Evolution, Knowledge, and Reality:

A Defence of Non-Adaptationist Evolutionary Epistemology.

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“We cannot look around our corner…”

Nietzsche, F. *The Gay Science*. Aphorism 374

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Preface

In the second semester 2015-2016, I attended the course "Philosophy of Mind" which was dedicated to the reading of *Mind and World* (1996) by John McDowell. In this book, McDowell seeks to understand the origin of the problem of explaining the mind-world relation and proposes a "quietist"[1] way to overcome it. During the summer, while I was considering potential thesis topics possibly related to evolutionary theory and epistemology, I happened to linger upon a passage from *Mind and World* which was still whirling around in my head. In a note at the end of Lecture VI, McDowell writes: "…the good questions we can raise in the evolutionary context come as close as good questions can to the philosophical questions I want to exorcize".[2] Now, during the course, I was able to appreciate the abstruse and, at times, quasi-Hermetic character of McDowell's writing style. Since I knew that making sense of that passage would have not been an easy task, I decided to look around and see whether other people were somehow puzzled by the same excerpt. I did my homework and I came across a paper by Carl B. Sachs entitled "The Shape of a Good Question: McDowell, Evolution, and Transcendental Philosophy" (2011). In this article, Sachs explicitly addresses McDowell's passage and shows that "the 'badness'" of the questions that McDowell seeks to dispel "…arises from the failure to observe correctly the distinction between scientific explanations and transcendental descriptions".[3] According to McDowell, although "there is nothing wrong with appealing to scientific explanations of human origins in order to understand how reason emerged from mere nature", we should be careful at conserving such distinction "at pains of

[1] Quietist philosophers refuse to resolve philosophical questions in a traditional "constructive" way (McDowell, 1996, p. xxiv). As Johannesson (2014, p. 2) argues, quietist philosophers hold that, in the first place, one should identify the philosophical or "linguistic confusions" from which philosophical problems arise and make them look like problems. Thereby, according to quietist philosophers, traditional philosophical questions should be dispelled "in a remedial or therapeutic way" (Johannesson, 2014, p. 2).
[2] McDowell, 1996, p. 124
[3] Sachs, 2011, p. 76

losing our grip on our very sense of what it means to be a thinking thing *qua* rational animal at all".[4] Thus, by distinguishing scientific explanations from transcendental descriptions, McDowell comes to separate science from philosophy or, as Wilfrid Sellars would have put it, the "scientific image" from the "manifest image".[5] In doing so, however, as Sachs argues, McDowell seems to underestimate the actual importance that the scientific image has for the philosophical endeavour.[6] Although, as Sachs notices, "McDowell's transcendental description of mature human beings as rational animals is a fine explication of the manifest image – perhaps even one of the best explications presently available", this does not mean that we can easily dismiss the "epistemic authority, ontological commitments, and cultural influence" of the scientific image.[7] Hence, if we still want to find a way to connect the scientific image with the manifest image, Sachs suggests, we should look somewhere else and "do philosophy the hard way, if we are to find a fully satisfying philosophical naturalism".[8]

Convinced of the importance of considering the scientific image in connection with the manifest one, I decided to follow Sachs's suggestion and to distance my research from McDowell's quietism. In this way, "by doing philosophy the hard way", I was able to appreciate the potentialities of an evolutionary epistemological approach for a reconciliation of the two images. My first impression about this possibility did soon become a conviction when I started to read the first chapter of *Experience and Beyond. The Outline of a Darwinian Metaphysics* (2016) by Jan Faye.[9] As reported by Faye, already Roy Wood Sellars (1922) understood the need for doing philosophy by taking into account "the inclusion of man in nature"[10]. Not only would have this "do[ne] justice to all …[human] distinguishing

[4] Sachs, 2011, p. 76
[5] Sachs, 2011, p. 77
[6] Sachs, 2011, p. 77
[7] Sachs, 2011, p. 77
[8] Sachs, 2011, p. 78
[9] Although some cross-references to Faye's book are present in my thesis, I have not included an in-depth analysis of Faye's position. The limited duration of my research project together with the choice of focusing on other authors prevented me from studying it in detail.
[10] Sellars, 1922, p. 3, quoted in Faye, 2016, p. 3

characteristics"[11], but it also would have served to reconnect "science and philosophy", the scientific image and the manifest image of the world, and picturing them as equally "properties of man".[12] Along these lines, the consideration of the evolutionary origins of "man's capacities and his place in the world" would have come to provide a way to connect the manifest image and the scientific image, "the image of the world to which we are adapted by natural selection" and the image of the world as "hypothesized by our best physical theories".[13] As noticed by Faye (2016), the manifest and the scientific image are in fact both determined by evolution: on the one hand, evolution has provided us with the manifest image, "the reality of common sense"; on the other hand, "evolution also constrains how we can develop the scientific image".[14]

So far so good, I thought, but how does our evolutionary history concretely affect our image(s) of the world? How does evolution constrain our knowledge of the world and shape our place in it? I would have soon understood that there is no straightforward answer to these questions. For there are at least two different ways to interpret cognitive and organic evolution which, in turn, give rise to as many different evolutionary epistemologies (EEs). In this thesis, I analyse two main evolutionary epistemological standpoints and discuss the reasons why we should prefer one over the other. Accordingly, the answer to the aforementioned questions will essentially depend on the informed choice of a certain evolutionary epistemology and, thus, of a specific evolutionary theory. Said another way: answering the above-mentioned questions will basically mean answering the question of which evolutionary epistemology one should adopt.

[11] Sellars, 1922, p. 3, quoted in Faye, 2016, p. 3
[12] Sellars, 1922, pp. 1-2, quoted in Faye, 2016, p. 3
[13] Faye, 2016, p. 2
[14] Faye, 2016, p. 4

1. Introduction

How does our evolutionary history concretely affect our image of the world? How does evolution constrain our knowledge of the world and shape our place in it? Unfortunately, there is no straightforward answer to these questions. For, there exists more than one way to interpret biological evolution which, in turn, give rise to as many evolutionary epistemologies. But why, in the first place, should epistemology look at evolutionary theory at all? What are the advantages of an evolutionarily informed epistemology?

Evolutionary epistemology was born in the wake of the "naturalistic turn", a movement marked by a novel interest in the sociological, psychological, anthropological as well as historical facets of knowledge.[15] By underlining these very aspects, naturalistic perspectives seek to demonstrate the importance of resorting to "empirical" disciplines in order to provide a comprehensive account of human knowledge.[16] For its part, by claiming the importance of considering biological evolution in studying knowledge, evolutionary epistemology comes to put the accent both on historical and "naturalised" aspects of cognition and knowledge.

In his article "Epistemology Without History is Blind" (2011), Philip Kitcher compiles a list of four motives intended to demonstrate the importance of historicism for epistemology. According to Kitcher, still today, many philosophers continue to snub historicism and embrace an "individualistic and static"[17] perspective on human knowledge.[18] In doing so, they fail to appreciate the powerful tools and insights that historicism can provide for epistemology as well as the potentialities of a "social and dynamic" approach to knowledge.[19] Among others reasons for embracing historicism in an epistemological context, Kitcher thinks that the application of

[15] Gontier, IEP
[16] Rysiew, 2016
[17] Feest and Sturm, 2011, p. 298
[18] Kitcher, 2011, p. 507. This point has been put forward also by Stroud, 2011, p. 497
[19] Feest and Sturm, 2011, p. 298

history to epistemology can help us to individuate the real origins of traditional epistemological problems and inscribe them into a wider perspective.[20] In addition to this, historicism can help epistemologists to appreciate to what extent knowledge, rather than being an individual affair, is first and foremost a collective business which we partly inherit from our predecessors.[21] As a result, it appears that the study of human knowledge cannot be split from the investigation of the social context from which it stems and the traditional practice of "socially assembling a body of transmitted knowledge".[22] Finally, the application of history to epistemology, can help us to understand the nature of our present knowledge and to shed some light on "the historical route through which…[our epistemological problems as well as their objects] have emerged".[23]

Now, Darwinism represents one of the many faces of historicism and forms a way to apply a historical point of view to epistemology. Although, as Kitcher (2003) has noticed, historicism is not identical with Darwinism, the latter represents "one of the most successful and elaborate schemes of historical explanations, and is both inspiration and resource for historicist programs".[24] Thereby, as Kitcher has put it, "[s]ince epistemology can benefit from historicism it can learn from Darwin".[25] Along these lines, we can individuate at least two main respects in which Darwinism can provide support to epistemology. First, Darwinism offers a powerful historical framework informed by the most recent biological findings and theoretical models. This very framework can help epistemologists to put philosophical questions into perspective and to understand the evolutionary origins of some of the traditional objects of epistemological investigation. Secondly, Darwinism represents a way to overcome synchronic kind of approaches to epistemology which, as Kitcher argues, have "beset… philosophical

[20] Kitcher, 2011, p. 507
[21] Kitcher, 2011, pp. 509-510
[22] Kitcher, 2011, p. 505
[23] Kitcher, 2011, p. 515
[24] Kitcher, 2003
[25] Kitcher, 2003

efforts to explain human knowledge" from Descartes to the present day.[26] In this regard, embracing Darwinism would mean abandoning the widespread idea according to which doing epistemology means "uncover[ing] a structure of justification in an individual's beliefs that identifies special warranting relations only among the beliefs themselves or between particular beliefs and the individual's experiences".[27] By not limiting epistemological studies to the individual or ontogenetic aspects of cognition and knowledge, but by extending them up to include the phylogenetic dimension, an evolutionarily informed epistemology can provide philosophers with a deeper and more comprehensive understanding of human knowledge.[28] Along these lines, by picturing the individual as part of a wider context (communital, historical, and evolutionary) Darwinism can provide epistemology with a way to overcome traditional generalizations as well as artificial synchronisms.[29]

By embracing Darwinism, evolutionary epistemology does not only espouse a certain mode of historicism, with all its virtues, but also a specific scientific model. Along these lines, as we have seen, an evolutionarily informed epistemology does not just represent a form of historical epistemology, but also a naturalised kind of epistemology. Before the naturalistic turn, epistemology was mainly dominated by empiricist as well as rationalist approaches which pictured knowledge as a "language-like" entity.[30] These very approaches are not completely left behind, and today they form the core of traditional epistemology. According to traditional epistemology, epistemology should rely only on its own tools and methodologies. Indeed, trying to resolve epistemological questions by resorting to other forms of knowledge would result in a question-begging move.[31] This point has been overcome by naturalised

[26] Kitcher, 2003
[27] Kitcher, 2003
[28] On the one hand, ontogenetic aspects stand for those aspects that pertain to a single individual. Ontogeny indeed refers to "the development of an organism from conception until death" (Gontier, IEP). On the other hand, phylogenetic aspects stand for those traits that belong to the species as a whole. Phylogeny is generally understood as referring to the evolutionary development of a species (Gontier, IEP).
[29] Kitcher, 2003
[30] Gontier, IEP
[31] Bradie and Harms, 2016

epistemologists which, by following Quine's pioneering work "Epistemology Naturalized" (1969), hold that "[empiricist and rationalist] scruples against circularity have little point once we have stopped dreaming of deducing science from observations".[32] By challenging both empiricist and rationalist assumptions, NE comes to regard science as a precious source of tools and insights for investigating human knowledge, while maintaining however a critical attitude towards it.[33] By regarding "knowing" as a "natural activity", NE claims the need of studying it "along the lines compatible with its status, i.e., by the methods of natural science".[34] Thus, rather than being an obstacle to the investigation of epistemological questions, science comes to enhance the epistemological visual magnitude.

By reconnecting human beings and knowledge to their evolutionary origins and by acknowledging the necessity of taking into account biological evolution in studying knowledge, evolutionary epistemology comes to support a naturalised epistemological point of view.[35] At the same time, evolutionary epistemology comes to enlarge the scope of NE.[36] Contrary to NE, evolutionary epistemology does not regard cognition in general and knowledge in particular as mere "linguistic (propositional) or…human-bounded characteristic[s]".[37] On the one hand, by looking at the results of ethology and ecology, evolutionary epistemology does extend the meaning of cognition and knowledge up to include "non-linguistic behaviour".[38] On the other hand, whereas NE stresses the importance of investigating "the relation between human[s], language-like knowledge, and the world" in order to understand knowledge, EE goes one step further and puts the accent on the "knowledge relation" that,

[32] Quine, 1969, pp. 75-76, quoted in Rysiew, 2016
[33] "W._V._O._Quine", in *Naturalism (philosophy)*, Wikipedia. The Free Encyclopedia. https://en.wikipedia.org/wiki/Naturalism_(philosophy)#W._V._O._Quine (accessed June 7, 2017)
[34] Bradie and Harms, 2016. The authors attribute this perspective only to evolutionary epistemology. However, in my opinion, the same point can be applied to naturalised epistemologies in general.
[35] Bradie and Harms, 2016
[36] Gontier, IEP
[37] Gontier, IEP
[38] Gontier, IEP

regardless an organism's capacity of language, every organism entertains with its environment.[39]

In the light of this, by overcoming the limits of traditional epistemology and by going beyond mere historical epistemology on the one hand and traditional naturalised epistemology on the other, evolutionary epistemology provides us with a novel and comprehensive point of view on knowledge. By broadening the notion of "knowledge", both in time and meaning, evolutionary epistemology comes to picture knowledge as an entity exceeding both our historical and human boundaries. In this way, knowledge ultimately regains its true evolutionary origins as well as its broader organic, and not just human, width.

Despite the evident virtues of an evolutionarily informed epistemology, it is far from clear how to exactly conceptualise the impact of evolution on our cognition and worldviews. As already mentioned, there is not just one kind of evolutionary epistemology, but many different ones as there are many different ways of interpreting organic and cognitive evolution. In this thesis, I seek to analyse two main evolutionary epistemological standpoints and discuss the reasons why we should prefer one over the other. The result of this study will provide an answer to the research questions from which this thesis got started.

