Abduction

1896 [c.] | Lessons of the History of Science | CP 1.65

There are in science three fundamentally different kinds of reasoning, Deduction (called by Aristotle {synagögé} or {anagögé}), Induction (Aristotle's and Plato's {epagögé}) and Retroduction (Aristotle's {apagögé}, but misunderstood because of corrupt text, and as misunderstood usually translated *abduction*). Besides these three, Analogy (Aristotle's {paradeigma}) combines the characters of Induction and Retroduction.

1901 | On the Logic of Drawing History from Ancient Documents Especially from Testimonies (Logic of History) | CP 7.202

Accepting the conclusion that an explanation is needed when facts contrary to what we should expect emerge, it follows that the explanation must be such a proposition as would lead to the prediction of the observed facts, either as necessary consequences or at least as very probable under the circumstances. A hypothesis then, has to be adopted, which is likely in itself, and renders the facts likely. This step of adopting a hypothesis as being suggested by the facts, is what I call *abduction*. I reckon it as a form of inference, however problematical the hypothesis may be held. What are to be the logical rules to which we are to conform in taking this step? There would be no logic in imposing rules, and saying that they *ought* to be followed, until it is made out that the purpose of hypothesis requires them. [—] Ultimately, the circumstance that a hypothesis, although it may lead us to expect some facts to be as they are, may in the future lead us to erroneous expectations about other facts, – this circumstance, which anybody must have admitted as soon as it was brought home to him, was brought home to scientific men so forcibly, first in astronomy, and then in other sciences, that it became axiomatical that a hypothesis adopted by abduction could only be adopted on probation, and must be tested.

1901 | On the Logic of Drawing History from Ancient Documents Especially from Testimonies (Logic of History) | CP 7.218

Abduction, on the other hand, is merely preparatory. It is the first step of scientific reasoning, as induction is the concluding step. Nothing has so much contributed to present chaotic or erroneous ideas of the logic of science as failure to distinguish the essentially different characters of different elements of scientific reasoning; and one of the worst of these confusions, as well as one of the commonest, consists in regarding abduction and induction taken together (often mixed also with deduction) as a simple argument. Abduction and induction have, to be sure, this common feature, that both lead to the acceptance of a hypothesis because observed facts are such as would necessarily or probably result as consequences of that hypothesis. But for all that, they are the opposite poles of reason, the one the most ineffective, the other the most effective of arguments. The method of either is the very reverse of the other's. Abduction makes its start from the facts, without, at the outset,

having any particular theory in view, though it is motived by the feeling that a theory is needed to explain the surprising facts. Induction makes its start from a hypothesis which seems to recommend itself, without at the outset having any particular facts in view, though it feels the need of facts to support the theory. Abduction seeks a theory. Induction seeks for facts. In abduction the consideration of the facts suggests the hypothesis. In induction the study of the hypothesis suggests the experiments which bring to light the very facts to which the hypothesis had pointed. The mode of suggestion by which, in abduction, the facts suggest the hypothesis is by *resemblance*, – the resemblance of the facts to the consequences of the hypothesis. The mode of suggestion by which in induction the hypothesis suggests the facts is by *contiguity*, – familiar knowledge that the conditions of the hypothesis can be realized in certain experimental ways.

1901 | On the Logic of Drawing History from Ancient Documents Especially from Testimonies (Logic of History) | CP 7.219

I now proceed to consider what principles should guide us in abduction, or the process of choosing a hypothesis. Underlying all such principles there is a fundamental and primary abduction, a hypothesis which we must embrace at the outset, however destitute of evidentiary support it may be. That hypothesis is that the facts in hand admit of rationalization, and of rationalization by us. [—] Now, that the matter of no new truth can come from induction or from deduction, we have seen. It can only come from abduction; and abduction is, after all, nothing but guessing. We are therefore bound to hope that, although the possible explanations of our facts may be strictly innumerable, yet our mind will be able, in some finite number of guesses, to guess the sole true explanation of them. *That* we are bound to assume, independently of any evidence that it is true. Animated by that hope, we are to proceed to the construction of a hypothesis.

