

1 **Abduction: Between subjectivity and**
2 **objectivity***
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12 **1. Why do we need a special issue on abduction?**
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14 Charles Sanders Peirce (1839–1914), creator of pragmatism, was a poly-
15 math. His contributions include such diverse areas of research as meteo-
16 rology, experimental psychology, geodesics, astronomy, mathematical
17 economy, philosophy of mathematics, theory of gravity, linguistics, his-
18 tory and philosophy of science, and the history and philosophy of logic
19 (Fisch 1986: 376). In spite of the breadth of his academic purview, many
20 Peirce scholars compress his work into the field of logic, which, for Peirce,
21 was semiotic (Houser 1997: 1).

22 There is some merit to this approach, since, according to Peirce, logic
23 in its various forms includes all of the disciplines with which he was in-
24 volved. Along with Gottlob Frege, Bertrand Russell, and David Hilbert,
25 Peirce is considered one of the founders of modern logic (Lukasiewicz
26 1970: 111; Barwise and Etchemendy 1995: 211; Quine 1995: 23; Hintikka
27 and Hilpinen 1997: ix). Independently of Frege, he developed the con-
28 cepts of quantification and quantifying logic (Hintikka and Hilpinen
29 1997: ix; Quine 1985: 767, 1995: 31; Putnam 1982: 297). He was author
30 of the terms ‘First Order Logic’ (Putnam 1988: 28), and ‘Trivalent Logic’
31 (Fisch and Turquette 1966; Lane 2001). He also anticipated Henry
32 Sheffer’s ‘Stroke Function’ by more than 30 years (*W* 4: 218–221; Houser
33 1997: 3); worked with what later came to be known as Claude Shannon’s
34 correspondence between truth functions and electrical circuitry (*W* 5:
35 421–422; Gardner 1982); and developed a logical notation using topolog-
36 ical forms (existential graphs) that anticipated hybrid systems of notation
37 based on graphs, diagrams, and frames (Roberts 1973; Shin 1994, 2002;
38 Barwise and Etchemendy 1995; Allwein and Barwise 1996; Hammer
39 1994, 1995).

40 As if this were not enough, one of his most original contributions con-
41 sists of his development of a *logic of discovery* based on the concept of
42 *abductive inference*, as outlined by various scholars (Bernstein 1980;

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1 Nickles 1980a, b). In the future, the repercussions from this aspect of
2 Peirce's monumental work are likely to be among the most noteworthy.

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5 2. Introducing the topic

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7 But Peirce's concept of abduction is still poorly approached and has re-
8 ceived no more than occasional attention since K. T. Fann's (1970) brief
9 but intensive study of abduction and a few scattered articles. When men-
10 tion has been made of abduction, it has usually been within the context
11 of scientific discovery and scientific method, regarding what has been
12 considered logico-rational discourse. There has been hardly more than lip
13 service paid to abduction as a general creative process. However, a turn-
14 around began with Umberto Eco and Thomas Sebeok's collection enti-
15 tled *The Sign of Three: Dupin, Holmes, Peirce* (1983). Since that time ab-
16 duction has occasionally found itself on the edge of the spotlight in Peirce
17 studies — for example, excellent articles can be found in *Transactions of*
18 *the Charles S. Peirce Society*, *Semiotica*, special issues of the journal *VS*
19 (1978, 1980), and Uwe Wirth's online collection of papers at [www.rz.uni-](http://www.rz.uni-frankfurt.de/~wirth/index.html)
20 [frankfurt.de/~wirth/index.html](http://www.rz.uni-frankfurt.de/~wirth/index.html).

21 Abduction is a distinct form of logical inference, though in extreme
22 cases it can be, and often is confused with perceptual judgment. Peirce de-
23 fines abduction as 'the process of forming explanatory hypotheses' (*CP*
24 5.171), the 'only kind of argument which starts a new idea' (*CP* 2.96). It
25 consists of two operations: the selection and formation of hypotheses for
26 the purpose of further consideration (*CP* 6.525). As an 'act of insight'
27 that 'comes to us like a flash' (*CP* 5.181), abduction is germane to cre-
28 ative and aesthetic dimensions of human cognition.

