

Icons and abduction

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. The 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. C.S.Peirce (MS 692)

Abstract:

In our effort to relate abductive process to iconic semiosis, we argue that meaning begins the process of its development as an icon, and logic of abduction is the logic responsible for this iconic process. Our aim here is to explore the relationship between Peirce's notion of abductive inference and iconic semiosis. In order properly to develop our argument, it behooves us to offer a brief introduction that includes: (i) the basic characteristics of abduction, (ii) Peirce's concept of semiosis, (iii) Peirce's categories of mind, and signs processes, and (iv) the nature of the iconic sign.

KEYWORDS: abductive inference, semiosis, icon, meaning, C. S. Peirce

Introduction

One of the most important facets of Peirce's thought is his effort to develop a logic of discovery based on the concept of abductive inference.¹ When approached, abduction is usually placed within the context of logic- and science-specific deductive-inductive concerns, with hardly more than passing mention of meaning,

¹ For an early study, Fann (1970); for further development of the topic, Ayim (1979), Hanson (1961, 1965), Harris and Hoover (1983), Hintikka (1998), Hoffman (1999), Magnani (2005), Pape (1999), Queiroz & Merrell (2005), Staat (1993), Turrisi (1990), Wirth (1999).

and creativity.² But what is the relationship between semiosis (meaning process) and abductive inference? What is the relationship between iconic semiotic process and abductive inference? According to Peirce, those processes (semiosis and abduction) are strongly connected.³ Bearing this in mind, we present a concept of abduction that includes inferential processes developing out of the most basic, and iconic semiotic forms. We are aware of no systematic study along these lines. This might come as a surprise, since Peirce repeated time and again in his writings that symbolic signs and their meaning owe their breadth and depth to their having been able to stand on the robust shoulders of iconic signs.

Abductive inference

Abduction is a distinct form of logical inference, though in extreme cases it can be and is often confused with *perceptual judgment*. Peirce defines abduction as “the process of forming explanatory hypotheses” (CP 5.171),⁴ the “only kind of argument which starts a new idea” (CP 2.96). It consists in two operations: the selection and formation of hypotheses for the purpose of further consideration (CP 6.525). As an “act of insight” that “comes to us like a flash” (CP 5.181), abduction is germane to creative and aesthetic dimensions of human cognition in addition to the importance of abductive inference in the formal disciplines. For Peirce, abduction is also the logical inference by which new knowledge can be obtained: “Abduction consists in studying the 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” (CP 5.145); “It must be remembered that abduction, although it is little hampered by logical rules,

² This assertion virtually applies to all the entries in note 1; some obvious exceptions are found in Queiroz and Merrell (2005).

³ Engel-Tiercelin (1992, 1998), Hartshorne (1970), Hausman (1993), Hookway (2002), Merrell (2000), Neumann (2003), Rosenthal (1994, 2000).

⁴ We shall follow the practice of citing from the Collected Papers of Charles Sanders Peirce (Peirce, 1931-35, 1958) by volume number and paragraph number, preceded by ‘CP’; the Essential Peirce by volume number and page number, preceded by ‘EP’. References to the microfilm edition of Peirce’s papers (Harvard University) will be indicated by ‘MS’, followed by the manuscript number.

nevertheless is logical inference, asserting its conclusion only problematically or conjecturally, it is true, but nevertheless having a perfectly definite logical form” (Peirce 1901: 15; CP 5.188).

In our effort to relate abductive process to iconic semiosis, we argue that meaning *begins the process of its development as an icon*, and logic of abduction is the logic responsible for iconic processes (Hookway 2002, Merrell 2004, 2005). Our aim here is to elucidate the relationship between Peirce’s notion of abductive inference and iconic semiosis. In order properly to develop our argument, it behooves us to offer a brief introduction that includes: (i) the basic characteristics of abduction, (ii) Peirce’s concept of semiosis, (iii) Peirce’s categories of mind, signs, and nature’s processes, and (iv) the nature of the iconic sign. The reader should bear in mind that our argument borders on recent developments in cognitive science and artificial intelligence.

What must be the nature abductive inference?

Is abduction no more than vague, conjectural, tentative, merely a radically indeterminate *might be* in contrast to what *is* and *what must necessarily be*? If so, can we validly speak of *abductive reasoning*? Of *abductive inference*? Peirce responds in the affirmative. He tells us that pragmatism “is nothing else than the question of the logic of abduction” (CP 5.196). Even though abduction is an “act of insight” that suddenly appears from somewhere (CP 5.181), and even though it is creative, of aesthetic nature, it is both inferential and insightful, both reasoning and creative, both rigorous and a free flight of the imagination (Anderson 1986, 1958).

