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## On Charles S. Peirce's Lecture "How to Theorize" (1903)

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# On Charles S. Peirce's Lecture "How to Theorize" (1903)

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Some explanation is needed why a whole article, aimed at the readers of *Sociologica*, is devoted to a lecture that American philosopher Charles S. Peirce (1839-1914) gave in 1903.<sup>1</sup> The reason is the following. Since a few years I have tried to develop a new approach to theory in which the central part can be described as "theorizing in the context of discovery." The key idea is that in order to revitalize social theory, sociologists should pay much more attention to theorizing or the process that precedes the formulation of theory. They should especially do so, I suggest, to the kind of theorizing that takes place at the stage before the formulation of hypothesis, namely at the stage known in philosophy of science as the context of discovery [see Swedberg 2012 for an elaboration].

Instead of teaching students social theory in the conventional manner, I suggest that it is crucial to teach students how to produce theories themselves – to theorize. To properly theorize in an empirical science such as sociology, one has to begin by observation and then, on the basis of empirical material, suggest a theory that can explain the phenomenon observed. Theorizing in the context of discovery contains the following steps: you observe; name the phenomenon; develop one or several concepts; build out the theory with the help of a classification, a typology and more;

<sup>1</sup> The first version of this paper was delivered at the conference "Theorizing in the Social Sciences," Cornell University, April 21, 2012. I thank Mabel Berezin for inspiration and Marco Santoro for suggesting some additions to the version in *Sociologica*.

and finally provide an explanation. Once the cycle from observation to explanation has been completed, one should proceed to the context of justification. This entails the part that is considerably better known in today's social science: drawing up a research design, executing the research design, and presenting the findings to the community of scholars.<sup>2</sup>

Where does Charles S. Peirce come into this project of theorizing (in the context of discovery)? In my view, Peirce developed many important ideas on theorizing, including the ones that can be found in his lecture "How to Theorize." Since there exists very little material on how to theorize, and especially in the context of discovery, it is in my view important to draw attention to the material that does exist. People such as Ludwig Wittgenstein, James G. March, Everett C. Hughes, Karl Weick, C. Wright Mills belong to the small group of scholars who has quite a bit to teach us about theorizing – and so does Charles S. Peirce.

### **Charles S. Peirce on Abduction**

The work of Charles S. Peirce has attracted much attention among scholars from many different disciplines; and this is especially true for what he has to say about the concept of abduction or the flash of insight that is characteristic of original research.<sup>3</sup> According to one of the editors of the new edition of Peirce's collected works, abduction may well be the concept that has been the most researched and discussed in his entire work [De Tienne 2012a].

The main emphasis of this research has typically been on such topics as the evolution of Peirce's theory of abduction or the meaning of abduction, sometimes as illuminated by what Peirce wrote on some related topic such as pragmatism or inquiry in general [see e.g. Fann 1970; Bertilsson 2004; Paavola 2006]. All of these topics raise important questions and are also interesting to take part of for sociologists interested in theorizing. Peirce, for example, early began to develop his ideas on abduction, but

<sup>2</sup> I distinguish, in all brevity, between the following forms of theorizing: theorizing in the context of discovery, theorizing in the context of justification, and fundamental theorizing (close to philosophy of science). Theorizing in the context of discovery has as its aim to come up with the theory from which hypotheses are drawn and tested in the context of discovery. The kind of theorizing that takes place in the context of justification includes, among other things, a fine tuning of the initial theory, an attempt to embed this theory in the tradition of sociological theory, and a search for a new theory if the initial theory turns out to be wrong. While most theorizing in sociology is empirically oriented, the whole enterprise presupposes ideas about what constitutes a fact, evidence, an explanation and so on – and these non-empirical questions are dealt with in what I call fundamental theorizing.

<sup>3</sup> For help with information about the 1903 lecture I am especially grateful to André De Tienne. I also thank Mabel Berezin, Margareta Bertilsson, John Clendinning and Frank M. Oppenheim.

often under a different name, especially Hypothesis. In his later writings, Peirce also used the term Retroduction.

There exists, roughly speaking, an early version of Peirce's notion of abduction and a later one, developed from around 1900. Abduction has an exact meaning sometimes in Peirce's work, as when he discusses its role in his logic. But it sometimes also has a broad and less clear meaning, as when he discusses its general role in inquiry or how it is related to perception.

In my view some insights could also be had by shifting the focus in the analysis of the concept of abduction in Peirce's work in a more practical direction, having to do with the meaning of abduction for theorizing or how you produce a theory. This is what I propose to do in this article and the kind of questions I want to explore are of the following kind. Can one expand one's capacity for abduction or is this capacity rather a gift that a select few scholars have been blessed with? If it is true that one can improve one's skill for abduction, how is this to be done? Does there, for example, exist some exercises that Peirce recommends? Or can we ourselves construct such exercises, based on Peirce's concept of abduction? What other practical tips can one find in Peirce, which can help us to become better at theorizing and abduction?

We know that Peirce from early on was very interested in teaching students how to think and reason. In the 1880s, for example, he started up an enterprise to teach students how to reason well through a correspondence course. He wrote to a friend,

I have worked out a long series of practical exercises to teach the whole art of reasoning from beginning to end. There are throughout the country thousands of young men and women to whom these lessons would be of more real service than almost anything they could study. [Brent 1993: 183]

In the 1890s Peirce worked on a multi-volume project called Principles of Philosophy and which, among other things, aimed at teaching the reader formal logic. Part of the plan was to develop a system would enable also "young persons of mediocre capacities" to develop their reasoning capacities [Peirce 1992b: 13]. "Not that I should expect to make dull young men bright; but I have a particular liking for and understanding of and respect for dull young men, and I understand just what logic can do for them" [*ibidem*: 16].

But there is a difference between being able to reason well and being good at abduction; and it is primarily the latter question that I want to explore in this article. In order to do so I will focus on one writing by Peirce that deals with the practical dimension of abduction, at least if we take its title seriously. This is the eight lecture in a series of lectures that Peirce delivered in the fall of 1903 at the Lowell Institute, entitled "How to Theorize."

In the rest of this article I will present the content of this lecture, which focuses squarely on abduction. I will then complement Peirce's argument in this lecture with some material on abduction that can be found in his writings from around 1900. In the last section, I will try to put together what can be said to constitute the practical side of abduction in Peirce's work. In this way I hope to present something of a how-to-do-it or manual in abduction and theorizing that spells out for the researcher how to go about one's research, so that an original discovery can be made. At the end of the article I will also say something about what is very valuable and less so in Peirce's views from the perspective of theorizing in social science.