This thesis is divided into five main chapters. After these introductory remarks, in chapter 2, I will discuss possible approaches to EE. After presenting two different ways of interpreting biological evolution (from an environmental and organismic point of view), I will take care to illustrate the evolutionary epistemologies that spring from these very biological evolutionary theories. In that context, I will thus integrate the work of different authors under two main labels: adaptationist and non-adaptationist EE. While adaptationist EE is generally characterized in a quite homogeneous way, non-adaptationist EE gathers a much wider variety of perspectives (from common-sense realism to complete constructivism). All these various

[39] Gontier, 2006, p. 9 and Gontier, IEP

standpoints will be analysed in the light of four aspects: the philosophical position's commitment to an adaptationist or non-adaptationist perspective, its adherence to a metaphysical standpoint, its adoption of a certain theory of truth, and its understanding of science's aims and limits. These very aspects will keep recurring in the critical discussions of chapters 3 and 4. At the end of chapter 2, I will provide a table so as to offer a more schematic view on the positions and questions discussed.

In chapter 3, I will discuss some reasons for preferring non-adaptationist approaches over adaptationist ones. Thus, I will isolate two crucial situations where non-adaptationist EE has the upper hand over adaptationist EE. In the first section of the chapter, I will argue against adaptationism by showing that its espousal of a hypothetical form of realism is redundant at best and unfounded at worst. Contextually, I will demonstrate that non-adaptationist approaches provide much more feasible ways to account both for the success of our cognitive faculties as well as for our experiences of resistance and pain. In the second section of chapter 3, I will take into consideration the epistemic circularity in which both adaptationist and non-adaptationist perspectives are caught. In that context, I will show that whereas this circle is fundamentally problematic for adaptationism, the same circularity appears to be a strength point of non-adaptationism.

In chapter 4, I will consider two possible critiques against non-adaptationist EE and I will demonstrate that they miss their mark. In the first section of the chapter, I will direct Donald Davidson's attack of conceptual relativism towards non-adaptationist approaches. In particular, I will refer to Davidson's critique to the untranslatability between different conceptual schemes (4.1.1) and his argument against the idea of organising experience (4.1.2). In the second section of chapter 4, I will discuss the paradox of backward causation and I will consider to what extent non-adaptationist perspectives are affected by it.

In the conclusion (5), I will finally take stock and answer my research questions in the light of my analysis. In that context, I will argue that we have good reasons for answering the research questions from which this thesis got started from within a non-adaptationist perspective.

This thesis project stems from my deep conviction that today, in a world that is quickly growing more and more complex, philosophers can hope to picture its multifaceted nature only by engaging in a constructive dialogue with other disciplines. This, rather than entailing the abandonment of the critical attitude that philosophy traditionally exerts towards other cultural endeavours, means rethinking this very attitude in the light of new shared goals. In my thesis, I have sought to demonstrate that not only is such collaboration possible, but also highly desirable. An evolutionarily informed epistemology can offer a more comprehensive view on human knowledge and its limits, than traditional epistemology could possibly do. The time has finally come to understand that there has never been any *tabula rasa*: our knowledge is the product of our natural and cultural history, and it should be approached as such.

My thesis intends to contribute to the adaptationist/non-adaptationist debate in evolutionary epistemology in two ways. On the one hand, it seeks to shed a new light on the protagonists of the abovementioned dispute and to present their positions in a novel organic way. Whereas my discussion of adaptationist approaches has not required significant deviations from the already existing literature, the discussion of non-adaptationist perspectives, however, has sometimes forced me to make drastic decisions. For, the integration of the work of different authors under the same label "non-adaptationist evolutionary epistemology" required me to go beyond anachronisms and mutual misunderstandings which could have easily mislead the reader. I am thinking, for instance, about Franz Wuketits and complete constructivist thinkers: on the one hand, Wuketits accuses complete constructivist thinkers of espousing solipsism, arbitrariness in construction, and anti-adaptationism; on the other hand,

complete constructivists accuse Wuketits of embracing hypothetical realism. An analysis of the work of these scholars has allowed me to disarm their disagreements, often simply arising from anachronisms and superficial readings, and to offer the reader an informed interpretation of their works. This, of course, has sometimes implied to take into consideration the evolution of an author's position over the years. Whereas some authors (i.e. Wuketits) have explicitly stressed a change in their perspective, other authors (i.e. Diettrich)[40] have been less explicit and have left the job of tracing modifications in their views to their readership. I hope this work of critical integration of different non-adaptationist positions will serve as a solid basis for future studies in the field.

On the other hand, my thesis intends to contribute to the adaptationist/non-adaptationist debate in evolutionary epistemology by bringing fresh grist to the mill of non-adaptationist perspectives. Whereas my critiques to adaptationist approaches are nothing more than a new and integrated version of pre-existing arguments against adaptationist EE (chapter 3), my attacks to non-adaptationist EE (chapter 4), as far as I know, have never been directly employed against it. Thus, by defending non-adaptationist perspectives from these new possible critiques, I have sought to strengthen the tenability of these very standpoints.

[40] Diettrich often reiterates the same idea in different articles and slightly changes the form through which he presents it. In this thesis, I have tried to indicate the presence of the same passage in different papers.

2. State of the debate

Biological evolution is the object of different evolutionary theories. Depending on whether evolutionary biologists endorse an environmental or organismic point of view, cognitive and organic evolutions come to be characterized in different ways.[41] As mentioned, this state of affairs is irremediably reflected by evolutionary epistemology.[42] Depending on the evolutionary theory embraced, evolutionary epistemologists come to support different metaphysical and epistemological positions. In this chapter, after illustrating two ways of interpreting biological evolution (section 2.1), I present three main evolutionary epistemological positions whose selection has been partly inspired by a scheme elaborated by Olaf Diettrich (1998, 2004, 2006). In discussing possible readings of cognitive evolution, Diettrich classified three major evolutionary epistemological positions: structural realism, functional realism, and constructivist evolutionary epistemology (CEE). As the reader will see, in this chapter I draw upon Diettrich's tripartite picture, but I largely modify it and extend it. Whereas, like Diettrich, I treat structural realism as a position on its own, unlike him, I combine functional realism with other common-sense realist perspectives. Moreover, whereas Diettrich regards Wuketits's position as a realist one, I will stress how Wuketitis's perspective and that of other common-sense realists is actually much closer to non-realism than realism.[43] Finally, unlike Diettrich, I combine Diettrich's Constructivist Evolutionary Epistemology (CEE) with Riegler's radical (or complete) constructivism under the label "Complete Constructivist Evolutionary Epistemology" (CCEE).

[41] Gontier, IEP
[42] Gontier, IEP
[43] In this regard, I think Diettrich's (2006) exposition of functional realism actually confirms my reading of Wuketits's position. Until 2004, Diettrich explicitly refers to both Wuketits and Glasersfeld's works when speaking about functional realism. Diettrich regards functional realism as a realist position implying a reference to an external reality. However, in 2006, Diettrich does not refer to Wuketit's anymore, but just to Glasersfeld's. Now, Diettrich does not provide any justification for this omission. I, personally, have interpreted it as a sign of a change of mind on the part of Diettrich about the nature of Wuketits's position.

The purpose of the sections following 2.1 is to illustrate the main epistemological and metaphysical implications of structural realism, common-sense realism, and CCEE, which are here assembled into two main groups depending on their subscription to an adaptationist (2.2) or non-adaptationist (2.3) point of view. Structural realism, common-sense realism, and CCCE are the respective focal points of sections 2.2, 2.3.1, and 2.3.2. Each section elaborates on a single perspective and presents it in the light of four main themes: the philosophical position's commitment to an adaptationist or non-adaptationist perspective, its adherence to a metaphysical standpoint, its adoption of a certain theory of truth, and its understanding of scientific knowledge. As *coda* to the chapter, some conclusive remarks are intended to take stock and put the contents of this chapter into perspective. Finally, a table is provided to offer a more schematic view on the positions and questions here discussed.

Although a first comparison of the positions under consideration is inevitable, I postpone a more extensive critical discussion of these perspectives to the next two chapters. Whereas the following sections are intended to give a general overview of the state of the debate, the fourth chapter and the fifth one are respectively intended to show the advantages of non-adaptationist accounts of cognition over adaptationist ones and to test the actual tenability of non-adaptationist approaches.

2.1. Two theories of biological evolution

There are two leading ways to interpret biological evolution, depending on whether evolutionary biologists endorse an environmental or organismic point of view.[44] There is no

[44] Gontier, IEP. Gontier (IEP and 2006) indicates the existence of a third point of view: the "gene's eye view", which can be seen as a complement of the environmental point of view. However, Gontier (2006) quickly dismisses it on the basis of its shortcomings and oversimplifications. In what follows, I take into consideration only the environmental and organismic perspectives on evolution.

current consensus among biologists which interpretative model should be preferred and this state of affairs has a direct impact also on evolutionary epistemology.[45] Indeed, as we will see in the following sections, all forms of EE irremediably suffer the consequences of choosing one interpretative model over the other. Therefore, there is not just one evolutionary epistemology, but as many different evolutionary epistemologies as there are interpretations of evolutionary theory.[46] In addition, epistemologies relying on different evolutionary theories appear to start from different metaphysical settings and provide different answers to traditional epistemological questions (i.e., the nature of our theories of truth, the aim and limits of knowledge in general and scientific knowledge in particular). In this section, I will present the evolutionary theories on which evolutionary epistemologies are based, in order to set the table for the discussion that will follow in the next chapters. First, I will briefly discuss evolution from the point of view of the environment. Second, I will illustrate the evolutionary theory which privileges an organismic perspective.

The evolutionary theories which favour an environmental point of view are generally based upon Modern Synthesis and are usually subsumed under the label "adaptationist program".[47] This very expression was first coined by Gould and Lewontin in their 1979's article "The Spandrels of San Marco and the Panglossian Paradigm: A Critique of the Adaptationist Programme".[48] As reported by Gould and Lewontin, the adaptationist program pictures

"…natural selection as so powerful and the constraints upon it so few that direct production of adaptation through its operation becomes the primary cause of nearly all organic form, function, and behaviour".[49]

[45] Gontier, IEP
[46] Gontier, IEP
[47] Gontier, IEP
[48] Gontier, IEP
[49] Gould and Lewontin, 1979, pp. 584-585, quoted in Gontier, IEP

Said another way: within this perspective, natural selection plays a central role and every aspect of living beings can be explained in terms of adaptation. Along these lines, cognition in general and knowledge in particular come to be regarded as the products of adaptation, whereby adaptation is determined by an "active environment" which "selects" adaptive traits and discards non-adaptive ones.[50] Thus, organisms appear to be passive entities which are completely unable to condition their "chances of survival or fitness" and are shaped by the action of an external environment which exists independently of every organism and interact with them only under the dynamics of natural selection.[51]

This adaptationist or environmentalist picture is criticised and rejected by organismic theories of evolution which indeed are usually pictured in the terms of "non-adaptationist" perspectives.[52] According to the organismic theories of evolution,

> "…[T]he claim that the environment of an organism is causally independent of the organism, and the changes in the environment are autonomous and independent of changes in the species itself, is clearly wrong. It is bad biology, and every ecologist and evolutionary biologist knows that is bad biology".[53]

Contrary to the adaptationist program, the non-adaptationist approach does generally draw upon Developmental Systems Theory (DST), rather than on Modern Synthesis.[54, 55] Whereas Modern Synthesis puts the accent on the environment and the external mechanisms of

[50] Gontier, IEP
[51] Gontier, IEP
[52] Gontier, IEP
[53] Lewontin, 2000, p. 48, quoted in Gontier, IEP
[54] Gontier, IEP
[55] Although, as we will see, Olaf Diettrich subscribes to the non-adaptationist program, he regards his perspective as based upon an extension of Synthetic Theory. Within his perspective, "adaptation" (or accommodation) is flanked by "assimilation".

adaptation, DST comes to shed some light on the central role that organisms have in enhancing their own survival and fitness. According to DST, organisms are "autocatalytic systems" which develop some "inner mechanisms" in order to improve their "chances of survival and fitness".[56] Along these lines, as noticed by Gontier, organisms appear to be able to enhance their survival and fitness, because they are able to "self-organize and self-maintain, sometimes even despite the environment", rather than in virtue of the fact that they are adapted to an external environment.[57] In the light of this, organisms cease to be passive entities shaped by an independent outer environment and become active protagonists of their existence. By engaging in a "dialectical" relationship with their environment, organisms appear to be able to shape their own environment "by constructing and reconstructing it in an active manner".[58]

From all this, however, it does not follow that the environment does not play any role within non-adaptationist perspectives. "Environment" comes to be identified with "the organism's environment" which the very organism selects. As Lewontin (2000) has shown, by choosing which elements constitute their own environments, organisms "literally construe" their environment, and they are able to develop a "scheme of reaction"[59] to anticipate and appropriately react to external stimuli by converting external signals into internal signals.[60] Thus, within non-adaptationist perspectives, environment still partly influences organisms by exercising an adaptive pressure on the latter, but, as Wuketits (2006) takes care to stress,

[56] Gontier, IEP
[57] Gontier, IEP
[58] Gontier, IEP
[59] Wuketits, 2006, p. 43, quoted in Gontier, IEP
[60] Lewontin, 2000, quoted in Gontier, IEP. To be precise, Lewontin (2000) says that "organisms partly determine by themselves which elements from the *external environment* belong to their environment or niche, and they determine to a large extent how these different elements relate to one another" (Lewontin, 2000, quoted in Gontier, IEP, Italics mine). In the light of this, Lewontin seems to grant the existence of an external world, intended as something extending beyond an organism's own environment. I do not think its perspective can be applied to non-adaptationist approaches in general. As we will see in chapter 3, by neglecting the idea of a world-in-itself, common-sense realist and complete constructivist thinkers seem to distance themselves from Lewontin's position. For this very reason, and since I have not studied Lewontin's work in detail, I have preferred to present Lewontin's approach in a way that comes close to the non-adaptationist perspectives that I will consider in the following chapters.

