GERMINATING ABDUCTIONS THROUGH AUDITORY REPRESENTATIONS: A PEIRCEAN DEVELOPMENTAL APPROACH

Donna E. West
State University of New York at Cortland

The intent herein is two-fold: to package Peirce’s concept of abduction as a teleological event capitalizing on its nature as a cause-effect operation, and to suggest viable procedures to determine onset of abductive reasoning. The former issue is consonant with Hulswit’s (1996) analysis—that every event within Peirce’s continua (including consequent events which induce abductions) is teleological. Hulswit (1996) refers to the process of teleology invading every event as “developmental teleology”, applying even to events whose causes are not apparent. As such, the essence of every event, as a semiotic reality, is its purpose. When extended to manifold event signs, it becomes evident that the nucleus of the Interpretant (especially relevant to inferential processes) is its function in the stream of signs—the possibility of selecting that sign over others given its regularity of function and contextual features, e.g., cues which implicate the likelihood that a certain effect will materialize. In short, regularity of purpose, as habit, establishes the sign’s meaning and/or effect. This teleological attribute of signs primed by their Interpretants is particularly poignant when characterizing abductions, in that a primary ingredient in generating novel hypotheses is to determine etiologies ultimately to recommend a course of action (1909: MS 637: 12). The purpose for perhaps all abductions is to suggest a viable means to avert a trauma or to advance a cause (personal, social, scientific), which entails recommending an implementable course of action. Recommending a course of action entails strategizing, not “move-by-move rules”, as Hintikka (1998: 513, 516) articulates.

The latter focus of this inquiry is particularly ground-breaking—to propose an experimental scenario whereby the emergence of abductive reasoning can be adequately measured. Determining more

---

1 Peirce’s characterization of abduction as a recommendation for a course of action has some foundation in Kapitan’s (1992: 12) account of Peircean abduction. It appears not to have been taken up by Peircean scholars thereafter, perhaps as a consequence of a lack of treatment of more practical (experiential) forums in which inferencing is paramount.
precisely the juncture when abductive reasoning emerges affords many benefits, chief among them is meticulous identification of individual properties operating during an abductive act, and determining the sequence of each in the development of bona fide abductive rationality. Isolating individual properties in the abductive turn can obviate the relative contribution of each to the consequence under consideration, and can determine, with confidence, the point in development when initial plausible courses of action can be proffered, and the process of determining whether and how to modify/abandon an initial hypothesis in favor of more plausible ones, particularly when new information/considerations warrant alterations. Establishing precisely when children ascribe an auditory sign with logical Interpretants represents the most fertile platform to capture the inception and conception of truly insightful hypothesis-making. It informs us of the earliest viable inferences predicated upon attenuation between sign, object and interpretant, and between potential cause-effect events. In short, auditory, rather than visual signs constitute more apt indicators of event associations not bearing upon coincident features—co-existence or simultaneity.

**Components of Abduction**

Abductions are novel explanations to resolve an open matter. Some scholars have superseded a restrictive Peircean model of abduction, arguing that the consequent event which Peirce requires to be the zero-point for the inference, does not represent the only catalyst to conceive of abductions, and that consequences need not be surprising/unexpected from an objective point of view. Instead abductions can emanate from other intrinsic/extrinsic sources, and can result not merely from novel (as Peirce requires) but from anomalous consequences (Aliseda 2004: 353). Magnani (2009: 346–358) makes a distinction within abductions based upon world knowledge, namely perceptual versus manipulative abductions. Although these abductions are often indistinguishable, especially in early schema formation, e.g., prehension, Magnani’s distinction, if considered carefully, illustrates a critical role differential—event observer versus event participant, respectively. While an observer perceives events from the outside, an event participant commands direct involvement. These two roles have perhaps equal merit, in that whereas the former gives rise to more nature-based objective hypotheses, the latter may increase the relevance and impetus for hypothesis-making, despite its rather subjective character. Both Aliseda (2000: 54–55; 2004: 354; 2006:
184–5) and Magnani (2009: 357) amplify Peirce’s concept of abduction—they determine that abductions may constitute expansions of previous plausible inferences or revisions of those inferences, in the form of hypothesis modification/withdrawal. Nonetheless, scholars (Peircean and non-Peircean alike) do agree that abductions are inferences whose premises supersede the slim data which observation affords.

