Gillies - Chapter 1

As you proceed, keep a list of (about 10 or 11) KEY people (not all) that Gillies discusses.

Also, review this [brief history of science philosophy](https://ufl.instructure.com/courses/355207/files/39296888/download?wrap=1)

[Settings](https://ufl.instructure.com/courses/355207/pages/gillies-reading-concepts)

 I asked you to read above, and see if you can find contradictions (of any kind) between it and this chapter.  ***Gillies was Popper's student,*** so I think I would use this chapter as the authority!

* What is Inductivism?
* Explain Bacon's idea of experiments of fruit and light. Are these ideas relevant today?
* Succinctly explain the inductive method. Does it align best with 'anticipation' or 'interpretation' of nature?
* What is a fundamental difference between induction (or inductive logic) and deduction (or deductive logic)?
* Bertrand Russell was alive long after Bacon, but Russell tried to provide a framework for inductivism as a scientific method by defining 2 principles that capture the methods Bacon promoted. Explain the principles of (1) the uniformity of nature and (2) induction. Why was Russell's principle of induction attacked by critics?
* In section 1.3, focus on the discussion of Bayesianism (starting page 14-middle).  Now, re-write Russell's Principle of Induction as a Bayesian would. In this revised form, this principle is accepted (and widely assumed) today.
* What/who was the Vienna circle (the major players)? What is it known for and what did they have in common with Russell? Was Sir Karl Popper an integral member?  What / who was the Cambridge school?

Gillies Chapter 2

* Popper's critique of inductivism had 3 arguments; present each in a single sentence (all are stated in section 2.1, but the third is hard to find - see the penultimate sentence on page 20). Leave some space near each of these sentences in your journal.
* Explain Popper's theory of conjecture and refutation as succinctly as you can. Does it align best with 'anticipation' or 'interpretation' of nature?
* How does Popper's theory lead us to making a distinction between 'discovery' and 'justification' in understanding scientific method?
* What is Bayesianism and what has it got to do with any of this? (You better study this idea here, because Bayesianism is very big in ecology these days!).
* In section 2.4, Gillies makes his own observations on Popper's three arguments against (pretty much everything about) Inductivism.  Next to your three sentences describing Popper's three criticisms (above), write Gillies' observations as to the plausability of each. Which of Popper's criticisms does Gillies think implausible? [This criticism (of Popper's criticism) leads us to Gillies' own thesis - presented in Chapter 10, which is (my words) really cool!  Gillies' thesis places him equal to Popper in importance as a guide for scientists seeking to understand today's scientific methods, though most people do not recognize this/him. Lakatos was the more famous of Popper's students, but my opinion is that Gillies contribution was simple, brilliant, and much more profound and useful!]
* Sectons 2.5-2.7 are fascinating examples of Popper's first (and strongest) criticism of Inductivism, and they all demonstrate the same thing.  What do these three examples represent in Popper's argument, and what do they say about the inductivist paradigm?
* Finally, can you explain why Popper coined the terms 'bucket' and 'searchlight' as metaphors for Inductivism and Falsificationism?

Gillies Chapter 10.

This a meaty chapter that may be difficult to read but is worth it!  Focus on the following 4 themes.

Falsifications is a theory of scientific method, a theory that science proceeds through conjectures and regulations.

**Theme 1**: How do we recognize scientific (testable) hypotheses (or statements) and distinguish them from un-testable (unscientific ones)?

While Popper recognizes that scientists can and do hold onto theories in the face of failed predictions when there are no predictively superior rivals to turn to. He holds that scientific practice is characterized by its continual effort to test theories against experience and make revisions based on the outcomes of these tests*.*By contrast, theories that are permanently immunized from falsification by the introduction of untestable ad hoc hypotheses can no longer be classified as scientific. Among other things, Popper argues that his falsificationist proposal allows for a solution of the problem of induction, since inductive reasoning plays no role in his account of theory choice.

**Theme 2**: How do we distinguish between testable statements that can be tested via falsification and/or confirmation?

Confirmation and falsification are different strategies for testing theories and characterizing the outcomes of those tests. Roughly speaking, confirmation is the act of using evidence or reason to verify or certify that a statement is true, definite, or approximately true, whereas falsification is the act of classifying a statement as false in the light of observation reports.

Popper’s proposed method is falsificationism. Instead of proposing hypotheses and then seeing if they can be confirmed by evidence, Popper said that science ought to involve making conjectures that can potentially be refuted.

Popper’s early work attempts to solve the problem of demarcation and offer a clear criterion that distinguishes scientific theories from metaphysical or mythological claims. Popper’s falsificationist methodology holds that scientific theories are characterized by entailing predictions that future observations might reveal to be false. When theories are falsified by such observations, scientists can respond by revising the theory, or by rejecting the theory in favor of a rival or by maintaining the theory as is and changing an auxiliary hypothesis. In either case, however, this process must aim at the production of new, falsifiable predictions. While Popper recognizes that scientists can and do hold onto theories in the face of failed predictions when there are no predictively superior rivals to turn to.

**Theme 3**: Explain the concept of 'demarcation', or, distinguishing theories or pursuits that are legitimately scientific from those that are metaphysical (not open to scientific testing).

Karl Popper described the demarcation problem as the “key to most of the fundamental problems in the philosophy of science” (Popper 1962, 42). He rejected verifiability as a criterion for a scientific theory or hypothesis to be scientific, rather than pseudoscientific or metaphysical.

Demarcation - a dividing line.

**Theme 4**: What is explanatory surplus? How is it applied to hypothesis testing, theory testing, and to demarcation?

This principle is shown to be non-Bayesian in character, and to lead to a treatment of simplicity in science. Two cases of the principle of explanatory surplus are considered. The first (number of parameters) is illustrated by curve-fitting examples, while the second (number of theoretical assumptions) is illustrated by the examples of Newton's Laws and Adler's Theory of the Inferiority Complex.

Gillies is probably best known for his work on Bayesian confirmation theory, his attempt to simplify and extend Popper’s theory of corroboration. He proposes a novel "principle of explanatory surplus", likening a successful theoretician to a successful entrepreneur. The entrepreneur generates a surplus (of income) over and above his initial investment (of funds) to meet the necessary expenses of the enterprise. Similarly, the theoretician generates a surplus (of explanations) over and above his initial investment (of assumptions) to make the necessary explanations of known facts. The size of this surplus is held to be a measure of the confirmation of the theory — but only in qualitative, rather than quantitative, terms.