"adaptability [comes to be] defined by the organism itself".[61] Along these lines, the non-adaptationist notion of "environment" is extended to include both an organism's external and internal environment.[62]

2.2. Adaptationist approaches to EE

The adaptationist approach to EE, or "traditional EE"[63], has been put forward, among others, by Donald T. Campbell (1974), Konrad Lorenz (1941, 1977), and Gerhard Vollmer (1984, 2004). Despite springing from naturalised epistemology (NE) (see chapter 1), adaptationist EE comes to abandon NE's typical *anthropocentric* view in favour of a much wider "*environmental*" perspective.[64] On the one hand, by committing to anthropocentrism, NE stresses the importance of investigating "the relation between human[s], language-like knowledge, and the world" in order to understand knowledge.[65] On the other hand, EE goes one step further and puts the accent on the "knowledge relation" that, regardless an organism's capacity of language, every organism entertains with its environment.[66] According to adaptationist EE, since every organism is adapted to its environment and adaptation can be seen as a knowledge-gaining process, every organism can "reconstruct or represent particular aspects of the external world"[67].[68] Thus, within this perspective, cognition itself comes to be

[61] Wuketits, 2006, p. 38
[62] Gontier, IEP
[63] Gontier, IEP
[64] Gontier, 2006, p. 9, Italics mine. We must be careful at not confusing the adaptationist environmental view with the organismic position held by non-adaptationist evolutionary epistemologists (see next section). Indeed, although adaptationist EE takes into account also non-human organisms, its focus is on the environment rather than on the organism itself. As emphasized by Nathalie Gontier (IEP), adaptationist EE provides "a description of the environment through the organism, rather than describing the organism itself".
[65] Gontier, 2006, p. 9
[66] Gontier, 2006, p. 9
[67] Wuketits, 1992, p. 122, translation mine, "l'abilita di un organismo a ricostruire o a rappresentarsi aspetti particolari del mondo"
[68] Wuketits, 1992, pp. 121-122

defined as a form of adaptation: by providing the organism with a map of the world, cognition enhances the survival and fitness of an organism because it helps the organism to orient itself in its own environment.[69]

Adaptationist EE supports a fundamentally "dualistic" conception of reality in which the organism and the environment are completely detached from one another and interact only under the dynamics of natural selection.[70] As seen, within this perspective, those organisms that are not capable of language are nonetheless in the condition of engaging in a "knowledge relation" with their environment.[71] Since every organism is adapted to the outer world as a result of the pressure of natural selection, his strategies do deal with the world reflect the world that it inhabits.[72] The latter actively impresses its features onto the passive organisms and can be pictured on the basis of the behaviours displayed by the very organisms. In this respect, the vivid image that Lorenz (1974) has offered as an illustration of the intimate relationship between cognition and adaptation appears particularly explicative:

"The central nervous apparatus does not prescribe the laws of nature any more than the hoof of the horse prescribes the form of the ground. Just as the hoof of the horse, this central nervous apparatus stumbles over unforeseen changes in its task. But just as the hoof of the horse is adapted to the ground of the steppe which it copes with, so our central nervous apparatus for organizing the image of the world is adapted to the real world with which man has to cope".[73]

As shown by this passage, according to adaptationist EE, both organic and cognitive evolution proceed by adaptation to the external world. Moreover, there exists an isomorphic relation between the (organic or cognitive) strategies that organisms devise in order to cope with the

[69] Wuketits, 1992, p. 121
[70] Gontier, IEP and Gontier, 2006, p. 15
[71] Gontier, 2006, p. 9
[72] Gontier, 2006, p. 9
[73] Lorenz, 1941, quoted in Gontier, IEP

world and the world itself.[74] This very relation, which is brought about by adaptation, is typically rendered in the terms of a *correspondence theory of truth*. According to this theory, the image (or theory about the world) that an organism has of its environment does correspond with the outer world and this very fact holds for every organism, irrespectively of whether an organism "[has developed] a language or not, [has] a brain or not, [has] sense organs or not".[75] Within this perspective, those organisms that appear to be "comparably well adapted to their respective environment"[76] are said to provide a "true", but "simplified" and partial, representation of reality.[77] On the one hand, these organisms are said to provide a true representation of the outer world, because this is a fundamental biological imperative: organisms with a false or unrealistic perception of the outer world would not manage to survive in their environment![78] On the other hand, their image of the world is simplified and incomplete, because it is bound to what adaptation has made possible for them to cognize.

On the grounds of its adherence to a correspondence theory of truth, adaptationist EE can be described as a realist position which, however, comes to reject any form of *naïve realism*. Contrary to naïve realists, adaptationist evolutionary epistemologists maintain that no organism is able to get a complete picture of the outer world. Even if the existence of the latter is posited, an organism cannot know it completely and as it is in itself, but only *structurally* and on the basis of its *appearances*. In the light of this, adaptationist thinkers prefer to speak of a correspondence between an organism's cognitive image of the world and the *structures* of the external world.[79] As Diettrich (2004) has remarked, without however committing to an adaptationist point of view himself, adaptationist EE holds that an organism's image of reality

[74] Gontier, IEP
[75] Gontier, 2006, p. 10
[76] Wuketits, 2000, p. 28
[77] Wuketits, 2000, pp. 28-29. This state of affairs is also known as hypothetical realism. See section 3.1 for a critical discussion of this position.
[78] Wuketits, 2000, p. 29. In this regard, a famous passage by Simpson (1963, p. 152), quoted by Wuketits (2000, p. 29), appears to be highly evocative: "the monkey who did not have a realistic perception of the tree branch he jumped for was soon a dead monkey – and therefore did not become one of our ancestors".
[79] See Wuketits, 1992, and Diettrich, 1998, 2004.

"[has] to delineate correctly the structures of the environment, because the strategies devised to meet the requirements of the environment are [to be derived] from those structures".[80] In other words, an organism's worldview must correspond at least structurally with the external world, otherwise the organism would not be able to act appropriately (or survive) in its environment.

This adaptationist reading of the evolution of our cognitive faculties not only has an impact on the way we conceive cognition and knowledge in general, but also on what we consider to be the aims and limits of our scientific knowledge in particular. To adaptationist EE, the aim of science is that of providing us with a true, although preliminary and partial, picture of the outer world (whose existence is given for certain).[81] As seen, within this perspective, human beings are considered to be able to master nature on the grounds of a structural correspondence between their image of the world and the outer world itself. Truth is pictured in the terms of a correspondence relation between the elements of our cognitive images and the structures of the external world. Along these lines, as Diettrich (2004) has put it, scientific knowledge appears to be "reliable (i.e., it allows verifiable predictions) if and only if it is 'true', i.e., if it is derived from perceptions and their 'true' theoretical interpretation".[82] Within this perspective, the accumulation of reliable and thus true scientific knowledge is expected to flow into "a complete and definitive set of laws of nature".[83] In other words, as Diettrich (2004) has observed, since scientific knowledge is seen to be a cumulative and non-reversible process, adaptationist evolutionary epistemologists are led to assume that science is tending towards a Barrowian "theory of everything".[84] Once the latter will be achieved, the adaptationist scientist holds, the world will have no more secrets to be unveiled.

[80] Diettrich, 2004, p. 61
[81] See next chapter for a critical discussion of hypothetical realism.
[82] Diettrich, 2004, p. 61
[83] Diettrich, 2004, p. 61
[84] Diettrich, 2004, p. 61 and p. 69

2.3. Non-adaptationist approaches to EE

By following the publication of Lewontin and Gould's 1979 critique of the adaptationist programme[85], non-adaptationist EE, or "new EE"[86], was born as a reaction to the strictures of adaptationist EE. By enlarging the scope of Modern Sythesis or by building upon the achievements of developmental systems-theory (DST), non-adaptationist EE has gradually come to impose itself as the new evolutionary epistemological paradigm.[87] Although Franz M. Wuketits can be indicated as the main exponent of the non-adaptationist approach to EE – he indeed was the first one to propose it in 1989 and constantly refine it over the years –, as it will come clear through sections 2.3.1 and 2.3.2 respectively, non-adaptationism is supported by both common-sense realist positions and complete constructivist EE as well.

In general terms, the non-adaptationist approach to EE rejects the "pan-adaptationism"[88] posited by adaptationist EE and, unlike the latter, it favours an *organismic* point of view over an environmental one. As seen, adaptationist EE regards the organism-environment relation as a unilateral kind of exchange. Within that perspective, both the organic and cognitive functions of an organism are determined by the shaping action of the environment over a passive organism. Non-adaptationist EE rejects this plain adaptationist (and fundamentally dualistic) point of view and offers a more "dialectical" approach to the organism-environment relationship.[89] Along these very lines, non-adaptationist perspectives on EE reject (hypothetical) structural realism and a correspondence theory of truth and replace them with more non-realist standpoints and a coherence theory of truth. All this, as we shall

[85] Lewontin and Gould, 1979, "The Spandrels of San Marco and the Panglossian Paradigm: A Critique of the Adaptationist Programme"
[86] Gontier, IEP
[87] Gontier, IEP
[88] Wuketits, 1992, p. 124, translation mine, "pan-adattazionismo".
[89] Gontier, 2006, p. 15

see, leads non-adaptationist approaches to conceive the scientific enterprise as indelibly forged by its human origins[90] and irremediably unbale to provide us with a "theory of everything"[91].

2.3.1. Common-sense realism: between functional realism, internal realism, and non-realism

In this section, I unite the works of Andy J. Clark (1984a, 1986), Michael Ruse (1989), and Franz M. Wuketits (from 1989 onwards) under the same "common-sense realist" label. As the reader will see, although these authors (with the exception of Clark) recur to the term "realism" when defining their respective positions ("common-sense realism", "internal realism", and "functional realism"), their views are actually much closer to anti-realism than realism. All these positions are indeed similarly characterized by the *pragmatic* rejection of a world-in-itself and by the idea that there is no world beyond our experience and thinking. Along these lines, we can draw many connections between Clark, Ruse, and Wuketits's perspectives on cognitive evolution. First of all, by looking at the cross-references that they themselves make to the works of the each other: whereas Ruse (1989) often refers to Clark's work (1986), Wuketits (1992, 1995, 2000, 2006) explicitly draws upon Clark's and Ruse's. Secondly, a common thread can be easily found if we read these positions in the light of the above-mentioned four themes: the philosophical position's commitment to an adaptationist or non-adaptationist perspective, its adherence to a metaphysical standpoint, its adoption of a certain theory of truth, and its understanding of science and its limits.

[90] Clark, 1986, p. 151. This passage draws upon Clark's idea of science as "…intrinsically limited and indelibly marked with the stamp of his own humanity". ("His" stands for "proper of the evolutionary epistemologist").
[91] Diettrich, 1992

I define the common-sense realist position as non-adaptationist. Whereas this point is clear in Wuketits's work, I can only deduce it with respect to Clark and Ruse's on the grounds of their rejection of the idea that every cognitive function can be defined in terms of adaptation.[92] After 1989, Wuketits explicitly rejects adaptationism in favour of a non-adaptationist perspective on EE. By drawing upon DST, Wuketits comes to scale down the role of adaptation, without however completely neglect it. Within this perspective, adaptation continues to play a fundamental role in evolution, but it appears that not every function or behaviour of an organism can be explained in terms of adaptation.[93] Along these lines, Wuketits comes to embrace a *organismic* perspective, whereby organisms are not passive entities shaped by their environment, but they themselves contribute to determine their environment and their own developmental path.[94] In other words, "organisms are not puppets operated by environmental strings"[95], but they are "active bio-systems"[96] which are engaged in a dialogical relation with their environment. According to Wuketits, this very relation can be expressed in the terms of a reconstruction-construction dynamic, where the organisms not only reconstruct their environment, but they also actively construct it in the light of their "inner environment".[97]

In the light of the dialectical relationship between organisms and their own environment, Wuketits comes to replace a correspondence theory of truth with a *coherence theory of truth*. Since what counts for an organism is survival, an organism does not need to have a realistic image of what is out there in order to survive. In other words, an organism does not need to accurately represent to itself states of affairs given in an external world, but it only needs "to generate a *life-supporting* view of the world it lives in".[98] Along these lines, Wuketits

[92] In this regard, the very fact that Wuketits himself sometimes refer to Clark and Ruse's works when illustrating his own position reinforces the idea that Clark and Ruse's positions should be read in a non-adaptationist key.
[93] Wuketits, 1992, p. 124
[94] Wuketits, 2006, p. 37
[95] Weiss, 1969, p. 362, quoted in Wuketits, 2006, p. 37
[96] Wuketits, 2006, p. 38
[97] Gontier, IEP
[98] Wuketits, 2006, p. 40

comes to subscribe to a *functional* coherence theory of truth and thereby to a *functional* notion of reality. This position, as reported by Gontier, states that:

> "What an organism, according to its own inner mechanisms of perception, perceives as real, is real for that organism in its struggle for existence. If that organism is able to survive because of the way it perceives things, it is able to reproduce and reintroduce its genes into the gene pool".[99]

In other words, what an organism conceives to be real is just what is *functional* to its survival and what is functional to the survival of an organism differs from organism to organism and it does not need to be a realistic representation of an outside world. Since different organisms have evolved in different ways and have developed different tools to interact with their own environment, an organism's beliefs and theories about the world are true if they cohere with other beliefs and theories, rather than in virtue of a structural correspondence with states of affair in a supposed species-independent world.[100] However, it must be noticed, Wuketits does not completely negate the existence of a correspondence between an organism's world view and its surroundings, but it admits this possibility only within the realm of our everyday life: "[a]fter all", Wuketits says, "the belief in any kind of external reality has most probably been adaptive and helped survival"[101], "[h]owever, such a belief does not tell us anything *true* about the supposed ultimate reality"[102].

In a similar vein, Clark (1984a, 1986) and Ruse (1989) have come to inscribe the belief in an external reality (or the belief in a correspondence between our experiences and states of affair in the outer world) within a non-realist or common-sense realist perspective. Either by espousing some sort of idealism (even if not in an extremely subjective form)[103] or by drawing

[99] Gontier, IEP
[100] Wuketits, 2006, p. 39
[101] Wuketits, 2006, p. 44. As we will see, the same idea has been put forward also by Diettrich.
[102] Wuketits, 2006, p. 42
[103] Ruse, 1989, p. 218, with reference to Clark (1986)

upon Putnam's (1981) lesson[104, 105], both Clark and Ruse assume that our knowledge rests upon our perception and thought.[106] To them, there is no (actual or hypothetical) world beyond our experiential world: "reality and thinking about it are inseparable and (…) the belief in something beyond this is meaningless and redundant".[107] According to these authors, there is not a world-in-itself which exists beyond our (direct or indirect) experience of it and that can be defined in species-independent terms. Even if it is still possible to talk of an external world in our daily life, this must be conceived as the product of a species-specific construction. Along these lines, the belief in an external reality turns out to be fundamentally "adaptive".[108] However, as put it by Ruse, "…even though we are naturally led to believe in the existence of objects external to consciousness, at the philosophical level there is a 'justificatory void'[109]".[110] For this very reason, Ruse (1998) is led to espouse a coherence theory of truth:

"Obviously, working within the common-sense level, the Darwinian is just as much of a correspondence thinker as anyone else…But at the final level, defending common-sense reality, as we have had to accept, the Darwinian subscribes to a coherence theory of truth, believing that the best you can do is to get everything to hang together".[111]

[104] It must be noticed that Ruse's metaphysical position extensively draws upon Putnam's "internal realism". (Lemos, 2002, p. 793). According to this perspective, positing the existence of a reality external to "the sensing interpreting subject…is meaningless". (Ruse, 1998, p. 194, quoted in Lemos, 2002, p. 794) In particular, according to internal realism "'Objects' do not exist independently of conceptual schemes. We cut up the world into objects when we introduce one or another scheme of description". (Putnam, 1981, p. 52, quoted in Ruse, 1995, p. 65, quoted in Lemos, 2002, p. 794) If we reread these passages in an evolutionary optic, it appears that objects do not exist independently of an organism's cognitive capacities and that there is no reality beyond that of species-specific experiences and interpretations.

