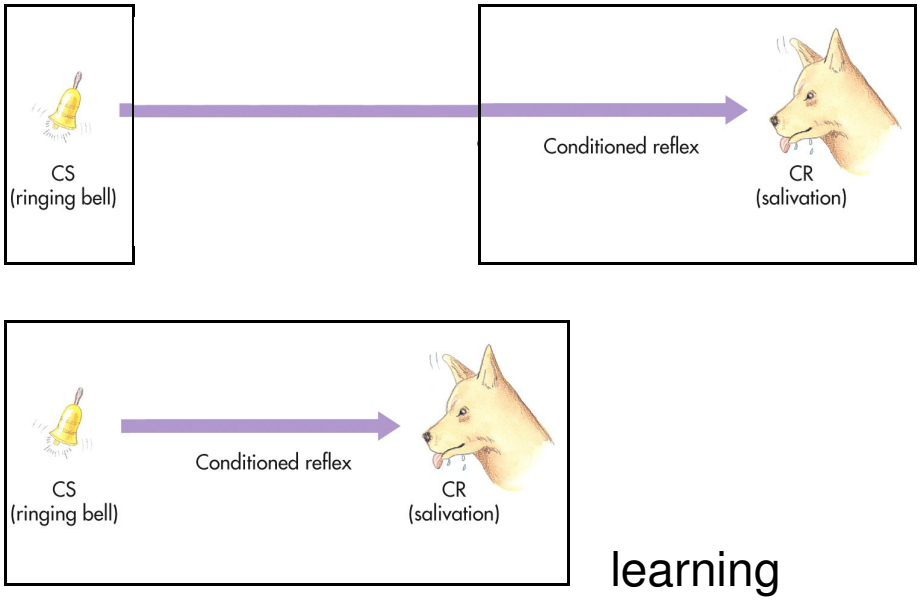
Figure 2-4 *Speed as a measure of learning. The decline in the average time it takes rats to run a maze indicates learning. (Adapted from Tolman and Honzik, 1930.)*

- A person can enter their password faster
- You can text faster
- A student can make bread in less time

Measuring Learning

Latency of behavior:
The amount of time that passes between the signal of the behavior and the behavior.

- When a bell is rung to signal the presentation of food, the time the dog takes to salivate becomes shorter.



learning

- When a fire drill occurs, the time to evacuate a building becomes shorter when learning occurs.
- When students are asked questions, their time hesitating is reduced (assuming no increase in error rate).

Measuring Learning

Changes in rate or frequency:
Learning occurs when a behavior increases.

- A pigeon going from 5 pecks per minute to 10 pecks per minute
- Decoding Morse code at a faster rate

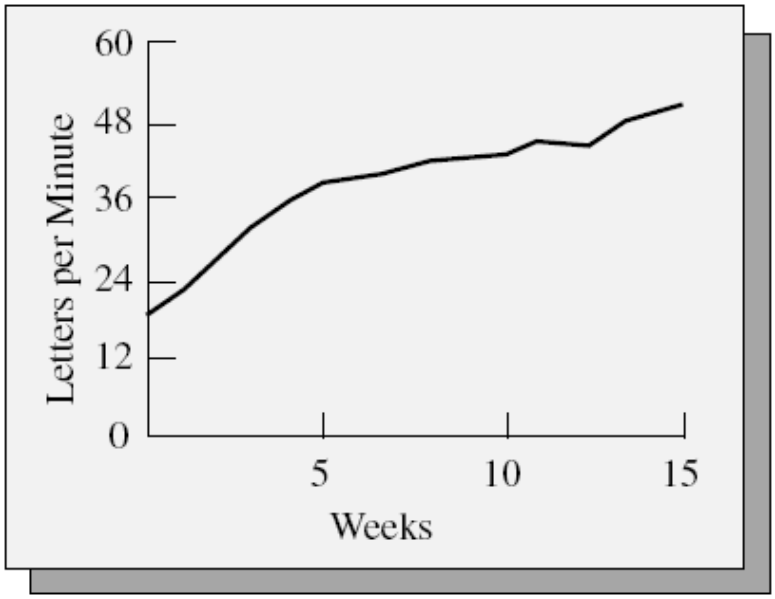


Figure 2-6 *Rate as a measure of learning. Number of Morse code letters correctly received. The increase in rate of decoding is a measure of learning. (Adapted from Bryan and Harter, 1899.)*

- Reading and comprehending more pages per minute
- Stocking more freight per hour.

- What are examples of "good behaviors" that are learned and more frequent?
- What are examples of "bad behaviors" that are learned and are more frequent?

Measuring Learning

Fluency:

A measure of learning that combines errors and rate. You are able to give correct responses faster.

Research Designs

- Anecdotal Evidence
- Case Studies
- Descriptive Studies
- Experiments
  - Independent variables
  - Dependent variables
  - Between subjects experiments
  - Experimental group
  - Control group
  - Matched samples
  - Within subjects
  - ABA reversal design
- Limits on experimental research