

The Little Logic Book
Hardy, Ratzsch, Konyndyk De Young and Mellema
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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 Seven of The Little Logic Book can be sent to logic@calvin.edu

Exercise Bank for Chapter Seven:
Mill's Methods
(Posted June, 2014)

1.0 Basic Concepts

Briefly describe each of the following:

- 1.1 Method of agreement
- 1.2 Method of difference
- 1.3 Joint method of agreement and difference
- 1.4 Method of concomitant variation
- 1.5 Method of residues

2.0 Mill's Methods Basics

Indicate whether the following statements are true or false; briefly explain your answer.

- 2.1 Only scientists engage in causal reasoning.
- 2.2 The correct application of Mill's Methods guarantees that we will discover the causes in question.
- 2.3 If A is always present whenever B occurs, then A causes B.
- 2.4 If A always happens before B happens, then A causes B.
- 2.5 The method of concomitant variation can only be applied to things, properties and events that come in degrees.
- 2.6 Mill's Methods are basically just a regimentation and elaboration of common sense when it comes to reasoning about causes.
- 2.7 Since situations where people reach an agreement are so much more pleasant than those where people have differences, one should always use Mill's first method rather than his second.

3.0 Mill's Methods

- 3.1 Construct a scenario where the method of agreement would help us identify the cause of some event or state of affairs.
- 3.2 Construct a scenario where the method of difference would help us identify the cause of some event or state of affairs.
- 3.3 Construct a scenario where the joint method of agreement and disagreement would help us identify the cause of some event or state of affairs.
- 3.4 Construct a scenario where the method of concomitant variation would help us identify the cause of some event or state of affairs.

- 3.5 Construct a scenario where the method of residues would help us apportion cause and effect.
- 3.6 The joint method is sometimes applied to overcome a potential weakness of the method of agreement. What is that weakness?
- 3.7 Sometimes various of Mill's Methods cannot tell us of two strongly correlated types of events which one is the cause, and which one is the effect. Name at least two ways we might try to resolve that ambiguity.
- 3.8 Little Johnny noticed that whenever the neighborhood kids stood at the corner, a big yellow bus would come and pick them up for an adventure and then bring them back in the afternoon. One day, bored with his toys, little Johnny went to stand at the corner, expecting a big yellow bus to come and pick him up for a day's adventure. What went wrong with little Johnny's reasoning in this case?
- 3.9 What exactly does "correlation does not guarantee causation" mean? Give an example illustrating that principle. When there is a correlation between two types of things or events—A's and B's—there are a number of possibilities concerning causal connections between them. For instance, it might be that A's cause B's. Name at least three other possibilities.
- 3.10 A crime is solved because only one of the suspects possesses all of the relevant identifying characteristics provided by witnesses. Which of Mill's Methods helped the detectives solve this case?
- 3.11 Joe discovers that his level of happiness on a given day rises or falls according to the degree to which he has tried to be of service to others. Using the method of concomitant variation, he concludes that trying to be of service to others causes his level of happiness to increase. Is his reasoning plausible? Explain your answer.
- 3.12 Using the method of concomitant variation Joe reaches the more modest conclusion that trying to be of service to others is a causal factor in the increase of his level of happiness. Is this a more reasonable conclusion? Explain your answer.
- 3.13 The average in sales generated in Fred's department for the month of March was \$88,000. Fred himself generated \$95,000 in sales. Fred reasons that he sold \$7,000 more than the average of the others in his department. Using the method of residues, help Fred correct his error in reasoning.

4.0 A Stretch

In each of the following, identify which of Mill's Methods is involved. Explain your answer.

4.1 What was so puzzling was first, that there should be sudden occurrences of gum warts around the county, and second that there seemed to be no sensible explanation at all. The victims were unrelated, lived in different parts of the country, were on a number of different drinking water systems, did not eat in the same restaurants, some smoked, some chewed tobacco, and some used no tobacco products at all. The subjects had had no contact with each other, and on and on. But finally a chance remark to one of the researchers led her to investigate past travel experiences, and it turned out that every one of the gum wart sufferers had been through a Miami airport X-ray machine in the second week of June of 2007. (And, oddly enough, each of them had been wearing brown shoes at the time.) Anyway, that was the hint that helped crack the case.

4.2 Marine biologists recently made a very unexpected discovery: Baluga whales are among the most vocal of all the marine mammals, being particularly vocally active just before and just after feeding. It was while recording some of their routine sounds that we noticed that as we followed them during their northern migration, over a two week period

their sounds got progressively lower, dropping gradually from around 247 cps [cycles per second] at the equator to around 161 cps off the coast of southern Alaska. The only other difference we noted was a decline of deep water temperature between the beginning and the end of the migration, from just over 15° C to just under 9° C. Apparently, song pitch is keyed to ambient marine temperature.

4.3 Why do we itch? This question has baffled scientists for years. Recent research, however, has shed some light on the question. Scientists have recently engineered a mouse that produces no natriurectic polypeptide B (or Nppb), a neurotransmitter usually found around the heart where it helps control blood pressure. Recent tests have shown that when these engineered mice are subjected to conditions that would make regular mice scratch a lot, the engineered mice apparently felt no itch at all. When injected with Nppb, they began to scratch with the rest of them. Evidently Nppb is a causal factor in itching. Researchers have also found cells in the nerves in skin that produce Nppb.