[105] As noted also by Lemos (2002, pp. 793-794), although Ruse (1989, p. 220) acknowledges that Putnam did reject evolutionary epistemology in virtue of its realist character, he nonetheless draws upon Putnam's "internal realism". Ruse thinks that Putnam was indeed right in his rejection of realist (adaptationist) evolutionary epistemology, but at the same time he believes that Putnam was wrong in condemning evolutionary epistemology as a whole.

[106] Ruse, 1989, p. 218

[107] Ruse, 1989, p. 220

[108] Lemos, 2002, p. 795

[109] Ruse, 1998, p. 192, quoted by Lemos, 2002, p. 795

[110] Lemos, 2002, p. 795

[111] Ruse, 1998, p. 202, quoted in Faye, 2016, p. 163

From the fact that common-sense realist thinkers hold that there is no reality beyond our experience and that truth rests in coherence, however, it does not follow that "anything goes".[112] Clark (1986), Ruse (1989), and Wuketits (2000), all distance their position from Richard Rorty's radical pragmatic worldview.[113] Even if a certain form of relativism is implied (see chapter 4), according to common-sense realists, "[w]hat is being rejected is not reality in any meaningful sense…It is simply to acknowledge that reality and thinking about it are inseparable and that the belief in something beyond this is meaningless and redundant"[114], it is "…to embrace the difficulty of admitting multiple valid descriptions and to assert that to be is to be perspectivally"[115].

As in the case of adaptationist EE, the non-adaptationist reinterpretation of the evolution of our cognitive capacities has repercussions for what we assume to be the aims and limits of our scientific knowledge. According to common-sense realist epistemologists, scientific knowledge is said to be "reliable" when it is the result of "perceptions and their appropriate interpretation, but neither perceptions nor their (viable) [or functional] interpretations need the evaluation by an external world".[116] In other words, Clark, Ruse, and Wuketits hold that science does not tell us anything about an objective world, but it is limited to those objects that have some (survival) functions for us or that are viable in our experiential world. In this regard, as Wuketits (1992) has put it, "as long as we comprehend these functions, the world that surrounds us is in order (for us)".[117] Along these lines, by following Faye (2016), we could dare to say that, according to common-sense realists, our conception of natural categories (i.e. time, space, causality, etc.) does neither say something about a supposed world-in-itself nor is it just a

[112] Ruse, 1989, p. 220
[113] Clark, 1986, p. 160 and Ruse, 1989, p. 220 (Ruse's passage is quoted by Wuketits, 2000, p. 36
[114] Ruse, 1989, p. 220 (also quoted by Wuketits, 2000, p. 36)
[115] Clark, 1986, p. 160
[116] Diettrich, 2004, p. 61
[117] Wuketits, 1992, p. 125, "(…) fintanto che comprendiamo queste funzioni il mondo intorno a noi è in ordine (per noi)", translation mine.

subjective mental construction.[118] On the contrary, our conception of these natural categories has an evolutionary origin (it has been constructed by our ancestors) and it is thus species-specific.[119] Accordingly, the common-sense realist would be led to acknowledge that natural categories are "ontologically species-dependent, but epistemologically mind-independent".[120] In other words, these categories, as we currently conceive them, are not objective properties of an external world, but they are the result of our predecessors' constructions as a whole. In this sense, these very categories are mind-independent from an epistemological point of view: they are not mental constructions of ours, but they exist independently from us in the world that we inhabit and that have been shaped by our ancestors. Since, as Faye (2016) notices, truth-makers are species-specific– they are neither to be found in an external world nor in our minds – truth can be found also beyond what can be experienced directly.[121] Along these lines, since what is experienced/observed "can be extended to include information from our technological devices and instrumental recordings", what is true does not have to be confined to what we can perceive immediately with the naked eye. [122] By means of science we can find truth also beyond our "*mesocosm* or 'world of medium dimensions'".[123] Nevertheless, our scientific grasp of the world will be forever biased and limited in virtue of its human origins.[124]

Finally, common-sense realists agree on the fact that even if human scientific knowledge appears to be the most refined form of knowledge (at least at a "*rational*" level), one cannot say that, for this reason, it is closer to truth about reality than other kinds of knowledge.[125] Indeed, it is impossible to grasp an absolute notion of truth as it is impossible to know the ultimate reality. So it has no sense to say that one form of knowledge is more or less

[118] Faye, 2016, p. 277
[119] Faye, 2016, p. 277
[120] Faye, 2016, p. 276
[121] Faye, 2016, chapter 5
[122] Faye, 2016, p. 329
[123] Vollmer, 1984, quoted in Wuketits, 2000, p. 29
[124] Clark, 1986, p. 151
[125] Wuketitis, 1992, p. 125. Clark (1986, p. 158) does support a similar point to which Ruse (1989) does explicitly refer.

close to truth. As seen, every organism has its own notion of truth and reality which is functional to its existence and which it is constructed on the basis of its own cognitive capacities.

2.3.2. Complete Constructivist Evolutionary Epistemology (CCEE)

In this section, I bring together Olaf Diettrich's *Constructivist Evolutionary Epistemology* (CEE) (1992, 1998, 2001, 2004, 2006) and Alexander Riegler's refined version of *Radical Constructivism* (RC) (2001, 2006, 2012) and name the position resulting from the two *Complete*[126] *Constructivist Evolutionary Epistemology* (CCEE). Both Diettrich and Riegler's positions distance themselves from Ernst von Glasersfeld's Radical Constructivism. As stressed by Diettrich (2006), contrary to the latter, they avoid any reference to an independent external reality[127] and reject a dualistic picture of the relation between mind and reality, without however renouncing to an evolutionary understanding of cognition.[128]

According to CCEE, both reality and its regularities, and so its objects and their relative properties, do not possess an independent and objective existence, but they have been *constructed* in the course of evolution. Thus, CCEE maintains that, from an epistemological point of view, there is no need to resort to the idea of an objective and external world to which our cognitive structures are adapted. In the opinion of complete constructivist evolutionary

[126] This adjective is used both by Diettrich (1998) and Riegler (2001) in order to distinguish their position from that of Glasersfeld, and to indicate their support for a constructivism "on all levels" (Riegler, 2001, p. 7).
[127] Diettrich, 2006, p. 90
[128] Whereas this point is particularly clear in Diettrich's work, I think it is reasonable to adopt this reading also with respect to Riegler's. Indeed, the latter does not only refer to ontogenetic aspects of cognition, but also to phylogenetically acquired ones. In the opinion of Riegler (2006), although at an ontogenetic level organisms can be described as organizationally closed cognitive systems which cope just with their own cognitive constructs, they irremediably start with "[phylogenetically] inherited cognitive structures representing innate anschauungsformen" (Riegler, 2006, p. 61).

epistemologists, both organic and cognitive evolution must be read in non-adaptationist terms. According to Diettrich, this implies an account of organic and cognitive evolution in the Piagetian terms of assimilation and accommodation.[129] Assimilation and accommodation represent two moments of both organic and cognitive evolution which stand in a continual feedback circuit. As put it by Diettrich (1998) himself, assimilation can be described as the action of "modifying or using external data in order to meet internal needs", while accommodation can be rendered as the act of "modifying these internal needs in order to be met more easily" by external data.[130] Within this perspective, both organic and cognitive evolution proceed along the lines drawn by accommodation and assimilation, with a tendency towards assimilating strategies.[131] Indeed, as Diettrich (1998) points out, "the more complex and 'higher' organisms are, the more difficult it becomes for them to modify the phylogenetically acquired physiological and other basic strategies, and the more likely it is, therefore, that evolution tends toward assimilating strategies, i.e., toward improving the methods for modifying the environment".[132] Albeit not drawing upon Piaget's cognitive constructivism, Riegler too seems to embrace a non-adaptationist perspective on cognitive evolution. According to Riegler, not every aspect of cognition can be rendered in the terms of adaptation since "the output of cognition is *mainly* a function of the cognitive system itself, especially of its self-organizing and constructive activities".[133] Moreover, as mentioned above, Riegler believes that at an ontogenetic level organisms deal just with their own cognitive states (which are partly phylogenetically inherited) and not in adaptation with states of affair which are given in an external world.[134]

[129] Diettrich, 1998
[130] Diettrich, 1998
[131] Diettrich, 1998
[132] Diettrich, 1998
[133] Riegler, 2006, p. 51, Italics mine.
[134] Riegler, 2006, p. 61

As seen, complete constructivist evolutionary epistemologists reject a dualistic picture of the mind-world relation. In doing so, they affirm the priority of a worldview according to which "reality and perception influence one another through generating one another".[135] According to this view, as illustrated in Diettrich (1998), an organism starts with phylogenetically acquired cognitive and organic tools, and so a certain picture of the world. In trying to modify its environment in order to meet its own internal needs (assimilation), so to enhance its own chances of survival, the organism can obtain two results: either it manages to alter the external data or it does not and so it has to modify its internal needs so to adapt them to external data. In the first case, "Actuality" ("Wirklichkeit" or the "physical structure of our environment" which we can modify through our actions) is produced.[136] Entities such as our trees, doors, walls, and chairs form what Diettrich calls Actuality. In the second case, the organism finds something that cannot be changed by its action and to which it has to adapt (accommodation). Repetitive failing attempts to modify these external data (assimilation) give rise to invariants or regularities which, in a classical sense, constitute our hardcore "Reality".[137] These invariants and regularities are classically condensed into laws of nature and appear to be unmodifiable until they collide with the results of new observations.[138] So, what today looks like an incontrovertible regularity or an unmodifiable law of nature has not always been as such. Indeed, as Diettrich (2004) has pointed out:

"…we concede that we have indeed no means of influencing the regularities perceived nor can we alter what we call the (classical) laws of nature - but only so far as the present is concerned. In the past…we intervened well through the phylogenetic decision on the development of the mental operators and by this on the regularities we perceive. The biological development of these operators can indeed

[135] Diettrich, 1998. The following account does just refer to Diettrich's perspective.
[136] Diettrich, 1998 and 2006, p. 76
[137] Diettrich, 1998 and 2006, p. 76
[138] Diettrich, 2006, p. 76

be considered finished. What is not finished, however, is the development of possible physical extensions in the form of novel experimental facilities with novel invariants forming novel laws".[139]

Thus, on the grounds of the results produced by its actions, the organism will construct a new worldview which, in turn, will generate new possibilities of action on the part of the organism or on that of its descendants, and so on. In the light of this, cognitive tools and organic tools appear to be caught in a continuous process of coevolution.[140] On the one hand, cognitive tools are determined by our acquired organic capacities. On the other hand, organic tools come to be determined by the requirements imposed, time after time, by cognition. Along these lines, the non-adaptationist character of the complete constructivist position is here reiterated: rather than evolving in adaptation to an external world, both cognitive and organic structures coevolve under the pressure of assimilation and accommodation.

In the light of this complex constructivist framework, I think we have good reasons to hold that, like Wuketits and the other common-sense realists, constructivist thinkers adopt a coherence theory of truth, rather than a correspondence theory of truth. To them, our beliefs and theories about the world are not true in virtue of some sort of correspondence relation with states of affairs given in an independent and objective world. On the contrary, our beliefs and theories results to be "viable" only if they cohere with other beliefs and theories in a given context and at a specific time of the evolutionary scale. In doing so, complete constructivist thinkers come to abandon the idea that it is possible to obtain certain (absolute) knowledge and claim that the best we can do is to move "from hypothesis to other hypotheses".[141] In this regard, one should be careful at noticing that, with this, complete constructivist evolutionary epistemologists are not affirming the absolute validity of a coherence theory of truth over a

[139] Diettrich, 2004, p. 46
[140] Diettrich, 1998
[141] Sterpetti, 2011, p. 187

correspondence theory of truth.[142] On the contrary, radical constructivist evolutionary epistemologists are stating that within our worldview a coherence theory of truth appears to be more consistent than a correspondence theory of truth. Along these lines, by seconding a relativist point of view, complete constructivists hold that there exist many different valid species-specific worldviews relative to as many different species-specific experiential worlds (see chapter 5 for a discussion of relativism).

Similarly to common-sense realists, complete constructivist evolutionary epistemologists hold that it is possible to talk of an external world as perceived in our daily life as well as of a correspondence relation between our beliefs and our common-sense world. According to Diettrich (1998), the very belief in an external reality has proved to be highly adaptive:

"…cognitive evolution bring[s] about the category of reality…[because] we have to immunize our perceptions against doubts and distrust, particularly in situations where quick reactions are required. This is exactly what the notion of reality does. Within our day-to-day realism we consider our perceptions as representations of what is real rather than as the outcome of deliberate cognitive interpretation. In this way, time consuming (and, therefore, possibly dangerous) considerations as to whether these interpretations could be improved on do not arise".[143]

However, this very belief in an independent outside world comes to be embedded into an agnostic perspective. This picture is supported both by Diettrich and Riegler.[144] As Riegler (2001) has conveniently put it:

[142] Quale, 2007. Quale does not speak in the terms of correspondence and coherence, but in those of a correspondence theory of truth versus "truth relativism" (Quale, 2007, p. 237).
[143] Diettrich, 1998
[144] Riegler et al., 2011. Diettrich is part of the editorial board of the journal "Constructivist Foundations". Since the journal opens with a list of aspects which are shared by all constructivist positions and agnosticism figures among these, I assume that Diettrich subscribes to an agnostic perspective too.

