Ask a man on the street if the sun will rise tomorrow, and he will most certainly answer in the affirmative. As far as he is concerned, the sun has risen each day of his life. He sees tomorrow as being no different. This appeal to experience to justify a belief involves a process of induction. Hume opposes the validity of this method of justifying beliefs by stating that “it is impossible ... that any arguments from experience can prove this resemblance of the past to the future since all these arguments are founded on the supposition of that resemblance.” According to Hume, no system of reasoning can justify the inductive process. A proof of validity involves either an inductive or a deductive argument. Justifying induction by using induction itself is reasoning in a circular fashion. A deductive argument is not valid either. All deductive proofs have the property that the negation of a claim leads to a contradiction. Negating a claim of a deductive argument for induction does not necessarily lead to a contradiction. Consequently, Hume considers induction unjustifiable, and any beliefs arrived at through an inductive process unjustifiable as well. A belief that the sun will rise tomorrow is unjustifiable in Hume’s system of reasoning.

Reichenbach accepts Hume’s position on the indefensibility of a theoretical justification of induction. He provides an alternative approach that is successful in justifying the process of induction. Reichenbach’s pragmatic justification proves deductively that induction is the method of arriving at true beliefs best suited to extend human knowledge. Induction is justified not because it guarantees success, but because it will succeed if any other method succeeds. This is more than can be said for any other method.

The fundamental problem Hume raises is that if nature is not uniform, the inductive method may fail to establish knowledge of unobserved phenomena based on a limited set of observations. We cannot validly prove the uniformity of nature, either a priori or a posteriori,
without first justifying the process of induction. This logical impasse cannot be resolved easily. Reichenbach’s solution is to avoid it altogether by proposing that induction is the best method to use irrespective of the uniformity, or lack thereof, of nature.

Consider the two possibilities, nature is uniform and nature is not uniform, as shown in the table below.

<table>
<thead>
<tr>
<th></th>
<th>Nature is uniform</th>
<th>Nature is not uniform</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Induction employed</strong></td>
<td>Success</td>
<td>Failure</td>
</tr>
<tr>
<td><strong>Other method employed</strong></td>
<td>Success or failure possible</td>
<td>Failure</td>
</tr>
</tbody>
</table>

If nature is uniform, induction eventually establishes knowledge. The uniformity of success of any other method provides a basis for an inductive method of reasoning. Consequently, if any method succeeds in justifying beliefs, then induction succeeds as well. If, on the other hand, nature is not uniform, every method of arriving at true or justifiable beliefs must fail. Continued success of any method would constitute uniformity, which would contradict the lack of uniformity in this state of nature. If induction fails, nature must not be uniform, and every other method fails as well.

A possible flaw in Reichenbach’s argument is that continued failure also constitutes uniformity. This can be refuted in two ways. Firstly, this shows that nature cannot lack uniformity at some level because failure occurs consistently. Secondly, failure can occur in different ways, or occur randomly inter-dispersed with success, so that there is no continuity. In either case, the conclusion of Reichenbach’s argument is not affected.

Reichenbach’s employs the rule of induction by enumeration in his argument. This rule governs the process of inference from an observed sample to a whole population. He formalizes this rule by formulating it in terms of probability calculus. Reichenbach focuses on
the limit of the relative frequency of an attribute in an infinite sequence. He constructs a new set of possible scenarios to show that induction by enumeration will establish the value of the limit of the relative frequency of an attribute in a sequence, if such a limit exists.