Peirce’s concept of abduction intimates that abductions emanate from surprising events (objectively surprising) without explicit reference to idiosyncratic expectations. His rather objective standard may reflect his occupation with the discovery of scientific and mathematical invariants. In any case, Peirce refers to consequent events as C events (c.1901: CP 7.220). To qualify as an abduction a novel cause must be inferred from observance of a surprising event. Woods (2013: 367–368), however, intimates that the surprising event may not be inherently surprising. Rather, apprehension of inferior/incomplete “cognitive resources” to resolve what gives rise to the unexpected C event is a necessary experiential basis to revise hypotheses, what Woods refers to as an “ignorance problem”. This highlights the fact that the foundation for abductions (plausible hypotheses—what contributed to the unexpected event) do not reach the level of fact, but reflect reasoning at the event level. As such, determining potential causes and revising them, consonant with Aliseda’s (2004) and Magnani’s 2009 claims, is paramount, especially to the semiosis of abductions.

A major impetus for revising hypotheses to arrive at a more viable abduction is founded in Peirce’s own insistence that teleology determines semiosis consequent to progressive alterations in the Interpretant. Accordingly, “recommending a course of action” serves as a primary impetus for the semiosis of abductions for one’s self and for another. “It will be remarked that the result of both practical and scientific retroduction is to recommend a course of action” (1909: MS637: 12). Peirce’s use of “retroduction” for abduction highlights the need to rely upon hypotheses predicated upon consolidated memories of past and present experiences, demonstrating the need to revise abductions when new data present themselves either by virtue of observation or direct involvement. Although more focused on the objective reality of consequent events, Peirce likewise obviously intended some practical, experiential application of abductive rationality to individual problem-solving efforts, in light of his characterization of abduction as a recommendation for a course of action. Hintikka (1958/1999: Chp. 4; 1998: 513–516) highlights this latter
point. In so doing, Hintikka further integrates Peirce’s objective reality of abduction with its more subjective, practical application, namely, that the distinguishing characteristic of abduction resides in the sequenced steps/strategies, often interrogative in nature (Hintikka 1998: 523), which inform the remedy settled upon by the hypothesis-maker, the supplier of advice. Hintikka illustrates that which is more latent in Peirce’s account—the internal inquiry underlying the recommendation; he amplifies Peirce’s directive that recommending a course of action constitutes the teleological essence (the Interpretant) of abductive rationality.

It is obvious, in view of the prominence of abduction in daily inquiry, that hypotheses which rise to the level of confirmatory inferences depend upon some limited observation of how events contribute to outcomes. Hence, daily problem-solving efforts (one’s own and others) in the operation of event interactions are foundational to abductions/reductions, particularly those surfacing at early stages in development. Here, abductions transcend mere impressions of sense—they even transcend mere percepts (1902: 2.141). “Neither deduction nor induction can ever add the smallest item to the data of perception [...] All that makes knowledge applicable comes to us via abduction” (1901: MS 692: 26). In fact, abductions are hypotheses whose development supersedes perception; they rise to the level of a three-fold purpose: “invention, selection and entertainment” (1901: MS 692: 15). In the same entry, Peirce further distinguishes the purposes of abduction from the purposes of other hypotheses—those which require “testing predictions” (tantamount to induction) or “application (equivocal to deduction)”. Most importantly, abductions capitalize on novel, plausible explanatory conjecture which (despite its significant experiential benefit) is “foreign to the data” (1901: MS 692: 23). In the same manuscript Peirce reiterates: “by its very nature abduction leads to a hypothesis which is entirely foreign to the data.” In short, although limited direct observation of object properties and/or contextual features (place and time) may enter into abduction formation, the prediction is neither constrained nor defined by these immediate, contextual characteristics—mere associations of happenstance, absent reliance on manufactured logic.

To qualify as abduction, one must go beyond perception of a fact to anticipate, from composites of resultative events, the conditions likely to have brought about the event. The conjecture needs to represent a novel inference—superseding percepts; and according to Peirce, it must surface when looking backward from the unexpected consequence. Hookway (1992: 265, 279) cautions against agency-
based analyses, since they often distort Peircean notions of cause-effect relations, limiting cause to precedent events.

