Critical Thinking

Worksheet 8: Causal Arguments

## Exercise 1: Possible explanations for correlations.

*Use the chart bellow to help you figure out what explains the following correlations.*

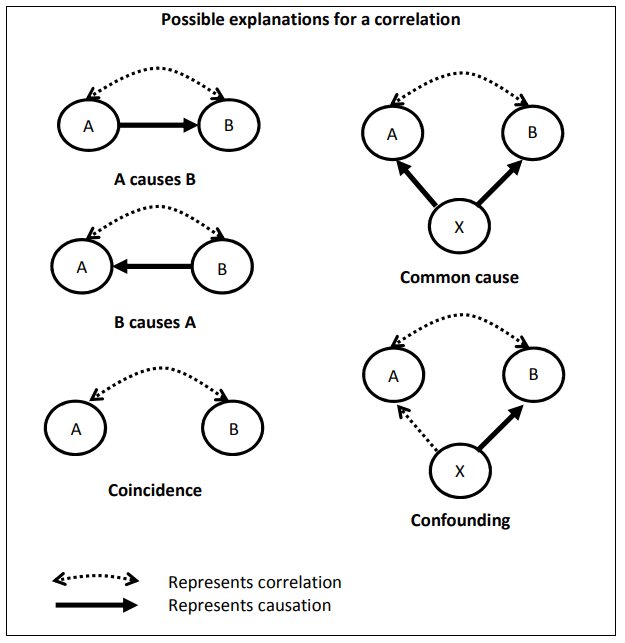
1. As the number of pirates in the world has decreased, the average global temperature has increased. Therefore, pirates prevent climate change.

1. The faster a windmill rotates the more wind there is. Therefore, windmills cause wind.

1. Sleeping with one's shoes on is strongly correlated with waking up with a headache. Therefore, sleeping with one's shoes on causes headache.

1. Assignments that are submitted several days before the due date typically get better scores than assignments that are submitted on the day. Therefore, you can improve your results by submitting your assignments early.

1. The presence of mosquitoes in your bedroom is tightly correlated with waking up covered in itchy bumps. Therefore, mosquitoes cause itchy bumps.



## Exercise 2: More complex cases.

## The following examples are adapted from the book How to think about weird things: critical thinking for a New Age, T. Schick and L. Vaughn, McGraw Hill, 2002. In each case, some evidence is reported regarding a particular treatment or diet. In each case, say whether there is sufficient evidence to support a causal generalization and explain your answer.

1. Therapeutic Touch (TT) is an alternative medicine technique said to be used by over 40,000 nurses in North America alone. It is supported by major nursing organizations and gets favourable mention in the media. TT practitioners claim that an “energy field” unknown to science surrounds the human body and that practitioners can use their hands to detect and manipulate this field. (No physical touching of the body is involved, though.) In particular, they say that they can cure disease by “balancing” people's fields, which are said to extend four to eight inches from the surface of the skin. Many people do in fact report feeling better after TT treatment.
2. A macrobiotic diet can be effective against cancer. Macrobiotics is a lifestyle and diet derived from Far Eastern ideas and promoted by many adherents. The diet is semi-vegetarian and low in fat. In recent years there have been many published accounts of people who say they have recovered from cancer because they ate a macrobiotic diet. There have also been several case reports. Attempts have been made to compare the outcomes of these cases to those of patients with comparable cases of cancer who did not follow a macrobiotic diet. These comparisons show that people on the macrobiotic diet often have better outcomes.
3. Shark cartilage has been called to public attention by a CBS 60 Minutes program focused on the theories of biochemist William I. Lane, Ph.D, author of Sharks Don’t Get Cancer, Narrator Mike Wallace began by calling attention to the book and stating that Lane says that sharks don’t get cancer. The program focused on a Cuban study of twenty-nine “terminal” cancer patients who were given shark-cartilage preparations. Wallace visited the site of the experiment, filmed several of the patients doing exercise, and said that most of the patients felt better several weeks after the treatment had begun. Two American cancer specialists then said that the results were intriguing. One, who was aligned with the health-food industry, said that three of the patients appeared to have improved. The other, who appeared to be solidly scientific, noted that evaluation was difficult because many of the X-ray films were of poor quality, but he thought that a few tumours had gotten smaller.
4. A recent study found that students who wear bright white shirts not only tend to do better at school but also are more successful by age 25. The longitudinal study tracked a cohort of 300 students from Clearwater Highschool in the Lakes District California. The study found that the students who regularly work bright white shirts to school achieved on average 15% higher GPA than their peers and by age 25 were earning almost double what the shabbier peers were. The lesson here, make sure your children are well dressed.