### **The Lowell Lecture, "How to Theorize"**

From November 23 to December 17, 1903, the 63 year old Peirce gave the eighth installment of a series of lectures at the Lowell Institute in Boston, as part of a course called "Some Topics of Logic bearing on Questions now Vexed."<sup>4</sup> The Lowell Institute had been in existence since 1836 and had as its goal to provide education on interesting and relevant topics for educated Bostonians [Knight 1898]. Each year a handful of courses were given, often by well-known politicians, scientists and academics. Peirce's father, who was the foremost American mathematician in his time and a professor at Harvard University, had for example given a few courses at the Institute. And so had Charles Peirce himself, starting with one called "The Logic of Science; or Induction and Hypothesis." Peirce delivered this course in 1866 when he was only twenty-five years old.

By 1903 – some forty years later – Peirce was no longer the promising and brilliant son of a brilliant father, but was leading a very difficult life, unemployed and desperately poor. Starting in the 1880s the willful and eccentric Peirce had been pushed out of the university world and later also from other possible employments [e.g. Brent 1993]. Peirce tried to keep up his scholarship as best as he could, but it was very difficult since he often lacked money for food and other necessities. His health had also suffered badly.

Peirce's situation in 1903 was particularly bitter, since he had set all of his hopes on getting a grant from the Carnegie Institution, something that did not happen.

<sup>4</sup> The names of the individual lectures were as follows: I. What Makes a Reasoning Sound? (November 23); II. A System of Diagrams for Studying Logical Relations (November 27); III. The Three Universal Categories and their Utility (November 30); IV. Exposition of the System of Diagrams Completed (December 3); V. The Doctrine of Multitude, Infinity and Continuity (December 7); VI. What is Chance? (December 10); VII. Induction as Doing, not mere Cogitation (December 14); and VIII. How to Theorize (December 17).

Many friends and former colleagues had engaged themselves in this effort and also tried to help Peirce when the support from Carnegie Institution did not materialize. One of these was William James, a childhood friend and now professor at Harvard University; and another was William T. Sedgwick, curator at the Lowell Institute and professor at MIT [cf. Turrisi 1997: 62]. It was the latter, for example, who arranged for Peirce to give the Lowell Lectures in the fall of 1903, while James arranged for another course to be given by Peirce a few months earlier at Harvard University.<sup>5</sup>

Exactly how many people attended Peirce's course in the fall of 1903 at the Lowell Institute is not known. Given that Peirce was not any longer a member of academia and that he had chosen a difficult topic, one suspects that only a small number of people were present. William James was definitely in the audience and probably also Josiah Royce.<sup>6</sup> Perhaps also some of James' students as well as Peirce's brother James Mill Peirce, professor of mathematics at Harvard, attended the lectures.

We also know little of its reception. William James is often said to have regarded the course a success. This, however, does not seem to have been the case; and in a letter he referred to the Lowell Lectures in his usual disparaging way when it came to Peirce: "Charlie is impossible. His Lowell Lectures were a pure caprice" [James 2003: 8].<sup>7</sup>

<sup>5</sup> William T. Sedgwick seems to have been a broad-minded and helpful individual. According to one source, it was he (rather than Lawrence Lowell, the head of the Institute) who secured the speakers [Winslow 1921: 259]. According to another source Sidgwick primarily "took care of the speakers' needs and the tickets" [Weeks 1966: 127]. During March 23 and May 14, 1903 Peirce taught a course at Harvard consisting of seven lectures, entitled "Pragmatism as a Principle and Method of Right Thinking" [Peirce 1997].

<sup>6</sup> In an article on Royce and Peirce, it is noted that by the time of Peirce's Lowell Lectures, Royce was back in Cambridge [Oppenheim 1997: 264]. When I asked the author if this also meant that Royce attended Peirce's lectures, I received the following answer: "My answer tends to 'Yes' because by then in 1903 Royce was back from his Spring Semester and Summer, 1903, in California with his asthmatic son Stephen, and recharged by this vacation was digging energetically into his new approach to logic and also vexing CSP enough to educe from CSP the stinging though perhaps more emotional than careful reaction, 'If you [JR] have really detected a fallacy in my proof, [...] couldn't you jot it down?' and meanwhile although JR was teaching a full load in the Fall 1903 semester, to me it seems most improbable that Royce (who had missed Peirce's early 1903 lectures on Pragmatism), would now that this key mentor of his mental development was right at hand not have hastened back from classes to be present at Peirce's late 1903 Lectures" [Oppenheim 2012]. Similarly John Clendenning, the author of the standard biography of Royce, says, "I believe that Royce was in Cambridge at this time (when the Lowell Lectures were being delivered) and it would surprise me to learn that he did not attend Peirce's lectures" [Clendenning 2012].

<sup>7</sup> The quote comes from a letter from James to Alice Howe Gibbens James dated April 14, 1905. The idea that James liked Peirce's Lowell Lectures is based on a quote where James, however, seems to be talking about the other set of lectures that Peirce gave in 1903, namely on pragmatism. The quote reads as follows: "The founder of pragmatism himself recently gave a course of lectures at the Lowell Institute with that very word in its title, - flashes of brilliant light against Cimmerian darkness! None of us, I fancy, understood *all* that he said" [James 1987: 488]. It can be added that William

That Peirce's lectures were no success in the eyes of his contemporaries is also indicated by the fact that he failed to get them published. G. P. Putnam, who was eager to publish a volume in the history of science by Peirce (which was never completed), declined to have the lectures published.

The Lowell Lectures of 1903 are still unpublished in their entirety. Important excerpts were however included in the first edition of Peirce's collected works, which began to appear in the 1930s.<sup>8</sup> The lectures are also scheduled to appear in their entirety in the new edition of Peirce's collected works that is currently under way, published by Indiana University Press. More precisely, they are scheduled to appear as volume 22; and much work has already been made in preparation by André De Tienne and Helmut Pape.

The situation with the eighth lecture on how to theorize is as follows. Most of the first half of the lecture appeared in 1934 under the editors' title "On Selecting Hypothesis" in Volume 5 of Peirce's Collected Papers [Peirce [1903] 1934: 590-604]. The second half appeared in 1985 as "Abduction. Part 2. Pythagoras" in a volume on Peirce's logic [Eisele 1985, 2:1011-1021]. This means that most of the eighth lecture is today available, except for the introduction. The latter is 13 pages long in manuscript form; and has kindly been made available to me by André De Tienne [Peirce 1903a]. The account that follows is, in other words, based on "How to Theorize" in its entirety.

## **The Content of "How to Theorize," Part 1**

The first thing that strikes the reader of Peirce's lecture who has access to the original manuscript, is that Peirce has written "Abduction" in bold letters on the first page (see Appendix). The lecture itself, however, appeared in the program, following Peirce's instructions, as "How to Theorize." This makes one think that Peirce had decided to roughly equate abduction with theorizing in his or at least closely related lecture – or at least saw them as closely related. The only other possibility is that Peirce had decided to change the title of the lecture, from "How to Theorize" to "Abduction," but there exists nothing to indicate that this was the case.

