Abductive Reasoning and the Genesis of New Ideas: Charles S. Peirce

RONALD A. BEGGETTO
University of Connecticut

Summary

In this chapter I provide commentary on selections from Charles Sanders Peirce's Collected Papers as they pertain to creative reasoning. More specifically, I provide commentary on Peirce's concept of abductive reasoning and discuss how it comprises a larger process of creative inquiry. In order to support this effort, I introduce a model of creative reasoning that I hope can serve as a bridge between Peirce's ideas and concepts relevant to contemporary creativity theorists and researchers.

Introduction

Charles Sanders Peirce (1839–1914) was an influential yet sometimes overlooked contributor to many lines of thought, including pragmatism, semiotics, philosophy of science, mathematics, and logic—just to name a few. As I will argue, many of his ideas also presaged concepts and issues taken up by contemporary creativity researchers.

The challenge in connecting Peirce with contemporary work in creativity, however, is not simply that his oeuvre covers an abundance of topics (which it does), but that the ideas he expresses over the course of his writings are at turns suggestive, systematic, developmental, and ultimately unfinished (Anderson, 1987; Burks, 1946). Adding to this challenge is the fact that I am not a logician, semiotician, or Peircean scholar. As such, the danger of misrepresenting Peirce's ideas is ever present. One therefore must, as the
Peircean scholar Douglas Anderson (1987, p. 11) has said, “acknowledge such dangers and keep them in mind as one proceeds . . . but one must proceed.”

The selection I have chosen for this commentary represents passages from the massive Collected Papers of Charles Sanders Peirce (CP). One of the editors of the papers has described them as “a disordered array of severed limbs” (Deely, 1994). Consequently the selection I have chosen to comment on is not a stand-alone document. Rather it represents excerpts, which I title “Abductive Reasoning as Part of a Larger Process of Creative Reasoning.”

It is my hope that this selection will offer creativity researchers a window into a Peircean account of creative inquiry. Although the window may be clouded by the fragmentary nature of the selection and my particular vantage point as a creativity researcher, I believe there is still value in considering Peirce’s ideas. Doing so can reveal several connections and insights relevant to contemporary perspectives on creative thought and action (as I hope to demonstrate in my commentary that follows the selection).

### Reading: Collected Papers of Charles Sanders Peirce

Commentary

How do Peirce’s ideas as represented in this selection have relevance for contemporary creativity researchers? I would argue that the relevance is most directly found in his concept of abductive reasoning and how it comprises a larger process of creative inquiry. In what follows, I offer a model that I hope can serve as a bridge between Peirce’s ideas and concepts relevant to contemporary creativity theorists and researchers.

Figure 10.1 depicts my attempt to illustrate and provide a Peircean account of how three modes of reasoning (i.e., abduction, deduction, and induction) represent a more general process of creative inquiry. In the sections that follow, I will discuss each of the components of this Peircean-inspired model.

I also discuss how the ideas represented in the model align with several key concepts of contemporary creativity theory and research: understanding the conditions and process from which creativity emerges, the dynamic features of the phenomenon of creativity, and even the definition of creativity itself.

A CATALYST FOR NEW IDEAS

Peirce offers a “logic of discovery” (Burks, 1946, p. 302), which describes the conditions from which new ideas are introduced, developed, and tested. Specifically, a Peircean account asserts that “some surprising phenomenon, some experience which either disappoints an expectation, or breaks in upon some habit of expectation unexpected” (CP 6.469), creates a rupture in our experience, which serves as a catalyst for creative inquiry.

This assertion aligns with how some creativity researchers have described the onset of the creative process. Specifically, when we face an ill-defined problem or surprising situation, we find ourselves uncertain how to proceed (Mumford & Mcintosh, 2017; Pretz, Naples, & Sternberg, 2003; but see Glaveanu, 2012). In other words, we experience a state of genuine doubt, which we are motivated to resolve (Beghetto & Schreiber, 2016; Burks, 1946).

Peirce explains that these ruptures in our routines and habits can occur at three levels of experience: the world of Ideas, “those airy-nothings”; the world of “Brute Actuality—of things and facts”; and the world of Signs or “connections between different objects, especially between objects in different Universes” (CP 6.455). In this way, disruptions that spark creative inquiry can be encountered (e.g., we find ourselves confronted with...
The anomalous phenomenon) or encouraged (e.g., we invite the unexpected into our experience through free play of ideas and actions).