What kind of *logic* can this be? If it is any kind of *logic* at all, by Peirce’s own admission it is at one and the same time both logical in the classical binary sense and *psychological*, hence caught up in ambiguity (CP 2.107). The riddle of *abductive logic*, if such *logic* there be, must include *vagueness* and *inconsistency* and *generality*

and *incompleteness*.⁵ Given the nature of *vagueness*, both one possibility and the other can be acceptable, given different timespace conditions. Given the nature of *generality*, neither one contextualized assertion nor another one is acceptable, for there is at minimum a third possibility. With this in mind, we can hardly escape the premonition that abductive inference by means of abductive *logic* takes in *alogical* principles from the viewpoint of classical logic, and it allows for the possibility of *inconsistency* and *vagueness* and *incompleteness* and *generality* as well (Hoffmann 1999).

The categories

Peirce's categories (Firstness, Secondness, Thirdness) are logically conceived as a system of irreducible classes of relations (monadic, dyadic, triadic). This system is the foundation of his philosophy and of his model of *semiosis* (see Murphey 1993: 303-306). Ontologically the categories are rudiments of the world. *Firstness* is the mode of being in which something is as it positively is, with no regard to anything else (MS 460: 5-21, 1903; MS 575,1886; W 5.299). It can be characterized as lacking determination: it is what it is without regard or relation to anything else (cf. also MS 277,1908). Therefore, *Firstness* as a mode of being is related to the modality of possibility. *Secondness* is the mode of being that is what it is with respect to some Second, irrespective of any Third. It is a kind of reaction with some other (CP 6.200). Like Firstness, Secondness can be related to a modality, namely the modality of actuality (Parker 1998; CP 6.455). The actuality of a thing is simply its occurrence: "Actuality is the Act which determines the merely possible. It is the act of direct determination. [It is the act] of arbitrary determination" (Peirce MS 277, 1908, p.00062). Rephrased, actuality is the realization of a possibility, without thereby

⁵ For some possible suggestions and sources, see Brock (1979), Chiasson (2002), Costa (1974), Costa and Krause (2001, 2003), Costa and Bueno (2001), Daniel (2003), Engel-Tiercelin (1992), Hanson (1961, 1965), Merrell (1997), Nadin (1983), Priest (1987, 2004, 2006), Priest et al., eds. (1989), Rescher and Brandom (1979).

having reference to something larger, be that a general law or an interpretation. *Thirdness* is the category of mediation: Thirdness mediates and thereby interrelates Firstness and Secondness in the same way that it mediates and brings itself into interrelation with them. The example par excellence is Peirce's semiotic process, in which a sign is related to an object by mediation through an *interpretant*.

Semiosis and icon, the sign of Firstness

According to Peirce, any description of semiosis (action of sign) involves a relation constituted by three irreducibly connected terms:

My definition of a sign is: A Sign is a Cognizable that, on the one hand, is so determined (i.e., specialized, *bestimmt*) by something *other than itself*, called its Object, while, on the other hand, it so determines some actual or potential Mind, the determination whereof I term the Interpretant created by the Sign, that that Interpreting Mind is therein determined immediately by the Object (CP 8.177. Emphasis in the original).

The above triadic relation is regarded by Peirce as irreducible in the sense that it is not decomposable into any simpler relation or set of relations. He conceived a Sign as a "First which stands in such a genuine triadic relation to a Second, called its Object, so as to be capable of determining a Third, called its Interpretant, to assume the same triadic relation to its Object in which it stands itself to the same Object" (CP 2.274. See also CP 2.303, 2.92, 1.541). The triadic relation between sign, object, and interpretant is irreducible: it cannot be decomposed into any simpler relation. This is why the sign-object relationship cannot be enough to understand sign-mediated process.

A sign is also pragmatically defined as a medium for the communication to the interpretant of a form embodied in the object, so as to constrain, in general, the interpreter's behavior.

[...] a Sign may be defined as a Medium for the communication of a Form. [...]. As a medium, the Sign is essentially in a triadic relation, to its Object which determines it, and to its Interpretant which it determines. [...]. That which is communicated from the Object through the Sign to the Interpretant is a Form; that is to say, it is nothing like an existent, but is a power, is the fact that something would happen under certain conditions (Peirce MS 793:1-3. See EP 2.544, n.22, for a slightly different version).

