

1 Meeting 1

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1.1 Main points and facts

- Statistical learning theory is about learning a probabilistic model from observations. Probability theory is about reasoning about the observations using the model. In a similar way, causal learning is about learning a causal model from observations, and causal reasoning makes inferences about observations using the causal model. (Figure 1.2)
- Structural causal model can be used to infer the impact of interventions. Statistical model only about conditional distributions. Two SCMs can lead the the same observable distributions (Figure 1.3)
- The principle of independent mechanisms states that the (causal) conditional distributions of each variable given its causes does not inform about other conditional distributions. This means that changing the distribution of cause $p(c)$ does not affect the conditional distribution of the effect $p(e|c)$. This allows to infer about the causal direction (in principle).
- Beuchet chair (Fig 2.1) is an illusion where two objects may appear as a chair if looked at from a very specific vantage point. (generic viewpoint assumption)

1.2 Questions

- How should we understand the Reichenbach's common cause principle. It seems that the book immediately contradicts with the principle, e.g., selection bias etc?
- Causal graphical model is not explained here well?
- In the Beuchet chair example, what is the cause, what is the effect? (I guess we could understand this as a combination of two independent mechanisms: 1) A chair is observed if a chair is present, and 2) the vantage point. However, the mechanisms are not independent, and hence, this demonstrates a violation of the independent mechanisms principle.)

1.3 Opinons, comments

- The principle of independent mechanisms is a very strong argument to try to build your regression model in the causal direction, whenever possible: when done this way the model should work in different environments.
- In general, the reason for selecting this book, instead of some other books, is the focus on the two-variable case, which seems largely neglected by the other approaches to causality.