"Although we can at anytime *assume* perception and experience in general to be the result of the impact of the reality on the I, we cannot prove this in *any* way. We are '*epistemological* solipsists' rather than God-like creatures equipped with the omnipotence to recognize reality – cf. Putnam's (1990) 'God's Eye point of view': 'Realism is an impossible attempt to view the world from Nowhere' (p. 28). Nor are we *ontological* solipsists who want to negate something (or claim its non-existence) which cannot be proven anyway".[145]

In other words, since we can neither prove nor disprove the existence of an outer world, we should adopt an agnostic perspective on the problem of reality. This agnostic position does not correspond with plain solipsism, because the existence of an objective and independent world is not negated (nor it is endorsed!). According to Diettrich and Riegler, we have to suspend our judgment and content ourselves with speculating only about what can be (directly or indirectly) known or observed.

This state of affairs has an impact on the way we understand science, its aims, and limits. Within the strong radical constructivist perspective, science does not aim at informing us about how the outer world looks. There is no unchanging world populated by static entities which relate to one another in virtue of static relationships.[146] The world continues to change and transform itself under the action of generations and generations of different organisms. The latter pass on their worldview to other successive generations which in turn elaborate on the worldview inherited from their ancestors. The inherited picture of reality does not contain a sort of map of the outer world, but rather information about how to behave appropriately in the environment.[147] In the words of Riegler (2006), "the function of cognition is adaptive; it serves

[145] Riegler, 2001, p. 2
[146] Riegler, 2006, p. 62
[147] Riegler, 2006, p. 52

the organization of the experiential world, not the *discovery* of ontological reality".[148] The same point has been put forward also by Diettrich (1992), who is convinced that both cognitive and organic evolution must be viewed not as processes of "*discovery*", but of "*conquest*".[149] According to Diettrich, both cognitive and organic evolution do not lead us to the discovery of the structures of an external world. Indeed, cognitive and organic evolution do not proceed within the boundaries imposed by the structures of an outer world, but they evolve along the lines of "what evolution itself has brought about".[150] Cognition in general and knowledge in particular are still regarded as processes of adaptation. However, instead of dealing with the structures of an external world, they are meant to explore "the various possibilities reduced or enlarged by all the previous developments" in order to conquer new rooms of manoeuvre.[151] This radical constructivist picture of the cognitive and organic evolution has repercussions on the way we conceive scientific knowledge. Through cognition, science's aim is that of organizing the world of our experiences, and not that of describing the structures of an independent external reality. In this optic, scientific theories, in order to be consistent, do not require the evaluation from external data acting as truth-makers, but they only need to be internally coherent and to reconstruct themselves (see section 3.2).[152] Within this perspective, scientific conceptions of basic natural categories such as laws of nature are not interpreted as properties of an external world, but rather as invariants deriving from phylogenetically acquired constructions. Along these lines, since both our world(view) and our cognitive capacities (also extended through the use of experimental facilities) are caught up in a continuous process of

[148] Riegler, 2006, p. 52, Italics mine. Whereas in (Riegler 2006), Roegler makes this point by drawing upon Glasersfeld's perspective, in (Riegler 2012, p. 247) he independently put forward the very same point.
[149] Diettrich, 1992, Italics mine
[150] Diettrich, 1992
[151] Diettrich, 1992
[152] Riegler, 2001, p. 7 and Diettrich, 1998

transformation and redefinition, it appears to be very unlikely that science will ever attain a "theory of everything".[153]

2.4. Conclusion

In this chapter, I have presented two possible modes for interpreting cognitive and organic evolution and I have analysed three evolutionary epistemological perspective and their impact on our understanding of knowledge and reality.

In section 2.1, I have discussed two possible interpretations of biological evolution. On the one hand, as seen, the environmental or adaptationist theory of evolution draws upon the findings of Modern Synthesis. Within this perspective, natural selection and environment (conceived as an external and independent entity) play a central role and shape the "chances of survival and fitness" of every organism.[154] In the light of this, organisms appear to be passive entities at the mercy of the environment and external mechanisms of adaptation. On the other hand, these adaptationist picture is put into question by the organismic or non-adaptationist evolutionary theory. As seen, by drawing upon DST, non-adaptationist theory of evolution stresses the importance of taking into consideration the "inner mechanisms" that operate in every organism.[155] These very mechanisms appear to condition an organism's survival and fitness expectations more than what adaptation does. By reconstructing and constructing their own environment, organisms cease to be passive entities governed by adaptation and become protagonist of their very own existences.[156] Along these lines, the meaning of "environment"

[153] Diettrich, 1992
[154] Gontier, IEP
[155] Gontier, IEP
[156] Gontier, IEP

changes and come to be extended up to include both the organism's external[157] and internal environment.[158]

As seen, adaptationist and non-adaptationist theories of evolution are at the basis of as many evolutionary epistemologies. In the second and third section of this chapter, I discussed these various epistemological approaches by focusing on four key elements which distinguish the positions considered: their subscription to an adaptationist or non-adaptationist perspective, their commitment to a metaphysical standpoint, their adherence to a specific theory of truth, and their understanding of scientific knowledge.

In the light of the above analysis, it appears that the various perspectives here considered can be assembled into two main groups: apart from adaptationist EE which, by definition, is adaptationist, common-sense realist and complete constructivist perspectives are fundamentally non-adaptationist.

With respect to the metaphysical position adopted, whereas adaptationist EE subscribes to a fundamental realist point of view (hypothetical structural realism), all the other perspectives commit to antirealism or to different shades of it (common-sense realism, functional realism, internal realism[159], and agnosticism).

This state of affairs finds its equivalent in the theories of truth embraced by the four positions here considered. As seen, adaptationist EE adopts a correspondence theory of truth, while non-adaptationist perspectives reject it categorically and replace it with a coherence theory of truth relative to a species-specific system of belief.

Taken together, all these factors affect the way these three perspectives come to characterize the aims and limits of science. Thus, whereas adaptationist EE holds that the aim

[157] Here "external environment" must be intended as the organism's own environment, rather than as an objective and independent entity.
[158] Gontier, IEP
[159] As seen, Wuketits's functional realism and Ruse's internal realism à la Putnam have very little to do with realism in general and with structural realism in particular. By rejecting any reference to an independent and objective reality, their positions come closer to antirealism rather than to realism.

of science is that of delineating the *structures* of the outer world in pursuing a "theory of everything", non-adaptationist approaches to EE maintain that science aims at exploring possibilities which have been opened in the course of evolution, but it cannot move beyond the epistemological boundaries which appear to be defined in species-dependent terms.

	Adaptationist or environmental approaches to EE	Non-adaptationist or organismic approaches to EE	
Positions and Scholars[160]	Adaptationist EE (Campbell, Lorenz, Munz, Vollmer)	Common-sense realism (Clark, Ruse, and Wuketits)	CCEE (Diettrich and Riegler)
Adaptationism or non-adaptationism?	Adaptationism: organisms are passively adapted to a species-independent outside world.	Non-adaptationism: organisms are not passively adapted to their environment, but they are engaged in a continuous construction-reconstruction process.	
Metaphysical position(s)	(Hypothetical) structural realism.	Antirealism (non-realism, internal realism, functional realism)	Agnosticism
Theory of truth	Correspondence theory of truth.	Rejection of any correspondence theory of truth (which is admitted only at the level of our common-sense world). Acceptation of coherence theories of truth within a relativistic picture.	
Aim and limits of science	Science aims at revealing the structures of an external and objective species-independent world. One day, science will attain a "theory of everything".	Science aims at organizing our experiential world. Since, in principle[161], new scientific devices will be invented and will extend the powers of our cognitive faculties, and since, in principle, our world(view) will change accordingly, it is very unlikely that we will ever reach a "theory of everything".	

[160] In both cases, the lists of scholars here presented do not aspire to be comprehensive. With the sole exception of Munz (see chapter 3), they refer only to the authors mentioned in chapter 2.
[161] "In principle" here means "according to our current worldview".

3. Two reasons for preferring non-adaptationist approaches over adaptationist ones

As seen in chapter 2, non-adaptationism is generally regarded as the new paradigm within EE.[162] As indicated previously, not only does this label apply to the particular non-adaptationist EE embraced by Wuketits, but more generally also to the common-sense realist positions of Clark and Ruse, and to CCEE as developed in the works of Diettrich and Riegler. As shown, although articulated in different ways, these positions share some distinctive characteristics. First, they all favour an organismic point of view over an environmental one and, in a broad sense of the term, they are all constructivist. Said another way: they hold that both organic and cognitive evolution do not proceed in adaptation to an "independent and objective outside world"[163], but along the lines of a process of continuous reconstruction (accommodation) and construction (assimilation) of the environment. Secondly, they all subscribe to different metaphysical positions (functional realism, internal realism, and agnosticism) which can ultimately be pictured as different degrees of the same standpoint: non-realism. Thirdly, they all embrace a coherence theory of truth instead of a notion of truth as correspondence. In the fourth place, they all regard science as a way to organize human experiential world, rather than a way to get closer to a supposed ultimate reality. In virtue of these common aspects, I proposed to unite the three abovementioned approaches under the comprehensive label of "non-adaptationist" or "organismic" perspectives so as to distinguish them from "adaptationist" or "environmental" approaches.

Either by taking biological developmental systems-theory as their starting point or by enlarging the scope of evolutionary synthetic theory, non-adaptationist perspectives have

[162] See Gontier, IEP and Gontier, 2006
[163] Diettrich, 1998

opened a new course in evolutionary epistemological studies. Along these lines, non-adaptationist scholars have sought to demonstrate the untenability of some adaptationist fundamentals both from a biological and philosophical point of view. Thus, it has now become generally accepted that organisms are not passive entities shaped by an external world, but that they themselves contribute to construct their own environment. This very fact, as seen, has a considerable impact on the way evolutionary epistemologists conceive the mind-world relation, our theories of truth as well as the aim and limits of (scientific) knowledge. Yet, despite the non-adaptationist challenge to the long-established hegemony of adaptationist EE, adaptationism is not easily left behind. Whereas some scholars have willingly moved from adaptationism to non-adaptationism (i.e. Wuketits (from 1989 on)), undeterred others continue to reaffirm their adaptationist creed (i.e. Munz (1993 [2001]) and Vollmer (2004)).[164] Nevertheless, despite a certain revival of adaptationism, I think non-adaptationist approaches have at least two good arguments for attacking and successfully tearing down the last fortresses of adaptationism.

In this chapter, I present two key situations where non-adaptationist approaches have the upper hand over adaptationist ones. In the first section, I will discuss hypothetical realism and demonstrate its fundamental redundancy. Whereas adaptationist EE depicts hypothetical realism as the only possible position to be embraced in an evolutionary epistemological milieu, I show that this is not necessarily so. In this regard, non-adaptationist approaches offer an intriguing way out. In the second section, I will focus on the circular movement in which cognition and reality appears to get caught. Although this circularity is common to both adaptationist and non-adaptationist perspectives, what for the former is a dangerous *vicious circle*, for the latter it turns out to be an essential "*virtuous circle*"[165]. In other words, on the

[164] Munz (2001 [1993]) has recently proposed a curious remodulation of the adaptationist program called "philosophical Darwinism". (Gontier, IEP) According to this perspective, organisms are "embodied theories" about their environment and, conversely, theories are "disembodied organisms". (Gontier, IEP)
[165] Also Clark (1986, p. 160 and note 9) uses the expression "virtuous circle".

one hand, within adaptationist EE the abovementioned circularity gets the lineaments of an unresolved (and unresolvable) knot. On the other hand, non-adaptationist approaches welcome it as an integral part.

3.1. The redundancy of hypothetical realism

As seen in chapter 2, adaptationist EE is oriented towards a realist understanding of cognition. In particular, by espousing a structural realist position, adaptationist EE affirms the existence of a correspondence relation between an organism's worldview and the structures of the outer world. Within this perspective, an organism can survive in its environment only if its image of the world does at least structurally correspond with states of affairs given in a species-independent external reality. This kind of realism has little to do with the functional/internal kind of realism adopted by Wuketits and Ruse. Structural realism, as developed within the adaptationist programme, maintains the existence of a world in itself which is only partially knowable to the subject. This position is also known as *hypothetical realism*. Contrarily, internal and functional kinds of realism, as respectively elaborated in Ruse's writings and in the late work of Wuketits, avoid any reference to such an entity. In this way, as shown in the previous chapter, Wuketits and Ruse's positions come closer to an antirealist point of view, rather than to a realist one.

In this section, I will present hypothetical realism as developed within the traditional evolutionary epistemological paradigm. Hence, I will demonstrate its redundancy and show that, contrary to what adaptationist thinkers hold, maintaining such a position in an evolutionary epistemological context is far from being necessary. Why indeed, should we appeal to a not-better-identified entity to explain a certain set of phenomena, when it can be

demonstrated that there are no "known compelling reasons for doing so"[166] and that the very same set of phenomena can be explained without referring to anything beyond our capacity of comprehension? In discussing this point, I will draw upon the critiques advanced by Clark, Ruse, Wuketits, and Riegler.

