



The eco-cognitive model of abduction

Ἀπαγωγή now: Naturalizing the logic of abduction



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ABSTRACT

Abduction (ἀπαγωγή, in ancient Greek, often translated as “leading away” or “reduction”) is a procedure in which something that lacks classical explanatory epistemic virtue can be accepted because it has virtue of another kind: Gabbay and Woods [15] contend (GW-schema) that abduction presents an *ignorance-preserving* or (ignorance-mitigating) character. From this perspective abductive reasoning is a *response* to an ignorance-problem; through abduction the basic ignorance – that does not have to be considered a total “ignorance” – is neither solved nor left intact. Abductive reasoning is an ignorance-preserving accommodation of the problem at hand. Is abduction really ignorance-preserving? To better answer this question I will introduce (and take advantage of) an *eco-cognitive model* (EC-Model) of abduction. It will be illustrated that through abduction, knowledge can be enhanced, even when abduction is not considered an inference to the best explanation in the classical sense of the expression, that is an inference necessarily characterized by an empirical evaluation phase, or an inductive phase, as Peirce called it. To further deepen the eco-cognitive character of abduction a simple genealogy of logic is provided: Aristotle clearly states that in syllogistic theory local/environmental cognitive factors – external to that peculiar inferential process, for example regarding users/reasoners, are given up. Indeed, to define syllogism Aristotle first of all insists that all syllogisms are valid and contends that the *necessity* of this kind of reasoning is related to the circumstance that “no further term from outside (ἐξωθεν) is needed”, in sum syllogism is the fruit of a kind of eco-cognitive *immunization*. At the same time Aristotle presents a seminal perspective on abduction: the second part of the article considers the famous passage in Chapter B25 of *Prior Analytics* concerning ἀπαγωγή (“leading away”), also studied by Peirce. I contend that some of the current well-known distinctive characters of abductive cognition are already expressed, which are in tune with the EC-Model. By providing an illustration of the role of the method of analysis and of the middle terms in Plato’s dialectic argumentation, considered as related to the diorismic/poristic process in ancient geometry – also, later on, emphasized by Proclus – I maintain that it is just this intellectual heritage which informs Aristotle’ Chapter B25 on ἀπαγωγή. Even if, in general, Aristotle seems to sterilize, thanks to the invention of syllogistic theory, every “dialectic” background of reasoning, nevertheless in Chapter B25 he is still pointing to the fundamental inferential role in reasoning of those externalities that substantiate the process of “leading away” (ἀπαγωγή). Hence, we can gain a new positive perspective about the “constitutive” eco-cognitive character of abduction, just thanks to Aristotle himself. Finally, the paper presents an excursus on Aristotle’s

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enthymemes from signs, disregarded by Peirce, but extremely important to stress the Aristotelian treatment of what I have called *selective abduction*. A forthcoming companion paper [35] will further deepen the EC-Model of abduction stressing stricter logical aspects: the first result will be that, contrarily to the classical logical view, relevance and plausibility in abductive reasoning have to be relativized and so the epistemologically embarrassing concepts of irrelevance and implausibility excupated: they are not always offensive to reason.

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Of the three Universes of Experience familiar to us all, the first comprises all mere Ideas, those airy nothings to which the mind of poet, pure mathematician, or another might give local habitation and a name within that mind. Their very airy-nothingness, the fact that their Being consists in mere capability of getting thought, not in anybody's Actually thinking them, saves their Reality.

[Charles Sanders Peirce, *A Neglected Argument for the Reality of God*, 1908]

1. The GW-schema and abduction as ignorance-preserving

1.1. The ignorance-preserving nature of abduction

As I have illustrated in my book on abductive cognition, [30, chapter two] following Gabbay and Woods' contention, it is clear that “[...] abduction is a procedure in which something that lacks epistemic virtue is accepted because it has virtue of another kind” [15, p. 62]. For example: “Let S be the standard that you are not able to meet (e.g., that of mathematical proof). It is possible that there is a lesser epistemic standard S' (e.g., having reason to believe) that you do meet” [61, p. 370]. Focusing attention on this cognitive aspect of abduction, and adopting a logical framework centered on practical agents, Gabbay and Woods [15] contend that abduction (basically seen as a *scant-resource* strategy, which proceeds in absence of knowledge) presents an *ignorance-preserving* (or, better, an *ignorance mitigating*) character. Of course, as Woods says, “[...] it is not at all necessary, or frequent, that the abducer be wholly in the dark, that his ignorance be total. It needs not be the case, and typically isn't, that the abducer's choice of a hypothesis is a blind guess, or that nothing positive can be said of it beyond the role it plays in the subjunctive attainment of the abducer's original target (although sometimes this is precisely so)” [61, p. 249]. In this perspective, abductive reasoning is a *response* to an ignorance-problem: one has an ignorance-problem when one has a cognitive target that cannot be attained on the basis of what one currently knows.

How can we simply define ignorance, in the perspective of ignorance preservation? Ignorance is always ignorance with respect to something, say the proposition that p or the theory T . Ignorance is being in a state of not knowing that (or whether) p or of not knowing what T says and/or whether it's true. If we are epistemic gradualists, then we are ignorant with respect to something to the extent that we lack the degree of knowledge that would remove it. Following Peirce's rational fallibilism, the doctrine that there is no absolute certainty in knowledge, we should consider the instability of what the agent considers her more or less reliable knowledge. Abduction is an inferential tool which empowers the individual to enhance her finite knowledge, so she can face an ignorance problem – for instance if she notices something is missing from her comprehension of a matter. While the knowledge-generating processes are usually studied in order to provide models for abductive inferences, the issue concerning how and what kinds of ignorance interact with those knowledge-generating processes is unsurprisingly overlooked.¹

¹ In [37] two types of ignorance are illustrated. They are defined in the *dynamic* interplay with the two types of abduction, selective and creative (cf. below Subsection 2.1). The first type of ignorance is set within the limits of the agent's cognitive environment and it is grounded on her own central information, which corresponds to the agent's topics of expertise and usual employment; she can easily reach them and her ignorance about them is minimal. This type of ignorance involves the part of illusion about

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