James wanted Peirce to revise two of the Harvard lectures for his Lowell Lectures, but Peirce was not interested [Perry 1935, 2: 427].

<sup>8</sup> For a description of the original manuscripts that make up the Lowell Lectures, and of which parts have been published, see the material under "Lowell Lectures 1903" in Robin [1967: 447-478] as well as supplementary material in Robin [1971: 38, 42]. Peirce's syllabus for the Lowell Lectures was published in an abridged version, 23 pages long, in 1903 [Peirce 1903b].

If it is true that Peirce wanted to explore the idea that theorizing and abduction were roughly the same thing in his lecture, this would mean the following. Just as abduction is an indispensable and autonomous element in the process of inquiry, so is theorizing. We could also start rereading Peirce's work from this angle.

By using theorize in the title of his lecture rather than theory (his usual term), Peirce may also have wanted to explore if theory cannot be better understood as a process than as some existing state. Peirce was very deliberate in his choice of terms; and that he chose theorize rather than theory should not be regarded as insignificant.<sup>9</sup>

Let us now follow Peirce's lecture on how to theorize, as if we were present on Thursday December 17, 1903 in The Huntington Hall on Boylston Street in Boston, where the lectures of the Lowell Institute were held. By this time Peirce was in his 60s and was probably dressed in clothes that had seen better days. He must also have looked very drawn, since he had been on and off sick. William James described the appearance of Peirce in early 1903 in the following way: "a seedy, almost sordid, old man" [James 2002: 225].

But Peirce was also a fine lecturer; and when he spoke he could draw on the skills that he had cultivated during a lifelong interest in amateur theatre. "Ladies and gentlemen," he began, "the most prominent peculiarity of the system of logic which my studies have led me to adopt is that instead of being satisfied with the almost universal division of all reasoning into Necessary and Probable Reasoning, I find myself forced to recognize three grand branches, Deduction Induction Abduction" [Peirce 1903a: (1)].

During the first few minutes of the lecture, Peirce also told his audience how he had come to develop his theory of abduction. Some 30-40 years ago, he said, he had read Boole's *Laws of Thought* (1854); and it had made a very powerful impression on him. Peirce likened this work to *De Revolutionibus* by Copernicus. What

<sup>9</sup> Peirce's ideas on the role of scientific terms can be found in his doctrine of "the ethics of terminology" [for an introduction, see e.g. Ketner 1981]. While one can find the term *theorizing* in a few places in Peirce's work, he did not use the term often, and he seems to have preferred *theory*. A search for the term "*theoriz\**" on a CD-ROM, based on Peirce's *Collected Papers*, "resulted only into eight hits, none of which casts any light on the word itself beyond the obvious" [De Tienne 2012b; but see also Peirce 1992b: 238 for his juxtaposition of theorizing "guided by our instincts" to theorizing by mechanically working through every possible alternative].

Still, one is justified in asking why Peirce decided to use the word *theorizing* in the title of the 1903 lectures. One possible clue answer may be found in a letter he wrote to William James a few months before the lectures began, on June 8, 1903. He here says that he wanted to present his ideas in a more accessible form to the audience: "As for my Lowell Institute lectures, I intend to have just as little pure theory in them as possible. I don't think even my Harvard audience [for the lectures on pragmatism] was quite fit for that. What they need is logical training – lessons, not lectures; and I mean to have my Lowell Lectures approach as near to practical lessons in reasoning as *lectures* can" [Perry 1935, 2: 428].



especially impressed Peirce was the way that Boole had shown how an inductive argument does not increase “the chances in favor of the truth of the proposition that it concludes” [*ibidem*: 9]. Boole had “made it perfectly clear for my mind that an inductive argument does not render its conclusion any more probable than it was before” [*ibidem*: 9].

Boole's ideas also made Peirce rethink Aristotle's argument about induction and deduction; and this led him to conclude that Aristotle must have developed a third form of reasoning: abduction. Early on Peirce also decided that the place where Aristotle had introduced this term was in the second book of *Prior Analytics*. In Peirce's view, the translator had probably failed to follow Aristotle's argument on this point because of the poor quality of the manuscript, and he had therefore chosen a different term.<sup>10</sup>

But Peirce was also very well aware that most students of logic would have difficulty in seeing how deduction, induction and abduction were all part of the Aristotelian syllogism. “For that reason,” he told the audience, “I have abandoned that mode of looking at the matter” [*ibidem*: 20]. From his new and broader way of looking at things, Peirce said, deduction, induction and abduction should all be viewed as parts of the process of inference, all working together while also being separate.

The tasks of these “three great classes of inference” were as follows. Abduction covers the process through which a theory or a hypothesis is produced. Deduction is used to work out the suggested hypothesis. Induction has the task of testing the hypothesis against the facts. The three types of inference are independent, yet part of one and the same “system” [*ibidem*: (1)].

From this stage onwards in the lecture, Peirce mainly spoke about abduction; what it was and how it must be linked to deduction and induction for there to be a full scientific inquiry. Half of the material of this lecture was devoted to a general discussion of abduction, which was closely modeled on its role in the natural sciences. The other half was devoted to a discussion of the role of abduction in the discipline of history, where the data and the methods are very different from those in the natural sciences.

Peirce did not provide a definition of abduction in his lecture; he did, however, provide two descriptions that are helpful and also come close to a definition. The first reads as follows: “Abduction must cover all the operations through which theo-

<sup>10</sup> The passage that Peirce refers to in Aristotle is as follows: “Reduction [abduction] occurs (1) when it is clear that the major term belongs to the middle term, and less clear that the middle term belongs to the minor, but that is as likely as, or more likely than, the conclusion to be accepted; or (2) if the terms intermediate between the minor and the middle term are few; in any of these cases we get nearer to knowledge” [Ross 1949: 489].

ries and conceptions are engendered” [Peirce [1903] 1934: 590]. Or, to phrase it in the terms of the perspective in this article: theorizing must cover all the operations through which theories and conceptions are engendered.

According to this description, theory is the result of abduction. Note also that Peirce refers to “theories or conceptions,” something that leads us to think that not only new theories but also new concepts come about through abduction.

Another part of this description, which should be emphasized, is that abduction is not presented as a sudden flash of insight but as a process in several stages. “Abduction must cover all the operations by which theories and conceptions are engendered” [*ibidem*: 590; emphasis added].

The second description of abduction that Peirce provides in his lecture is the following: “here [we are] understanding by abduction any mode or degree of acceptance of a proposition as a truth, because a fact or facts professing to say what idea it was that gave rise to that fact” [*ibidem*: 602]. Peirce then goes on to explicate what he means by this statement, and in doing so, he describes some of the stages (“operations”) that make up an abduction: “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 idea” [*ibidem*: 603]. To sum up: you first observe and then explain.

