

# Video Scenario 1: Countering stereotypical views of statisticians

## Discussion Questions

### Questions in video

1. How effective do you think the statistician was at getting the researcher to share the information needed to understand the research and develop a plan? What other strategies could be used?
2. Do you think sharing the anecdotal mistake was an effective communication strategy in this setting? Why or why not? What other strategies might help promote open communication and building of trust?

### Additional questions

3. What do you think the statistician did well and what could be improved in this conversation?
4. How do you think the statistician did in terms of conveying the idea that statisticians are not just “number crunchers” or “computers”? What other strategies might work to have the information come across in a respectful way?
5. How comfortable would you be sharing previous mistakes with someone you hope to work with? What are the pros and cons of sharing previous mistakes?
6. Here is the script of additional conversation between the statistician and researcher about details of the study design ( not included in the video). Read the script, preferably out loud with a partner, followed by additional discussion questions.

RESEARCHER	We have a new treatment to prevent a fungus in roses during storage. I have two factors and a covariate, so that means an ANCOVA is the way to go, right?
STATISTICIAN	Well, let’s talk more about the design and specific questions of interest before jumping to the analysis. What are the two factors you manipulated in the design?
RESEARCHER	One factor was increasing amounts of a chemical spray. The other factor was whether or not they were inoculated with a specific bacteria. We also measured them over time.  I’m interested in doing an ANCOVA so I can write a paper.
STATISTICIAN	We’ll get to the model later, but let’s continue with the design for now -- What specifically did you measure, and on what?

	And, You measured them over time? How often?
RESEARCHER	It's a disease severity scale—it's been validated. We give a flower between a 1 and an 8 for it's disease level. And yes, we measured them at 1 day, 4 days, 7 days, and 10 days post-harvest.
STATISTICIAN	Did you measure the same flower each day?
RESEARCHER	Of course not! Ha! You have to destroy the flower to rate it, so there's a separate flower for each day.
STATISTICIAN	Oh ok. That's good to know and definitely helps assess things like whether individual flowers need to be accounted for in the model. These details are really helpful.
RESEARCHER	Oh, interesting! I didn't realize things like that would matter.
STATISTICIAN	Yes—it's surprising how much little things can matter in terms of justifying a model and avoiding mistakes. Will you tell me more about the experimental set-up? For example, how many flowers did you measure each day? And, how were the flowers physically stored relative to each other?
RESEARCHER	Sure—sets of four flowers of the same cultivar were kept in jars in a big, walk-in refrigerator. Each cultivar had enough jars that we could do each treatment combination twice, and then take one flower at random at each day we measured.
STATISTICIAN	How many cultivars were there?
RESEARCHER	Oh, six. We'd like to know if any of them are particularly resistant.
STATISTICIAN	Let me make sure I'm understanding.... You have 6 cultivars, 8 treatment combinations, and two jars per cultivar/treatment combination? Let's see... 48 times 2 ... for a total of 96 jars? That's a lot!
RESEARCHER	Well -- not exactly. That is what I was hoping for, but we ran out of jars, so I had to combine some cultivars with the same treatment into the same jar. That shouldn't affect things though, since the treatment was the same. I actually had 84 jars I think.

STATISTICIAN	Okay -- we'll come back to that later. How did you actually apply the treatments? To the flowers in the jars? And, was there random assignment?
RESEARCHER	Well, that's kind of complicated due to how we have to do the inoculation .....

- a. What should be considered the experimental unit, or what additional questions would you ask for further clarification?
- b. Often disease severity scales are developed by transforming visual estimates of the percentage of the plant or petri dish covered in disease into an ordered categorical scale (such as the integers 1 through 8 mentioned in the script). How does this transformation complicate analysis strategies and subsequent inferences?
- c. Discuss additional challenges that may arise with a scale that is used to assess severity. What other questions would you ask the researcher to understand the measurement?
- d. The researcher originally suggested "ANCOVA" for the statistical analysis. Discuss reasonableness of the suggested approach given the design and data. Discuss ideas for more general wording that avoids implying a clear distinction between ANOVA, ANCOVA, and linear regression, assuming the researcher has very little background in statistical methods or inference?
- e. One strategy the statistician could have used was to ask the researcher to draw a diagram of the design -- and ask questions along the way. Diagrams of the design often lead to incredibly valuable information that may not be gathered through words. It is also a way to check that you, as the statistician, fully understand the design. Think about what possible diagrams might look like for this study -- try to draw your own based on information from the script (and assumed answers to other questions you came up with). Compare your diagram to those created by others and discuss.