

The Little Logic Book
Hardy, Ratzsch, Konyndyk De Young and Mellema
The Calvin College Press, 2013

Exercises for The Little Logic Book may be downloaded by the instructor as Word documents and then modified for distribution to students; or students may be instructed to download the exercises and then told which ones to answer. This is an exercise bank; it is not assumed that students will do all the exercises for any one chapter. Comments, questions or suggestions for Chapter Six of The Little Logic Book can be sent to logic@calvin.edu

Exercise Bank for Chapter Six:
Inductive Logic
(Posted June, 2014)

1.0 Basic Concepts

Define or identify the following:

- 1.1 Enumerative induction
- 1.2 Sample
- 1.3 Species (in the relevant sense)
- 1.4 The principle of *the uniformity of nature*
- 1.5 Natural kinds

2.0 Induction Basics

Indicate whether the following statements are true or false; briefly explain why you judged the statement to be true or false.

- 2.1 Science only observes and proves—it never just *assumes* anything.
- 2.2 Since inductive inferences do not *prove* their conclusions, it is best never to rely on them.
- 2.3 A huge number of our ordinary daily expectations depend implicitly upon inductive inferences.
- 2.4 As sample size increases, the sample often becomes increasingly more representative.
- 2.5 Increasing sample size guarantees that the sample will become more representative.
- 2.6 A small sample size can never be representative.

3.0 Inductive Logic

- 3.1 What is an inductive inference? (Here we are thinking of enumerative induction.)
- 3.2 Briefly describe the three steps of inductive generalization.
- 3.3 State the general structure of inductive inferences.
- 3.4 On the basis of past experience, I say that the sun will rise tomorrow. Why is my prediction only *probable*?
- 3.5 State the three main considerations for assessing samples.
- 3.6 How can a hasty generalization (see page 139) make for an unrepresentative sample?
- 3.7 Why does a small sample size usually make for an unrepresentative sample?

- 3.8 What are the two cautions regarding sample size?
- 3.9 Why might a large sample size not be necessary for a good inductive argument?
- 3.10 Why is diversity an important consideration in sample selection?
- 3.11 What if only 80% of the cases in a representative sample exhibit a certain pattern?
What could you legitimately infer about other cases of the same type?
- 3.12 Why must inductive generalizations assume that the future will resemble the past?

4.0 Inductive or Deductive?

4.1 Consider these two arguments:

1a. All swans are white.

Therefore,

2a. If there is a swan in Reeds Lake, it is white.

1b. All swans we have observed have been white.

Therefore,

2b. If there is a swan in Reeds Lake, it is white.

One of these arguments is an inductive argument; one of them is a deductive argument. Which is which? How can you tell?

The assumption in argument (b) is that we have not observed all the swans in Reeds Lake. But what if we had? What if our sample of swans included all swans in Reeds Lake? Would that change the logical status of argument (b)?

What would it take to establish the truth of 1a? What would it take to establish the truth of 1b? Which premise is easier to establish, premise 1a or premise 1b?

Which of the following arguments are deductive, which inductive?

4.2 Keith's bedroom is a mess, so he must be home from college.

4.3 The sun is starting to shine, so the rain will stop soon.

4.4 If the sun is starting to shine, the rain will stop soon.

The sun is starting to shine.

So, the rain will stop soon.

4.5 The sun will shine tomorrow, so either the sun will shine tomorrow or it will rain tomorrow.

4.6 No woman has ever won the primary for a presidential election, so Hillary Clinton will not win the primary for the presidential election.

4.7 Although decaffeinated coffee contains some caffeine, it doesn't keep me up at night; just last night I drank two cups and had no problems going right to sleep.

5.0 Evaluation of Inductive Arguments

5.1 Many political polls are taken by doing phone surveys. Phone surveys, however, only have access to landline phone numbers. In what way might this skew the results of a phone survey, even a very large survey? What might be a better way of collecting data on American political opinion?

5.2 An extensive study of 60,000 Americans found that Americans on average spend 40% of their time engaged in leisure activities. The survey was conducted in the state of Florida. Someone might claim that the survey was based on an unrepresentative sample. Why? What would be a good way to make the sample more representative?

5.3 Assess this induction: I'm in favor of stronger gun control laws; my neighbors are in favor of stronger gun control laws; the police in Grand Rapids are all in favor of stronger gun control laws. Let's face it, Americans are in favor of stronger gun control laws!

6.0 Science, Inductive Logic and the Problems of Induction

6.1 What role does inductive generalization play in science?

6.2 What exactly is the "Problem of Induction"? In what way might it be taken to undermine the rationality of science?

6.3 Do you agree with David Hume that we lack any firm rational basis for thinking that induction works? Why or why not?

6.4 If it is true that we have examined only a vanishing small fraction of all copper that exists in the universe, then what business do we have in making the scientific claim that all copper conducts electricity? Is that claim the result of an inherently weak inductive generalization?

7.0 A Stretch

7.1 You dissect a frog in a high school biology class not just to learn about the anatomy of the one frog you dissected, but about the anatomy of frogs. Maybe all frogs. Is your dissection of one frog an adequate basis for claims you make afterwards about frog anatomy in general? What kind of questions would you have to ask yourself to decide if your frog sample was large enough? If your frog sample was representative?

7.2 Discuss three instances where today you based your expectations and behavior on an implicit inductive generalization. Show how your thinking conformed to the pattern for inductive inferences.