29 Swimming against the traditional division of inference into simple de-
30 duction and induction, Charles S. Peirce held to his tripartite division: *ab-*
31 *duction*, *induction*, and *deduction*. Briefly, deduction was, for Peirce, a log-
32 ical matter of hypothesizing much as tradition had it; induction entailed
33 the process we would ordinarily term confirmation of deduced hypotheses
34 through observation of particular cases. But how could hypotheses come
35 about in the first place? If deduction involves the logical construction of
36 hypotheses by deductive operations, how is it that insight regarding the
37 possibility of a plausible hypothesis could emerge? Is there indeed a 'logic'
38 for creating hypotheses? Tradition responds with an emphatic 'NO!' Log-
39 ical positivists and Karl Popper were some of the most outspoken critics
40 of the very idea of a logical process for creating novel possibilities as
41 part of the discovery process. Popper wrote, 'the initial stage, the act of
42 conceiving or inventing a theory, seems to me neither to call for logical

1 analysis nor to be susceptible of it. The question how it happens that a
2 new idea occurs to a [person] . . . may be of great interest to empirical psy-
3 chology; but it is irrelevant to the logical analysis of scientific knowledge’
4 (Popper 1959: 20–21). Popper writes here, and elsewhere, that novel ideas
5 are the product of irrational flights of fancy — purely random happen-
6 ings. Hence there is no guarantee that any one idea popping into one’s
7 head has a better chance of success than another. Knowledge is the result
8 of purely blind guesses, and no more — i.e., Popper’s (1963) Darwinian
9 theory of ‘evolutionary epistemology’ (Bartley III 1984).

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12 **3. Spotlighting the topic**

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14 Peirce once suggested that the abductive act is an instinctive capacity of
15 the mind sufficiently prepared for informed guesses, as the mind has ‘a
16 natural bent in accordance with nature’ (CP 6.478). This attunement of
17 mind and nature merges into perception, which Peirce calls the ‘outward
18 clash’ of the physical world on the senses, and as traditional thought
19 would dictate, perception precedes conception. In Peirce’s words, the ‘ele-
20 ments of every concept enter into logical thought at the gate of perception
21 and make their exit at the gate of purposive action; and whatever can-
22 not show its passports at both those two gates is to be arrested as un-
23 authorized by reason’ (CP 5.212). *Perception, conception, and purposive*
24 *action*. The sequence is by no means as simple as it might appear. Peirce
25 knew this, and he elaborated on the problem on many occasions. For the
26 present, suffice it to observe that abduction, or some feeling that gives rise
27 to an informed guess by the prepared mind in tune with nature’s sym-
28 phony, precedes perception, conception, and purposive action. In other
29 words, if induction and deduction are matters of logically hypothesizing
30 by conception and confirmation through perception of particular cases in
31 the physical world, then abduction is what makes it all possible in the first
32 place.

33 There are no wide-eyed, innocent percepts according to Peirce. All per-
34 cepts come with beliefs, preconceptions, and prejudices leading to percep-
35 tual judgments; thus, there is no hard and fast line of demarcation be-
36 tween perception, conception, interpretation, and knowledge (CP 5.184).
37 Regarding abductive inference and these processes, there is a difference in
38 degree rather than kind: perception, conception, and interpretation can
39 be, to an extent, subject to the willful, controlling mind, while abductions
40 arise spontaneously, as it were. But the mind, having less control over the
41 workings of abductive ‘logic’ than more willfully controlled deductive and
42 inductive logic, is consequently privy to hardly more than the tip of the

1 iceberg. Below the level of the mind's conscious and willful control, there
2 is 'a vast complexus, which we may call the instinctive mind' (CP 5.212).

3 However, the reader who cavalierly takes Peirce's instinct to be out-
4 moded biological thinking has not read him closely. Instinct entails em-
5 bedded tendencies as well as inborn propensities. Although obviously it
6 cannot be specified — and Peirce, as far as we are aware, never denied
7 this — it serves as a tool, offering a conceptual grasp of an exceedingly
8 complex phenomenon: namely, a nonconscious linking of the qualitative
9 feeling or Firstness of a sign, its object and its interpretant by way of some
10 resemblance or other.

11 Upon evoking Peirce's category Firstness and his concept of the sign, a
12 few words are in order in that respect. Peirce defined the semiotic process
13 of signs becoming signs as irreducibly triadic, between sign, object, and
14 interpretant (CP 1.363, 7.537, 8.331). These are the minimal constitutive
15 components making up the sign, and their triadic interdependent, inter-
16 related interactivity integrates his three categories delineating natural
17 and mental processes (MS 318: 81, CP 2.242, 2.274). In brief, the cate-
18 gories can be defined as:

- 19 1. *Firstness*: what is such as it is, without reference to, or interrelation
20 with, anything else.
- 21 2. *Secondness*: what is such as it is, in interrelation with something else,
22 but without relation to any third entity.
- 23 3. *Thirdness*: what is such as it is, insofar as it is capable of bringing a
24 second entity into interrelation with a first one in the same way that
25 it is interrelated with the first and the second entity (for further infor-
26 mation on the categories, see Almeder 1980, Hookway 1985).

