

Analyzing Experiments Practice

Assignment Goal: (1) practice identifying independent, dependent, and controlled variables, (2) practice writing hypotheses, and (3) practice writing axes labels on graphs.

Directions

1. Read the following passages about real experimental and observational studies completed in the last few years.
2. In each, identify the independent and dependent variables. It may help you to highlight the variables in the experimental question (the title of each page) and/or the passage.
3. For the graph sketch, write in the axes labels. If you are working on paper, sketch a line or bars to show how you think the graph might look. If you are working online, drag and adjust the bars or line from the side of the slide.
4. For the hypotheses, you are practicing the format of the hypothesis. It is okay to align your hypothesis with the actual results of the experiment! Think about the “because” - this is where your “educated guess” may be.

Do social isolation and lockdown help limit the spread of coronavirus?

Both Belgium and Rwanda have populations around 12 million people. In the first month that each country had cases of COVID-19, Belgium went from 2 cases to 7,400 while Rwanda went from 2 cases to only 134.

In Rwanda, officials immediately began contact tracing and isolated people who were potentially exposed to the virus. They locked down the country 7 days after the first confirmed case of the virus. In Belgium, it took 17 days before they began locking down regions of the country, and over a month before schools and restaurants closed.

Moore, J. "What African Nations Are Teaching the West About Fighting the Coronavirus." *The New Yorker*, 15 May 2020.

Independent Variable	
Dependent Variable	
Controlled Variable (list one)	
Hypothesis	If then because

Does air pollution affect pregnancy outcomes?

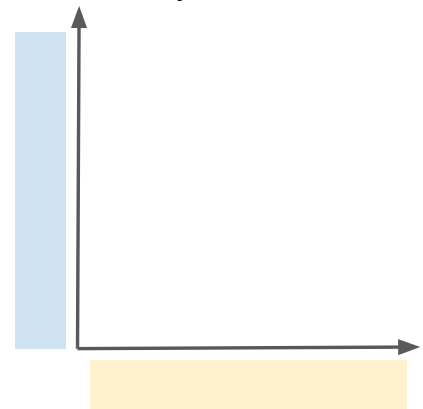
In this study, the researchers looked at how pregnancy outcomes in the United States changed depending on the amount of air pollution in the area where the mother lived. Negative pregnancy outcomes included low birth weight, babies born too early, and babies who died. They looked at data from 2007 to 2019.

The researchers found that the higher the air pollution (they looked at ozone and particulate matter), the worse the pregnancy outcomes. One additional finding was that living in areas with worse air pollution was more common for Black women, which means that Black women will have worse pregnancy outcomes.

Bekkar, B., S Pancheco, and R. Basu. "Association of Air Pollution and Heat Exposure With Preterm Birth, Low Birth Weight, and Stillbirth in the US: A Systematic Review." *Journal of the American Medical Association Network Open*, vol. 3, no. 6, June 2020. doi:10.1001/jamanetworkopen.2020.8243

Independent Variable	
Dependent Variable	

Graph Sketch:



Does having a doctor that is their race make patients more comfortable?

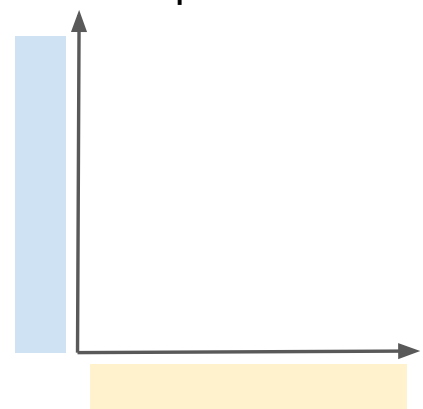
In this study, the researchers randomly assigned Black male patients in Oakland, California to either Black or non-Black male doctors. After the patients had met their doctor, they were given a list of preventative care services they could choose from, such as having their weight taken, flu shots, or blood pressure readings.

The researchers observed that the patients were more likely to ask for more services, and more invasive (or personal) services if they had a Black doctor versus if they had a non-Black doctor. The researchers also observed that the Black doctors engaged the Black patients in much more natural and personal conversation than the non-Black doctors before and during the services.

