

## GROUPS

## 5A: Fundamentals of Statistics

1. Identify the sampling method:

a) All of the Redland high school students were assembled in the gym, and then separated into groups by grade. Each student was assigned a number, and 25 numbers were randomly drawn from the students in each grade. They were asked if they planned to go to college. **Stratified Sampling**

b) You are standing outside of the grocery store and stop every 3<sup>rd</sup> person leaving to ask if they purchased milk.  
**Systematic Sampling**

c) At his book club meeting, Dan asked each member if they had seen the movie made from their current book.  
**Convenience Sampling**

2. The table below lists results for a Gallup poll conducted via random telephone interviews in October 2015. Assume that the margin of error is 4 percentage points.

a) Find the confidence interval for each category.

|   | American adults  | 18-34 years old  | 35-49 years old  | 50-64 years old  | 65+ years old    |
|---|------------------|------------------|------------------|------------------|------------------|
| Support Legalizing the use of Marijuana | 58%              | 71%              | 64%              | 58%              | 35%              |
| Confidence Interval                     | <b>54% - 62%</b> | <b>67% - 75%</b> | <b>60% - 68%</b> | <b>54% - 62%</b> | <b>31% - 39%</b> |

b) For which age group(s) can you claim that over half of those people support legalization of marijuana? Explain.

**For all age groups except those 65 and older, we can claim that over half of them support legalization of marijuana.**

c) For which age group(s) can you claim that the majority of those people do not support legalization of marijuana? Explain.

**For those 65 and older, we can claim that the majority do not support legalization of marijuana.**

d) Explain why the percentage for all American adults isn't exactly the average of all of the categories.

**The average (mean) for the four age categories is  $(71\% + 64\% + 58\% + 35\%) / 4 = 57\%$  and the stated overall percentage for American adults is close at 58%, but not exact. This is because there is not the same number of people in each age category.**

- e) The data for 1985: 18-34 years old (32%) 35-49 years old (22%) 50-64 years old (16%) 65+ years old (13%)  
Which age group saw the largest increase in percentage of people supporting legalization? Discuss.

Absolute Difference:

| 18-34 years old      | 35-49 years old      | 50-64 years old      | 65+ years old        |
|----------------------|----------------------|----------------------|----------------------|
| $71\% - 32\% = 39\%$ | $64\% - 22\% = 42\%$ | $58\% - 16\% = 42\%$ | $35\% - 13\% = 22\%$ |

**Notice that the 35-49 and 50-64 age groups both increased by 42%, but the increase is relatively greater for the 50-64 year olds because they started with a smaller percentage.**

Relative Difference:

| 18-34 years old                         | 35-49 years old                         | 50-64 years old                         | 65+ years old                           |
|---|---|---|---|
| $\frac{71\% - 32\%}{32\%} \approx 1.22$ | $\frac{64\% - 22\%}{22\%} \approx 1.91$ | $\frac{58\% - 16\%}{16\%} \approx 2.63$ | $\frac{35\% - 13\%}{13\%} \approx 1.69$ |
| <b>This is a 122% increase</b>          | <b>This is a 191% increase</b>          | <b>This is a 263% increase</b>          | <b>This is a 169% increase</b>          |

**The 50-64 year old age group saw the largest relative increase. The number of 50-64 year olds supporting legalization increased by 263%. Also note that the 65+ year olds had the smallest percentage point increase, but the overall percentage increase was larger than the 18-34 year old category)**

3. For each of the following, identify the type of study. If it is an observational study, state whether it is a case-control—if so, identify the cases and the controls. If it is an experimental study, identify the control group and the treatment group, and the type of blinding.

| Study   | Observational                    | Observational: Case-study            |                                   | Experimental                                       |  |  |
|---|----------------------------------|--------------------------------------|-----------------------------------|--|--|--|
|   |                                  | Controls                             | Cases                             | Control Group                                      | Treatment Group  | Blinding   |
| Over a 6-month period, among 100 people with bipolar disorder, patients given a high dose of omega-3 fats improved more than those given a placebo. Patients didn't know which they were given, but experimenters dispensing the pills knew.  |                                  |                                      |                                   | People with bipolar disorder receiving the placebo | People with bipolar disorder receiving high dose of omega-3 fats | Single-blind (patients don't know but those giving the pills do)                           |
| A National Cancer Institute study of 716 melanoma patients and 1014 cancer-free patients found that those having a single large mole had twice the risk of melanoma.  |                                  | Patients without a single large mole | Patients with a single large mole |  |  |  |
| Over the period of one-year, researchers determined which airline had the lowest percentage of canceled flights.  | Observational (not a case-study) |                                      |                                   |  |  |  |
| 1000 people were randomly separated into two groups—one group was assigned to exercise for 45 minutes daily, and the other group was instructed not to exercise. The participants in the exercise group reported falling asleep within 15 minutes of going to bed, but those not exercising laid awake for at least 30 minutes. |                                  |                                      |                                   | People not exercising                              | People exercising  | No Blinding (participants know if they are in the exercise group)                          |
| 500 patients with migraine headaches receive a shot to see if it helps reduce the frequency of the headaches. The nurses giving the shots write down the code on each syringe and the patient name. The syringes look identical, but half contain the new medicine and half contain saline.                                     |                                  |                                      |                                   | Patients receiving saline (no medicine)            | Patients receiving new medicine                                  | Double-blind (neither patients nor nurses administering know which syringes have medicine) |