1901 | On the Logic of drawing History from Ancient Documents especially from Testimonies (Logic of History) | CP 7.220n18

… what does it matter how the work of abduction is performed? It matters much, for the reason that it originates every proposition. It is true that, however carelessly the abduction is performed, the true hypothesis will get suggested at last. But the aid which a correct logic can afford to science consists in enabling that to be done at small expenditure of every kind which, at any rate, is bound to get done somehow. The whole service of logic to science, whatever the nature of its services to individuals may be, is of the nature of an economy.

1901 | The Proper Treatment of Hypotheses: a Preliminary Chapter, toward an Examination of Hume's Argument against Miracles, in its Logic and in its History | HP 2:899-900

Any novice in logic may well be surprised at my calling a guess an inference. It is equally easy to define inference so as to exclude or include abduction. But all the objects of logical study have to be classifled; and it is found that there is no other good class in which to put abduction but that of inferences. Many logicians, however, leave it unclassed, a sort of logical supernumerary, as if its importance were too small to entitle it to any regular place. They evidently forget that neither

deduction nor induction can ever add the smallest item to the data of perception; and, as we have already noticed, mere percepts do not constitute any knowledge applicable to any practical or theoretical use. All that makes knowledge applicable comes to us *viâ* abduction. Looking out of my window this lovely spring morning I see an azalea in full bloom. No, no! I do not see that; though that is the only way I can describe what I see. *That* is a proposition, a sentence, a fact; but what I perceive is not proposition, sentence, fact, but only an image, which I make intelligible in part by means of a statement of fact. This statement is abstract; but what I see is concrete. I perform an abduction when I so much as express in a sentence anything I see. The truth is that the whole fabric of our knowledge is one matted felt of pure hypothesis confirmed and refined by induction. Not the smallest advance can be made in knowledge beyond the stage of vacant staring, without making an abduction at every step.

When a chicken first emerges from the shell, it does not try fifty random ways of appeasing its hunger, but within five minutes is picking up food, choosing as it picks, and picking what it aims to pick. That is not reasoning, because (it is not done deliberately; but in every respect but that), it is just like abductive inference.

1901 | The Proper Treatment of Hypotheses: a Preliminary Chapter, toward an Examination of Hume's Argument against Miracles, in its Logic and in its History | HP 2:895

Now, in an inquiry concerning a hypothesis in general, three distinct stages have to be recognized, these stages being governed by entirely different logical principles. The first stage consists in the invention, selection, and entertainment of the hypothesis. This I call the abduction.

1901 | The Proper Treatment of Hypotheses: a Preliminary Chapter, toward an Examination of Hume's Argument against Miracles, in its Logic and in its History | HP 2:898-899

A singular salad is abduction, whose chief elements are its groundlessness, its ubiquity, and its trustworthiness. [—]

Abduction is that kind of operation which suggests a statement in no wise contained in the data from which it sets out. There is a more familiar name for it than *abduction*; for it is neither more nor less than guessing. A given object presents an extraordinary combination of characters of which we should like to have an explanation. That there is any explanation of them is a pure assumption; and if there be, it is some one hidden fact which explains them; while there are, perhaps, a million other possible ways of explaining them, if they were not all unfortunately, false. [—] By its very definition abduction leads to a hypothesis which is entirely foreign to the data. To assert the truth of its conclusion ever so dubiously would be too much. There is no warrant for doing more than putting it as an interrogation. To do that would seem to be innocent; yet if the interrogation means anything, it means that the hypothesis is to be tested. Now testing by experiment is a very expensive business, involving great outlay of money, time, and energy; so that comparatively few hypotheses can be tested. Thus, even the admission of an abductive conclusion to the rank of an active interrogation is a concession not to be too lightly accorded.

