Population
Parameter of interest
Statistic
Sample statistic
Bias
Variability
Margin of error
  Finding the N for a given margin of error
Quick Method of margin of error
  Confidence intervals
  Confidence statement
  Relationships:
    N to margin of error
    Margin of error to confidence interval
    N to confidence interval
    Level of confidence to confidence interval
  10% rule

N to margin of error:

Between two samples which has a smaller margin of error
the sample with the larger sample size
or
the sample with the smaller sample size?

Sample A is 500 people. Sample B is 1,000 people.
Which sample has a larger margin of error?

Op

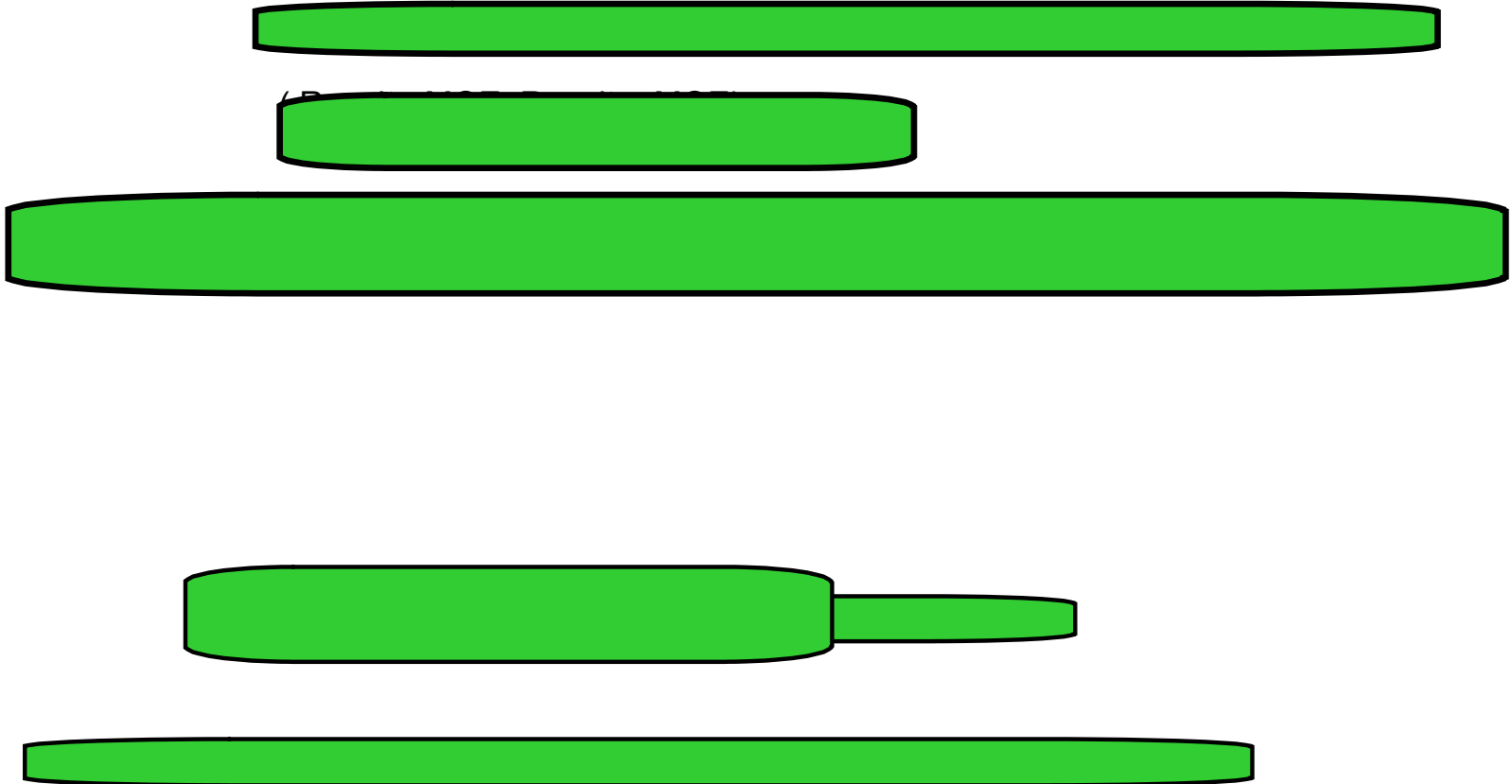# Margin of error to confidence interval

If the margin of error is bigger, is the confidence interval wider or narrower?

Sample A's margin of error is 4%. Sample B's margin of error is 5%.
Which one has the wider confidence interval?

N to confidence interval

If one sample has a larger samples size than the other,
which will have a wider confidence interval?