Such assertions align with my own work. I have, for example, described how unexpected moments, experiences of doubt and surprise, and ruptures in our experiences can serve as opportunities for creative thought and action (Beghetto, 2016a, 2016b). More specifically, in Beghetto (2016b) I have asserted how new ways of thought and action can emerge from internal ruptures (e.g., resulting from one’s own inner dialogues), social external ruptures (e.g., resulting from surprising interactions among people), and social-material ruptures (e.g., resulting from noticing disruptive sociomaterial features of the environment).

Whatever its origin, the process of creative inquiry (at least according to this account) is sparked by a disruptive experience, which moves us into an active effort to resolve it.

THE INTRODUCTION OF NEW IDEAS

When we find ourselves in a state of wonder, doubt, surprise, or unease, we engage in abductive reasoning to resolve the disruption we are experiencing. In this way the process of creative inquiry has the goal of moving us from an unsettled to a settled state. Peirce puts it this way: “The inquiry begins with pondering these phenomena in all their aspects, in the search of some point of view whence the wonder shall be resolved. At length a conjecture arises that furnishes a possible Explanation” (CP 6.469).

Peirce describes the resulting insight as coming “to us like a flash... It is the idea of putting together what we had never before dreamed of putting together which flashes the new suggestion before our contemplation” (CP 5.181). Peirce’s description of how new ideas and insights are generated is strikingly similar to what contemporary creativity researchers have described as the creative insights resulting from the combination of different (even opposite) stimuli (Rothenberg, 2014; Sawyer, 2012; Ward & Kolomyts, 2010).

Although Peirce does not provide a description of the psychological mechanisms at work during abductive reasoning, he does make clear that the resulting insights do not come out of thin air: “It is true that the different elements of the hypothesis were in our minds before” (CP 5.181). In other words, our efforts to resolve disruptive phenomena takes place in medias res (Anderson, 1987), that is, in the midst of prior action, knowledge, and understanding of the situation or domain at hand.

In this way there is an implicit recognition in Peirce’s system that “creativity of any kind cannot begin without a certain amount of funded experience” (Anderson, 1987, p. 148). Put simply, we need to have some experiential or conceptual context in order to recognize the disruption in the first place. Again, such assertions square with claims made by creativity researchers regarding the important role that prior knowledge and experiences play in creative thought. Guilford (1950, p. 448), for instance, asserted, “No creative person can get along without previous experiences or facts.”

Moreover the role of prior knowledge in understanding and working through ill-defined problems and situations also aligns with how creativity researchers have described the preparation and problem definition work necessary for resolving complex challenges and nonroutine problems (Kozbelt, Beghetto, & Runco, 2010; Sawyer, 2012).

Finally, abductive reasoning is also involved in learning anything new. As Peirce explained, “If we are ever to learn anything or to understand phenomena at all, it must be
by abduction that this is to be brought about” (CP 5.171). In this way a Peircean account of creative reasoning also predates similar arguments made by creativity researchers who have asserted links between creativity and learning (see Beghetto, 2016c; Guilford, 1967).

EVALUATING THE REASONABLENESS OF ABDUCTIVE INSIGHTS

Abductive insights are aimed at explaining or resolving a surprising phenomenon. Abductive insights are evaluated in light of their ability to reasonably—albeit provisionally—resolve the disruptive experience at hand. As Peirce explained, an abductive insight “cannot be admitted, even as a hypothesis, unless it be supposed that it would account for the facts or some of them” (CP 5.189).

The idea that novel (abductive) insights must also be reasonable aligns with the two-criteria (e.g., novelty and usefulness) definitions of creativity espoused by many creativity researchers (e.g., Kaufman, 2016; Plucker, Beghetto, & Dow, 2004; Runco & Jaeger, 2012; but see Corazza, 2016, and Smith & Smith, 2017, for variations on this definition).