An abduction, in other words, starts with observation. This is very important to Peirce, who argues against the idea that an abduction can be produced simply by thinking or by working with other theories. He attacks “the circular theory which assumes itself and returns into itself;” and he calls it an “aristocratic theory which holds itself aloof from vulgar facts” [*ibidem*: 594]. As a scientist, Peirce was convinced that discovery begins with observation.

The theory produced through abduction, Peirce also says, has to have a certain quality; and this is that it has to be testable or, in his terminology, “verifiable” [*ibidem*: 597]. “Every hypothesis should be put to the test by forcing it to make verifiable predictions. A hypothesis on which no verifiable predictions can be based should never be accepted” [*ibidem*: 599].

In arguing this point, Peirce states that Auguste Comte got it half right and half wrong. Comte insisted that only theories that can be verified are scientific; but he also argued that only what you can directly observe, can be verified. If this were true, a verifiable hypothesis, it would mean that anything in the past cannot be investigated in a scientific way. He also noted that all perceptions contain an element that is not directly related to the sensations of the senses. “Sensation,” as he put it, is also “a vehicle of thought” [*ibidem*: 601].

Peirce then added that “the leading consideration in Abduction [...] is the question of Economy,” and by Economy he meant “money, time, thought; and ener-

gy" [*ibidem*: 600]. What this meant was that once you have gotten some new ideas through abduction, you have to make a judgment of economy since work on any one hypothesis entails a serious investment. Again, "abduction commits us to nothing. It merely causes a hypothesis to be set down upon our docket of cases to be tried" [*ibidem*: 602].

But even if you start with an observation, it is not through induction that we get ideas, according to Peirce; these only come through abduction. And what exactly is the process through which these abductions come about? This is a very intriguing question, Peirce said, especially given the fact that scientists over the years have come up with so many true theories.<sup>11</sup> It is very unlikely, he argued, that these have come about through chance, since the number of possible theories that can explain any phenomenon is enormously large.

What then has made it possible for scientists to come up with just those hypotheses that turned out to be the right ones? Peirce's answer to this question is that human beings have a kind of innate sense for guessing what is right. Animals have this sense as well, he noted. We say, for example, that a chicken has an instinct for picking the right kind of food from the ground, when it is hungry. "But if you are going to think every poor chicken endowed with an innate instinct toward a positive truth, why should you think that to man alone this gift is denied?" [*ibidem*: 591].

According to Peirce, all human beings have a kind of "natural light, or light of nature, or instinctive insight, or genius, tending to make him guess those laws aright, or nearly right" [*ibidem*: 604]. The reason for this, he suggested, is that this has helped them to survive. "Man's mind has a natural adaptation to imagining correct theories of some kinds, and in particular to correct theories about forces, without some glimmer of which he could not form social ties and consequently could not reproduce his kind" [*ibidem*: 591].

More specifically, Peirce thought that there were two aspects of reality that humans had to be able to deal with, if they were to survive. This was to get food and to reproduce themselves. "The instincts conducive to assimilation of food, and the instincts conducive to reproduction, must have involved from the beginning certain tendencies to think truly about physics, on the one hand, and psychics, on the other" [*ibidem*: 591].

It should be noted that according to Peirce there was no reason to believe that human beings would be more successful in solving problems in physics and the

<sup>11</sup> True in the sense that "they produce predictions that are fulfilled" [Peirce [1903] 1934: 591].

natural sciences, than solving problems in what we today call the social sciences. In the material I have just presented, Peirce explicitly says that humans have a tendency to guess right when it comes to “social ties” and whatever it takes to succeed in reproduction.

Peirce kept coming back to animals and how these have much more complex mental capacities than we think. They seem, for example, to be endowed with “correct notions about the minds of their own kind and of other kinds” [*ibidem*: 604].<sup>12</sup> He added:

They all have, furthermore, wonderful endowments of genius in other directions. Look at the little bird, of which all species are so nearly identical in their physique, and yet what various forms of genius do they not display in modeling their nests? This would be impossible unless the ideas that are naturally predominant in their minds were true. It would be too contrary to analogy to suppose that similar gifts were wanting to man. [*ibidem*: 604]

Before leaving the topic of the innate qualities of the minds of humans and animals, Peirce asked one final question: “What do we think for? What is the physiological function of thought” [*ibidem*: 594]. His answer is similar to his argument about the innate qualities of the mind and why these have come about. People think, he suggested, because if they did not, this part of their biological make-up would ossify and vanish:

Thought requires achievement for its own development, and without this development it is nothing. Thought must live and grow in incessant new and higher translations, or it proves itself not to be genuine thought. [*ibidem*: 594]

## **The Content of “How to Theorize,” Part 2**

After having concluded the general part of his discussion of abduction, Peirce turned to the topic of “Abduction under difficulties” [Peirce [1903] 1985: 1011]. To Peirce’s mind, it was much more difficult to come up with scientific explanations when there existed very little evidence; and ancient history was a case in point. In this situation, one had to proceed differently than in normal science but still try to follow

<sup>12</sup> As a boy Peirce was convinced that animals had the same reasoning powers as humans [Brent 1993: 47]. As an adult he modified this opinion, while still defending “those whom we are so fond of referring to as the ‘lower animals’” [Peirce 1992b: 110]. “Man is so vain of his power of reason!,” he noted. In reality, however, “it is the instincts, the sentiments, that make the substance of the soul. Cognition is only its surface, its locus of contact with what is external to it.” While it is true that animals “reason very little,” thanks to their instincts they “very rarely commit a mistake, while we!” [*ibidem*: 110].

sound scientific principles. In other words, the historian must suggest an explanation, and then confront it with reliable data, in order to find out if the prediction/explanation was correct.

Before describing how Peirce suggested that the historian should proceed when there existed very little evidence, it should be noted that we have now moved from the natural sciences to the social sciences (or in Peirce's terminology, from the Physical Sciences to the Psychological Sciences – see Fig. 1). In principle, to repeat, there was no difference in the way that one should proceed in the various sciences, according to Peirce. In other words, what Peirce has to say about abduction and theorizing in his 1903 lecture, is just as applicable to the social sciences as to the natural sciences.