The object of sign transmission is a habit (a regularity, or a *pattern of constraints*) embodied as a constraining factor of interpretative behavior – a logically *would be* fact of response. The form is something that is embodied in the object as a *regularity, a habit, a rule of action, or a disposition*. Form is defined as having the *being of predicate* (EP 2.544) and it is also pragmatically formulated as a *conditional proposition* stating that certain things would happen under specific circumstances (EP 2.388). For Peirce, it is nothing like a *thing* (De Tienne 2003), but something that is embodied in the object (EP 2.544, n. 22) as a habit, *a rule of action* (CP 5.397, CP 2.643), *a disposition* (CP 5.495, CP 2.170), *a real potential* (EP 2.388) or, simply, a *permanence of some relation* (CP 1.415). We can say that Peirce follows a *via media* in which *form* has both the character of Firstness and Thirdness.

In the context of the *most fundamental division of signs* (CP 2.275), the categories correspond to icons (Firstness), indexes (Secondness), and symbols (Thirdness), which, in turn, match relations of similarity, contiguity, and law between S and O (sign-object relation) in the triad S-O-I (S-O relations coming into relation with an interpretant). Icons are signs that stand for their objects through similarity

or resemblance, in spite of whether or not they show any spatiotemporal physical correlation with an existent object. In this case, a sign refers to an object in virtue of a certain quality that sign and object share. When the interpreting system suffers an effect of the sign (i.e., when an interpretant takes place within it), this is due to the communication of a quality of the object to the system through the sign. An icon can refer to an object independently of the spatiotemporal presence of the latter because it denotes the object merely by virtue of characters of its own, and which it possesses, just the same, no matter if the object is present or not, and, in fact, no matter if the object actually exists or not. Icons play a central role in sensory tasks since they are associated with the qualities of objects. Thus, they are present in the sensorial recognition of external stimuli of any modality, as well as in the cognitive relation of analogy.

In contrast, indices are signs that refer to an object due to a direct physical connection between them. Since in this case the sign should be determined by the object, for instance, through a causal relationship, both must exist as actual events. This is an important feature distinguishing iconic from indexical sign-mediated processes. Accordingly, spatio-temporal co-variation is the most characteristic property of indexical processes. Symbols are signs that are related to their object through a determinative relation of law, rule or convention. A symbol becomes a sign of some object merely or mainly by the fact that it is used and understood as such, due to some of the kind of relations mentioned above.

In this iconic sign process, the form which is communicated from the object to the interpretant through the sign is a *general similarity* between the object and the sign. Generally speaking, an iconic sign communicates a habit embodied in an object to the interpretant, so as to constrain the interpreter's behavior, as a result of a certain quality that the sign and the object share. In this indexical sign process, for example, the form which is communicated from the object to the interpretant through the sign can be a general physical correlation between measles and the

small red spots in the skin. Generally speaking, an indexical sign communicates a habit embodied in an object to the interpretant as a result of a direct physical connection between sign and object. Finally, in a symbolic relation, the interpretant stands for *the object through the sign* by a determinative relation of law, rule or convention (CP 2.276).

What does it mean to say that the general semiotic process crucially depends on iconic processes involved in the development of indexical and symbolic signs? Icons are signs essentially hypothetical, deeply dependent on the qualities they contain. As we have indicated, *form* can be defined as potentiality (*real potential*, EP 2.388). If we consider this definition, we will also come to the conclusion that form can show the nature of both Firstness and Thirdness. Consider that potentiality is not the same as mere possibility. For the sake of our arguments, consider Peirce's treatment of Quality as a *mere abstract potentiality* (CP 1.422). It is abstraction not in the sense of a reduction of complexity to formal simplicity, but in the sense that the quality in question has been *abstracted* (cut) from the continuum of possibilities.

On Peirce's possibility

Peirce at times refers to Thirdness as possibility. In fact, Rosenthal observes that "Peirce's dual use of the term "possibility" is quite understandable, for since Secondness comprises the domain of the actual, the possible, in a broad sense, must inhere in both Firstness and Thirdness" (2001, p. 4). However, Firstness involves a weaker type of possibility than does Thirdness. To distinguish the possibility involved in each of the two categories, Peirce most often adopts *possibility* as qualification of Firstness and *potentiality* as qualification of Thirdness — though he remains somewhat ambiguous on the issue, as Rosenthal points out. In this manner, if Firstness is pure possibility — what *might be* — and Secondness is what *is*, in the physical world or the world of mind, then Thirdness is what *should be*. Firstness, then precedes what *is* though without its presenting a *vague* range of possibilities

what *is* could not *have been*, what *is* is to a greater or lesser degree what *should have been*. Secondness involves *particulars*, prior to their collection into *generalities*. And Thirdness is the collection of *particulars* into *generalities*.