1901 | Hume on Miracles (H on M) | CP 6.525

The first starting of a hypothesis and the entertaining of it, whether as a simple interrogation or with any degree of confidence, is an inferential step which I propose to call *abduction*. This will include a preference for any one hypothesis over others which would equally explain the facts, so long as this preference is not based upon any previous knowledge bearing upon the truth of the hypotheses, nor on any testing of any of the hypotheses, after having admitted them on probation. I call all such inference by the peculiar name, *abduction*, because its legitimacy depends upon altogether different principles from those of other kinds of inference.

1901 | Hume's Argument against Miracles, and the Idea of Natural Law (Hume) | MS [R] 873:3 (var.); HP 2:912

Inference is any act of deliberate assent, in any degree, however slight, which a man accords to a proposition because he thinks that assent warranted by his already accorded assent to another proposition or propositions, called the premises. It is one act of inference to adopt a hypothesis on probation. Such an act may be called an *abduction*. It is an act of the same kind, when a hypothesis is merely suggested as possible worth consideration. For even then some degree of favor is extended to it.

1902 | Reasoning | CP 2.774

Reasoning is of three elementary kinds; but mixed reasonings are more common. These three kinds are *induction*, *deduction*, and *presumption* (for which the present writer proposes the name *abduction*).

1902 | Reasoning | CP 2.776

Presumption, or, more precisely, *abduction* (which the present writer believes to have been what Aristotle's twenty-fifth chapter of the second *Prior Analytics* imperfectly described under the name of {apagögé}, until Apellicon substituted a single wrong word and thus disturbed the sense of the whole), furnishes the reasoner with the problematic theory which induction verifies. Upon finding himself confronted with a phenomenon unlike what he would have expected under the circumstances, he looks over its features and notices some remarkable character or relation among them, which he at once recognizes as being characteristic of some conception with which his mind is already stored, so that a theory is suggested which would *explain* (that is, render necessary) that which is surprising in the phenomena.

He therefore accepts that theory so far as to give it a high place in the list of theories of those phenomena which call for further examination. If this is all his conclusion amounts to, it may be asked: What need of reasoning was there? Is he not free to examine what theories he likes? The answer is that it is a question of economy. If he examines all the foolish theories he might imagine, he never will (short of a miracle) light upon the true one. Indeed, even with the most rational procedure, he never would do so, were there not an affinity between his ideas and nature's ways. However, if there be any

attainable truth, as he hopes, it is plain that the only way in which it is to be attained is by trying the hypotheses which seem reasonable and which lead to such consequences as are observed.

1902 | Carnegie Institution Correspondence | HP 2:1031-1032

But in my paper on probable inference in the Johns Hopkins “Studies in Logic”, owing to the excessive weight I at that time placed on formalistic considerations, I fell into the error of attaching a name the synonym I then used for Abduction, to a probable inference which I correctly described, forgetting that according to my own earlier and correct account of it, abduction is not of the number of probable inferences. It is singular that I should have done that, when in the very same paper I mention the existence of the mode of inference which is true abduction. Thus, the only error that paper contains is the designation as abduction of a mode of induction somewhat resembling abduction, which may properly be called abductive induction.

1902 | Carnegie Institution Correspondence | NEM 4:37-38

Abduction is reasoning which professes to be such that in case there is any ascertainable truth concerning the matter in hand, the general method of this reasoning, though not necessarily each special application of it, must eventually approximate to the truth.

Of these three classes of reasonings Abduction is the lowest. So long as it is sincere, and if it be not, it does not deserve to be called reasoning, Abduction cannot be absolutely bad. For sincere efforts to reach the truth, no matter in how wrong a way they may be commenced, cannot fail ultimately to attain any truth that is attainable. Consequently, there is only a relative preference between different abductions; and the ground of such preference must be economical. That is to say, the better abduction is the one which is likely to lead to the truth with the lesser expenditure of time, vitality, etc.

