

Reading Assignment 1: Decisions Under Ignorance

Assigned Reading Read the following sections from M. Peterson. *An introduction to decision theory*. Cambridge University Press, 2017.

1. Sections 1-1.3, and the first paragraph of Section 1.4 on page 8
2. Sections 2-2.3
3. Sections 3-3.1,

In total, there are roughly 24 pages of text in the above sections.

Technical Requirements

Answer questions two, three, five, and eight below. Together, your answers should not be longer than a single typed page. Remember to provide page numbers indicating which passages you are paraphrasing. For the remaining optional questions, please write down the page numbers on which the authors address the question.

1. Copy Table 1.1. from Peterson's textbook; the table illustrates a decision problem faced by Christopher Columbus. Label the following in the matrix: (1) the states (of the world), (2) the acts (i.e., the set of alternatives), and (3) the outcomes. Note that Peterson introduces the distinction between states, acts, and outcomes briefly in the first chapter but if you want further confirmation that you have labeled the parts of the matrix correctly, see sections 2.1-2.3,
2. According to Peterson, the question of "whether people visiting casinos in Las Vegas *ought* to gamble as much as they do" is a question for what type of decision theory? In contrast, the question of "*why* people gamble" is a question for what type of decision theory? Briefly explain why Peterson claims the former type of question should typically be addressed *before* the latter.
3. At the turn of the 18th century, Sweden attacked Russia. Was the Swedish king's decision *right* according to Peterson? Was it *rational*? Briefly explain.
4. What decision did Louis Washkansky have to make in 1967? What distinction does Peterson uses Washkansky's decision to illustrate? Briefly explain by contrasting Washkansky's decision with the same decision that contemporary people might face, in light of improvements to medical knowledge.
5. Compare the decision matrix below to the decision matrix in Table 2.3 of Peterson's text. For what reason would Peterson consider these decision matrices as containing "illegitimate" partitions of states?

	I pass the exam	I fail the exam
Study	Pass, but wasted time on studying	Failed, and time wasted on studying
Party	Pass, no time wasted	Fail, no time wasted

6. Compare the decision matrix in the previous question to Washtanky's decision matrix in Table 1.2 of Peterson's text. If the decision matrix in the previous question were legitimate (it is not!), why would it be easy for the student to decide whether to study, just as Peterson claims it was "easy for Mr. Washkansky to decide what to do"?
7. Section 2.2. contains a description of ordinal, interval, and ratio scales. This distinction is a bit messy, and we'll return to it later classes. For now, do your best with the following.
 - (a) Alice's height in *inches* is twice that of Bill's. What is the relationship between Alice's height in *centimeters* and Bill's height in centimeters? What does this show us about the

type of scale that is most appropriate for measuring age (conceived here as a length of time)?

- (b) Look at Equation 5. Suppose the function f' assigns each object x its length $f'(x)$ in *inches*. Suppose the function f does the same, but it assigns lengths in *centimeters*. What is the value of k in Equation 5?
 - (c) Go online and find another example of an interval scale, other than temperature. Briefly explain why it counts as an interval scale.
8. Peterson uses the term “weak dominance” in an atypical/non-standard way, and so in this question, I will introduce you to the standard way of distinguishing weak from *strict* dominance. For the remainder of the class, we will use the terms “weak dominance” and “strict dominance” in the typical way, not Peterson’s way.

In the first decision matrix below, Act 1 *weakly* dominates Act 2. In the second decision matrix, Act 1 *strictly* dominates Act 2. Which of the two decision matrices below was more alike to the Mr. Washkansky’s decision matrix, and why?

	State 1	State 2
Act 1	3	2
Act 2	1	2

	State 1	State 2
Act 1	3	2
Act 2	1	3/2