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Abduction 101: Reasoning processes to aid discovery

Robert Folger *, Christopher Stein

University of Central Florida, Management Department, P.O. Box 161400, Orlando, FL 32816-1400, United States

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ABSTRACT

We propose that the process of abduction is a useful tool for how management scholars can better develop new explanatory hypotheses and theories. In doing so, we differentiate abduction from the more commonly studied methods of deduction and induction. We briefly explain the various research streams on abductive reasoning and propose a version that is focused more on the process of abductive reasoning and less on the outcomes. We argue that by using contrastive reasoning and by recognizing different triggers of abduction, this process can help guide researchers to the types of causal explanations that are interesting. We conclude with some examples of abduction in the history of management research and a discussion of features of the reasoning processes involved.

1. Introduction

A Greek word, ἀπαγωγή, is in this sentence. You suspect its presence is related to this special issue's topic—induction. To reach that tentative conclusion, however, you did not do what's ordinarily called induction. It was not an inference based on accumulated evidence, not reasoning from the specific to the general. Nor was it a deductive inference, a conclusion entailed by its premises. Indeed, it was only a reasonable inference, not a definitive conclusion. What makes it reasonable? If it turns out to be true, for example, you won't say "Wow, what a lucky guess!" or "What an amazing coincidence!" In essence a tacit reasoning process led you to form a plausible hypothesis ("I'll bet that Greek word is in some way related to induction"), and ἀπαγωγή has been used as a label for such processes. Understanding how they function will aid conceptual developments in the study of management, and *that* is what accounts for the otherwise puzzling appearance of a Greek word in our opening sentence.

That word refers to *abduction*, which Aristotle included with induction and deduction as one of three types of inferences. His spelling of the first two—ἀπαγωγή, for abduction, and ἐπαγωγή, for induction—differs only by an initial letter, whereas the spelling of deduction—συλλογισμ'ος—does not share a single letter with either of them (Magnani, 2015). The following section portrays the relations among these three types of inferences in a manner consistent with those Greek spellings. We first describe a feature unique to deduction, placing induction and abduction into the shared category of inferences lacking that feature. We discuss how induction and abduction represent variations in this type of inference and then indicate how abduction differs from induction despite sharing the feature of being non-deductive. Next, we describe various forms of abduction, focusing on the process of abductive reasoning rather than the product of it. Singling out one in particular, we describe best-practice uses of it.

* Corresponding author.
E-mail address: rfolger@ucf.edu (R. Folger).

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2. Differences among deduction, induction, and abduction

Alive humans breathe. The editors of this special issue are alive, so it is a deductively logical conclusion that they breathe. Once the premises of an argument are accepted as true (viz., that all living humans breathe; that the editors are living humans), deductive inferences are a matter of logical necessity. Unfortunately, this self-contained aspect comes at a price: Inferred conclusions from deductive reasoning add nothing to what is already present in their premises. Breathing is a life-or-death matter for these editors, but that statement is trivial from a purely logical point of view, because breathing-to-stay alive represents something already stipulated as part of what it means to be human. *Deductive* syllogisms such as this one have logical validity based on their internal structure; they do not require evidence and thus could even refer to imaginary entities (e.g., All vampires are green, Vlad is a vampire, therefore Vlad is green).

Many logicians refer to *inductive* reasoning as an inference approach whose conclusions are only probable, rather than true as a matter of necessity (i.e., logically entailed). That is, any non-deductive form of reasoning would be classified as inductive. As our opening paragraph suggests, however, we prefer to treat abduction (described subsequently) as distinct from both deduction and typical instances of induction. This is particularly evident regarding *enumerative* induction, whereby the details contained in the premises of an argument "add up" to generalizations as the inferred conclusions. Research on management topics can reflect enumerative-induction reasoning when generalizations are based on evidence accumulated from various investigations. Drawing conclusions about a population based on the characteristics of a sample also illustrates a form of enumerative induction. Sometimes enumerative inductions provide grounds for the initial premises of a deductive argument. Evidence that this issue's editors are human, combined with evidence that each breathes, could lend inductive support—in the form of a preliminary generalization—to the same first premise we used to illustrate a deductive argument (viz., living humans are breathers).

Whereas enumerative inductions use evidence as support (and not deductive certainty) for *conclusions*, abduction is the act of proposing speculative—but plausible—*conjectures* about the nature of a phenomenon, and hence what kinds of evidence might increase the prospects of further insights into it. For example, our opening sentence has ἀπαγωγή as an undefined term. No data are needed to prompt a conjecture that it is related to induction, because its appearance in this special issue makes that a plausible hypothesis. What does that hypothesis suggest about sources of evidence for making sense of why it's in this paper? One approach would be looking for the definition of that word by using a search engine such as Google, which actually turns out to be rather unhelpful (e.g., many entries merely give the English, abduction—or the word *kidnapping*, including a short YouTube video with that title). Reading more of the paper, on the other hand, is more directly germane to making sense of our use of that word in this context.

The editors of this issue have an additional and more secure basis for the induction-relevance hypothesis, because they vetted this submission only after an initial proposal had indicated how the paper would address induction. In other words, a given datum can affect the plausibility of a conjecture by virtue of information about a background context. The less suggestive that context, the greater the number of possible conjectures and the harder it becomes to gauge their plausibility. *Abductive* conjectures are analogous to "persons of interest" whom the police might consider adding to a list for questioning after evidence for a crime, whereas the merit of conclusions from enumerative inductions is like the persuasiveness of the evidence-based arguments a prosecutor assembles in attempting to convince a jury of a defendant's guilt.

Describing the essence of abduction in simple terms is easy, in part because one expression of it was neatly summarized by Peirce (1903/1955; cf. Hanson, 1958) as follows:

> The surprising fact, C, is observed;
>
> But if A were true, C would be a matter of course,
>
> Hence, there is reason to suspect that A is true.

Note how this captures an abductive inference about our first sentence: (1) An undefined Greek word in that sentence is surprising. (2) But if the authors intended it to have something to do with induction, that would account for their use of it. (3) Hence, there is reason to suspect that the authors used it because of some possible relevance to induction (see Table 1).

This format highlights an inference that starts with an effect and ends with a tentative conclusion about a possible cause. The inference is from "Huh?" to "Aha!" (Folger, 2005). "Huh?" refers to curiosity about a phenomenon. "Aha!" refers to a point at which a reasoning process makes some types of explanations seem more promising (worthy of investigation) than others. More must be said about that process, but first we clarify how our approach differs from some other ways abduction has been described.

3. Prior views: over-emphasizing abduction as product rather than process

Discussions of abduction can focus on process or product (Aliseda, 2006). *Product* refers to the outcome of abductive thinking—an explanation. *Process* is the activity whereby such arguments/explanations take shape (cf. Cornelissen & Durand, 2014). Aliseda (2006) describes the distinction as the conditions that give abductions explanatory power (product) and the types of algorithms that produce explanations (process). Harman (1965) and Lipton (2004), for example, adopted a product outlook in equating abduction with what they called *inference to the best explanation* (IBE). The goal of finding a causal explanation that is "the best" emphasizes selection criteria by which to evaluate the results of abductive reasoning. Hanson (1958)

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