1902 | Carnegie Institution Correspondence | NEM 4:62

Methodeutic has a special interest in Abduction, or the inference which starts a scientific hypothesis. For it is not sufficient that a hypothesis should be a justifiable one. Any hypothesis which explains the facts is justified critically. But among justifiable hypotheses we have to select that one which is suitable for being tested by experiment. There is no such need of a subsequent choice after drawing deductive and inductive conclusions.

1902 | Minute Logic: Chapter I. Intended Characters of this Treatise | MS [R] 425:120-122

Arguments are of three kinds, *Deduction*, *Induction*, and what I call *Abduction* [—] If the conclusion is adopted, simply because it suggests itself as a possible fact which, if true, would necessitate ascertained facts, the Argument is Abductive. [—] It will be remarked that in the case of Abduction the only way in which the facts presented in the argument are any sign of the fact inferred is that they are

an *Icon* […] of it.

From early/discarded draft

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

… 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. As long as I held that opinion, my conceptions of Abduction necessarily confused two different kinds of reasoning. When, after repeated attempts, I finally succeeded in clearing the matter up, the fact shone out that probability proper had nothing to do with the validity of Abduction, unless in a doubly indirect manner. But now a number of considerations offered themselves as possibly connected with the solution of the problem, and owing to the extreme weakness of this form of inference, it was difficult to make sure that they were irrelevant. I seemed to be lost in a pathless forest, until by minute application of the first principles, I found that the categories, which I had been led to neglect from not seeing how they were to be applied, must and in fact did furnish the clue that guided me through the maze.

1902 | Minute Logic: Chapter I. Intended Characters of this Treatise | CP 2.96

Argument is of three kinds: *Deduction*, *Induction*, and *Abduction* (usually called adopting a hypothesis). [—] An originary Argument, or *Abduction*, is an argument which presents facts in its Premiss which present a similarity to the fact stated in the Conclusion, but which could perfectly well be true without the latter being so, much more without its being recognized; so that we are not led to assert the Conclusion positively but are only inclined toward admitting it as representing a fact of which the facts of the Premiss constitute an *Icon*. For example, at a certain stage of Kepler’s eternal exemplar of scientific reasoning, he found that the observed longitudes of Mars, which he had long tried in vain to get fitted with an orbit, were (within the possible limits of error of the observations) such as they would be if Mars moved in an ellipse. The facts were thus, in so far, a *likeness* of those of motion in an elliptic orbit. Kepler did not conclude from this that the orbit really was an ellipse; but it did incline him to that idea so much as to decide him to undertake to ascertain whether virtual predictions about the latitudes and parallaxes based on this hypothesis would be verified or not. This probational adoption of the hypothesis was an Abduction. An Abduction is Originary in respect to being the only kind of argument which starts a new idea.

1903 | Harvard Lectures on Pragmatism: Lecture V | CP 5.144-145

… three radically different kinds of arguments which I signalized in 1867 and which had been recognized by the logicians of the eighteenth century, although [those] logicians quite pardonably failed to recognize the inferential character of one of them. Indeed, I suppose that the three were given by Aristotle in the Prior Analytics, although the unfortunate illegibility of a single word in his MS. and its replacement by a wrong word by his first editor, the stupid [Apellicon], has completely altered the sense of the chapter on Abduction. At any rate, even if my conjecture is wrong, and the text must stand as it is, still Aristotle, in that chapter on Abduction, was even in that case evidently groping for that mode of inference which I call by the otherwise quite useless name of Abduction – a word which is only employed in logic to translate the [{apagoge}] of that chapter.

These three kinds of reasoning are Abduction, Induction, and Deduction. [—] All the ideas of science come to it by the way of Abduction. Abduction consists in studying facts and devising a theory to explain them. Its only justification is that if we are ever to understand things at all, it must be in that way.