Peirce offered additional guidelines for evaluating the acceptability of abductive insights: “capable of being subjected to experimental testing”; “[explaining] the surprising facts we have before us”; and taking into consideration “economy” [i.e., “cost, the value of the thing proposed, in itself, and its effects upon other projects]” (CP 7.220). Again, these additional criteria are similar to how creativity researchers have described the role of convergent thinking used to evaluate the merit of candidate ideas, insights, and actions when creatively solving complex challenges and ill-defined problems (Beghetto, 2016a; Mumford & McIntosh, 2017; Sawyer, 2012).

Peirce also recognized that what we “provisionally” accept to be “plausible . . . ranges in different cases” (CP 6.469). An abductive insight deemed as acceptable in one domain (e.g., physics) will be different from what is deemed acceptable in other domains (e.g., painting). Even with these variations, reasonableness still serves as a core criterion across situations and cases, as Anderson (1987, p. 60) has explained: “Whereas scientific reasoning ends with reasonable ideas, art ends with reasonable feelings.” This recognition that there is variability across different cases also aligns with contemporary perspectives on the domain-specific nature of creativity (e.g., Baer & Garrett, 2010).

REFINING OF IDEAS AND OUTLINING PROBABLE CONSEQUENCES

Once abductive insights have been deemed acceptable, they then get tested and refined through deductive reasoning. More specifically, in a Peircean account of creative reasoning, we use deduction to determine the necessary and experiential consequences of pursuing our abductive insights.

As Peirce explained, once we have adopted an abductive insight “we employ deduction to deduce from that ideal theory a promiscuous variety of consequences to
the effect that if we perform certain acts, we shall find ourselves confronted with certain experiences” (CP 8.209).

Deductive reasoning refines abductive insights into probable consequences (CP 7.202) by pruning away abductive possibilities in an effort to arrive at more viable options. Again, this refining of ideas aligns with the convergent and evaluative processes described by contemporary creativity researchers (e.g., Beghetto, 2016a, Mumford & McIntosh, 2017; Sawyer, 2012).

**PREDICTED OUTCOMES**

The probable consequences—which have been deductively rendered out of abductive possibilities—have a logical necessity to them (i.e., they demonstrate that “something must be” [CP 5.171]). The insights that result from abductive reasoning move from a more tentative or possible state of “something may be” to a more probable state through deduction and then ultimately tested, through induction, to determine whether “something actually is operative” (CP 5.171).

Again the specific features vary by discipline. In domains like the sciences, for instance, abductive insights that have been deductively rendered into logically coherent consequences will eventually be put to the test through experimentation. In domains where the constraints on logical necessity and experimental testing are not as strict, such as the arts, deductive reasoning is used to narrow possibilities in an effort to start moving a creative work toward resolution.

Anderson (1987) provides an example in his discussion of artistic creative deduction. Anderson explains that when Cezanne placed an initial broad brushstroke in the middle of one of his paintings, the stroke limited the future trajectory of the work. And with each successive stroke, the indefinite beginning transformed into a more definite telos, moving back and forth as necessary (between induction and deduction), and ultimately coming to rest in a resolution (i.e., a finished painting).

These claims too align with descriptions of the creative process put forth by creativity researchers (e.g., Sawyer, 2012). Once possibilities have been generated, they are then evaluated, refined, and prepared for experiential testing (e.g., testing whether they resolve the ill-defined problem or complex situation at hand). The process can have starts and stops, cycle back and forth between deductive and inductive phases, and, if not abandoned, continue until a viable resolution has been achieved.

**EXPERIENTIAL TESTING OF REFINED, ABDUCTIVE INSIGHTS**

Once an abductive insight has moved through deductive reasoning to “produce conditional predictions concerning our future experience” (CP 7.115), we then, according to Peirce, use inductive reasoning to “bring these predictions to the test, and thus to form our final estimate of the value of the [abductive insight]” (CP 7.115).
Induction, in a Peircean account of creative reasoning, is the experiential testing ground for our creative insights. In the case of the sciences, for instance, this might involve determining whether abductive hypotheses can be refuted through experimental testing. In the arts, this testing takes on a different flavor. As Anderson (1987) explains, the creative artist tests the resulting work against his or her aesthetic judgment to determine whether it resolves the unsettled or disruptive experience that prompted the creative effort in the first place.

Put simply, induction works to test whether a deductively refined abductive insight is operative in resolving some surprising phenomenon, unsettling feeling, or disruptive experience. Each of the three types of creative reasoning plays a different but related role in the process of creative inquiry.

