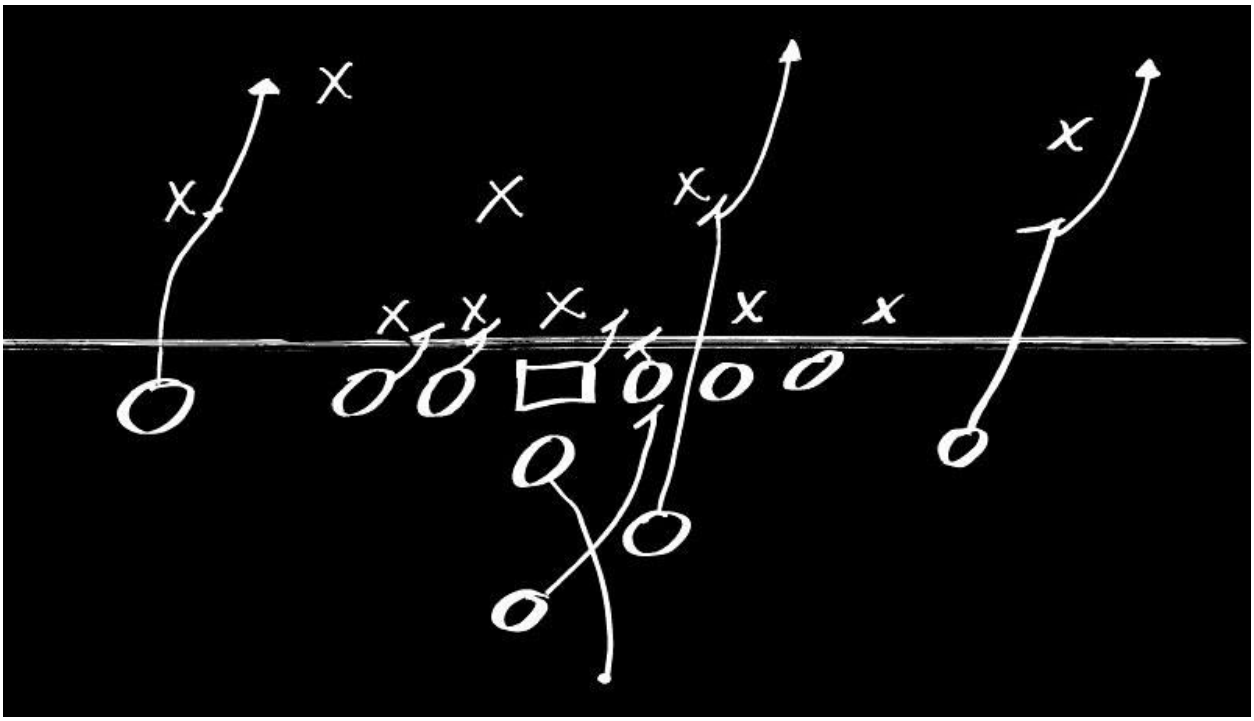
Memory Strategies, Infectious Diseases



Common-Sense Thinking

Vaccine types: Obviously, to create an immunity, the vaccine must contain whatever chemicals of the agent that induce an immune reaction. With some organisms, you can do this by ***killing the organism*** so it can't infect; but you can't kill the chemicals (antigens) that stimulate an immune response.

For the other type of vaccine, remember the cowpox example in Jenner's story. This was a ***live infection***, but with a virus that was modified from smallpox (in this case nature did the modifying). In modern medicine, scientists often modify an infectious organism by growing it in another species or cell culture so that it loses its ability to infect, without losing its ability to stimulate an immune response. So the two types: dead or modified live.

Antigen/Antibody: The prefix "anti" means against. The "gen" prefix suggests generating or creating something; in this case generating a disease and an immune response against the infection. Antibody would be a chemical that works against the infecting body (bacteria, virus, fungus).

Two kinds of immunity: You already know that diseases can be species specific. That is humans don't get dog parvo virus, and dogs don't get our flu. Thus, for whatever reason humans are ***naturally*** immune for parvo and dogs are naturally immune for flu. You already know that you can ***acquire*** immunity to a certain disease if you are vaccinated for it.

Pandemic/Epidemic: The prefix "pan" means widespread or a lot. The suffix "dem" refers to people. Thus pandemic would be a disease that infects people in many places or countries. The prefix "epi" means "upon" or "on." Thus, an epidemic would be a more limited infection that acts on a more limited number of people.

Categorization

Kinds of infectious agents: there are just three categories: bacteria, viruses, fungi.

Subject-object-verb (SOV)

Virus mechanism of action: Think of the virus that we consider often in this module: the flu virus. In your mind's eye, see it fly into ("flu") a cell and see it grabbing various organelles one at time. You might imagine it like an airplane that carries a series of banners behind it. Anyway the particle is seen as capturing organelles.

Body Components of the immune system:

You can visualize sound-alike words for three organs. First, link the idea of immunity to the images you saw of skin in the Jenner story on pox lesions. Then visualize white circles (**white blood cells**) plastered all over the skin of your thigh (**thymus**), causing you to limp (**lymph nodes**). That only leaves "***spleen***" that you need to remember by rote.