Alsan, M, O. Garrick, and G.C. Graziani. "Does Diversity Matter for Health? Experimental Evidence from Oakland." *American Economic Review*, vol. 109, no. 12, 2019. doi: 10.1257/aer.20181446

Independent Variable	
Dependent Variable	

Graph Sketch:



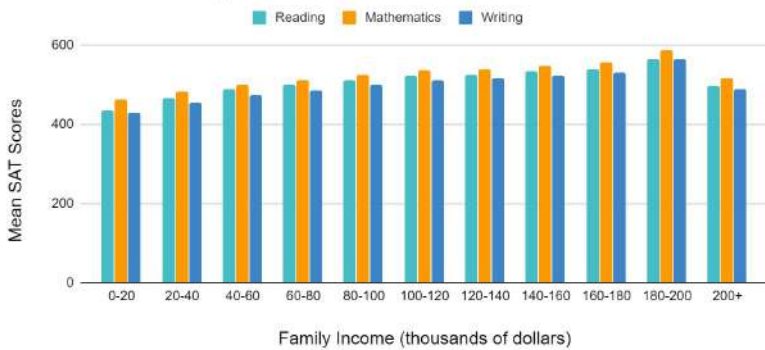
Does family income impact SAT scores?

In 2013, the SAT released data that compared demographic information to students test scores for college-bound seniors. The data for family income is graphed below.

*For the controlled variable, what is one variable YOU would control if you were completing this study to better understand what this data means?

The College Board. "Total Group Profile Report: 2013 College-Bound Seniors." *The College Board*, 2013.

SAT Scores vs. Family Income



Independent Variable	
Dependent Variable	
Controlled Variable*	
Hypothesis	If then because

Do strict voter ID laws affect whether people of color vote?

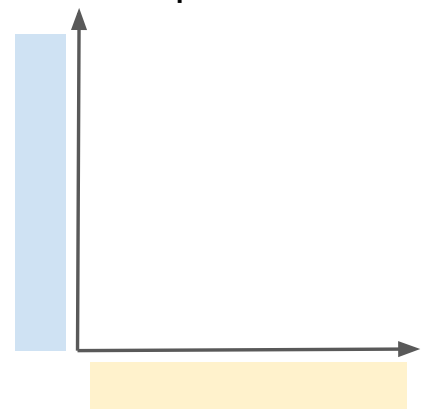
In this study, the researchers compared states with strict and less strict voter ID laws in the United States to see whether this impacted whether people of different races came to vote. They looked at elections that took place in 2008 and 2012, because before 2012 there just isn't enough data and because voter IDs were not required before 2006.

They found that in states with strict voter ID laws, Black and Latinx voters were almost half as likely to vote as white voters.

Hajnal, Z., N. Lajevardi, and L. Nielson. "Voter Identification Laws and the Suppression of Minority Votes." *The Journal of Politics*, vol. 79, no. 2, Jan. 2017. *The University of Chicago Press Journals*.

Independent Variable	
Dependent Variable	

Graph Sketch:



Can gut bacteria affect the risk of heart disease?

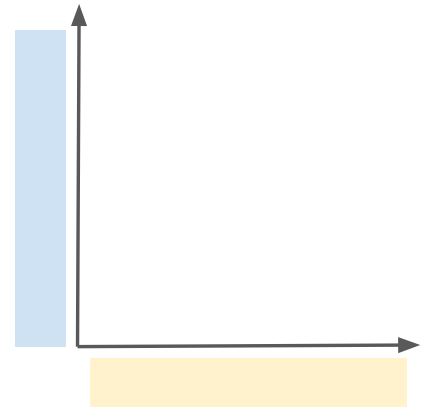
Some bacteria in the human intestines are considered “good” and some are considered “bad”. Scientists have found that some “bad” bacteria produce a chemical called TMA, which causes clogged arteries that can lead to heart disease.

Scientists recently discovered a new bacteria. *E. limosum*, that stops TMA from being made. They think that more *E. limosum* people have in their intestines, the less likely they will be to have clogged arteries.