Cause-Effect Events as Abductions

As plausible hunches, abductions represent the means to manage explanatory possibilities in working memory, organizing and administering different weights to contributory events. As such, arriving at an abduction entails, as Hulswit (1997: 765 and 2001: 339) describes it, a process by which law-like chaining is implicated. Accordingly, abductive based inquiry constitutes a process by which causes exist not only as active isolated initiators of effects, but more latent steps in a chain, together causing the effect—cause not restricted to preceding the effect. Associating contributory events with an unexpected, resultative event (the C event) is paramount for Peirce. As such, Peirce’s concept of abduction rests upon relational happenings which supersede mere associative phenomena. According to Peirce, two occurrences do not rise to the level of causal/contributory events by virtue of their co-occurrence—associations by way of co-existence especially in view of their simultaneity can never constitute cause-effect relations (1892: EP 1: 323). In fact, simple, quite coincidental events can deceive a naive observer to believe that events are connected causally merely by virtue of spatio-temporal alignment/proximity. Peirce warns against this assumption—causal connection predicated upon contiguity/co-occurrence in space or time: “an event cannot directly suggest a cause” (1893: MS 402: 6). Peirce articulates that causal events should be connected rather by “seek[ing] relations in nature” (1892: EP 1: 323)—reifying Peirce’s occupation with the continua.

Once beyond erroneous associative assumptions, when contemporaneous events are logically connected, bona fide cause-effect event contenders (“relations in nature”) can qualify as abductions, provided that the observer have the competency to mentally reverse the operation from the unexpected event to its logical cause(s), hence Peirce’s reference to abductions as “retructions”. Absent mental reversibility (extensively discussed in Piaget 1936) from consequence to cause, abduction would be short circuited.

Peirce separates contributory events (causes) into two types: efficient versus final causation (further discussed in Hookway 1992: 276 and Hulswit (1997: 755–756; 2001: 343–344). The seeming interchangeability of “causality” and “causation” in Peirce’s account can be settled—the former concerns itself with a relationship between single causes and their effects (tantamount to fact-seeking in Second-
ness, while the latter militates in favor of the process of producing effects (consonant with seeking objective chance in events). Efficient causation materializes consequent to physical manipulation toward fact-seeking and gives rise to energetic Interpretants, whereas final causation emanates from apprehension of the continua within event scenarios and surfaces as logical Interpretants.

While efficient causation constitutes “a compulsion determined by the particular condition of things”, final causation is equivocal to “the relation of a law as a cause to the action of force (effect)” (1902: CP 1.212). Although both types of causation constitute habits for Peirce, efficient causation represents regularity in nature or in action schemes, while regularity of mental operations characterizes final causation. Peirce further asserts that the two are complementary, but that neither can exist without the other (1902: CP 1.213). In the same manuscript, Peirce emphasizes this point still further, claiming that efficient causation alone constitutes pure “chaos”, while final causation is “helpless” as an independent operation (1902: CP 1.220). While efficient causation underscores the regularity of one effect as related to a particular cause in practical genres in Secondness, final causality is characterized by conformity of purpose and by possibilities conceived of through individual mental ingenuity in Thirdness and Firstness, lending further credibility to habit as played out in these distinct operations. These two types of causation/causality illustrate how cause and effect can encompass practical and scientific lawlikeness in terms of producing a pattern (habit) which implies the likelihood of chained events.

**Auditory Versus Visual Abduction**

Demonstrating the earliest novel inferences is essential to determine the core attributes of abduction. In other words, reducing abductive reasoning to its simplest form can provide insight into the components necessary to produce novel, insightful inferences which explain relations between/among episodes (cf. West 2014 for further discussion). Developing an experimental paradigm which measures the onset of this type of inferential rationality can simplify our understanding of what constitutes abduction in its most foundational form. Furthermore, generating a measure which can draw from more than a single sense modality (especially not limiting the procedure and processing to visual perception) affords additional advantages. It hastens the application of logical Interpretants, rather than energetic ones to link sign to object. Lack of direct access to auditory sign and object
reduces the eventuality that sign and object must bear an iconic relationship.

Implementing a design which requires/encourages associating auditory sign to object readily promotes logical relations among members of the triad, rather than those constructed upon simultaneous coincidental co-occurrence or similarity relations, common to visual signs. Associating auditory sign to object and Interpretant obviates a certain remoteness of space and time among the members of a triad, promoting utilization/manufacture of logical Interpretants.