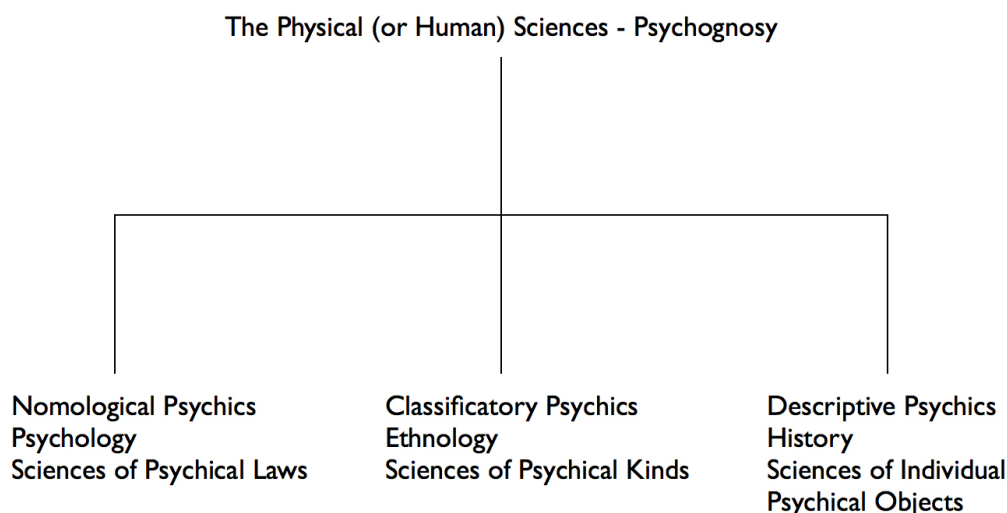


Fig. 1. Peirce's Classification of the Psychological or Human Sciences (1903)

Source: Peirce 1992a: 458-462.

*Comment:* Peirce was very interested in the classification of the sciences. In the scheme he developed in 1903, and which was handed out during his Lowell Lectures, he distinguishes between the Physical Sciences and the Psychological Sciences. Modern social science mainly falls in one of the subcategories of the latter (Classificatory Psychics), which in its turn includes such topics as "Ethnology of Social Developments, customs, laws, religion, and tradition" and "Ethnology of Technology."

One way to handle the lack of reliable evidence in history, according to Peirce, was for the historian to be on the lookout for archeological facts that could be used to confirm an explanation. He himself, Peirce told the audience, had proceeded in precisely this way:

On five occasions in my life, and on five occasions only, I have had an opportunity of testing my Abductions about historical facts, by the fulfillment of my predictions

in subsequent archeological or other discoveries; and on each of those five occasions my conclusions, which in every case ran counter to that of the highest authorities turned out to be correct. [Peirce [1903] 1985: 1011]

He then went on to describe two of the five cases. In one of these Peirce had argued that contrary to the opinion of a historian of Egypt, who claimed that some dynasties were mythical, these dynasties had actually existed. A tomb was subsequently discovered which proved that Peirce was right. In the second case Peirce suggested that the Babylonians were skillful astronomers, and again an archeological finding was made that proved he was right.

To illustrate another way in which one might handle a concrete case of “Abduction under difficulties,” Peirce then went on to present a case in quite some detail where very little evidence existed. The evidence that did exist was also of questionable quality. Still, according to Peirce, one could reach a solution thanks to “a good guess.”

Peirce began by noting that the main sources of evidence in ancient history typically consist of manuscripts and documents, and that these often contain errors. But instead of discarding testimonies because they contain errors, as German historians tend to do, one should proceed differently. The correct strategy is to explain the existence of the errors. False testimonies, for example, should be seen as problems to be solved; and if one proceeds in this way, this type of testimonies would become helpful instead of being dismissed as erroneous.<sup>13</sup>

The example that Peirce chose to discuss in order to prove his point, was the life of Pythagoras. Peirce’s account is quite curious, but since he chose to dwell on it at some length in his lecture, I will also recount it here. Very little is known about the life of Pythagoras (580-495 BC); and whatever facts exist are often contradictory. In brief, the case of Pythagoras was one of “Abduction under difficulties.”

According to the account of Jamblichus, one of the few existing sources about Pythagoras, the famous mathematician was taken prisoner in Egypt by a Persian general called Cambyses and then transported to Babylonia. But as Peirce shows, this cannot be correct. Pythagoras was not in Egypt when Cambyses was there; and there are no traces of Babylonian thought in his work.

Pythagoras had however been to Egypt; he had been taken prisoner at another point by the Persians under Cyrus; and he had been removed to another country.

<sup>13</sup> In “The Logic of Drawing History from Ancient Documents” Peirce presents six rules for how to evaluate the truth of documents and inscriptions in the area of ancient history [Peirce [1901] 1966: 146-147]. One is that you should not only state that a testimony is untrue, but how this has come about. Another is that one should assume that testimonies are true. Peirce also gives some examples of how to handle a lack of evidence when it comes to ancient history. One reason to accept a hypothesis, for example, would be that it would render the existence of a monument probable. Another is that if a monument exists, certain documents should make a reference to it.

Peirce sums up his account of Pythagoras, as well as the whole lecture on how to theorize, as follows:

I have run through the almost necessary consequences of explaining the assertion by Jamblichus that Pythagoras was taken prisoner by the Persians under Cambyses by supposing it due to the fact that he had been taken prisoner by the Persians under Cyrus. You have seen how the consequences fit into fact and have, I hope, been impressed with the necessity of explaining testimonies whether they be true or whether, as in this case, they be false. [Peirce [1903] 1985: 1021]

### **Material Complementing the 1903 Lecture**

Peirce's lecture on how to theorize is full of interesting ideas and also contains some useful tips for how to proceed in order to produce creative hypotheses and handle these well. On several points, however, Peirce's argument needs to be complemented, for it to become clearer and also to cover the full range of his thought on abduction. Some important elements of abduction are either not mentioned or just mentioned in passing. For these reasons, I will supply some of this extra and complimentary material.

In some cases this material comes from the other lectures that Peirce gave as part of his lecture series at the Lowell Institute. Peirce, for example, lectured on both induction and deduction prior to the lecture on how to theorize. In some other cases I have taken material from writings that Peirce produced after or around 1900. I will, for example, often cite what I consider to be Peirce's second most important writing when it comes to discussing the practical aspects of abduction, namely his lecture "Training in Reasoning" from 1898 [Peirce 1992b: 181-196].<sup>14</sup>

It should also be pointed out that Peirce's thought is extraordinarily complex, and at times contradictory, so what follows does not represent an attempt to summarize or produce a synthesis of Peirce's various statements on abduction. It more represents an attempt to complement, clarify and tie together some of the central themes in "How to Theorize."

What may not come through very clearly in the 1903 lecture on how to theorize is how Peirce viewed inquiry in his own, very special way, as consisting of three interrelated yet independent and distinct operations. These, to repeat, are abduction, deduction and induction.

<sup>14</sup> Just as "How to Theorize" should in my view be seen as a classic in theorizing, so should "Training in Reasoning." While the latter lecture is not centered around abduction, like "How to Theorize," it does include a discussion of this topic which shows that Peirce saw abduction as part of reasoning [Peirce 1992b: 193-194].