According to Vollmer (2004), a declared adaptationist evolutionary epistemologist, adaptationist EE's commitment to hypothetical realism can be affirmed on the basis of its adherence to three different principles:

> "*Ontological realism*: there is a world independent (for its existence) of our consciousness, lawfully structured, and quasi-continuous.
>
> *Epistemological realism*: this world is partially knowable and understandable by perception, thinking, and an intersubjective science.
>
> *Fallibilism*: our knowledge about this world is hypothetical and always preliminary."[167]

In the opinion of Vollmer, even if we cannot affirm to have absolute and certain knowledge of the outer world, we have nonetheless good reasons to believe in its existence and in our capacity of forming a partial picture of what is going on out there. This appears to be evident in the light of the fact that our cognitive structures have evolved in a continuous interplay with the outer world.[168] As a result of this evolution, our cognitive abilities appear to "fit" the world both from a phylogenetic and ontogenetic point of view.[169] From a phylogenetic perspective, it appears that our cognitive capacities fit the world in so far as they emerged in adaptation to

[166] Spade, P. V. and Panaccio, C. 2016. "William of Ockham", *The Stanford Encyclopedia of Philosophy* (Winter 2016 Edition), Zalta, E. N. (ed.), https://plato.stanford.edu/archives/win2016/entries/ockham/ (accessed June 5, 2017)
[167] Vollmer, 2004, p. 200, Italics mine
[168] "Hypothetical Realism", *Encyclopedia of Science and Religion*. *Encyclopedia.com* http://www.encyclopedia.com (accessed March 27, 2017)
[169] Vollmer, 2004, p. 198

"the *real* world".[170] At an ontogenetic level, "in every individual", our cognitive structures still must fit the outer world, otherwise it would be hard for us to behave properly in our environment and thus survive.[171] In regard to this latter point, adaptationist scholars maintain that although doors or walls could look different from how we conceive them, we have to recognize that there is something out there which we cannot trespass and, if only we would try to, it would cause us an indescribable pain.[172]

In the light of this, since the development and function of our cognitive capacities is fundamentally connected to the existence of an outer world (both from a phylogenetic and ontogenetic point of view), the hypothetical/preliminary character of our knowledge does not detract anything from the certain existence of such an external world.[173] Thus, along these lines, it seems that if we accept the evolutionary epistemological account of cognition, we are irremediably led to espouse hypothetical realism. Who would ever negate – the adaptationist scholar provocatively asks - the crucial role of adaptation or that of survival in the shaping of our cognitive structures? Who would ever deny – the adaptationist continues - that adaptation and survival are in fact the tangible proofs of the existence of an outer world? Whereas, as seen, her adaptationist colleagues seem to have a quite straightforward answer to these questions ("there exists an objective and independent world which explain the success of our cognitive capacities"), I think their reasons are not persuasive enough to convince us of the existence of an outer world. First of all, as noticed by Löw (1984), "[i]f reality is given us only through the glasses of our 'ratiomorphic world-view apparatus', then every statement about the 'true' reality is, at the same time, a statement viewed through such glasses and no 'truer' than

[170] Vollmer, 2004, p. 198, Italics mine
[171] Vollmer, 2004, p. 198
[172] This passage is a modified version of Wuketits's argument (2006, p. 43) against arbitrariness in construction. Although Wuketits puts it into non-adaptationist terms, here I re-interpreted in adaptationist terms. I do not think that Wuketits would support this modified version.
[173] "Hypothetical Realism", *Encyclopedia of Science and Religion*. *Encyclopedia.com* http://www.encyclopedia.com (accessed March 27, 2017)

others".[174] Along these lines, the adaptationist thinker should recognize that not only our knowledge of reality is hypothetical, but the very category of reality itself.[175] Secondly, I believe that antirealist and agnostic perspectives provide us with much more consistent accounts of cognition which have the advantage of not leading us into the insidious territory of a supposed objective and species-independent reality. By saving the notions of adaptation and survival or by rereading them in a radical constructivist optic, Clark (1986), Ruse (1989, 1995), Wuketits (2006), and Riegler (2006) show us that avoiding any gratuitous postulation of an external reality is not only possible, but highly desirable.

Even if developed along different lines, Clark and Ruse's critiques of hypothetical realism do arrive at the same conclusion: the rejection of any notion of reality which goes beyond the realm of our experience.[176] According to Clark and Ruse, EE is better understood in the terms of an antirealist perspective, rather than in those of a hypothetical realist one. On the one hand, by following the lesson of Donald Davidson and Michael Dummet, Clark comes to drop the notion of mind/species-independent reality as "redundant" and "no longer comprehensible".[177] In the opinion of Clark, since it is impossible from an evolutionary epistemological perspective to give a sound account of a reality which exist beyond the world of our experience and thinking, we should reject the idea that EE naturally goes hand in hand with hypothetical realism.[178] On the other hand, by following the lesson of Hume, Ruse comes to question the tenability of any notion of reality which "lies beyond our ken, and that necessarily must remain so".[179] According to Ruse,

[174] Löw, 1984, p. 213, quoted in Randrup, 2004
[175] Randrup, 2004
[176] Ruse, 1989, p. 219-220
[177] Ruse, 1989, p. 219
[178] Ruse presents Clark's position as a critique to Vollmer (1987). As reported by Ruse (1989, p. 218), in a passage of Vollmer (1987, p. 188), Vollmer states that "evolutionary epistemology is inseparably connected with hypothetical realism".
[179] Ruse, 1989, p. 219

"…to speak of a[n objective and mind-independent] reality, we must in some way specify what it would be like to meet with this reality and, on the evolutionary epistemological position, this is precisely what we cannot do".[180]

Ruse believes that everything we know, we know it by means of our cognitive capacities.[181] Thus, the only reality we can know and of which we can sensibly speak about is that of our experience: the world as we perceive it, think it, and interpret it.[182] Beyond that, there is no meaningful reality whose existence we have reason to postulate. Thus, the notion of an objective and independent world should be rejected: since we cannot know such a world through our cognitive capacities, we do not have any ground to postulate its ontological existence either. This, according to Ruse, rather than opening the doors to a state of affairs "…where anything goes, where there are simply no constraints on knowledge…"[183], reiterates the fundamental species-dependency of our world (see chapter 2).

By following Clark and Ruse, Wuketits[184] (2006) too comes to label the notion of an independent and objective reality as "obsolete" and "redundant".[185] According to Wuketits, an organism can know and is interested to know only the world of its experience, perception, and thought. Moreover, since an organism is interested to enhance its survival, it does only need to cope with its own world in an appropriate way.[186] In the light of this, Wuketits affirms, postulating the existence of a world-in-itself is far from being necessary in an evolutionary epistemological context.

[180] Ruse, 1995, p. 192, quoted in Lemos, 2002, p. 796
[181] Lemos, 2002, p. 796
[182] Ruse, 1989, p. 220
[183] Ruse, 1989, p. 220
[184] Before 2006, Wuketits embraced hypothetical realism, but only a weak version of it. By drawing upon Clark and Ruse, he indeed already avoided the reference to an external and objective reality. However, in Wuketits (2006), I have found no reference to hypothetical realism at all.
[185] Wuketits, 2006, p. 43
[186] Wuketits, 2006, p. 43

Like Clark, Ruse and Wuketits, Riegler (2006) too is convinced of the fundamental inconsistency of hypothetical realism. Whereas Clark, Ruse, and Wuketits refuse hypothetical realism by questioning the *meaning* of an objective and independent reality, Riegler comes to reject it by criticising the Vollmerian notion of "*psychological evidence*"[187]. According to Vollmer, the fact that some objects resist our and other people's actions and thoughts does corroborate the idea that there is an independent and objective external reality.[188] In the opinion of Vollmer, the impossibility of walking through walls or trees does continuously confirm us that in fact there is a mind-independent reality which we cannot change to our liking and that irremediably constrains our possibility of action. Contrary to Vollmer, Riegler believes that our experiences of resistance and pain do not necessarily imply the existence of an outer world. In the opinion of Riegler, these very experiences are determined by the construction of "mutual relationships among sensations".[189] According to Riegler, sensations/experiences follow one another in a historical way and are put into relation as to form a "network of hierarchical interdependencies".[190] Within these networks or "constructed mental complexes" experiences/sensations are put in a mutual relation with each other.[191] As a result, different experiences constrain each other and define the form of further constructions (or relationships among sensations/experiences).[192] As an example, Riegler speaks of the mutual relationship between "the 'reality' of a door and the experience of bumping into it" as part of the same construction network.[193] According to Riegler, it appears to be possible to change the mutual relationship among the component of a constructed mental complex, however there exists

[187] Riegler, 2006, p. 57. As reported by Riegler (2006, p. 57) himself, Vollmer's argument for "psychological evidence" does refer to Russel's idea of "*instinctive belief*" (Italics in original).
[188] Riegler, 2006, p. 57
[189] Riegler, 2012, p. 249
[190] Riegler, 2006, p. 58
[191] Riegler, 2006, p. 58
[192] Riegler, 2006, p. 58
[193] Riegler, 2006, p. 58

different "degrees of changeability"[194].[195] Sometimes it is easy to modify their relationship, other times, especially in the case of constructions with a "…[long] history and/or [a big] number of mutual dependent components[,] we can expect…insuperable obstacles in somebody's attempt to change them, such as our idea of doors and bumping into them".[196] Constructions of the latter kind are not any more accessible at a conscious level, but are part of "preverbal memories" which cannot be rendered in a verbal or linguistic form.[197] As such, Riegler believes that we are neither in the condition to linguistically-philosophically address these preverbal constructs (or "early sensorimotor experiences") in any meaningful way nor in that of reasonably affirming their belonging to an independent and objective world.[198] In the light of this, Riegler concludes that the belief in the existence of a world-in-itself as derived from the fact that some objects resist our actions is both unnecessary and unfounded.

3.2. A question of epistemic circularity

As noticed by Diettrich (1998, 2004, 2006), Riegler (2001), and Sterpetti (2011a, 2011b), both adaptationist EE and complete constructivist approaches are caught in a fundamental *epistemic* circularity "insofar as not only the categories of space, time and causality are interpreted in phylogenetic terms but also the notion of reality and nature – the latter comprising phylogeny itself".[199] On the one hand, cognition (and its experimental extensions) is what brings about our image of reality with all its categorizations; on the other hand, this very image of reality with all our species-specific categorizations explains the

[194] Riegler, 2012, p. 249
[195] Riegler, 2006, p. 58
[196] Riegler, 2006, p. 59
[197] Riegler, 2006, p. 59
[198] Riegler, 2006, p. 59
[199] Diettrich, 2006, p. 88

coming into existence and fit of our very cognitive faculties (and their experimental extensions).[200] As reported by Sterpetti (2011b), this circular state of affairs is the main target of anti-naturalist arguments that seek to demonstrate the "*self-defeating*" character of evolutionarily naturalized epistemologies.[201] This kind of arguments pivot on the necessity of safeguarding the traditional notion of knowledge as "'justified true belief"" [202] as well as the traditional notion of truth as correspondence. Thus, anti-naturalist scholars point out, since evolutionarily informed explanations are circular and thus not able to guarantee the truth of our knowledge, the naturalization of epistemology through evolution would result in "a confirmation of scepticism and a jeopardization of the classical theory of knowledge".[203] In the light of this, any "evolutionary naturalization of knowledge" should be rejected.[204] As we will see, whereas this kind of arguments hit adaptationist EE, they leave untouched non-adaptationist approaches to cognition.

In what follows, I will discuss the abovementioned circularity with respect to adaptationist EE and complete constructivist perspectives. Thus, I will show that what appears to be an insuperable obstacle for the former turns out to be a strong point for the latter. In doing so, I will refer to the works of Diettrich (1998, 2001, 2004, 2006), Riegler (2001) and Sterpetti (2011a, 2011b) who have extensively elaborated on this theme. Although Clark (1986) is the only common-sense realist thinker who has explicitly discussed this epistemic circularity, I think we have good reasons to hold that what, in the present context, goes for CCEE can be also applied to common-sense realist approaches and thus to non-adaptationist perspectives in general. Indeed, as we have seen, the latter share both an organismic setting and a fundamental constructivist framework.

[200] Diettrich, 1998, Diettrich, 2004, p. 59 and Diettrich, 2006, p. 88
[201] Sterpetti, 2011b, p. 338
[202] Sterpetti, 2011b, p. 339, translation mine: "'credenza vera giustificata'"
[203] Sterpetti, 2011b, p. 338, translation mine: "una conferma dello scetticismo e la messa in crisi della concezione classica della conoscenza"
[204] Sterpetti, 2011b, p. 339, translation mine: "naturalizzazione evoluzionistica della conoscenza"

When we set to demonstrating the reliability of our cognitive powers, we irremediably found ourselves wondering about the ancient question of what, between the chicken and the egg, came first.[205] Reread in an evolutionary epistemological optic, the old dilemma sounds as follows: which one of the two did come first? Reality or our cognitive capacities? As for the chicken-egg question, also in this case it seems hard to find a hard-and-fast answer. Indeed, as accurately shown by Diettrich (2004), nature and cognition are caught in an epistemic circle:

"…on the one hand our *world view* is the construct of our cognitive and experimental procedures; on the other hand, this *world view* is exactly what physics and biology refer to, particularly when describing the development of the human brain and the operators established there. So which is the hen and which is the egg? Is the real world we live in and which developed in the course of organic evolution up to and including the brain's functions, or is it just this brain functions that bring about the view of a real world as a tool for both articulating and solving our problems? Formulated differently: are perceptions brought about by nature, or is nature a category brought about by our cognitive apparatus?"[206]

This circularity is problematic for adaptationist EE, especially in virtue of its fundamental realistic and dualistic setting.[207] As seen (section 2.2), adaptationist EE starts from a dualistic perspective in which the world and the cognizing subject are distinct entities which interact only under the dynamics of natural selection. Within this picture, we are adapted to an outer world which exists independently of us. This outer world, whose existence is taken for granted, can be known only in a partial and preliminary way, on the basis of its appearances and through the cognitive faculties that we have acquired phylogenetically. Thus, reality is interpreted

[205] Diettrich, 1998, Diettrich, 2004, p. 59 and Diettrich, 2006, p. 88
[206] Diettrich, 2004, p. 59, Italics mine
[207] According to Diettrich (1998, 2004, 2006), this epistemic circularity represents a threat for realist positions in so far as they support the "dichotomy" nature-cognition. I think that the notion of "dualism" renders the whole situation in a more effective way.

(categorized) according to our cognitive capacities (and their experimental extensions) which we developed in the course of evolution.[208] Now, this very image of reality which bears with itself our species-specific categorizations is what bio-physical sciences refer to when explaining phylogeny itself, and so the origin and fit of our very phylogenetically acquired cognitive structures (and their experimental extensions).[209] Thus, as Diettrich (2004) argues, "phylogeny is interpreted by phylogeny, which is circular".[210] This epistemic circularity is problematic for adaptationist EE insofar as the latter maintains a realistic position that, as we have seen, implicates that a theory, to be consistent, must keep faith with states of affairs in the external world. By "den[ying] the possibility to reach a direct (or even indirect) comparison with reality in order to state the truth of the [scientific] knowledge produced"[211], the abovementioned circularity ends up undermining adaptationist approaches.