1903 | Harvard Lectures on Pragmatism: Lecture V | CP 5.146

Among these opinions which I have constantly maintained is this, that while Abductive and Inductive reasoning are utterly irreducible, either to the other or to Deduction, or Deduction to either of them, yet the only *rationale* of these methods is essentially Deductive or Necessary. If then we can state wherein the validity of Deductive reasoning lies, we shall have defined the foundation of logical goodness of whatever kind.

1903 | Harvard Lectures on Pragmatism: Lecture V, a deleted passage | PPM 276-277

Now, I said, Abduction, or the suggestion of an explanatory theory, is inference through an Icon, and is thus connected with Firstness; Induction, or trying how things will act, is inference through an Index, and is thus connected with Secondness; Deduction, or recognition of the relations of general ideas, is inference through a Symbol, and is thus connected with Thirdness. [—] But my connection of Abduction with Firstness, Induction with Secondness, and Deduction with Thirdness was confirmed by my finding no essential subdivision of Abductions, that Induction split at once, into the Sampling of Collections, and the Sampling of Qualities, while in the logic of relatives the three figures of syllogism gain a reality which is not so easily perceived in non-relative syllogism but really exists there also.

1903 | Harvard Lectures on Pragmatism: Lecture VI | CP 5.171-172

Concerning the validity of Abductive inference, there is little to be said, although that little is pertinent to the problem we have in hand.

Abduction is the process of forming an explanatory hypothesis. It is the only logical operation which introduces any new idea; for induction does nothing but determine a value, and deduction merely evolves the necessary consequences of a pure hypothesis.

Deduction proves that something *must be*; Induction shows that something *actually is* operative;

Abduction merely suggests that something *may be*.

Its only justification is that from its suggestion deduction can draw a prediction which can be tested by induction, and that, if we are ever to learn anything or to understand phenomena at all, it must be by abduction that this is to be brought about.

No reason whatsoever can be given for it, as far as I can discover; and it needs no reason, since it merely offers suggestions.

1903 | Harvard Lectures on Pragmatism: Lecture VII | CP 5.181

The third cotary proposition is that abductive inference shades into perceptual judgment without any sharp line of demarcation between them; or, in other words, our first premisses, the perceptual judgments, are to be regarded as an extreme case of abductive inferences, from which they differ in being absolutely beyond criticism. The abductive suggestion comes to us like a flash. It is an act of insight, although of extremely fallible insight. It is true that the different elements of the hypothesis were in our minds before; but it is the idea of putting together what we had never before dreamed of putting together which flashes the new suggestion before our contemplation.

1903 | Harvard Lectures on Pragmatism: Lecture VII | CP 5.188-189

It must be remembered that abduction, although it is very little hampered by logical rules, nevertheless is logical inference, asserting its conclusion only problematically or conjecturally, it is true, but nevertheless having a perfectly definite logical form.

Long before I first classed abduction as an inference it was recognized by logicians that the operation of adopting an explanatory hypothesis – which is just what abduction is – was subject to certain conditions. Namely, the hypothesis cannot be admitted, even as a hypothesis, unless it be supposed that it would account for the facts or some of them. The form of inference, therefore, is this:

> The surprising fact, C, is observed;
> But if A were true, C would be a matter of course,
> Hence, there is reason to suspect that A is true.

Thus, A cannot be abductively inferred, or if you prefer the expression, cannot be abductively conjectured until its entire content is already present in the premiss, “If A were true, C would be a matter of course.”

1903 | Harvard Lectures on Pragmatism: Lecture VII, a deleted passage | PPM 282-283

The maxim of Pragmatism, if it is sound, or whatever ought to replace it, if it is not sound, is nothing else than the logic of abduction.

A mass of facts is before us. We go through them. We examine them. We find them a confused snarl,

an impenetrable jungle. We are unable to hold them in our minds. We endeavor to set them down upon paper; but they seem so multiplex intricate that we can neither satisfy ourselves that what we have set down represents the facts, nor can we get any clear idea of what it is that we have set down. But suddenly, while we are poring over our digest of the facts and are endeavoring to set them into order, it occurs to us that if we were to assume something to be true that we do not know to be true, these facts would arrange themselves luminously. That is *abduction*. [—]

The anticipation that such might be the truth, not amounting to positive assertion yet by no means sinking to a recognition of a bare possibility, was the Abductive conclusion.

