Karl Popper – Logic of Scientific Discovery (Extract: pp. 40-42[1])

§6. Falsifiability as a Criterion of Demarcation

- The criterion of demarcation inherent in inductive logic, namely the positivistic criterion of meaning, requires that all "meaningful" statements of empirical science must be capable of being finally decided as true or false. Popper calls this "conclusively decidable", and the form of such statements must be such that it is logically possible both to verify and to falsify them. Schlick claims that a genuine statement must be capable of conclusive verification. Waismann says that if there's no possible way to determine if a statement is true, it has no meaning at all, for "the meaning of a statement is its method of verification".
- Popper claims that there is no such thing as induction (other than mathematical induction). It is logically inadmissible to infer theories from singular statement that are verified by experience (and Popper questions the meaning of this supposed verification). So, theories are *never* empirically verifiable. If we want to retain the theoretical systems of natural science, we must choose a criterion which allows statements that cannot be verified into the domain of science.
- The above not withstanding, Popper will only allow a system to count as empirical or scientific if it can be *tested* by experience. *Falsifiability*, not *verifiability* is to be the criterion of demarcation. Popper notes that the criterion is not one of *meaning*, since falsifiability separates two classes of perfectly meaningful statements – those that are falsifiable and those that aren't – drawing a line within, not around, meaningful language (we're referred to §§4 & 9 for enlightenment[2]). Scientific systems should be capable of being singled out once and for all in a negative sense by empirical tests, but not in a positive sense. Any scientific system must be capable of being refuted by experience. Tautologies are not empirical. Popper now considers some objections.
    1. **Objection**: It's wrong headed to characterise science, which is supposed to give positive information, as satisfying a negative requirement such as falsifiability. **Answer**: Popper will show in §§31-46 that the amount of positive information about the world conveyed by a scientific statement increases in accord with the likelihood that it will clash, on account of its logical character, with possible singular statements. The more a law of nature prohibits, the more it says.
    2. **Objection**: Similar objections can be raised against falsifiability as against verifiability. **Answer**: Popper's proposal is based on an *asymmetry* resulting from the logical form of universal statements (which asymmetry is further discussed in *22 of Popper's *Postscript*[3]). Universal statements can never be derived from, but can be contradicted by, singular statements. Consequently, we can use modus tollens to argue from the truth of singular statements to the falsity of universal statements. This is the only strictly deductive inference from singular to universal statements.
    3. **Objection**: Even allowing for the asymmetry, it is still impossible for any theoretical system to be conclusively falsified. Possibilities are ad hoc auxiliary hypotheses or changes of definition. It's not logically inconsistent simply to refuse to acknowledge falsifying experience at all, even though this

[1] Chapter 1 : Fundamental Problems, §6.
[2] Look these up!
[3] Look this up too!

isn't the way scientists tend to proceed. **Answer**: Popper admits that this objection has more force. However, he will propose in §§20ff[4] that the *empirical method* will be characterised precisely as one that excludes such logically admissible ways of avoiding falsification. Popper proposes that the empirical method is characterised by its manner of exposing the system under test to falsification in every way conceivable. Rather than save untenable systems, it seeks to select the fittest by way of a struggle for survival.

- Popper thinks his criterion of demarcation solves Hume's problem of induction (of the validity of natural laws). The root of the problem is the apparent contradiction between (a) the thesis that experience alone can decide the truth or falsity of scientific statements (the "fundamental thesis of empiricism") and (b) Hume's recognition that inductive arguments are inadmissible. Popper claims that the contradiction only arises if we assume that all empirical scientific statements must be conclusively decidable (that both verification and falsification must be possible in principle). The contradiction disappears when we abandon this requirement and allow unilateral decidability – that of falsification, which presupposes no inductive inference but only the undisputed tautological transformations of deductive logic (see also *Appendix* *i, and *Postscript* *2[5]).

§7. The "Empirical Basis"[6]

- Popper's thesis only leads him from the problem of the empirical character of *theories* to that of *singular statements*. Even so, there has been a gain, because, while doubts about the empirical character of theories are rife, those of singular statements are rare. While singular statements may be false on account of observational error, they are rarely thought by scientists to be metaphysical or non-empirical.
- Consequently, *problems of the empirical basis* – problems concerning the empirical character and method of testing of singular statements – differ in the part they play in the logic of science from most others. The former lie in the *theory* of knowledge, whereas the latter lie in the *practice* of research. However, Popper feels he must tackle the many obscurities, in particular the relation between *perceptual experiences* and *basic statements*, the latter (otherwise known as a *basic proposition*) being a statement of a singular fact that can serve as a premise in empirical falsification.
- Perceptual experiences have been regarded as justifying basic statements which are "based on" them and through which they become "manifest by inspection", etc. Popper agrees that such views correctly emphasise the close connection between basic statements and our perceptual experience, yet it was also rightly felt that statements can be logically justified only by statements, and so the connection perceptions and statements remained obscure.
- Popper thinks a solution can be found if we clearly distinguish those aspects of the problem that are psychological from the logical and methodological – our *subjective experience* or *feeling of conviction* from the objective logical relations that obtain between and within the various systems of scientific statements. Popper will discuss this in §§25-30, but now defines *subjective* and *objective*.

[4] Look this up.
[5] Look these up too!
[6] Not sure if this was "set". It's pp. 21-22 of my edition of LSD.