A new client has come to your office suite with some problems they need your statistical expertise on. This client, a psychologist, has a special interest in art. She recently opened a high-end contemporary art studio and achieved through great luck many amazing pieces of art. The only problem is, there is one that is confusing - she is worried that the correct orientation of this work (i.e., which way goes up?) may not be as pleasing as the way the artist intended. Before she pays people to hang this piece, she wants to understand the best way to go. Using replicas of that piece, she conducted a study.

The study involved her placing hangers on each fake painting so that it could be hung with any one of the four sides up. 200 people were randomly selected and then asked to hang the painting the way they feel it looked correct/pleasing. She gathered the following data. Each cell has the number of respondents who hung the fake painting in a particular orientation:

|  |  |  |  |
| --- | --- | --- | --- |
| Top up (Correct) | Bottom up | Left side up | Right side up |
| 72 | 68 | 28 | 32 |

The psychologist’s problem is that she only knows about correlations and it does not seem that correlations are helpful in this instance. She’s at a loss and turns to you for help. Why won’t correlations work? What test would work and why? What is the null that is at play in this research? Is there a need to calculate an effect size? If so, which one and what does it tell you (if needed)? Using your statistical expertise, what do you tell her to do and why? Anything else you’d like to add?

This psychologist also has an interest in the role of gender on perception and aesthetics. Some people view that males and females differ, but her work finds that there is no difference between males and females. Given this she also offers data on the picture hanging by the gender of the respondent. These data look like this:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Top up (Correct) | Bottom up | Left side up | Right side up |
| Male | 25 | 5 | 10 | 10 |
| Female | 75 | 15 | 30 | 30 |

The question she poses is if there is a relationship between gender and views on the ‘right’ way to hang the painting. How can you address that for her? What test do you use? Why? What do you find? What is the null that is at play in this research question? Is there a need to calculate an effect size? If so, which one and what does it tell you (if needed)? Using your statistical expertise, what do you tell her to do and why? Anything else you’d like to add?

You have obtained a large contract to conduct all of the statistical research for a local university’s psychology department. Due to budget cuts, the university has been hiring hacks who can’t figure out how to calculate a percentage. Though you view this as another step toward the downfall of higher education, you are happy about all the extra money your firm will earn. The problem you have been presented with today is this:

Research shows strong gender preferences in teenagers’ approach to dealing with mental health issue. In a study the dept. recently conducted, eight grad students were asked to report their willingness to use mental health services in the event that they experience emotional or other mental health problems. The data for a sample of 150 students are shown in the table below. Is there a relationship between gender and willingness to seek mental health assistance?

|  |  |  |  |
| --- | --- | --- | --- |
|  | Probably no | Maybe | Probably yes |
| Male | 17 | 32 | 11 |
| Female | 13 | 43 | 34 |

How will your team address that question? What test do you use? Why? What do you find? What is the null that is at play in this research question? Is there a need to calculate an effect size? If so, which one and what does it tell you (if needed)? Using your statistical expertise, what do you tell the client to do? What policy implications? Future research? Anything else you’d like to add?

This same department has a race/ethnicity expert who claims gender is not important, but rather the race of the respondent is related to seeking assistance. They gathered their own data but have no idea what to do with it. A sensitive part of this problem is that the faculty member is SURE that they know the answer and have asked you to make sure it works out to show there is a difference between whites and blacks (the only races to participate). Their data looks like this:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Probably no | Maybe | Probably yes |
| White | 15 | 28 | 15 |
| Black | 15 | 47 | 30 |

How will your team address that research question? What test do you use? Why? What do you find? What is the null that is at play in this research question? Is there a need to calculate an effect size? If so, which one and what does it tell you (if needed)? Using your statistical expertise, what do you tell the client to do? How to you handle the potential ethical problem with this client? What policy implications? Future research? Anything else you’d like to add?

Yet another psychologist from the local lame university has come to you with more data. They are interested in understanding is infants display any color preferences. They have conducted the following research. They used a stimulus consisting of four color patches (red, green, blue and yellow) which was projected onto the ceiling above a crib. Infants were placed in the crib one at a time and the psychology records how much time each infant spend looking at each of the four colors. The color that received the most attention during a 100 second test period will be identified as the preferred color of an infant. Using a sample of 60 infants, these are the data gathered:

|  |  |  |  |
| --- | --- | --- | --- |
| Red | Green | Blue | Yellow |
| 20 | 12 | 18 | 10 |

How will your team address that research question? What test do you use? Why? What do you find? What is the null that is at play in this research question? Is there a need to calculate an effect size? If so, which one and what does it tell you (if needed)? Using your statistical expertise, what do you tell the client to do? What policy implications? Future research? Anything else you’d like to add?

