

## *Hypothesis [as a form of reasoning]*

1865 | Harvard Lectures on the Logic of Science. Lecture VIII: Forms of Induction and Hypothesis | W 1:266-267

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*Hypothesis* is to be explained in a similar manner to induction. Hypothesis is quite a different thing from induction and is usually so considered although I have not found any definition given of it which brings out the difference distinctly. But it will be acknowledged that a hypothesis is a categorical assertion of something we have not experienced. Now in induction there is nothing of this sort. [—] Hypothesis is in fact the inference of a minor proposition as in the following examples respecting light.

We find that light gives certain peculiar fringes. Required an explanation of the fact. We reflect that ether waves would give the same fringes. We have therefore only to suppose that light is ether waves and the marvel is explained.

[—]

We have then three different kinds of inference. Deduction or inference *à priori*. Induction or inference *à particularis*, and Hypothesis or inference *a posteriori*.

1865 | Harvard Lectures on the Logic of Science. Lecture X: Grounds of Induction | W 1:283

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But the manner in which they have attained to certainty indicates a very different general strength of the three kinds of inference. [—] Thus we have in order of strength Deduction, Induction, Hypothesis. Deduction, in fact, is the only demonstration; yet no one thinks of questioning a good induction, while hypothesis is proverbially dangerous. *Hypotheses non fingo*, said Newton, striving to place his theory on a basis of strict induction. Yet it is hypotheses with which we must start; the baby when he lies turning his fingers before his eyes is making a hypothesis as to the connection of what he sees and what he feels. Hypotheses give us our facts. Induction extends our knowledge. Deduction makes it distinct.

1865 | Harvard Lectures on the Logic of Science. Lecture XI | W 1:290

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Hence the ground of deduction relates to symbols; that of induction to things; that of hypothesis to forms.

[—] And the hypothetic inference attained certainty by having only a subjective character.

1866 | Lowell Lectures on The Logic of Science; or Induction and Hypothesis: Lecture V | W 1:428

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These differences between these two scientific inferences are so great that it seems to me essential to

a right understanding of the subject that we should recognize two kinds of scientific reasoning. Induction and Hypothesis. [—] Hypothesis alone affords us any knowledge of causes and forces, and enables us to see the *why* of things. [—] So that we have

Deduction  
Induction  
and Hypothesis

as three coördinate classes of reasoning.

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1866 | Lowell Lectures on The Logic of Science; or Induction and Hypothesis: Lecture IX | W 1:485

We come to [...] the argument. [—] It will therefore be divided into three species according as this representation is a likeness, index, or symbol.

These three species are the same as Hypothesis, Induction, and Deduction. Hypothesis brings up to the mind an image of the true qualities of a thing - it therefore informs us as to comprehension but not as to Extension, that is it represents a representation which has Comprehension without Extension; in other words it represents a likeness.

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1866 | Lowell Lectures on The Logic of Science; or Induction and Hypothesis: Lecture VI. Practical Maxims of Logic | W 1:441

The inductive or hypothetic conclusion, therefore, stands to one of its premisses in the relation of a deductive or syllogistic premiss to its conclusion, the second premiss of the induction or hypothesis remaining a premiss in this explaining syllogism. It is in fact a sufficient definition of a scientific inference to say that it is the inference of one of the premisses of a syllogism from the other premiss and from the conclusion.

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1867 | On a New List of Categories | W 2:58; CP 1.559

In an argument, the premisses form a representation of the conclusion, because they indicate the interpretant of the argument, or representation representing it to represent its object. The premisses may afford a likeness, index, or symbol of the conclusion. In deductive argument, the conclusion is represented by the premisses as by a general sign under which it is contained. In hypotheses, something *like* the conclusion is proved, that is, the premisses form a likeness of the conclusion. Take, for example, the following argument: -

M is, for instance, PI, PII, PIII, and PIV;  
S is PI, PII, PIII, and PIV:  
∴ S is M.

Here the first premiss amounts to this, that “PI, PII, PIII, and PIV” is a likeness of M, and thus the premisses are or represent a likeness of the conclusion.

Hence the formulæ are [—]

*Hypothesis*

Any *M* is, for instance, *P' P'' P'''*, &c.,  
*S* is *P' P'' P'''*, &c.;  
∴ *S* is probably *M*.

Hypothesis may be defined as an argument which proceeds upon the assumption that a character which is known necessarily to involve a certain number of others, may be probably predicated of any object which has all the characters which this character is known to involve. Just as induction may be regarded as the inference of the major premiss of a syllogism, so hypothesis may be regarded as the inference of the minor premiss, from the other two propositions. [—]

The function of hypothesis is to substitute for a great series of predicates forming no unity in themselves, a single one (or small number) which involves them all, together (perhaps) with an indefinite number of others. It is, therefore, also a reduction of a manifold to unity. Every deductive syllogism may be put into the form

If A, then B;  
But A:  
∴ B.

And as the minor premiss in this form appears as antecedent or reason of a hypothetical proposition, hypothetic inference may be called reasoning from consequent to antecedent.

