

Seeing Red II – Building a Better Mousetrap

Teacher Notes

The second activity for students, “Building a Better Mousetrap”, introduces students to the idea of a population of interest, issues involved in deciding what to measure and how to measure it, different methods of sampling, and potential sources of bias in sampling. Students must first decide which books will be considered “red”. Here is a color palette of the spectrum of colors that resemble red.



Source: http://en.wikipedia.org/wiki/Category:Shades_of_red

Students have this color palette available to them on the corresponding student worksheet. (Note: There is a separate page with this color palette at the end of these notes. You will need to print enough copies so that each group can have a color palette to use for the next round of sampling.) Discuss any possible omissions from this palette and have the class come to a common agreement regarding the various colors that are defined as “red”.

Books that do not show an overwhelming amount of red on the cover may fall into a grey area. Work with your students to determine what “makes a book red.” Some possibilities are:

- back or front cover that is 100% red.
- all of the book cover is red.
- at least 50% of the book cover is red.

- at least half of the back (or front) is red.

You may also work with your students to define what is not red: books with red as an accent, or whose type is red for titles and author name, or that have red only on the spine of the book.

After the class has come to agreement on the definition of “red”, you should show the class three or four books to determine if the students understand the classification of books into red and not red.

Prior to distribution of the student worksheet, you should cover material related to random selection from the corresponding chapter of your textbook. Be sure to include:

- sampling with or without replacement,
- identification of the population of interest (does the population include videos, DVDs, audiotapes, journals or magazines?)
- definition of the sampling frame,
- possible sources of bias in sampling,
- different types of random sampling methods (simple, stratified, cluster or systematic)
- the pitfalls of convenience sampling.

You should discuss the advantages/disadvantages of each type of sampling method with students. You should also present the possible effects of the various types of bias, since bias is introduced by the method of sampling undertaken. The class may want to discuss here the types of bias that could be found in **Seeing Red I**. [For example, a *selection bias* (undercoverage) might exist if students are sampling books from the library when other students have already checked out some unknown number of books. Or *measurement bias* may crop up if one student determines that less than 50% of a book’s cover is red when another student judges that the same

book cover is more than 50% red.] You may also wish to discuss the effects, if any, of fat books on a shelf. Books that are wider across the spine take up more space on a shelf, thus reducing the number of books on that shelf. If students are using their calculators to generate random numbers representing positions along a shelf (for instance if the random number 17 indicates the 17th book along the shelf), a random number with a high value may not be represented on shelves with a large number of fat books.

While there may be questions related to sample size, this discussion is best left to later in the course. Sample sizes will assigned to students in the next activity, **Seeing Red III--The Red Spectrum** – some groups will sample 50 books and some groups will sample 100 books. You may wish to have a short class discussion about why a simple random sample may not be possible, but why a “near random sampling” is more appropriate than the other possible sampling methods. As close as possible, steer the students into “a near random sampling” plan so that inference can be performed at a later time.

How students number the shelves in the media center is another item for discussion; keeping track of the shelf numbering system may produce difficulties for students. The ideal situation is for you to create a schematic of your school’s library that includes bookshelves and/or work areas. If the library is organized by work areas or floors, then by stacks and individual shelves on a stack, students may need to randomly generate four values that will identify, in order: work area/floor, stack, shelf and book on the shelf. If the library is located on a single floor and does not have discernable work areas, then the schematic might only contain a numbering system of the stacks around the room.

If students will use their graphing calculator’s random number generator for this activity, you need to ensure that each student’s calculator is seeded differently before sampling

commences. (On the TI-83/84/89, have students use the last four digits of their social security number/drivers' license number/home phone number as a seed. For example, a student might execute the command 2379 → Rand (Rand can be found under PRB).

From Wikipedia, the free encyclopedia

This category is for colors resembling red.

Shades of red													
Alizarin	Amaranth	Burgundy	Cardinal	Carmine	Cerise	Chestnut	Coral Red	Crimson	Dark Pink	Falu red	Fire engine red		
Fuchsia	Girlsberry	Hollywood Cerise	Magenta	Maroon	Mauve	Persian red	Pink	Pomegranate	Red	Red-violet	Rose		
Rust	Puce	Sangria	Scarlet	Shocking Pink	Terra cotta	Venetian red	Vermilion						