Sample A has 400 subjects. Sample B has 800 subjects.
Which one will have a wider 95% confidence interval?

Level of confidence to confidence interval

Remember the fish.

If two samples have the same N, but
  you make a 95% confidence interval for one
  and
  an 85% confidence interval for the other
  which interval will be wider?

To capture a higher % of the samples, you need a wider interval.

To capture a smaller % of the samples, you can have a narrower interval.

N to margin of error

Margin of error to confidence interval
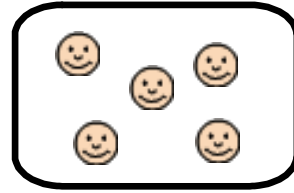
N to confidence interval

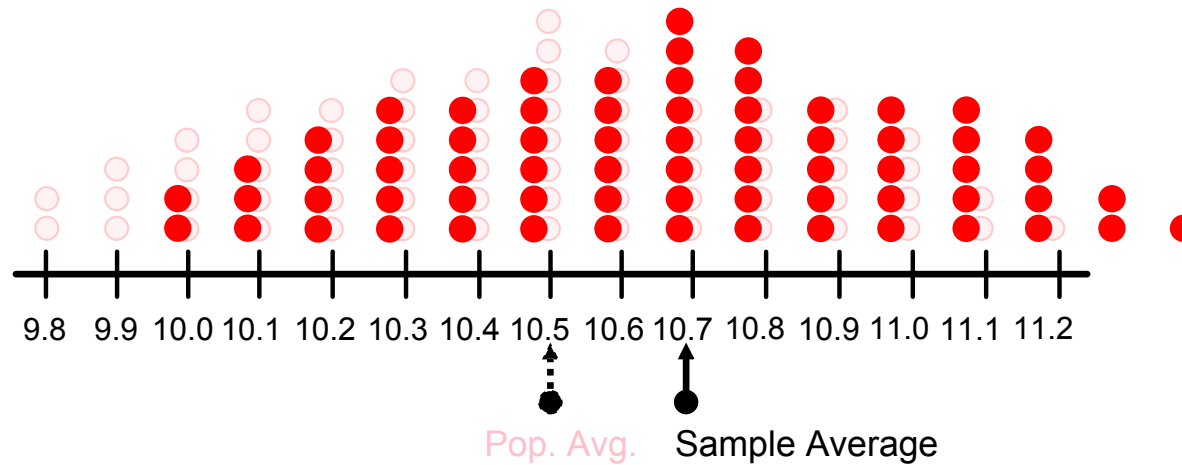**Level of confidence to confidence interval**

Population of interest:

Values* calculated
for the population
are parameters

Sample

Values* calculated
for the sample
are statistics

9.8 9.9 10.0 10.1 10.2 10.3 10.4 10.5 10.6 10.7 10.8 10.9 11.0 11.1 11.2

Pop. Avg.   Sample Average

With bias you will still get some results above the PARAMETER
some below the PARAMETER
But the key idea with bias,
is you EXPECT STATISTIC to be off.

UNBIASED means WE EXPECT SAMPLE STATISTIC = POPULATION PARAMETER

What does a margin of error mean?:
- It tells us how variable samples like ours are.
- Specifically, it tells us
    o how big a bracket
    o would include 95%
    o of the results of surveys like ours

Three major skills with margin of error

- Calculate it

- Explain it

- Make a confidence statement

How do you calculate margin of error?

- We will learn full calculation later.

- An approximation called the quick method is this:

$$\frac{1}{\sqrt{number\ of\ subjects}} = \frac{1}{\sqrt{n}}$$

Confidence interval:

(Sample Proportion - MOE, Sample Proportion + MOE)

Confidence statement

I am 95% confident, given my methods,
that the population parameter lies between
50% and 54%.

The margin of error is 2% means:

If I took lots of samples with this design,
I would expect 95% of them
to give a result <u>within</u> 2% of the pop. parameter.

Can I figure out my n to get down to a 1% margin?

$$\frac{1}{\sqrt{n}} = .01$$

$$\frac{1}{\sqrt{n}} = \frac{.01}{1}$$

$$1 = .01 * \sqrt{n}$$ or $$\frac{1}{m^2} = n$$

$$1^2 = \left(.01 * \sqrt{n}\right)^2$$

$$1 = .0001 * n$$

$$\frac{1}{.0001} = n$$

$$10000 = n$$

Wider margins support larger confidence

Narrower margins support lower confidence

The variability of a statistic from an SRS does not change with the size of the population as long as the population is at least 10 times larger than the sample.

So, two samples of size n have the same variability.
 AS LONG AS
both samples are less than 10% of their populations.

OR

As long as population size is 10 times samples size . (Pop > 10n)