After the process of abduction has been completed, the process of deduction begins. At this stage of the inquiry a hypothesis has been produced. The two main tasks of deduction are to make the hypothesis as distinct as possible and also to spell out what is implied in it, including its presuppositions [e.g. Peirce 1935, 526, 611-639; Peirce 1958a, 124]. Deductions never bring forth anything new, Peirce says, since they do not deal with facts.

But deduction also has its own dangers: The worst fallacy of deductive reasoning consists in not reasoning at all, but only going by the rule of thumb. That is to say, the *soi-disant* reasoner has been in the habit of referring in a certain way which in his experience has worked well; and he now roundly asserts its necessity. [Peirce 1992b, 194].

As this quote makes clear, Peirce would not have been very happy with some of the literature that today goes under the label of heuristics, and sees as its task precisely to produce rules of thumb. It should be noted that in the very same text where this quote comes from, Peirce refers positively to “rules of retroduction [abduction],” so it is not the idea of rules that Peirce reacts against [Peirce 1992b: 193; emphasis added]. It is rather the tendency not to think, which comes with certain types of heuristic rules, that he objects to.

When used properly, deduction helps to refine the original hypothesis, and in this way prepare it for the third stage in the process of inquiry, namely induction. Besides abduction, Peirce’s view of induction represents the second major novelty in his conception of inquiry. While the standard meaning of induction can be described as making a generalized conclusion based on particular instances, Peirce meant something very different with this term. To him, induction meant testing or confronting the hypothesis with data, in order to see if it is true.

The usual form that this confrontation takes is that of experiment: The operation of testing a hypothesis by experiment, which consists in remarking that, if it is true, observations made under certain conditions ought to have certain results, and then causing those conditions to be fulfilled, and noting the results, and, if they are favorable, extending a certain confidence to the hypothesis, I call induction. [Peirce 1935: 526]

The key to Peirce’s notion of experiment in science, in other words, is that an explanation consists of predicting something with the help of data.

Another part of the 1903 lecture that needs to be clarified and complemented is Peirce’s presentation of abduction as a process, rather than as a single sudden insight. In “How to Theorize” an abduction, to repeat, is described as “all the operations through which theories and conceptions are engendered” [Peirce [1903] 1934: 590].



Peirce also said that an abduction includes observation, and that in dealing with a number of possible hypotheses considerations of cost should be taken into account (time, money, energy and thought).

In others of his writings Peirce adds considerably to these brief statements, and it is to this material I now shall turn. But even if the richness of this additional material is obvious, Peirce nowhere says exactly what elements the process of abduction consists of, say in the way that he describes how the process of inquiry consists of three stages. Abduction always remained something of a mystery to Peirce; and this is also mirrored in his many attempts to understand it.

The word "hope" was mentioned once in Peirce's lecture from 1903, but the reference to it comes very quickly, and was in all likelihood lost on the audience. According to Peirce, hope was nonetheless of importance throughout the process of abduction. The researcher has to have hope that an explanation exists and also that he or she will eventually come upon the right hypothesis. We must start from the assumption, Peirce says

[...] that the facts in hand admit of rationalization, and of rationalization by us. That we must hope they do, for the same reason that a general who has to capture a position or see his country ruined, must go on the hypothesis that there is some way in which he can and shall capture it [...] We are [also] 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 for 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. [Peirce 1958a: 219]

While hope is important to the process of abduction in Peirce's mind, he does not often discuss or mention it. In contrast, he very often refers to the crucial role of surprise. The scientist observes whatever he or she is studying – and is then suddenly surprised by something. "Every inquiry takes its rise in observation [...] of some surprising phenomenon" [Peirce 1998: 440-441].

The reason for the surprise, according to Peirce, was that the scientist has a set of expectations of what the world is like; and it is when these expectations are not fulfilled, that a surprise occurs. "All knowledge begins by the discovery that there has been an erroneous expectation of which we had before hardly been conscious. Each branch of science begins with a phenomenon which violates a sort of negative subconscious expectation" [Peirce 1958a, 111-112].<sup>15</sup>

<sup>15</sup> In the lectures on pragmatism, delivered a few months before "How to Theorize," Peirce had emphasized the role of surprise not only in science but in experience more generally. With the bitterness that his life had taught him by 1903, he wrote: "In all the works on pedagogy that I ever

The explanation is directly linked to the element of surprise, in the sense that when you are surprised you search till you find an explanation. “An explanation is needed when facts contrary to what we should expect, emerge” [*ibidem*: 113]. At this point a new expectation is founded.<sup>16</sup>

In the 1903 lecture Peirce states that economic aspects are central to the process of abduction (or theorizing), but he does not say very much more than so.<sup>17</sup> Intuitively, one might think that this type of considerations would primarily be important at the stage of induction or when experiments are set up to test the abduction against data.

But elsewhere in his writings, Peirce shows how cost plays an important role, not only at the stage of induction but also at the stage of abduction. Part of what constitutes “cost,” he says, has to do with the following three aspects of abduction: “caution,” “breadth” and “incomplexity” [*ibidem*: 139-146]. Caution has to do with what you need to do in order to narrow down the number of fertile ideas to one single hypothesis. Breadth means that it is sometimes advisable to broaden the hypothesis to also cover other topics. And incomplexity means that a simpler hypothesis is sometimes to be preferred, even if it does not cover the complexity of the object of study.

Of all the elements that make up the process of abduction, it is however observation that needs to be discussed in most detail. The reason for this is that Peirce’s view of observation is far richer than his 1903 lecture lets the audience know. Observation is closely linked to the idea of surprise, something that comes out very clearly in his lectures on pragmatism, delivered a few months before his Lowell Lectures. “Experience,” Peirce here said, “is certainly our great and only teacher [...] and surprise is the grand characteristic of experience” [Peirce 1997:144-145]. By experience Peirce meant acts of observation, and observation that the scientist carries out on his/her own. “Mind you, that my appeal is to observation, and this observation you must make for yourself” [*ibidem*: 145; emphasis added].

In his later work Peirce sometimes referred to abduction as “retroduction,” a term through which he wanted to express the fact that in an explanation you first

read, – and they have been many, big, and heavy, – I don’t remember that any one has advocated a system of teaching by practical jokes, mostly cruel. That however, describes the method of our great teacher, Experience. She says, ‘Open your mouth and shut your eyes And I’ll give you something to make you wise.’ And thereupon she keeps her promise, and seems to take her pay in the fun of tormenting us.” [Peirce 1997: 160]

<sup>16</sup> In his early work, similar ideas are discussed in terms of belief being broken by doubt [e.g. Peirce 1992a: 109-123]. In one of his writings, Peirce also gives an example where no surprise whatsoever was involved [Peirce [1901] 1966: 196].