The important point is that since Firstness implies any and all possibilities, some of them must contradict one another: they are *inconsistent*. *Generals* as Thirdness were always *there* as possibilities of Firstness. As possibilities, *generals* at one time and place and within one culture might be considered *real*, but at another time and place within another culture those same *generals* might be considered mere figments of the imagination. This is to say that any and all *generals* are to a greater or lesser extent *incomplete*, since there is the possibility that at some space-time juncture they may be discarded and replaced by some alternative or other. In other words, no actual collection of objects, acts, and events in the practices and knowledge of everyday life can completely exhaust the range of possible actualities held within the embrace of Firstness, there and ready for the taking by some interpreting agent or other.

Or in Nelson Goodman's (1978) manner of putting the issue, there can be many *possible* worlds or collections of *particulars* and their respective *generalities*, some of them compatible with one another, some of them in competition, and some of them mutually contradictory, but no matter how many worlds have been constructed and concocted, their sum will never be tantamount to The World (the collection of all possibilities of Firstness). Firstness, then, embraces all possibilities of *generality*.

In sum, *quality* is of the nature of Firstness, being essentially *indeterminate* and *vague*. In a certain sense Thirdness entails *quality generalized*. But in this case, we are beyond the domain of pure Firstness, as *generality* refers to convention or some law-like tendency. When addressing ourselves to semiosis in terms of iconic signs of Firstness and abduction, we must focus on possibility.

Where to begin where there is not really any where or when?

Ideally, abduction should complement the chiefly voluntary manipulation of signs in inductive and deductive practices. The process of hypothesis formation is put into play by an individual act of abduction. Peirce considered “one of the worst of ... confusions, as well as one of the commonest” that of “regarding abduction and induction taken together ... as a simple argument” (CP 7.218).

Nevertheless, confusion of abduction and induction has been common. For example, Nelson Goodman, like the vast majority of scholars during the heyday of logical positivism and since, has essentially ignored abduction. This is especially evident in his *New Riddle of Induction*.⁶ The riddle is a play on two conflicting color concepts. We believe the assertion *Emeralds are green* was, is, and will always be true, for emeralds can be none other than green, and that’s that. However, some people from an exotic culture who take it that ‘Emeralds are “grue”’, which should be fine by us. But it isn’t. Their *grue* emeralds are the equivalent of our *green* emeralds before time t_0 , but thereafter *grue* for them is the same as what for us is *blue* (their *bleen*). Strange indeed, we are inclined to conclude. But from their vantage it is we who are misled by our appearances. Our *green* emeralds are their *grue* emeralds up to and including time t_0 , but thereafter our *green* is what for them is *bleen* (our *blue*). Color schemes regarding our *green-blue* and their *grue-bleen* are symmetrical. As far as they are concerned, we have no more inductive certainty than do they from our perspective.

James Harris (1992, pp. 60-61) writes, and justifiably so, that if we adopt Peirce’s distinction between abduction and induction, *then* [Goodman’s] *new riddle of induction is properly viewed as a riddle of abduction*. Hume’s dilemma was how to explain how what we have seen in the past can justify predictions regarding what we will see in the future. Goodman’s riddle rests on how hypotheses are chosen for

⁶ See Goodman 1965, Hacking 1993, 1997, Hesse 1969, and especially Stalker, 1994.

confirmation in the first place: within a given cultural context will the consensus be *All emeralds are green* or *All emeralds are grue*, and why? Properly separating Goodman from Hume, and roughly we have Peirce's abduction-induction pair.

Once selection of a sign has been made from the range of all possibilities, the fee has been paid for entering the field of *underdetermined* concepts and theories, that, since they are never absolute nor *complete*, eventually they will suffer alterations, or they will be discarded entirely. But we must be more specific regarding abductive inference. So, consider this: What color are emeralds? Why *green* of course. One day we make the acquaintance of a strange soul for whom emeralds used to be *grue* (our *green*) and at a certain point in time he still called them *grue* but in a different way (corresponding to our *blue*).