The present design makes possible either auditory or visual sign processing for experimental vs. control groups. It proposes an episode comprised of a surprising/unexpected event, represented via either auditory or visual signs of a pedestrian falling on train tracks. The observer is a child of 3;0 or 4;0 who afterward is introduced to additional signs which may influence initial hypotheses as to the cause/s. Initial auditory signs include: sound of train proceeding along track, the sound of rain falling/wind blowing, and laughter of a bystander. Watching train proceed along track, prevailing darkness, lack of lights on train, and the like constitute some of the visual signs. Child subjects would then be asked the initial question: why the pedestrian fell and became injured (to elicit abductive reasoning). Subjects were expected to supply what they initially determined to be the cause/s; and afterward, they were introduced to scenes augmenting the initial scene, in which further auditory/visual signs intimating other causes, e.g., bystander’s retreating footsteps/fleeing form, train stopping well prior to location of pedestrian/absence of screeching breaks, were depicted. Opportunity to revise the initial hypothesis as to a viable cause/s of the injury was then provided. This form of questioning is consonant with Piaget’s approach to determine (consequent to questioning from a source whose reasoning is more logically advanced) whether the child will alter his/her initial logic, given some potential conflicting data. After individual subjects settle upon their proposed cause/s, they would be encouraged to suggest (in the form of advice to the pedestrian) how the tragedy might have been or might be averted. The expectation is that subjects would recommend a course of action, together with rationale to support the recommendation, e.g., pedestrian should wear boots with treads/should not walk outside in the dark/should carry a flashlight, or not cross train tracks, because X contributed most to the pedestrian’s fall and injury.

Expectations are that abductions (elicited from subjects) which depend upon auditory sign associations contain more than a single
cause, when compared to the abductions of those relying upon visual signs. Rationale is predicated upon the fact that exposure to visual sign and object concurrently can more easily mislead the child to assume that spatial proximity alone determines causal relations. The eidetic memory of both events as a unified picture, makes them vulnerable to presuming causal relatedness; whereas, auditory signs and their objects ordinarily have less spatial continuity—allowing children to cast about for an appropriate logical cause for a state of affairs.

Conclusion

The theoretical treatment herein, together with the proposed testing procedure underscore the import of determining when children begin to imbue auditory signs with logical Interpretants, recognizing the issues of final causation, and manifesting the means to implement abductive reasoning as objective chance. The emergence of objective chance (arriving at novel, non-subjective hunches regarding an explanation for a resultative event) clearly illustrates what Hulswit terms “developmental teleology”—to gradually come to utilize signs whose Interpretants go beyond the data expressed in the original array. Such derives from Peirce’s (1901: MS 692) claim that to qualify as an abduction the novel premise must spontaneously rely upon an inference “foreign to the data”.

Similarly, the present approach highlights significant semiotic disadvantages in relying on spatially motivated contextual features to determine event relations (contiguity across events), especially in ontogeny. The upshot is that depending exclusively upon visual signs to derive potential meaning culminates in later emergence of final causation competencies. This work has relevance beyond developmental issues of the human species—it establishes that emergence of Interpretants which are foreign to visually observed event arrays, are likewise paramount to inferential thought of other species. Moreover, hastening explanatory inferences from auditory signs provides still other advantages—isolating affordances discovered in the process of cultivating objective chance in events. In fact, affordances become most salient when sense modalities other than vision are primary, as is the case in other systems (living, natural), particularly germane to advancing Peirce’s continua.
References

ALISEDA, Atocha.

HINTIKKA, Jaakko.
1958. Inquiry as Inquiry: A Logic of Scientific Discovery (Heidelberg: Springer).

HOOKWAY, Christopher.

HULSWIT, Menno.

KIM, Jaegwon.

MAGNANI, Lorenzo.

PEIRCE, Charles S. (1839–1914).
i.1866–1913c. Unpublished manuscripts are dated according to the
Annotated Catalogue of the Papers of Charles S. Peirce, ed.
Richard Robin (Amherst: University of Massachusetts Press,
1967), and cited according to the convention of the Peirce Edition
Project, using the numeral “0” as a place holder.

PIAGET, Jean (1896–1980).
1936. The Origins of Intelligence in Children, trans. Margaret Cook

THAGARD, Paul.
mechanisms”, in Inductive Reasoning: Experimental, Developmental,
and Computational Approaches, ed. Aidan Feeney, and Evan

WEST, Donna E.
2014. “Perspective-switching as event affordance: The ontogeny of
abductive reasoning”, Cognitive Semiotics 7.2, 149–175.

WOODS, John.
2013. Errors of Reasoning: Naturalizing the Logic of Inference (London:
College Publications).