**ACCEPTANCE OF OUTCOMES**

Taken together, a Peircean account of creative reasoning describes a process that commences with a disruptive experience, which is then followed by an attempt to generate possible resolutions of that disruption through abductive reasoning. Candidate possibilities are selected based on their reasonableness, explanatory power, value, and economic feasibility.

These possibilities are then narrowed and refined through deductive reasoning, which renders out probable consequences that can be tested experientially. This process can move through multiple iterations before coming to rest in a state of indefinite resolution (which can be reanimated by subsequent disruptions). As Peirce explained,

> When . . . we find that prediction after prediction, notwithstanding a preference for putting the most unlikely ones to the test, is verified by experiment, whether without modification or with a merely quantitative modification, we begin to accord to the hypothesis a standing among scientific results. (CP 7.206)

Hypotheses that have been accorded scientific standing can, of course, be refuted or further refined at some later date. Even in cases where a creative work is finished and the creator never again alters it, we can still assert with Anderson (1988, p. 145) that "whereas a hypothesis can grow to adapt to new facts, a work of art may grow to adapt to new interpretations." A finished painting, for instance, is still open to new and different interpretations by audiences, critics, and connoisseurs.

A Peircean account of creativity therefore recognizes that the work is never entirely resolved. The process of creative reasoning is dynamic, open, and ultimately unfinished. This assertion also aligns with arguments put forth by contemporary creativity researchers (e.g., Beghetto, 2016b; Beghetto & Corazza, in press; Corazza, 2016) and empirical work aimed at exploring the more dynamic features of creativity. Gadja et al. (2017), for instance, have demonstrated how a student’s novel idea, which has been accepted, dismissed, or ignored by the teacher, can later become reanimated and built upon by other students engaged in that discussion.
INSPIRING FUTURE DIRECTIONS

Once you get through the density of Peirce’s prose, there is an underlying precision and elegance to his ideas. He offers a perspective that situates creative insights in the context of a broader process of creative inquiry. As discussed, abductive (or creative) reasoning is a special form of reasoning that emerges out of states of surprise or doubt, which eventually can lead to new ways of thought and action through deductive refinement and inductive testing. Importantly, this is a dynamic and ultimately unfinished process.

Creative reasoning from a Peircean perspective is always tentative. It is represented by signs—such as hunches, symptoms, and clues (see Shank & Cunningham, 1996). But it is not capricious. Rather it is funded by prior experiences and knowledge. In this way it is part of a dynamic sense-making or, more precisely, semiotic process. This more dynamic, meaning-making view of creativity challenges creativity researchers to move beyond static conceptions and static measures of the process.

A Peircean account of creative inquiry can offer contemporary researchers complementary and differing perspectives on how theyconceptualize and study creative thought. Still, there is much left unsaid and unresolved in a Peircean account of creative reasoning. Part of this has to do with the fact that I have provided only small slices of Peirce’s oeuvre and that those slices have been limited by the narrow scope of this commentary as well as my own particular interpretations, biases, and perspectives. Part of this also has to do with the particular Peircean account being presented, which is narrowly focused on the role abductive reasoning plays in a more general process of creative reasoning.

Consequently we do not have an adequate account of how the process of reasoning presented herein fits within Peirce’s broader system of semiotics. Moreover we do not have an adequate exploration of the more micropsychological processes that might explain how abductive insights occur, nor do we have an adequate accounting of the role played by of the sociocultural-historical context.

Fortunately there are examples of very promising and compelling efforts aimed at more directly addressing some of these limitations, such as Anderson’s (1988) account of creativity and the philosophy of Peirce; Ohlsson’s (2011) account of creative insight; and Gläveanu, Gillespie, and Valsiner’s (2015) volume providing social and cultural perspectives on creativity. These efforts provide a good starting point for those interested in rounding out the very rough and incomplete sketch of a Peircean perspective I have offered herein.

A more complete connection between Peircean and contemporary perspectives on creativity can result in promising new directions for how creativity researchers conceptualize, study, and understand creative phenomenon. Doing so will require making the much needed step toward more integrated, dynamic, and multidisciplinary accounts of creative thought and action.

References