<sup>17</sup> Already in the 1870s Peirce was writing on “the economy of research” [Peirce 1958a: 139-157].

work with the facts, and then attempt to say what happened before the facts came into being, that is, what caused them to exist. As is clear from the following quote, retroduction entails a very free engagement with the facts:

[Retroduction] is that process in which the mind goes over all the facts of 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 [abduction] But [...] 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. [Peirce 1906: 4-5]

The idea that theorizing involves a whole series of mental operations of the most various kinds is also evident from another text in which Peirce discusses retroduction:

The whole series of mental performances between the notice of the wonderful phenomenon and the acceptance of the hypothesis, during which the usually docile understanding seems to hold the bit between its teeth and to have us at its mercy, the search for pertinent circumstances and the laying hold of them, sometimes without our cognizance, the scrutiny of them, the dark laboring, the bursting out of the startling conjecture, the remarking of its smooth fitting to the anomaly, as it is turned back and forth like a key in a lock, and the final estimation of its Plausibility, I reckon as composing the First Stage of Inquiry. Its characteristic formula of reasoning I term Retroduction. [Peirce 1935: 469]

For the abduction (or theorizing) to be successful, it is crucial that the observation is carried out in a way that is unorthodox and imaginative. It is, in other words, to be conducted in a very different way from what goes on at the stage of induction, where experiments are used and where everything has to take place according to accepted rules in the profession.<sup>18</sup>

Observation, Peirce also notes, has two parts to it. One he describes as “a sort of subconscious induction” that draws on “associational potency” [Peirce 1992b: 182]. Here you use free association, and draw on thoughts and ideas that are barely conscious. The other part Peirce calls “upper consciousness;” and here you develop the idea that answers to the object of observation [*ibidem*: 183].

While the upper consciousness must be used in observation, Peirce warns that it also tends to dismiss and belittle what the mind has produced in a subconscious

<sup>18</sup> It should also be noted that according to Peirce, observation plays a role in mathematics as well as in logic, for example, through the inspection of diagrams. Peirce, in brief, had his own view of what constitutes observation.

manner. “Do not allow yourself,” he warns the reader, “to be impressed upon by the egotism and conceit of the upper consciousness” [*ibidem*: 183].

The subconscious part of the mind is especially helpful when it comes to very difficult problems, Peirce also says. In these cases it is often necessary to start with what you find in the subconscious, and then move toward the problem at hand. Drawing on German poet Schiller, Peirce refers to some of the imaginative operations of the mind as “Play of Musement” [Peirce 1935: 452-465].

The reader of this article may at this point think that Peirce the scientist has vanished and been replaced by Peirce the dreamer. But Peirce could have answered this accusation by pointing to his work in experimental psychology – and this is also what he did [Peirce [1907] 1929: 277-281]. More precisely, Peirce referred to the experiments on the subconscious that he and his assistant Joseph Jastrow had carried out together in the 1880s. Jastrow (1863-1944) then went on to become a well-known experimental psychologist and the head of the American Psychological Association [cf. Jastrow 1916].

Peirce is considered one of the founders of experimental psychology, and in the work with Jastrow he not only did research on the subconscious, he also pioneered the use of randomized experiments [e.g. Hacking 1988]. Through a series of experiments, Peirce and Jastrow showed that their subjects were much more likely than chance would suggest, to guess “right” what they had not been able to perceive consciously.<sup>19</sup>

Peirce and Jastrow also showed that the subjects were much better at guessing when they were passive and receptive, than when they tried to make a conscious effort. Their article ends with the statement that “feint sensations ought to be fully studied by the psychologist and assiduously cultivated by every man” [Peirce, Jastrow 1885: 83].

Some twenty years later, in discussing a case in which he had tried to figure out who had stolen a valuable watch from him, Peirce referred to his experiments with Jastrow, and said that he still believed in the importance of the subconscious for guessing right. In this work, he described how he and Jastrow had created conditions that made it possible for them to compare how well the subjects guessed, when they concentrated and when they relaxed. Peirce wrote,

<sup>19</sup> The experiments aimed at testing Fechner’s Law of Weight Perceptions. Under carefully monitored conditions, Peirce and Jastrow subjected their subjects to small increases of weight that these failed to notice. When asked whether the weights had been heavier or lighter than those that had preceded them, two out of three suggested the correct answer (Peirce and Jastrow 1885; for a presentation and discussion of the research, see e.g. Hacking 1988).

Everybody knows how self-consciousness makes one awkward and may even quite paralyze the mind. Nobody can have failed to remark that mental performances that are gone through with lightly are apt to be more adroit than those in which every little detail is studied while the action is proceeding, nor how a great effort [...] may spoil one's success. Perhaps it is in trying very hard we are thinking about our effort instead of about the problem in hand. At any rate my own experience is that self-consciousness, and especially conscious effort, are apt to carry me to the verge of idiocy and that those things I have done spontaneously were the best done. [Peirce [1907] 1929: 280]

### **Tips by Peirce on How to Become Better at Abduction**

I shall now turn to the issue of what kind of tips and exercises for becoming better at abduction and theorizing that one can find in Peirce's 1903 article and related material. That a person can improve his or her mental skills is something that Peirce believed very firmly. He was also convinced that "the work of abduction" can either be carried out "carelessly" or "with a correct logic;" and that the difference between the two was huge [Peirce 1958a: 220, n. 18].

One way of approaching the subject of tips and exercises in Peirce's work would be to just take some statement of his on abduction and rephrase it, and in this way turn it into a suggestion for how to proceed. Since abduction was so much more than "the bursting out of the startling hypothesis," this way of proceeding should be able to yield some result.

1. *Observe and be hopeful (Abduction, Part I)*
2. *Focus on what surprises you (Abduction, Part II)*
3. *Select one idea to work on (economy of research; Abduction, Part III)*
4. Explicate and turn the abduction into testable hypotheses (*Deduction*)
5. Test the hypothesis against data (*Induction*)

Fig.2. A Practical Guide for How to Theorize, according to Peirce

*Comment:* It is clear that # 1-3 (in italics) are part of the process that Peirce called theorizing in his 1903 lecture "How to Theorize." That induction is not part of the theorizing process is obvious, while it is not equally obvious how Peirce viewed deduction. Peirce probably did *not* regard deduction as part of theorizing, since he reserved this term, as he did with abduction, for the creation of new theories and conceptions. In my own view, however, the line between abduction and deduction is fleeting; and deduction should be seen as part of theorizing, although subordinate to the goal of making an abduction.

From Figure 2, in which I have summarized Peirce's view of how to conduct an inquiry, it is clear that abduction has the following parts or elements to it: 1) you observe and you hope that a solution can be found; 2) you then focus on what is surprising; and finally 3) you select one out of several hypotheses by considering the costs involved. Translated into exercises this can be expressed in the following manner. First, train yourself in the art of observation. Second, when you carry out your observations, be on the outlook for surprises and focus on these. And third, try to settle for one good idea, by carefully considering how costly it would be to carry out other good ideas, in terms of time, money, energy and thought.