Kountz, D.J., E.J. Behrman, L. Zhang, and J.A. Krzycki. MtcB, a member of the MttB superfamily from the human gut acetogen *Eubacterium limosum*, is a cobalamin-dependent carnitine demethylase. *Journal of Biological Chemistry*, 2020. doi:10.1074/jbc.RA120.012934

Independent Variable	
Dependent Variable	

Graph Sketch:



Does having collective bargaining rights increase misconduct in police officers?

In Florida, police officers were given collective bargaining rights through a state Supreme Court decision in 2003. Collective bargaining rights allow the police union to defend police officers who use violence or otherwise misuse their power, and using collective bargaining to protect officers is a “normal” role for police unions to play.

When the union was allowed to use collective bargaining rights, misconduct increased by 40%. In this study, “misconduct” was defined as an event that involved violence.

Dharmapala, D., R.H. McAdams, and J. Rappaport. “Collective Bargaining Rights and Police Misconduct: Evidence from Florida.” *University of Chicago Coase-Sandor Institute for Law & Economics Research Paper No. 831*, 27 Aug. 2019.

Independent Variable	
Dependent Variable	
Controlled Variable (list one)	
Hypothesis	If then because

Do language-learning apps work?

In this study, scientists wanted to see if the language-learning app, Babbel, was actually helping people learn a language. They had 85 students take a Spanish test, then spend 12 weeks using Babbel with specific studying requirements (using the app at least 10 minutes per day), then they took the same test again.

The scientists found that 69% of people who used the app for six hours significantly improved their scores and 75% of people who used the app for 15 hours significantly improved their scores.

Loewen, S., D. R. Isbell, Z. Sporn. "The effectiveness of app-based language instruction for developing receptive linguistic knowledge and oral communicative ability." *Foreign Language Annals*, vol. 53, no. 2, 4 Jun. 2020. doi: 10.1111/flan.12454

Independent Variable	
Dependent Variable	
Controlled Variable (list one)	
Hypothesis	If then because

Are Black people more likely to be pulled over because of racial profiling?

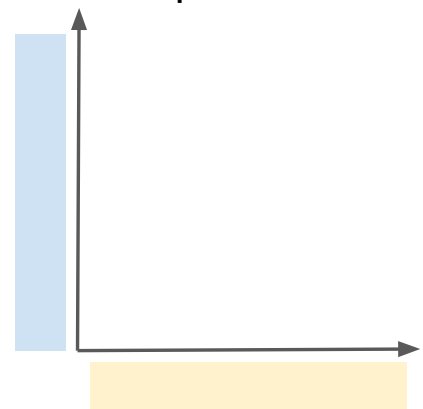
In this study, the researchers compared the rate at which people of different races were pulled over in the day time versus at night. They believed that at night, the police officers would have a more difficult time identifying a person's race before pulling them over. They looked at 100 million traffic stops in the United States from 2011 to 2017.

The found a 5-10% decrease in the number of Black drivers who were pulled over at night, which suggests that Black drivers are being racially profiled by the police during the day.

Pierson, E., et. al. "A large-scale analysis of racial disparities in police stops across the United States." *Nature: Human Behavior*, 4 May 2020.

Independent Variable	
Dependent Variable	

Graph Sketch:



Does multitasking have an effect on mood?

In this experiment, researchers divided their participants into two groups.

The first group answered emails first and then wrote an essay. The second group wrote an essay, but were frequently interrupted with emails that they needed to stop and answer.

The researchers found that the first group had a neutral mood and facial expressions, while the second group expressed sadness and anger.

Blank, C. et. al. "Emotional Footprints of Email Interruptions." *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*, Apr. 2020. doi:10.1145/3313831.3376282

Independent Variable	
Dependent Variable	
Controlled Variable (list one)	
Hypothesis	If then because

Extra Challenge: Look up an experiment or study on your own!

Write a short description below, then complete either the variable and hypothesis template OR the variables and graphing template (copy and paste from the previous slides).

I recommend using [sciencedaily.com](https://www.sciencedaily.com) to find an article.

Rubric

Performance Indicators	Progress			Comments
	IM	PM	IE	
I can identify independent and dependent variables				
I can identify controlled variables				
I can write a hypothesis using the if/then/because format				
I can write axes labels for a graph				
I can correctly identify whether to use a bar or line graph				

IM = indicator met, PM = indicator partially met, IE = insufficient evidence