1903 | Lowell Lectures on Some Topics of Logic Bearing on Questions Now Vexed. Eighth Lecture, Abduction | CP 5.590

If we are to give the names of Deduction, Induction, and Abduction to the three grand classes of inference, then Deduction must include every attempt at mathematical demonstration, whether it relate to single occurrences or to "probabilities," that is, to statistical ratios; Induction must mean the operation that induces an assent, with or without quantitative modification, to a proposition already put forward, this assent or modified assent being regarded as the provisional result of a method that must ultimately bring the truth to light; while Abduction must cover all the operations by which theories and conceptions are engendered.

1903 | Lowell Lectures on Some Topics of Logic Bearing on Questions Now Vexed. Eighth Lecture, Abduction | CP 5.602-603

For abduction commits us to nothing. It merely causes a hypothesis to be set down upon our docket of cases to be tried.

I shall be asked, Do you really mean to say that we ought not to adopt any opinion whatever as an opinion until it has sustained the ordeal of furnishing a prediction that has been verified?

In order to answer that question, it will be requisite to inquire how an abduction can be justified, here understanding by abduction any mode or degree of acceptance of a proposition as a truth, because a fact or facts have been ascertained whose occurrence would necessarily or probably result in case that proposition were true. The abduction so defined amounts, you will remark, to observing a fact and then professing to say what idea it was that gave rise to that fact. One would think a man must be privy to the counsels of the Most High so to presume. The only justification possible, other than some such positive fact which would put quite another color upon the matter, is the justification of desperation. That is to say, that if he is not to say such things, he will be quite unable to know anything of positive fact.

In a general way, this justification certainly holds. If man had not had the gift, which every other animal has, of a mind adapted to his requirements, he not only could not have acquired any knowledge, but he could not have maintained his existence for a single generation. But he is provided with certain instincts, that is, with certain natural beliefs that are true.

1903 | Lowell Lectures on Some Topics of Logic Bearing on Questions Now Vexed. Eighth Lecture,

Abduction | CP 5.600

But even then the likelihood would not weigh with me directly, as such, but because it would become a factor in what really is in all cases the leading consideration in Abduction, which is the question of Economy – Economy of money, time, thought, and energy.

1903 | Syllabus: Syllabus of a course of Lectures at the Lowell Institute beginning 1903, Nov. 23. On Some Topics of Logic | EP 2:287

The whole operation of reasoning begins with *Abduction*, which is now to be descibed. Its occasion is a *surprise*. That is, some belief, active or passive, formulated or unformulated, has just been broken up. It may be in real experience or it may equally be in pure mathematics, which has its marvels, as nature has. The mind seeks to bring the facts, as modified by the new discovery, into order; that is, to form a general conception embracing them. In some cases, it does this by an act of *generalization*. In other cases, no new law is suggested, but only a peculiar state of facts that will “explain” the surprising phenomenon; and a law already known is recognized as applicable to the suggested hypothesis, so that the phenomenon, under that assumption, would not be surprising, but quite likely, or even would be a necessary result. This synthesis suggesting a new conception or hypothesis, is the Abduction. It is recognized that the phenomena are *like*, i.e. constitute an Icon of, a replica of a general conception, or Symbol. This is not accepted as shown to be *true*, nor even *probable* in the technical sense, - i.e., not probable in such a sense that underwriters could safely make it the basis of business, however multitudinous the cases might be; - but it is shown to be *likely*, in the sense of being some sort of approach to the truth, in an indefinite sense. The conclusion is drawn in the interrogative mood (there is such a mood in Speculative Grammar, whether it occur in any human language or not). This conclusion, which is the Interpretant of the Abduction, represents the Abduction to be a Symbol, - to convey a general concept of the truth, - but not to *assert* it in any measure.