The chair of the psychology came to this meeting and was so impressed with the professionalism and expertise that he spontaneously decided to have your team address his research question. She is interested in finding out whether there has been a significant change in grading practices over the years. It is know that the overall grade distribution for the department in 1985 has 14% As, 26% Bs, 31% Cs, 19% Ds, and 10% Fs. She gathered grades from a sample of recent psychology students from last semester which looked like this:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| A | B | C | D | F |
| 32 | 61 | 64 | 31 | 12 |

How will your team address that research question? What test do you use? Why? What do you find? What is the null that is at play in this research question? Is there a need to calculate an effect size? If so, which one and what does it tell you (if needed)? Using your statistical expertise, what do you tell the client to do? What policy implications? Future research? Anything else you’d like to add?

The local county manager approaches your firm because they are considering a budget proposal that would allocate extra funding toward the renovation of city parks. A survey is conducted to measure public opinion concerning the proposal. A total of 150 people respond to the survey: 50 who live in the city, and 100 who lives in the surrounding suburbs. The data looks like this:

|  |  |  |
| --- | --- | --- |
|  | Favor increase | Oppose increase |
| City | 35 | 15 |
| Suburb | 55 | 45 |

Is there a significant different in the distribution of opinions for city residents compared to those in the suburbs? How will your team address that research question? What test do you use? Why? What do you find? What is the null that is at play in this research question? Is there a need to calculate an effect size? If so, which one and what does it tell you (if needed)? Using your statistical expertise, what do you tell the client to do? What policy implications? Future research? Anything else you’d like to add?

It just so happens that the same day, a city manager for a neighboring jurisdiction comes in with the identical question! This manager conducted the identical survey, but she sampled 200 people. Here are the data she gathered.

|  |  |  |
| --- | --- | --- |
|  | Favor increase | Oppose increase |
| City | 70 | 30 |
| Suburb | 110 | 90 |

Is there a significant different in the distribution of opinions for city residents compared to those in the suburbs? How will your team address that research question? What test do you use? Why? What do you find? What is the null that is at play in this research question? Is there a need to calculate an effect size? If so, which one and what does it tell you (if needed)? What role does sample size play in this work? Using your statistical expertise, what do you tell the client to do? What policy implications? Future research? Anything else you’d like to add?

Chris Powell, extreme weight loss super star, comes to your office with his scantily dressed wife Heidi. They have increasing become interested in more than weight loss – specifically they want to better understand more about body image. So they gathered some data. They prepared a set of silhouettes showing different female body shapes ranging from somewhat thin to somewhat heavy and asked a group of women to indicate which body figure they though men would consider the most attractive. Then a group of men were shown the same set of profiles and asked which image they considered the most attractive. The following data show the number of individual who selected each of the four body image profiles.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Somewhat thin | Slightly thin | Slightly heavy | Somewhat heavy |
| Women | 29 | 25 | 18 | 8 |
| Men | 11 | 15 | 22 | 12 |

Do the data suggest that men and women have different preferences? How will your team address that research question? What test do you use? Why? What do you find? What is the null that is at play in this research question? Is there a need to calculate an effect size? If so, which one and what does it tell you (if needed)? What role does sample size play in this work? Using your statistical expertise, what do you tell the client to do? What policy implications? Future research? How does Heidi walk in those shoes?

In more discussions with Chris and Heidi, it comes to light that they also have data on age of viewers of the show. The wonder if there is an age preference in their show. Understanding this would make marketing the show far more efficient and effective.

|  |  |  |
| --- | --- | --- |
| Under age 20 | 20-29 | 30 or older |
| 68 | 92 | 140 |

Do the data suggest that there is a preference in their show by age of viewer? How will your team address that research question? What test do you use? Why? What do you find? What is the null that is at play in this research question? Is there a need to calculate an effect size? If so, which one and what does it tell you (if needed)? What role does sample size play in this work? Using your statistical expertise, what do you tell the client to do? What policy/marketing implications? Future research? Anything else you’d like to add?