Thus an emotion is always a simple predicate substituted by an operation of the mind for a highly complicated predicate. Now if we consider that a very complex predicate demands explanation by means of an hypothesis, that that hypothesis must be a simpler predicate substituted for that complex one; and that when we have an emotion, an hypothesis, strictly speaking, is hardly possible – the analogy of the parts played by emotion and hypothesis is very striking. There is, it is true, this difference between an emotion and an intellectual hypothesis, that we have reason to say in the case of the latter, that to whatever the simple hypothetic predicate can be applied, of that the complex predicate is true; whereas, in the case of an emotion this is a proposition for which no reason can be given, but which is determined merely by our emotional constitution.

Hypothesis is where we find some very curious circumstance, which would be explained by the supposition that it was a case of a certain general rule, and thereupon adopt that supposition. Or, where we find that in certain respects two objects have a strong resemblance, and infer that they resemble one another strongly in other respects. [—]

As a general rule, hypothesis is a weak kind of argument. It often inclines our judgment so slightly toward its conclusion that we cannot say that we believe the latter to be true; we only surmise that it may be so. But there is no difference except one of degree between such an inference and that by which we are led to believe that we remember the occurrences of yesterday from our feeling as if we did so.

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1878 | Deduction, Induction, and Hypothesis | CP 2.643

We may say, therefore, that hypothesis produces the *sensuous* element of thought, and induction the *habitual* element.

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1878 | Deduction, Induction, and Hypothesis | CP 2.623

Suppose I enter a room and there find a number of bags, containing different kinds of beans. On the table there is a handful of white beans; and, after some searching, I find one of the bags contains white beans only. I at once infer as a probability, or as a fair guess, that this handful was taken out of that bag. This sort of inference is called *making an hypothesis*. It is the inference of a case from a rule and a result. We have, then—

DEDUCTION.

*Rule.*—All the beans from this bag are white.

*Case.*—These beans are from this bag.

*∴Result.*—These beans are white.

INDUCTION.

*Case.*—These beans are from this bag.

*Result.*—These beans are white.

*∴Rule.*—All the beans from this bag are white

HYPOTHESIS.

*Rule.*—All the beans from this bag are white.

*Result.*—These beans are white.

*∴Case.*—These beans are from this bag.

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1883 | A Theory of Probable Inference | CP 2.706-707

Corresponding to induction, we have the following mode of inference: [—]

Hypothesis.

*M* has, for example, the numerous marks *P'*, *P''*, *P'''*, etc.,  
*S* has the proportion *r* of the marks *P'*, *P''*, *P'''*, etc.;  
Hence, probably and approximately, *S* has an *r*-likeness to *M*.

Thus, we know, that the ancient Mound-builders of North America present, in all those respects in which we have been able to make the comparison, a limited degree of resemblance with the Pueblo Indians. The inference is, then, that in all respects there is about the same degree of resemblance between these races.

If I am permitted the extended sense which I have given to the word "induction," this argument is simply an induction respecting qualities instead of respecting things. [—]

I call this induction of characters hypothetic inference, or, briefly, hypothesis.

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1892 | The Law of Mind | CP 6.144-146

The three main classes of logical inference are Deduction, Induction, and Hypothesis. These correspond to three chief modes of action of the human soul.

[—]

By hypothetic inference, I mean, as I have explained in other writings, an induction from qualities. For example, I know that the kind of man known and classed as a "mugwump" has certain characteristics. [—] These views, among others, I know to be obtrusive marks of a "mugwump." Now, suppose I casually meet a man in a railway train, and falling into conversation find that he holds opinions of this sort; I am naturally led to suppose that he is a "mugwump." That is hypothetic inference. That is to say, a number of readily verifiable marks of a mugwump being selected, I find this man has these, and infer that he has all the other characters which go to make a thinker of that stripe. [—] Now the mind acts in a way similar to this, every time we acquire a power of coördinating reactions in a peculiar way, as in performing any act requiring skill. Thus, most persons have a difficulty in moving the two hands simultaneously and in opposite directions through two parallel circles nearly in the medial plane of the body. To learn to do this, it is necessary to attend, first, to the different actions in different parts of the motion, when suddenly a general conception of the action springs up and it becomes perfectly easy. We think the motion we are trying to do involves this action, and this, and this. Then the general idea comes which unites all those actions, and thereupon the desire to perform the motion calls up the general idea. The same mental process is many times employed whenever we are learning to speak a language or are acquiring any sort of skill.

Thus, by induction, a number of sensations followed by one reaction become united under one general idea followed by the same reaction; while, by the hypothetic process, a number of reactions called for by one occasion get united in a general idea which is called out by the same occasion. By deduction, the habit fulfills its function of calling out certain reactions on certain occasions.

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1900-05-20 | Smithsonian Institution letters | HP 2:878-879

Hypothesis is guessing, or if you please starting a question. A phenomenon is observed having something peculiar about it. Ruminating leads me to see that *if* a certain state of things existed, of whose actual existence I know nothing, that phenomenon would certainly occur, or at any rate, would in all probability occur. I say, By George, I wonder if that is not the very state of the case! That is hypothesis. The justification of my attaching the slightest weight to such a mere guess is, that there are just these three modes of inference, and neither Deduction or Induction can furnish me with any new idea. Unless I can get to the bottom of things by hypothesis, I may as well give up trying to comprehend them. But not only that; but just as the general advantage of the inductive procedure admits of deductive proof, so induction in its turn shows that hypotheses have a very decent chance of turning out satisfactory, or at least answering well and being helpful for a long time.