1903 | Syllabus: Nomenclature and Division of Triadic Relations, as far as they are determined | EP 2:299

An *Abduction* is a method of forming a general prediction without any positive assurance that it will succeed either in the special case or usually, its justification being that it is the only possible hope of regulating our future conduct rationally, and that Induction from past experience gives us strong encouragement to hope that it will be successful in the future.

1904 | A Brief Intellectual Autobiography by Charles Sanders Peirce | Peirce, 1983, p. 65; MS [R] L107:3-MS [R] L107(s):6

…he divided all reasoning into, 1st, the deductive, including all necessary inference together with all probable inference to which the calculus of probabilities is properly applicable (rejecting inverse probabilities not founded on positive information), 2nd, the inductive, including all experimental testing of hypotheses (for he considers a physical experiment to be in a general sense of the same nature as a geometrical reasoning, which is performed by internal experimentation) but excluding, 3rd, the

“abductive,” or the process of forming and accepting on probation, a hypothesis by which to explain surprising facts.

This quote has been taken from Kenneth Laine Ketner's 1983 reconstruction of Peirce's 'Autobiography'

1905 | Letters to Mario Calderoni | CP 8.209

... there are but three elementary kinds of reasoning. The first, which I call *abduction* (on the theory, the doubtful theory, I confess, that the meaning of the XXVth chapter of the second book of the Prior Analytics has been completely diverted from Aristotle’s meaning by a single wrong word having been inserted by Apellicon where the original word was illegible) consists in examining a mass of facts and in allowing these facts to suggest a theory. In this way we gain new ideas; but there is no force in the reasoning. [—] ... induction is, as Aristotle says, the inference of the truth of the major premiss of a syllogism of which the minor premiss is made to be true and the conclusion is found to be true, while abduction is the inference of the truth of the minor premiss of a syllogism of which the major premiss is selected as known already to be true while the conclusion is found to be true. Abduction furnishes all our ideas concerning real things, beyond what are given in perception, but is mere conjecture, without probative force.

1906 | Prolegomena to an Apology for Pragmaticism | CP 4.541 n1

Abduction, in the sense I give the word, is any reasoning of a large class of which the provisional adoption of an explanatory hypothesis is the type. But it includes processes of thought which lead only to the suggestion of questions to be considered, and includes much besides.

1906-7 | PAP [ed.] | NEM 4:319-320

Let us now consider non-necessary reasoning. This divides itself, according to the different ways in which it may be valid, into three classes: probable deduction; experimental reasoning, which I now call Induction; and processes of thought capable of producing no conclusion more definite than a conjecture, which I now call Abduction.
[—]
Abduction is no more nor less than guessing, a faculty attributed to Yankees. [—] Such validity as this has consists in the generalization that no new truth is ever otherwise reached while some new truths are thus reached. This is a result of Induction; and therefore in a remote way Abduction rests upon diagrammatic reasoning.

nd | Lecture I | MS [R] 857: 4-5

The three kinds of reasoning may be designated by the letters A, B, C.

A is that process in which the mind goes over all the facts the case, absorbs them, digests them, sleeps over them, assimilates them, dreams of them, and finally is prompted to deliver them in a form, which, if it adds something to them, does so only because the addition serves to render intelligible what without it, is unintelligible. I have hitherto called this kind of reasonings which issues in explanatory hypotheses and the like, *abduction*, because I see reason to think that this is what Aristotle intended to denote by the corresponding Greek term '[apagoge]' in the 25th chapter of the 2nd Book of his Analytics [...] But since this, after all, is only conjectural, I have on reflexion decided to give this kind of reasoning the name of *retroduction* to imply that it turns back and leads from the consequent of an admitted consequence, to its antecedent. Observe, if you please, the difference of meaning between a *consequent* the thing led to, and a *consequence*, the general fact by virtue of which a given antecedent lead to a certain *consequent*.