Abductive uncertainties

Abduction, icons, and Firstness have to do largely with similarities. Goodman claims similarities are inevitably *wrong* from one perspective or another, for they could have always been other than what they are. Peirce also recognized that:

There is no greater nor more frequent mistake in practical logic than to suppose that things which resemble one another strongly in some respects are any the more likely for that to be alike in others.... The truth is, that any two things resemble one another just as strongly as any two others, if recondite resemblances are admitted. (CP 2.634)

The ultimate implications of Peirce's *practical logic* of abductive inference are no less radical than Goodman's comparable notion of similarity. If virtually any and all resemblances, even the most blatant and the most recondite, stand a gaming chance of gaining entrance into the semiotic world from a virtually aleatory background of possibilities, then there is no all-or-nothing method for determining

beforehand whether *All emeralds are green* or *All emeralds are grue* — or any other combination of likely candidates — will withstand the test of time.

Is the idea of abductive meaning meaningful?

Ian Hacking (1993) gives account of Kripke's (1982) correlating Goodman with Wittgenstein's skeptical problem. Kripke suggests that *grue* can be addressed not to induction but most properly to meaning. The question would not be *Why not predict that grass, which has been grue in the past, will be grue in the future?* but rather, the Wittgensteinian question *Who is to say that in the past I did not mean grue by "green," so that now I should call the sky, not the grass, "green"?* (Kripke 1982, p. 58). In other words, in the past I called emeralds *green*, but meant *grue*, and now I continue to call them *green*, but I actually mean *bleen* (in English, *blue*). And I now call the sky *blue*, but actually mean *green* (that is, *grue*). Hacking points out that while Goodman's problem is outer directed with respect to what the community thinks and says, Kripke's is inner directed: what I think and say.

In this sense, his question becomes: *Why do I call the sky blue and grass green when actually I mean green (grue) and blue (bleen) respectively?* If we take Goodman's original use of his riddle into full account, as does Hacking, then the entire community comes into the picture. We, as members of the community, could all be speaking out of the wrong side of our mouth for the sake of maintaining lines of communication intact without knowing that everyone else was doing the same.

Ultimately, the problem with meaning is not in its proof but in its taste. Quite simply, if it goes untasted, virtually anything may be capable of going as a proof, and if virtually anything can be a proof, then whatever the taste may prove, the proof will more often than not be little more than superfluous. We allude to the inextricability, in good semiotic practices, of either the *representamen*, the *semiotic object*, or the *interpretant* of the sign, and of either Firstness, Secondness, or Thirdness, from the entire triad of interrelations. The thorn in the side of meaning is

that most popular accounts of the *grue-green* dilemma highlight either one or two legs of the triad at the expense of the other(s). On the one hand, Goodman's riddle focuses on projection of predicates on things, thereby bringing about entrenchment, which is not a matter of *truth* or even meaning, *per se*, but of linguistic practice. On the other hand, Kripke's Goodman raises the question of meaning, if not exactly *truth*, in addition to induction. Goodman, as a good nominalist, evokes an attitude focusing more on *actuals* (Seconds), how they are most appropriately to be taken, once seen, and most specifically, how they should be clothed in *linguistic garb* (Thirds).

Kripke's Goodman takes *actuals* in his stride as a matter of course; of more focal interest is the range of *possibles*, and how, in their interaction with those *actuals*, they can in the future *potentially* give rise to alternatives to the conventions that be. That is one difference between Goodman's *true grue* and Kripke's *Goodman's grue*. Another important difference is that of *outer* directedness and *inner* directedness. Kripke, following Wittgenstein on rules, remains tied to consideration of thought-signs—in contrast to Goodman's emphasis on sign-events—of the mathematical sort, which are in this sense quite commensurate with Peirce's consideration of mathematics, fictions, dreams, and hallucination (Dozoretz 1979).

Speaking of Peirce, where he stands out most briskly when placed alongside the Goodman-Kripke pair rests in his refusal to eschew indexicality, and especially iconicity, from the entire picture: he by no means remained inextricably tied to language (or symbols) and language alone. Peirce stressed long and hard that there is an iconic relation between the *semiotic object* that gives rise to an abduction and its attendant hypothesis, on the one hand, and that *semiotic object* as it is actually perceived inductively, on the other. This relation is that of analogy or resemblance, proper to iconicity. In this regard, meaning is impossible without abduction, iconicity, and Firstness.

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