

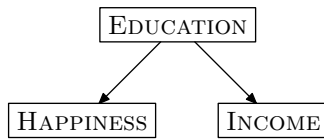
Philosophy 12: Introduction to Causal Reasoning

Problems with causal discovery study questions

Consider the following response structure:

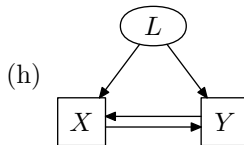
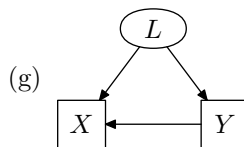
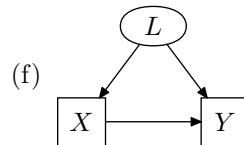
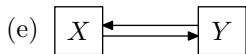
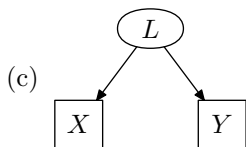
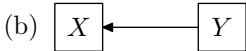
Assignment	Causal Factor 1	Causal Factor 2	Causal Factor 3	Effect
1	True	True	True	False
2	True	True	False	False
3	True	False	True	False
4	True	False	False	True
5	False	False	True	False
6	False	False	False	False
7	False	True	True	False
8	False	True	False	False

1. In our terminology, each row represents:
 - (a) a response structure
 - (b) a causal factor
 - (c) a causal assignment
 - (d) a value of a causal variable
2. In our terminology, the matrix represents:
 - (a) a response structure
 - (b) a causal factor
 - (c) a causal assignment
 - (d) a value of a causal variable
3. In our terminology, each column (except Malaria) represents:
 - (a) a response structure
 - (b) a causal factor
 - (c) a causal assignment
 - (d) a value of a causal variable
4. In our terminology, each cell in the matrix (except those in the column for Malaria) represents:
 - (a) a response structure
 - (b) a causal factor
 - (c) a causal assignment
 - (d) a value of a causal variable
5. Suppose the population consisted of 800,000 people evenly distributed among the 8 possible causal assignments (that is, there were 100,000 with each of the 8 assignments). Which of the following is true?
 - (a) The response structure does not give us enough information to predict how many will have malaria.
 - (b) The response structure warrants use concluding that 100,000 will have malaria.
 - (c) The response structure warrants use concluding that 200,000 will have malaria.
 - (d) The response structure warrants use concluding that 100,000 will have malaria.
6. Consider the following causal graph:



Given the causal relations represented, which of the following is true?

- (a) EDUCATION $\perp\!\!\!\perp$ HAPPINESS
 - (b) EDUCATION $\perp\!\!\!\perp$ INCOME
 - (c) HAPPINESS $\perp\!\!\!\perp$ INCOME
 - (d) EDUCATION $\not\perp\!\!\!\perp$ HAPPINESS
7. Assume these are the values of the variables in the above graph: EDUCATION: { High School, College }, INCOME: { High, Low }, and HAPPINESS: { High, Low }. Given the causal relation represented in the above graph, which of the following is not true?
- (a) $\text{Fr}(\text{EDUCATION} = \text{College}) \neq \text{Fr}(\text{EDUCATION} = \text{College} \mid \text{INCOME} = \text{Low})$
 - (b) $\text{Fr}(\text{EDUCATION} = \text{High School}) \neq \text{Fr}(\text{EDUCATION} = \text{High School} \mid \text{INCOME} = \text{Low})$
 - (c) $\text{Fr}(\text{EDUCATION} = \text{High School}) = \text{Fr}(\text{EDUCATION} = \text{High School} \mid \text{INCOME} = \text{High})$
 - (d) $\text{Fr}(\text{INCOME} = \text{High}) \neq \text{Fr}(\text{INCOME} = \text{High} \mid \text{EDUCATION} = \text{High School})$
8. In the graphs below, consider L to be an unobserved common cause of X and Y . In general, if we observe only variables X and Y , and find that they are associated, then which alternatives can we eliminate from consideration?



9. Now consider the same problem, but suppose that not only are X and Y associated, but that X always occurs before Y . Which alternatives can we eliminate from consideration?