But it is also possible to find explicit tips and exercises for how to improve one's capacity for abduction and theorizing in Peirce's work? The answer is "yes" and one particular important place for this is the lecture that Peirce gave in 1898, called "Training in Reasoning," and to which I have already referred [Peirce 1992b]. Reading books and doing exercises are useful, Peirce here says, but most progress comes from doing research. One can also reach "surprising results" by engaging in the right kind of observation [*ibidem*: 183]. But for this to happen you have to be open to what your subconscious picks up and "cultivate your senses" [*ibidem*: 183]. One must under no circumstance force things: "In observation, the most essential condition is passivity, the inhibition of the natural tendency to meddle, to conjecturally emend the dicta of Nature" [*ibidem*: 187].

In observing, one must also give free wings to one's imagination; and in doing so one should try to observe "the objects of our creative fancy" [*ibidem*: 186]. These imaginary objects are described by Peirce as consisting of three kinds: "sensuous elements," "relations between different parts of the objects," and "the system, the form, and the idea of the whole" [*ibidem*: 186]. One can, for example, train one's capacity to imagine different ways in which the relations between the various parts of a whole are related. This can be done by playing chess and trying to solve mathematical problems [*ibidem*: 187].

One should also learn to take exact notes. "Extensive reading" is important as well, but it has to be reading of a special type [*ibidem*: 192]. Formulating what we may call reading as a form of engaging in theorizing empathy, Peirce writes: "real reading consists in putting oneself into the author's position, and assimilating his ways of thinking" [*ibidem*: 192].

Conversations with interesting people is also helpful. "Conversations with all sorts of people whom we do not altogether understand, freshens the mind; but then, interesting people are as hard to find as interesting books" [*ibidem*: 192]. "Solitary" thinking and the recording of one's thoughts are recommended, as are "exercises in divisions and classifications, exercises in definitions and the logical analysis of ideas,

and exercises in compacting theories of trains of thinking" [*ibidem*: 192-933]. These exercises are especially important when one has found a new way of approaching a problem.

A new way of approaching a problem means that you have replaced a mental habit with a novel one. A mental habit, according to Peirce, consists essentially of "associations of ideas;" and the goal is to develop "the plasticity of childhood" [*ibidem*: 191-192]. He writes,

But so far as a man is to be a learner, a philosopher, it is most essential that he should preserve; and to do so he has to battle against a natural law of growth. To be a philosopher, or a scientific man, you must be as a little child, with all the plasticity of the child's mental habits. [*ibidem*:192]

A set of concrete tips can also be found in a well-known text from 1908 in which Peirce discusses the Play of Musement or letting one's imagination run free. To do so, he says, is very refreshing for the mind; one's imagination can also be gently steered towards a problem. And as earlier mentioned, especially those problems that at first may seem "utterly insoluble" are suited to The Play of Musement [Peirce 1935: 460].

The best way to engage in musement or reverie is to take a walk at dawn or at dusk. Peirce recommends spending 5-6 % of one's waking time in this way, which means a little less than an hour per day. During this magic time, you should just let go. Peirce writes,

Enter your skiff of Musement, push off into the lake of thought, and leave the breath of heaven to swell your sail. With your eyes open, awake to what is about or within you, and open conversation with yourself; for such is all meditation. [*ibidem*: 461]

## **Concluding Remarks**

By way of concluding, and also of summing up the main argument in this article, the reader should first of all be reminded that I have tried to look at abduction in Peirce's work from a different angle than what is common in the secondary literature on Peirce, namely to see what we can learn from him so that we ourselves can become better at abduction. In doing so, my focus has been on the practical aspects of abduction as Peirce conceived it in his later writings. I have also tried to argue that in his 1903 lecture Peirce wanted to explore the idea that abduction and theorizing are pretty much the same thing or at least closely related.

At the outset of the article I mentioned that I wanted to find out what the relevance might be of Peirce's ideas on abduction for theorizing in social science

(social theorizing). Even if Peirce did work in psychology, and occasionally even in history and sociology, what he had in mind when he spoke about abduction was probably the natural sciences [for Peirce on sociology, see e.g. Swedberg 2011].

This means for one thing that Peirce does not address some of the most difficult questions in social science, namely those that involve language and meaning. Social science is considerably more messy than the natural sciences; and what this may mean is something that the reader of Peirce does not learn much about.

Another critique of Peirce, is that he tends to present the process of theorizing in a neat way.<sup>20</sup> There are certain steps to be followed in theorizing according to Peirce, while in actual theorizing the borders between the various stages may be anything but clear. Add to this that theorizing is decidedly an iterative process. Peirce also fails to address the issue of the role that the existence of problems may have as an inspiration for theorizing [e.g. Simon 1991]. To Peirce, you start by observing and you continue till you encounter something that surprises you.

Finally, in Peirce abduction is very much centered around explanation. While explanation is also central to theorizing in social science, creative and valuable work may in addition take the form of establishing a new phenomenon and giving it a name, creating a new typology or using a metaphor in a clever way. It is my suspicion that Peirce would agree – or, to specify, at least in some of his writings since Peirce is not very consistent.

There may exist some other differences as well between the way we may want to conduct theorizing today and what Peirce advocated, both in “How to Theorize” and in his other writings on abduction. But having said all of this, it is also obvious how very rich and valuable Peirce’s ideas are for anyone interested in theorizing creatively. The reader should also be aware that I have only scratched the surface of his work. Peirce’s writings are voluminous and full of wonderful ideas; and it is my guess that a thorough inventory of everything he has to say on abduction as a practical enterprise, could easily fill a book.

<sup>20</sup> I thank Karin Knorr Cetina for this point.



## Appendix

The first page reads (in Peirce's neat handwriting):

C.S. Peirce's  
Lowell Lectures  
of 1903  
Eighth Lecture  
**Abduction.**

About half way into the manuscript there is a page that says:

C.S. Peirce's  
Lowell Lectures  
of 1903  
Eighth Lecture.  
**Abduction.**  
Volume 2. Pythagoras

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## On Charles S. Peirce's Lecture "How to Theorize" (1903)

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Abstract: As part of the larger project of trying to revitalize social theory by drawing attention to theorizing, I analyze the views of philosopher Charles S. Peirce on this topic. I take my departure in his 1903 lecture called "How to Theorize" and note that for Peirce theorizing was closely linked to his concept of abduction. In analyzing this central concept in Peirce's work, I suggest that we may want to look at it especially from a practical point of view. More precisely, what can we learn from Peirce in terms of concrete tips and suggestions for how we ourselves should go about theorizing? I also supplement the material from the 1903 lecture with what can be found in Peirce's later writings.

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*Keywords: Theory, social theory, theorizing, Peirce, Charles S., abduction.*

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