Items to Be Memorized: Data

Common-sense Thinking

Meaning of "Data." Factual information is referred to as data. The word "data" is a plural word when it refers to more than one number or one piece of information. Thus, correct English is to say "data are," not "data is."

The word "data" is like the word "date." Dates are usually numbers, right? The process of generating data is described by the verb "quantify" (kwän-tə-ˌ fī), which basically means to measure in numerical units. There is another kind of data, known as "qualitative" data, which must be described in ways other than numbers. Examples of qualitative data include the location of countries on a map, the different colors associated with the electromagnetic spectrum, or the different kinds of fossils.

Variables. The word comes from the word "vary," which you already know means differences, such as students vary in the grades they make, teachers vary in how they approach you, tree leaves vary depending on what time of year it is, and so on. With regard to infectious disease, there are varying diseases, symptoms vary with the kind of disease, and so on.

In science, a major objective is to measure the variables: how do people vary in height in terms of feet and inches, how they vary in terms of weight, in terms of kilograms and grams, and so on. In other words, the measurements are expressed as numbers. Numbers are the data that scientists use to gain knowledge about the real world.

Acrostics

How can we remember than numbers are reported as averages, medians, modes, or ranges? Think of an acrostic:

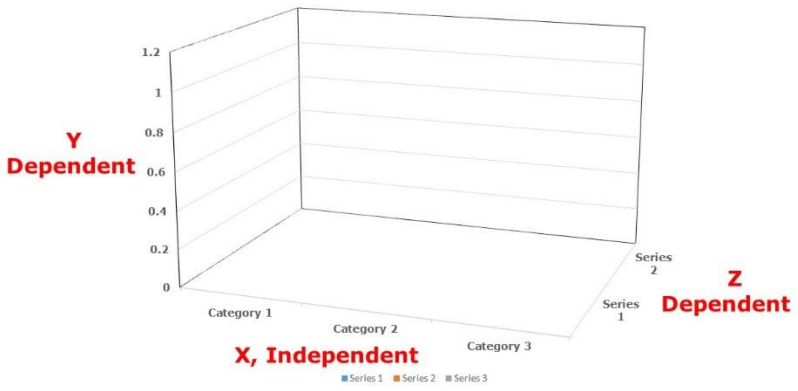
"Numbers **R**ange (from) **M**eans, **M**edians, (to) **M**odes."

The three words starting with "m" are a word form known as alliteration, and that form makes things easier to remember.

Categorization

Classes of variables. The lesson categorized variables into three classes, independent, dependent, and controlled. How shall we remember that? Think about the fact that in any study, the results **depend on** a treatment or manipulation of some kind. These results may be affected by factors other than your manipulation, so they would be **independent** of your intention of the study. These independent variables need to be ruled out or **controlled**, lest you misinterpret your results.

Axes of a Graph. Recall the common expression, "That is as easy as X, Y, Z." Those are the last three letters of the alphabet, which you already know. Now memorize this picture of a three-dimensional graph without any data:



Subject-object-verb (SOV)

Scale: The way to remember what data "scale" means is to imagine you step on a weight scale. You see the total range (from 0 to say 300 pounds), which is the scale (range) of possible weights

Four Uses of Data. They are to report findings, answer questions, make predictions, draw conclusions. Note the verbs: report, answer, predict, draw, conclude. See yourself giving a **repor**t in class. They teacher says she will ask you some **questions.** Your **predict** (nervously) that you won't know all the answers. You see yourself ***draw***ing on the right answers on the blackboard, ***concluding*** that you will get a good grade.

Types of Graphs. How can we memorize the three types of graphs: line, bar, pie? Make a mental picture of a series of numbers. ***Line*** them up in your mind's eye. Then picture the numbers marching into a **ba**r, and instead of ordering a beer, they order a ***pie***. To remember which of these is best for showing changes over time, note that it takes time to line up and march in. Once already there with the pie, time is not changing.

Meaning of the slope of a line. See yourself on snow skis moving down a mountain slope. The steepness of the slope reveals how fast you move (***rate of change***).

Memory Palace

Number Units. In a mental image, pick a familiar location. For example, suppose it is your math classroom. As you walk in the door, you see the blackboard, with thermometers representing **temperature units** drawn on it instead of numbers. Next you see the teacher's desk, and it has a set of antibiotic pills that she takes in doses of **weight units of mg/kg**. Next, you see the desk you usually sit in, and it has a **scale** in the seating, reminding you that data occur along a scale of observations. Then, you see that many other seats are empty, because part of the class (**%**) is out sick with the flu. These mental images should be enough to remind you that data have specific units of measurement that occur along a range (scale) of observations.

Story Chain

Use of different kinds graphs: See yourself setting a dinner **table**. The table can contain all sorts of things, from dishware to many different foods. Thus, tables can be used to display most any kind of data. See several kinds of **pie** sitting on the table. See members of the family standing in **line** in the living room waiting for the table setting to be completed. Each person is one of a series of people in line, reminding you that line graphs are useful for displaying a series of numerical observations. Note that people in line are held back by a set or series of **bars** placed across the door to the dining room. This also reminds you that bar graphs can be used for a series of data.

Not shown in the lesson are "**scatter plots**" which are like line graphs, except that the data are individual numerical observations, without lines drawn between each point. Remember this by seeing your story change as the bars across the door are lifted and the family members scatter to the various chairs around the table.