Now, by following Vollmer (2004), adaptationist thinkers do usually appeal to adaptation in order to solve this circularity and show that our knowledge is in fact reliable. Adaptation is here understood as "a truth-encoding process" guided by natural selection, whereby natural selection is what "…encode[s] in us true (or approximately true) knowledge about the world, or … give[s] us a faculty which is able to reach some true (or approximately true) knowledge about the world in dealing with it".[212] In the light of this, since scientific knowledge is a "human product", its truth is guaranteed by natural selection and thus it is "based on true features of the world".[213] However, as noticed by Sterpetti (2011a),

"…adaptationism itself can hardly guarantee the crucial assumption in the above argumentation: the fact that the relation between organisms and their environment [(adaptation)] can be

[208] Diettrich, 2004, p. 59
[209] Diettrich, 2004, p. 59
[210] Diettrich, 2004, p. 59
[211] Sterpetti, 2011a, p. 183
[212] Sterpetti, 2011a, p. 185
[213] Sterpetti, 2011a, p. 185

seen as a sort of transfer of true knowledge, managed by selection, which is able to guarantee the product of our knowledge. This assumption can only be sustained by an IBE [(Inference to the Best Explanation)]. This is a "success-to-truth" inference, for which the survival of an organism implies his true (or approximately true) knowledge of its environment.".[214]

The appeal to IBE (and thus to the idea that our beliefs about the world must be true otherwise we would have not survived) is often used by adaptationist evolutionary epistemologists to contrast arguments against the possibility of naturalizing knowledge.[215] Thus, by appealing to IBE and evolution, adaptationist scholars try to solve the abovementioned circularity and "re-establish a one-to-one correspondence between reality and theory".[216] However, as shown by Sterpetti (2011b), the recourse to IBE and to evolution is actually of no help to the adapationist thinker who ends up presupposing what first should be demonstrated:

"The appeal to evolution…does not seem to be resolving, unless some realist assumptions are already incorporated".[217]

"The presupposition is that without true beliefs we would not have been able to survive, but this connection between success and truth is what should have been demonstrated, not what should have been presupposed".[218]

[214] Sterpetti, 2011a, p. 185
[215] Sterpetti, 2011b, pp. 329-330
[216] Sterpetti, 2011b, p. 330, translation mine: "ristabilire una biunivocità realista tra la realtà e la teoria"
[217] Sterpetti, 2011b, p. 333, translation mine: "L'appello all'evoluzione, come nel caso della ragione, non sembra essere risolutore, se non avendo già incorporato delle assunzioni realiste".
[218] Sterpetti, 2011b, p. 335, translation mine: "Il presupposto è che senza credenze vere non saremmo stati in grado di sopravvivere, ma questa connessione tra successo e verità è quello che si sarebbe dovuto dimostrare, non quello che si sarebbe dovuto presupporre".

Thus, by not managing to account for the legitimacy of their realistic assumptions, adaptationist scholars appear to be unable to offer a sound way out from the abovementioned epistemic circularity. As seen, anti-naturalist arguments pivot on the necessity of maintaining a traditional notion of knowledge as "'justified true belief'".[219] On the other hand, adaptationist scholars come to adopt the same traditional notion of knowledge and truth, but at the same time they tie it to an evolutionary point of view.[220] This, as seen, leads adaptationist thinkers to an inescapable circular state of affairs. As shown by Sterpetti (2011b), the very "difficulty" in eluding such situation is what makes "the anti-naturalist and Plantinga's theist alternatives" look feasible.[221] However, not only these alternatives are invalidated by the fact that they themselves start from unfounded realist assumptions[222], but, as we will see, their arguments do not manage to undermine non-realist evolutionary epistemologies.

On their part, complete constructivist perspectives on EE are affected by the abovementioned epistemic circularity too. Yet, the latter, rather than constituting an insurmountable vicious circle, represents an integral part of CCEE and, I think, of organismic positions in general. Indeed, both CCEE in particular and non-adaptationist positions in general reject the mind-world dualism and, as seen (chapter 2), any reference to an external reality. In doing so they thereby reject a classical theory of knowledge as well as a notion of truth as correspondence and replace it with a notion of truth as coherence in relation to a certain conceptual scheme. In this way, non-adaptationist approaches to EE can accommodate circularity between reality and cognition and "root our…[knowledge] in our cognitive and bodily structures"[223]. As stated by Diettrich (2004),

[219] Sterpetti, 2011b, p. 339, translation mine: "'credenza vera giustificata'"
[220] Sterpetti, 2011b, p. 340
[221] Sterpetti, 2011b, p. 340
[222] Sterpetti, 2011b, p. 340
[223] Sterpetti, 2011a, p. 183

"…no real dichotomy exists so long as there is certainty that perception and nature condition one another by generating one another. This certainty is provided by the fact that our cognitive phenotype constructs a world picture that permits an understanding of the genesis of this cognitive phenotype by means of evolution within the framework of this world picture".[224]

"In the cognitive area the following holds: the cognitive apparatus (and all the science based on it) is what decides how the sensory input is to be reinterpreted and what world view is conveyed. The knowledge acquired in this manner is consistent and reproducible, however, only if the cognitive/scientific apparatus generates a world view that includes the cognitive/scientific apparatus itself".[225]

In the opinion of Diettrich, cognition and reality are not independent from one another, but they are intimately related in so far as they bring about each other.[226] According to Diettrich, the consistency of this image is supported by the fact that at this stage of evolution we possess certain cognitive structures which allow the construction of a certain worldview which explains the origin and evolution of our cognitive structures which determine our very worldview.[227] In the light of this, a complete constructivist worldview (knowledge about the world) is consistent because it is able to "reconstruct itself" in a coherent way, in a way that is viable for us at this stage of evolution, rather than, as in the case of adaptationist approaches, because it keeps faith with a species-independent and objective external reality.[228] Thus, the fact that the abovementioned epistemic circularity impedes any comparison of our worldview with an independent external world is not a problem for complete constructivist perspectives, because they indeed hold that the best we can do is producing a coherent model which only needs to

[224] Diettrich, 2004, p. 59
[225] Diettrich, 2004, p. 60
[226] Diettrich, 2004, p. 59
[227] Diettrich, 2004, p. 59
[228] Diettrich, 2004, p. 60

reconstruct itself. This very point, as Diettrich (2004) has noticed, is what distinguishes non-adaptationist/constructivist positions on cognitive evolution from adaptationist ones and what allows constructivist approaches to accommodate epistemic circularity as an integral part of theirs.[229] Along these lines, as noticed by Sterpetti (2011), within complete constructivist perspectives

> "…cognitive structures [are not intended to] truly represent or incorporate in us some features of the world: it is sufficient that were sufficient to contribute (among other factors), or that at least didn't impede, the survival of organisms, and for this are not required to be true [in the sense of corresponding to external states of affairs] …".[230]

With this, complete constructivist thinkers abandon the traditional notion of knowledge as "'justified true belief'"[231] and come to embrace the idea of an "infinite process of moving from hypothesis to other hypotheses".[232]

This "self-referential circularity of knowledge", as Riegler (2001) defines it, has an impact also on the way we interpret scientific knowledge and its aims.[233] As seen, according to organismic positions in general and complete constructivist approaches in particular, science does not seek to describe the structures of an ontological reality which exist independently of us. To them, the aim of scientific theories is that of coherently organizing the world of our experiences, without necessitating the evaluation from external data (belonging to an independent world) acting as truth-makers. Along these lines, Clark (1986) has shown that science itself is marked by a fundamental epistemic self-referentiality. As reported by Clark himself, on the one hand, we hold that our theories about the world are justified if they are

[229] Diettrich, 2004, p. 60
[230] Sterpetti, 2011a, p. 187
[231] Sterpetti, 2011b, p. 339, translation mine: "'credenza vera giustificata'"
[232] Sterpetti, 2011a, p. 187
[233] Riegler, 2001, p. 7

supported by observational evidence; on the other hand, from an evolutionary epistemological point of view, observational evidence is understood as nothing over and above "a species-valid arrangement of information concerning the external world".[234] In this way, Clark continues "[t]heory is thus justified by theory in a cosy epistemic circle of the kind sometimes described as 'virtuous'".[235]

In the light of this, as Diettrich (2001) has nicely put it:

"What we expect from scientific theories is to explain all known phenomena within the framework of one coherent world model. Such a model brought about by human brains has to explain everything from the big bang, the creation of our world, organic and then cognitive evolution and eventually up to the development of the scientific model itself".[236]

Thus, what, in the context of adaptationist EE appears to be a problematic *vicious circle*, turns out to be an essential *virtuous circle* when read within non-adaptationist approaches to EE. This circularity does not just represent a strength point of non-adaptationist approaches over adaptationist ones, but it also marks the measure of the openness of scientific disciplines as read within a non-adaptationist optic: by "acknowledg[ing] their own roots, [scientific disciplines are] …open to critical re-examinations and proper integration of new insights".[237]

[234] Clark, 1986, p. 160
[235] Clark, 1986, p. 160
[236] Diettrich, 2001, p. 4
[237] Riegler, 2001, p. 7

3.3. Conclusion

In chapter 2, I presented non-adaptationist EE as the new trend within evolutionary epistemological studies. By distancing themselves from adaptationist readings of cognitive evolution, non-adaptationist scholars have successfully shown that organisms are not passive entities shaped by an external world, but that they themselves contribute to construct their own environment. Despite the theoretical (biological and philosophical) advantages offered by this new perspective, some philosophers have continued to undeterredly defend the validity of adaptationist approaches to EE. In this chapter, I have sought to demonstrate that non-adaptationist perspectives are to be preferred over adapationist ones and so I have considered two key situations where non-adaptationist approaches have the upper hand over adaptationist EE.

In the first section, I have argued against the adaptationist idea that the success of our adaptive strategies can be explained only in the light of the existence of an "independent and objective outside world"[238] lying beyond the domain of our experiences. In that context, I started by presenting the adaptationist point of view. According to adaptationist evolutionary epistemologists, there is nothing problematic with the postulation of an independent reality. To them, although our understanding of such a reality is always preliminary and partial, we are irremediably led to acknowledge its certain existence.[239] In the opinion of adaptationist scholars, that an independent outside world exists is indisputably proven by the adaptive character of our cognitive faculties as well as by the "psychological evidence" that some objects resist our actions.[240] However, we have seen that both the success of our cognitive tools and our experiences of resistance or pain can be explained also without postulating an objective

[238] Diettrich, 1998
[239] Vollmer, 2004, p. 200
[240] Riegler, 2006, p. 57

reality beyond our experiential world. As shown by non-adaptationist thinkers, our survival is guaranteed by the fact that our cognitive (and organic) capacities allow us to meet the requirements of our own world (which is species-dependent), and not those of a supposed independent reality. Moreover, our experiences of resistance and pain do not say anything about an ultimate reality, but only that some construction networks of ours are old and thus difficult to modify. In the light of this, hypothetical realism is not the only possible position to be embraced in an evolutionary epistemological context. On the very contrary, hypothetical realism appears to be fundamentally redundant at best, and unfounded at worst. As seen, on the one hand, adaptationist scholars explain a certain set of phenomena (the success of our cognitive tools and our experiences of resistance and pain) by postulating the existence of a not-better-identified entity (an objective and independent external world); on the other hand, non-adaptationist thinkers explain the same phenomena without appealing to any further entity. As Occam *docet*: "*Frustra fit per plura quod potest fieri per pauciora*" ["It is pointless to do with more what can be done with fewer"].[241] Although Occam's razor does not provide a confutation of adaptationism, in the light of the above analysis and of the fact we have no compelling reasons for explaining the success of our cognitive faculties and our experiences of resistance and pain by appealing to a world-in-itself, non-adaptationist approaches should be preferred over adaptationist ones.

In the second section, I talked about the epistemic circularity in which reality and cognition are caught. As seen, anti-naturalist thinkers pivot on this circularity to demonstrate the untenability of evolutionarily naturalized epistemologies. As seen, whereas their arguments hit adaptationist perspectives, they leave untouched non-adaptationist ones. Indeed, whereas the abovementioned circularity represents a problem within the context of adaptationist EE, it becomes an integral part and a main strength of non-adaptationist perspectives. On the one

[241] Occam, *Summa Totius Logicae*, i. 12, quoted in "William of Ockham", Wikiquote, https://en.wikiquote.org/wiki/William_of_Ockham, (accessed June 4, 2017)

hand, by subscribing to a realistic and dualistic perspective on the mind-world relation, adaptationist EE remains stuck in an unresolvable circular movement. On the other hand, by rejecting any mind-world dualism and any reference to an external world, non-adaptationist positions manage to tame the reality-cognition circularity and turn it in their favour. According to non-adaptationist scholars, reality and cognition bring about one another. To them, the validity of this very image is supported by the fact that at this stage of evolution we possess certain cognitive structures which allow the construction of a certain worldview in which it has sense to envisage the origin and evolution only of our cognitive structures as pictured by this very worldview.[242] As seen, this image does not only apply to cognition in general, but also to scientific knowledge in particular. In the light of this, by abandoning the traditional theory of knowledge and by welcoming circularity, non-adaptationist approaches offer a valid alternative to anti-naturalist perspectives.[243]

In the light of this, I think we have two good reasons for preferring non-adaptationist approaches over adaptationist ones. Contrary to the latter, non-adaptationist scholars are able to explain cognition in general and knowledge in particular without recurring to any supposed independent world and by turning a potential vicious circle into a fundamental virtuous one.

In the next chapter, we will have a look at possible critiques against non-adaptationist approaches. In that context, I will try to defend the tenability of organismic readings of cognitive evolution.

[242] Diettrich, 2004, p. 59
[243] As seen in section 3.2, anti-naturalist approaches are undermined by the fact that they start from unfounded realistic assumptions. (Sterpetti, 2011b, p. 340)

4. On conceptual schemes and dinosaurs: critiques of non-adaptationist approaches

In chapter 3, we observed that there are at least two good reasons for preferring non-adaptationist approaches over adaptationist ones. First of all, contrary to adaptationist perspectives, non-adaptationist positions provide us with a way to understand both the adaptive success of our cognitive tools and our experiences of resistance and pain without appealing to any phantom entity beyond our comprehension. Secondly, whereas the epistemological circularity between reality and cognition appears to be fundamentally problematic for adaptationist approaches, it is welcomed as an integral element and find an explanation within complete constructivist perspectives. So far so good, but non-adaptationist approaches are liable to some critiques which could *prima facie* seem to irremediably undermine their tenability.