1900-05-20 | Smithsonian Institution letters | HP 2:876-877

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In 1867, I produced what I considered, and still consider proof that all arguments are of three kinds Deduction, Induction and Hypothesis, with a supplementary kind Analogy sharing in the nature of Induction and of Hypothesis. In various publications, I gradually made my doctrine more definite, until in 1883 I gave an account of it in *Studies in Logic by Members of the Johns Hopkins University*. The theory there given seems to me substantially correct as far as Induction goes. Later, I was led to see objections to the method in which I there dealt with Hypothesis, in regard to which I had departed from my earlier opinions; and in order to meet these objections, I at first proposed slightly to modify my theory both of Induction and of Hypothesis, leaving my later opinions about their relations to one another, as they were. But this new view on further consideration was found not to be acceptable in regard to Induction; and finally some five years ago I made an entirely fresh investigation, more careful than ever, the result of which was that I return to my early views on the relations of induction and hypothesis, leave the theory of induction as I had it in 1883 substantially, and restrict the modifications of it to hypothesis only. I think I may be confident of having the matter right now. At any rate, several careful re-criticisms of it have not disclosed any faults.

1902 | Minute Logic: Chapter I. Intended Characters of this Treatise | CP 2.102

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... the study of Abduction. Upon this subject, my doctrine has been immensely improved since my essay "A Theory of Probable Inference" was published in 1883. In what I there said about "Hypothetic Inference" I was an explorer upon untrodden ground. I committed, though I half corrected, a slight positive error, which is easily set right without essentially altering my position. But my capital error was a negative one, in not perceiving that, according to my own principles, the reasoning with which I was there dealing could not be the reasoning by which we are led to adopt a hypothesis, although I all but stated as much. But I was too much taken up in considering syllogistic forms and the doctrine of logical extension and comprehension, both of which I made more fundamental than they really are.

1910 [c.] | Letters to Paul Carus | CP 8.238

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As for the validity of the hypothesis, the retrodution, there seems at first to be no room at all for the

question of what supports it, since from an actual fact it only infers a *may-be* (*may-be* and *may-be not*). But there is a decided leaning to the affirmative side and the frequency with which that turns out to be an actual fact is to me quite the most surprising of all the wonders of the universe.

1910 [c.] | Letters to Paul Carus | CP 8.227-228

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... the division of the elementary kinds of reasoning into three heads was made by me in my first lectures and was published in 1869 in Harris's *Journal of Speculative Philosophy*. I still consider that it had a sound basis. Only in almost everything I printed before the beginning of this century I more or less mixed up Hypothesis and Induction ... .

The general body of logicians had also at all times come very near recognizing the trichotomy. They only failed to do so by having so narrow and formalistic a conception of inference ( as necessarily having formulated judgments for its premises) that they did not recognize Hypothesis (or, as I now term it, *retroduction*) as an *inference* ... .

1910 [c.] | Letters to Paul Carus | CP 8.234

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A good account of Quantitative Induction is given in my paper in *Studies in Logic, By Members of the Johns Hopkins University*, and its two rules are there well developed. But what I there call hypothesis is so far from being that, that it is rather Quantitative than Qualitative Induction. At any rate, it is treated *mostly* as Quantitative. Hypothesis proper is in that paper only touched upon in the last section.

1913 | Letters to F. A. Woods | CP 8.385-388

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I have always, since early in the sixties, recognized three different types of reasoning, viz: 1st, *Deduction* which depends on our confidence in our ability to analyze the meanings of the signs in or by which we think; 2nd, *Induction*, which depends upon our confidence that a run of one kind of experience will not be changed or cease without some indication before it ceases; and 3rd, *Retroduction*, or Hypothetic Inference, which depends on our hope, sooner or later, to guess at the conditions under which a given kind of phenomenon will present itself.

Each of these three types occurs in different forms requiring special studies.

From the 1st type to the 3rd the security decreases greatly, while the *uberty* as greatly increases ... .

I don't think the adoption of a hypothesis on probation can properly be called induction; and yet it is *reasoning* and though its *security* is low, its *uberty* is high.

nd. | Reasoning and Instinct [R] | MS [R] 831: 13-14

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There are three kinds of reasoning, the Inductive, the Deductive, and the Hypothetical. The last

consists in the introduction into a confused tangle of given facts of an idea not given whose only justification lies in its reducing that tangle to order. This kind of inference is little subject to control, and so not highly rational; and one reason for this is that when once the facts have been apprehended in the light of the hypothesis, they become so swallowed up in it, that a strong exertion of intellect is required to disembarass them from it, and to recall them in their pristine nudity.

nd | Fragments [R] | MS [R] 839

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*Hypothesis* consists in the inference of a case from a rule & a result or from the denial of a rule & the denial of the result or the inference of the contradictory of a result from a rule & the denial of a case.