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28 Briefly, the sign or representamen, outside any and all considerations of
29 the object with which it interdependently and interactively interrelates, is
30 Firstness; its entering into interrelatedness with its object ushers in Sec-
31 ondness; and its taking on an interpretant that brings about mediation be-
32 tween sign and object in the same manner in which it enters into inter-
33 dependent, interrelation interaction with them, involves Thirdness. This
34 triadic semiotic process allows the sign to suggest a plausible hypothesis
35 to its interpreter, by way of its potential interpretant, which can be real-
36 ized only through interdependent, interrelated interaction with its inter-
37 preter. Then, and only then, can the emerging sign become a subservient
38 sign by opening itself to the mind's whims and prejudices.

39 In this manner, linkage by Firstness can enable the interpreter-
40 interpretant to process the sign in conjunction with the character of its
41 object, such interpretation providing for the possibility of an alteration
42 of feeling, thought, and action. To put this another way, feeling is a

1 sensation of some abduction arising as the plausible solution to some
2 problem situation (Firstness); the problem situation came about as the
3 consequence of something in the physical world that seemed contrary to
4 what was expected (Secondness); and the emerging interpretant involved
5 some possible hypothesis or solution to the problem situation that re-
6 cently entered the scene uninvited (Thirdness).

7 Feeling, or the sign of Firstness, issues forth as a stream, though this
8 stream may be inordinately vague. Its specification can be made possible
9 only after the fact of Secondness and by way of mediating Thirdness. For
10 example, an abduction emerging as feeling is at that point acritical, with-
11 out doubt, and enshrouded in exceeding uncertainty, though on the spur
12 of that particular moment it may seem to be a paragon of clarity (*CP*
13 5.446). And it might bring with it, as Secondness bounds onto the scene,
14 a shock of surprise, for it is entirely different from what was expected; it
15 contradicts recently acquired or well-worn habits of perception and of
16 thought.

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19 **4. An example**

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21 Take Henri Poincaré's discovery of the Fuchsian functions in mathe-
22 matics (Poincaré 1914). Poincaré's lively account has him working on
23 the problem for fifteen days without success. One evening, after drinking
24 black coffee, he spent a sleepless night experiencing jumbles of ideas col-
25 liding until they interlocked, convincing him that the tentative hypothesis
26 he had constructed was incorrect. This turned out to be an erroneous ab-
27 duction by his nonconscious style of dream reasoning. Then he went on
28 vacation, and, while boarding a bus, he suddenly realized that the Fuch-
29 sian functions were identical to a set of functions that already existed in
30 mathematics, the transformation of non-Euclidean geometry, which he
31 could then use to solve his problem. This, he discovered, was a correct ab-
32 duction, arrived at by a spontaneous shock of surprise in his waking state
33 — and as a consequence Poincaré writes that he nearly missed a step into
34 the bus and went toppling to the ground.

35 Poincaré goes on to tell us that the incidents of travel put his mathe-
36 matical work in 'cerebral limbo,' where it gestated and gelled on its own,
37 to surface at an unexpected moment (as an abduction). This 'cerebral
38 limbo' is a timeless *ensemble* (of possible abductions). His next, somewhat
39 arduous task was that of patiently, and in a more or less linear, contin-
40 uous operation, taking up pen and ink and setting his discovery down
41 on paper (by constructing a well-formulated hypothesis and a proof or
42 confirmation, in deductive and inductive fashion). This is a *time-bound*

1 process. Comparable stories abound: Kekulé's discovery of the benzene
2 ring experienced as intertwined snakes after a coffee-drinking marathon;
3 Coleridge's dream of Kubla Khan and his palace which, upon awakening
4 from a drug-induced slumber, he wrote as if the composition were all
5 there and awaiting its realization on the page; Mozart's melodies coming
6 to him in their entirety in one massive clash. In each case, there is some-
7 thing that remains beyond control (cerebral limbo, the *ensemble*), which,
8 after arising, can be subjected to the willful workings of the mind (a lin-
9 early logical *time-bound* process).

10 The abductive act, coming in many guises and from within many forms
11 of cognitive activity, merits considerable more inquiry than it has received
12 in the past. With this in mind, we have designed this special issue for the
13 purpose of awakening interest in Peirce's abductive process.

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16 Note

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