<table>
<thead>
<tr>
<th>Rule of induction by enumeration</th>
<th>Sequence has a limit</th>
<th>Sequence has no limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limit established</td>
<td>Limit not established</td>
<td></td>
</tr>
<tr>
<td>Limit may be established</td>
<td>Limit not established</td>
<td></td>
</tr>
</tbody>
</table>

The most significant objection raised to Reichenbach’s argument is that his reasoning justifies an infinite number of rules. Induction by enumeration is represented as:

\[ F^n (A, B) = \frac{m}{n} + c, \]

where ‘c’ is a corrective term and can be specified at discretion, ‘n’ is the sample size, and ‘m’ is the observed frequency. In an inductive rule, ‘c’ is zero. However, there is an infinite class of rules, called ‘asymptotic rules’, in which ‘c’ converges to zero as ‘n’ goes to infinity. These infinitely many asymptotic rules can also successfully ascertain the limit of a relative frequency if such a limit exits. In order to prove that induction by enumeration is valid, one, and only one, of all possible rules must be demonstrably preferable to the others. Reichenbach uses descriptive simplicity as the selection criterion. Salomon provides a more formal and rigorous approach that is able to successfully refute the objection by showing that only one rule, of all the possible rules, is truly valid.

Salmon proposes two criteria to determine the preferred rule from the infinite class of possible rules. The first criterion is that all rules must be regular. Regularity implies that the sum of the limits of the relative frequencies of a mutually exclusive and exhaustive set of attributes must equal one. Each of these relative frequencies must be greater than zero. Rules that violate this condition are logically absurd; for example, an irregular rule could give rise to
the conclusion that the limit of the relative frequency of a disjunctive attribute is greater than one.

The second criterion of linguistic invariance states that “given two logically equivalent descriptions (in the same or different languages) of a body of evidence, no rule may permit mutually contradictory conclusions to be drawn on the basis of these statements of evidence. In other words, any rule whose outcome is in some manner determined by the definition of its predicates is linguistically variable and hence not a suitable candidate. For example, in the case of drawing marbles out of a box, any rule whose specification includes specifying the number of colors the marbles can take on is linguistically variable because changing the manner in which the colors are defined changes the result of the rule. Stipulating the adoption of a complete set of color predicates cannot eliminate this problem. A continuum of colors would be impossible to represent in discrete mathematics.

Salmon finalizes his argument by trying to determine the basis by which additional observation helps infer the value of the limit in question. By the rule of regularity, adding something to the observed frequency of one attribute requires removing an equal amount from the observed frequencies of other attributes. Salmon focuses his attention on determining the basis for deciding which observed frequencies to increase, and which to decrease. Using the words or expressions used to refer to these attributes, or some derivation thereof, as a basis violates the criterion of linguistic invariance. Using the attributes themselves requires a synthetic a priori knowledge that would presuppose the conclusion of the entire exercise. Only a function that depends exclusively on the observed frequencies is mathematically possible and satisfies the criteria of regularity and linguistic invariance. In terms of the earlier introduced notation, this is the function where the corrective term ‘c’ is zero – the rule of
induction by enumeration. Any deviation from this rule leads to an arbitrary biasing of the evidence. Therefore, it is possible to select a unique rule of inference from an infinite class of such rules.

One might argue that a classical interpretation of probability, specifically the principle of indifference, would provide a much simpler justification. The principle of indifference states that two possible occurrences are equally probable if there is no reason to suppose one will happen rather than the other\textsuperscript{v}. This principle gives rise to the Bertrand paradox. Reasoning in purely classical probability terms, the principle of indifference results in mutually contradictory conclusions.

Reichenbach and Salmon show that induction is justifiable from a pragmatic standpoint. Induction is the best method for inferring the unobserved from the observed because it guarantees results that are no worse than any other method. There is no theoretical justification for a belief that the sun will rise tomorrow, but a pragmatic argument shows that experience can serve as a valid basis instead\textsuperscript{vi}. The sun has risen each day for millions of years. The limit of its relative frequency is one. Why should tomorrow be any different?

\textsuperscript{1} Hume, David. “Sceptical Doubts”. An Enquiry Concerning Human Understanding, pg 24. Course Pack.
\textsuperscript{2} Salmon, Wesley C. “The Pragmatic Justification of Induction”, pg 86. Course Pack
\textsuperscript{3} ibid. Pg 87
\textsuperscript{4} ibid. pg. 92
\textsuperscript{5} ibid. Pg. 94
\textsuperscript{vi} I do not support any of the other theoretical justifications we studied because I feel that the objections to them are not adequately refuted or refutable.