

## Reading Assignment 8: Dutch Book Arguments

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### Assigned Reading

1. S. Vineberg. “Dutch Book Arguments”. In: *The Stanford Encyclopedia of Philosophy*. Ed. by E. N. Zalta and U. Nodelman. Fall 2022. Metaphysics Research Lab, Stanford University, 2022, Sections 1-3

### Technical Requirements

Answer question three, five, and twelve. Because the assigned reading is a webpage, please cite the *section numbers* in which questions are answered, as page numbers are not available. See the document “Reading Assignment and Quiz Guidelines” for further instructions.

### Questions

1. Vineberg distinguishes three different, possible statements of the “Normalization” (also called “normality”) axiom for probability. Understanding the difference between the statements requires distinguishing tautologies, logical truths and necessary truths. Give an example of a logical truth that is not a tautology. **Hint:** Vineberg gives an example in a later section of a claim  $A$  such that (i)  $A$  is “not tautological” but (ii) if one were to name a price (in Kadane’s sense) on  $A$  other than \$1, then one would be a sure loser (in some sense).
2. What is the conclusion of the Dutch Book *Argument* (DBA)? In no more than a few sentences, explain the difference between the conclusion of the DBA and the Dutch Book *Theorem*.
3. Vineberg discusses a slightly different version of the Dutch Book Theorem than the one we discussed in class. In class, we showed that, to avoid sure-loss, an agent’s *fair prices* must obey the probability axioms, whereas Vineberg discusses a version that shows that ones *betting quotients* must obey the probability axioms. Provide a concrete example (with numbers) of how stakes and quotients work. That is, give examples of an event  $H$ , a betting quotient  $q$ , and a stake  $S$ , and explain how much money would exchange hands if  $H$  were true and if  $H$  were false. Use an example in which the stake  $S$  is not equal to \$1.
4. Give an example of a *contingent* truth and an example of a *necessary* truth. In no more than sentence, explain the distinction. *Note:* The distinction is not explained in the assigned readings, and so if you have not encountered the distinction before, run a search at the following url:
  - <https://www.oxfordreference.com/>
5. What does the *Converse* Dutch Book Theorem assert? Explain why, under one interpretation of the meaning of “sure loser”, the Converse Dutch Book theorem is false unless the normalization axiom requires that the price that one assigns to every *necessary truth* (and not just a tautologies) is \$1.
6. Vineberg claims that, under one interpretation of the meaning of “sure loser”, the Converse Dutch Book theorem is false *even if* the normalization axiom requires that the price that one assigns to every *necessary truth* is \$1. What other propositions must one assign a price/probability of 1 to in order to avoid being a sure loser, according to this interpretation of “sure loser”? How can one redefine “sure loss” in order to avoid this counterexample to the Converse Dutch Book theorem?
7. This (optional) question is intended only for students with an interest in logic and can be skipped by all others. Look up the meaning of “decidable” in computability/recursion theory. Who proved the the theorem that there is “no decision procedure for determining in general whether a given sentence is a logical truth”? Why does this Vineberg mention this theorem when she claims that the truth of the Dutch Book Theorem requires that “sure loss” must be interpreted “to mean loss if the bets are in fact placed and settled”?

8. In no more than a paragraph, Vineberg's argument for the following claim: "A correct formulation of the theorem must accordingly restrict the form and number of the allowable bets." State one of the other "probabilistic norms" that, if violated, would make one a sure loser. *Optional Challenge:* Discuss how one could limit the "allowable bets" so that, in violating the norm you just stated, one is *not* a sure loser.
9. What is the Czech Book Theorem? In no more than a paragraph, explain how Hajek uses the theorem to criticize the Dutch Book Argument.
10. To the best of your ability, explain what Vineberg might mean when she says, "Rational action-guiding credences should generally reflect the agent's evidence, yet at least in the cases above, probabilism seems sometimes to require that they do not." Hint: Try to describe a case in which you might have evidence *against* what, unbeknownst to you, is a logical truth.
11. What is "divided-mind inconsistency", and why does Vineberg argue that considerations of such consistency at best support the claim that credences should satisfy the additivity axiom (but not the normalization axiom)?
12. According to Ramsey, if a person's credences do not satisfy the probability axioms, then in what way are the person's attitudes "inconsistent"? Vineberg raises two objections to Ramsey's argument. Summarize the first in your own words.
13. What is a "depragmatized" Dutch Book argument?