## Exercise 3: Historical Cases.

In each of the following historical cases, identify what causal claim is being made and what evidence is being used to support it. And then evaluate 1) whether or not these studies provide compelling evidence for their conclusions and 2) how you might improve on them.

1. In order to test whether pellagra – a disease characterized by dermatitis, diarrhea, dementia, and ultimately death that decimated the American South between 1907 and 1940 – was an infection disease spread or one caused by an inadequate diet, Joseph Goldberger increased the allotment of fresh meat at two orphanages and an asylum where pellagra was prevalent. He found that this intervention all but eradicated instances of pellagra. The study involved 702 subjects, 414 of which suffered from pellagra. Of these, only one had a recurrence of pellagra, after the dietary changes were made. And there were no cases of healthy subjects developing the disease.

**Causal Claims:**

**Evidence:**

**Is this study compelling evidence for Goldberger’s conclusion?**

1. In a later study Goldberger tried to induce pellagra by feeding 11 volunteers at a prison farm an impoverished corn heavy diet. The prison farm had no recorded cases of pellagra. 6 of the 11 developed the disease (The volunteers were offered shortened sentences for their participation). Does this strengthen Goldberger’s case?

**Is this study compelling evidence for Goldberger’s conclusion?**

1. In a later study still, Goldberger tried to infect himself and his family with pellagra via known methods of germ transmission. He swabbed the throats of pellagra patients and then wiping the swab on the throats of his family members. He even fed them bits of scabs and faeces from pellagra patients! None of his volunteers developed pellagra. Does this strengthen Goldberger’s case?

**Is this study compelling evidence for Goldberger’s conclusion?**

1. [Ignaz Semmelweis](https://en.wikipedia.org/wiki/Ignaz_Semmelweis), a [Hungarian](https://en.wikipedia.org/wiki/Hungary) [obstetrician](https://en.wikipedia.org/wiki/Obstetrician) working at the [Vienna General Hospital](https://en.wikipedia.org/wiki/Vienna_General_Hospital) (Allgemeines Krankenhaus) in 1847, noticed the dramatically high maternal mortality from [puerperal fever](https://en.wikipedia.org/wiki/Puerperal_fever) following births assisted by doctors and medical students. However, those attended by [midwives](https://en.wikipedia.org/wiki/Midwives) were relatively safe. Investigating further, Semmelweis made the connection between puerperal fever and examinations of delivering women by doctors, and further realized that these physicians had usually come directly from [autopsies](https://en.wikipedia.org/wiki/Autopsies). Asserting that puerperal fever was a [contagious disease](https://en.wikipedia.org/wiki/Contagious_disease) and that matter from autopsies were implicated in its development, Semmelweis made doctors wash their hands with chlorinated lime water before examining pregnant women. He then documented a sudden reduction in the mortality rate from 18% to 2.2% over a period of a year. Despite this evidence, he and his theories were [rejected](https://en.wikipedia.org/wiki/Contemporary_reaction_to_Ignaz_Semmelweis) by most of the contemporary medical establishment.

*(Wikipedia entry on the Germ Theory of disease)*

**Causal Claim:**

**Evidence:**

**Is this study compelling evidence for Semmelweis’s conclusion?**