In what follows, I will discuss two main objections. On the one hand, in virtue of their fundamental relativistic setting, non-adaptationist positions appear to be the easy target of Donald Davidson's famous attacks to conceptual relativism (see section 4.1). On the other hand, non-adaptationist positions seem to imply the existence of backwards causation which is often thought to be an inherently paradoxical phenomenon (see section 4.2). I will try to provide arguments in defence of non-adaptationist positions. Finally, some concluding remarks will help us to take stock and put the content of the present chapter into perspective.

4.1. On the very Davidsonian critiques to conceptual schemes

In December 1973, Davidson delivered a lecture at the occasion of the "Seventieth Annual Eastern Meeting of the American Philosophical Society" in Atlanta which would ultimately serve as the basis of his famous essay "On the Very Idea of a Conceptual Scheme".[244] In this article, Davidson argues against conceptual relativism, namely the idea that something can be said to be true only in relation to a conceptual scheme[245] and that there exist "incommensurable" (or not "intertranslatable") conceptual schemes[246]. According to Davidson, the notion of conceptual scheme must be intended as "…something ordering, organizing, and rendering intelligible empirical content".[247] By drawing upon the notions of conceptual scheme and empirical content, conceptual relativism appears to be the bearer of an untenable "scheme-content dualism" which Davidson baptizes the "third dogma" [248] of empiricism.[249] In showing the untenability of such dualistic view, Davidson comes to criticise the ideas that conceptual schemes serve to organize our experiential world and that there is "uninterpreted [empirical] content" with respect to which many different conceptual schemes offer as many different points of view.[250]

As seen in chapters 2 and 3, non-adaptationist scholars hold a fundamental relativist position in their interpretation of cognition and reality. In general terms, non-adaptationist

[244] Davidson, 1974, p. 5
[245] Preview of the chapter "On the Very Idea of a conceptual Scheme" in Donald Davidson, *Inquiries into Truth and Interpretation*. Oxford Index. http://oxfordindex.oup.com/view/10.1093/0199246297.003.0013 (accessed on May 12, 2017)
[246] Davidson, 1974, p. 12
[247] Preview of the chapter "On the Very Idea of a conceptual Scheme" in Donald Davidson, *Inquiries into Truth and Interpretation*. Oxford Index. http://oxfordindex.oup.com/view/10.1093/0199246297.003.0013 (accessed on May 12, 2017)
[248] Davidson, 1974, p. 11
[249] Preview of the chapter "On the Very Idea of a conceptual Scheme" in Donald Davidson, *Inquiries into Truth and Interpretation*. Oxford Index. http://oxfordindex.oup.com/view/10.1093/0199246297.003.0013 (accessed on May 12, 2017)
[250] Preview of the chapter "On the Very Idea of a conceptual Scheme" in Donald Davidson, *Inquiries into Truth and Interpretation*. Oxford Index. http://oxfordindex.oup.com/view/10.1093/0199246297.003.0013 (accessed on May 12, 2017)

thinkers argue that different organisms which possess different species-specific cognitive apparatus have as many different worldviews, but the latter are not tied to the structures of an independent reality, but are brought about by the experiential world of each organism as structured by its species-specific cognitive powers. According to this view, objects and their properties are posited in the course of phylogenetic evolution rather than given in an outside world.

In the light of their very relativist setting, the tenability of non-adaptationist positions seems to be subjected to Davidson's attacks. Nevertheless, it must be noticed that Davidson's critiques were not directed at non-adaptationist interpretations of cognitive evolution and reality and, for their part, non-adaptationist thinkers do not generally resort to the particular notions of "conceptual scheme" or "empirical content". However, I think, we can easily translate Davidson's language into that used by evolutionary epistemologists. According to Davidson (1974):

"…something is a *language*, and associated with a *conceptual scheme*, whether we can translate it or not, if it stands in a certain relation (predicting, organizing, facing or fitting) to experience (nature, reality, sensory promptings)".[251]

If we substitute the two terms in Italics "language" and "conceptual scheme" with the words "worldview" and "cognitive set" respectively, we obtain the evolutionary epistemological equivalent of the just abovementioned idea, which sounds as follows:

"…something is a [*worldview* (a theory about the world, a strategy to deal with our environment)], and associated with a [particular *cognitive set* (or cognitive apparatus)], whether we can

[251] Davidson, 1974, p. 13

translate it or not, if it stands in a certain relation (predicting, organizing, facing or fitting) to experience (nature, reality, sensory promptings)".[252]

In the light of this, we can reread Davidson's critiques to conceptual relativism also in evolutionary epistemological terms and thus apply Davidson's arguments to non-adaptationist positions.

In what follows, I will discuss two Davidsonian critiques to conceptual relativism with respect to non-adaptationist evolutionary epistemological positions. First, I will take into consideration Davidson's argument against the idea that different conceptual schemes can "fit"[253] uninterpreted empirical content in different ways and thus give rise to incommensurable points of view. In that context, I will briefly refer also to the relativist kind of perspective adopted by adaptationist EE and compare it with that embraced by non-adaptationist approaches. Along these lines, I will demonstrate that Davidson's argument is at best a challenge to the former perspective, rather than to the latter. Secondly, I will discuss Davidson's critique to the idea that conceptual schemes serve to organize experiences. Also in this case, I will briefly draw upon adaptationist perspectives in order to develop my argument and demonstrate that Davidson's point of view, rather than representing a threat to non-adaptationist positions, is actually very close to what non-adaptationist thinkers hold.

4.1.1. On the very untranslatability of conceptual schemes

As seen, in his famous essay "On the Very Idea of a Conceptual Scheme" (1974), Davidson vehemently argues against conceptual relativism. In particular, Davidson affirms the

[252] Davidson, 1974, p. 13
[253] Davidson, 1974

untenability of the idea that different conceptual schemes, which appear to "fit" the *same* "empirical content", generate incommensurable points of view. Thus, as noted by Brons (2016), Davidson does not reject the idea of "conceptual scheme" as a whole, but only the notion of "*untranslatable* schemes".[254, 255] In evolutionary epistemological terms, this critique can be rendered as follows: according to Davidson, the idea that different cognitive sets can generate incommensurable worldviews about the *same* "reality (the universe, the world, nature)"[256] or the *same* experiential world "(the passing show, surface irritations, sensory promptings, sense data, the given)"[257] must be rejected.

As seen in chapters 2 and 3 and as mentioned in the previous section, not only non-adaptationist approaches are fundamentally relativistic, but also adaptationist ones. On the one hand, adaptationist scholars maintain that different organisms endowed with different specific[258] cognitive sets develop as many different worldviews of the same objective and independent outside world. Within this perspective, objects and their properties are already given in an external reality.[259] On the other hand, non-adaptationist thinkers hold that different organisms endowed with different specific cognitive apparatuses generate different worldviews which are relative to their very and peculiar species-dependent experiential world

[254] Brons, 2016, p. 60.
[255] According to Brons (2016, p. 60), "Davidson did not reject all notions of conceptual schemes (and thus not "the very idea", despite the title of 1974), but only a particular notion of conceptual schemes that he ascribed to Whorf, Kuhn, and Quine, among others. That particular notion is one of *untranslatable* schemes". In elaborating on this question, Brons (2016, p. 61) affirms that, contrary to what is commonly held, Davidson "occasionally" resorted to the use of the term "conceptual scheme". By reporting a fragment from "Seeing Through Language" (Davidson, 1997), Brons (2016, p. 61) stresses that "…he [Davidson] recognized that there are (or can be) 'differences or provincialisms in our conceptual schemes. But these are variants or features we can explain to one another, or could, given enough time, adequate attention, and sufficient intelligence on both sides' ([Davidson, 1997, p.] 128…)". This same point has been noticed also by Wheeler, 2014, p. 68.
[256] Davidson, 1974, p. 14
[257] Davidson, 1974, p. 14
[258] "Specific" here means "relative to a species"
[259] Unfortunately, I have not managed to understand whether adaptationist scholars envisage these different worldviews as "incommensurable"/"not intertranslatable" (Davidson, 1974, p. 12) or not. However, as we will see, this does not particularly compromise the present discussion which, in this chapter, is mainly focused on non-adaptationist approaches.

(which, *in principle*[260], does differ from that of other species). Within this perspective, objects and their properties are defined by organisms in the course of evolution. Moreover, within non-adaptationist approaches, we can observe two forms of untranslatability or incommensurability (or, as Davidson would call it, non-intertranslatability)[261] among different worldviews: strong, and weak untranslatability. The strong form is found at an ontogenetic level among members of the same species which live in the same experiential context and have the same cognitive apparatus, but which happens to hold different worldviews. This kind of untranslatability is supported only by Riegler (2012). On the other hand, the weak form of incommensurability is to be found among worldviews that are generated by organisms belonging to different species (i.e. between human beings and extra-terrestrial forms of life in the most radical case)[262] which have different cognitive apparatus and experiential worlds.[263] This type of untranslatability is supported by Clark (1986), Ruse (1989), Diettrich (1991, 1992, 1998, 2001, 2004), and Riegler (2012). Wuketits (2000) does not speak in terms of "untranslatability" among different conceptual schemes, but he nonetheless admits that organisms belonging to different species

[260] "*In principle*", because it can be said only within our worldview that there are other experiential worlds and worldviews! I think that non-adaptationist scholars would not take the risk of affirming that different cognitive sets give rise to different worldviews in any categorical way: that other organisms with different cognitive apparatus have different worldviews can be affirmed only in principle, on the basis of our very (current) worldview. Along these lines, as Clark (1984b, p. 169) notices, one could even argue that "…from within a given, highly tolerated model S it is sensible to regard other possible alternative models P, Q, R as models *of* the reality described by S. Similarly, within P, it would be right to see S, Q, R, as models of the reality described by P. What makes no sense is to seek after a standpoint from within no model at all and to ask what transcendental reality is modelled by P, Q, R, $S_{n1…nx}$. One nice consequence of this analysis is that we can allow the possibility of alien epistemologists (perhaps even alien evolutionary epistemologists) working successfully with a different model of the 'common reality' to our own! Such epistemologists may even diagnose man's models as a natural end explicable outcome of our own biological nature as it appears to their science. We, of course, might do the same for them! Each scientific model would therefore be sufficiently powerful to embrace the working of the other, though they may each be based on different intellectual strategies and basic forms of access to data". This, however, does not mean that we can translate extra-terrestrial models into human terms. As pointed out by Diettrich (2004, p. 44): "…we could…come to a kind of working arrangements with extraterrestrians if we met them. After a period of cohabitation we might learn how they behave in given situations. This might lead to a modus vivendi. But we cannot understand them, i.e. we cannot extrapolate their behaviour to new and unknown situations".

[261] Davidson, 1974, p. 12

[262] Clark (1986), Ruse (1989) and Diettrich (1991, 1992, 1998, 2001, 2004) all report this example.

[263] Cf. footnote 262

elaborate different worldviews on the grounds of their very cognitive apparatus and species-specific experiential world.

In the light of their relativistic setting, it could seem that both adaptationist and non-adaptationist perspectives are liable to Davidson's critique of conceptual relativism. However, it must be notice that Davidson's argument is directed against "…the metaphor of *a single space* within which each [conceptual] scheme has a position and provides a point of view".[264] If applied to an evolutionary epistemological context, this means that Davidson's critique is directed against the idea that there is a single "amorphous"[265] reality or a single experiential world with respect to which different cognitive apparatus have different positions and generate different and incommensurable worldviews (or theories about the world or strategies to deal with nature). Along these lines, it appears that only adaptationist scholars (in the case they conceive different species-dependent worldviews to be incommensurable)[266] and those non-adaptationist thinkers who affirm a strong kind of untranslatability are affected by Davidson's critique. Indeed, they both admit the possibility of incommensurable worldviews relative to the same reality (adaptationist thinkers) or experiential world (non-adaptationist scholars supporting a strong form of untranslatability). On the other hand, it turns out that the Davidsonian argument here considered does not undermine those non-adaptationists that only endorse the weak form of untranslatability between schemes. Within this perspective, since different species-dependent cognitive apparatus fit different species-dependent experiential worlds, and not a very same empirical content, the situation envisaged by Davidson's argument does not occur. Along these lines, the non-adaptationist idea of "…multiple valid species-specific descriptions [of the world] whose objects are determined by the descriptions

[264] Davidson, 1974, p. 17, Italics mine
[265] Faye, 2016, p. 206
[266] Cf. footnote 261

themselves…" remains untouched by Davidson's argument.[267] The latter, as Clark (1986) argues, actually seems to give support to the very non-adaptationist approach to EE.[268]

4.1.2. On the very idea of organising experience

As seen in the previous sub-section, Davidson's critique of the idea of incommensurable different conceptual schemes fitting the same experiential world (or reality) does not affect non-adaptationist approaches to EE, at least in so far as the latter do support a weak form of untranslatability. However, as mentioned in the introductory remarks to 4.1., Davidson's attack of conceptual relativism does not boil down to the just discussed critique, but it is also directed at the idea that conceptual schemes serve to organise experience. This idea, as we shall see, is not directly tied to the question considered above. Thus, the fact that non-adaptationist perspectives appear to be immune to the previous critique does not necessarily imply that they are also resistant to this second attack.

According to non-adaptationist thinkers, cognition serves to organize our experiential domain into objects and their relative properties. Thus, contrary to what adaptationist evolutionary epistemologists hold, objects, their properties, and natural laws are not already given in an independent external world, but determined by us (our ancestors and, very likely, our successors) in the course of evolution. Along these lines, in opposition to adaptationist scholars, non-adaptationist philosophers believe that "…our posits (or positings) [do not] follow inherent 'joints' in nature or external reality"[269]. This idea is explicitly clear in Riegler (2006, 2012) who, by following Glasersfeld's (1991) lesson, thinks that "…the function of

[267] Clark, 1986, p. 159
[268] Clark, 1986, p. 159
[269] Brons, 2016, p. 61

cognition is adaptive; it serves the organization of the experiential world, not the discovery of ontological reality".[270] Diettrich (1992) himself seems to make a similar point when he states that "…cognitive and scientific as well as organic evolution is an enterprise of conquest rather than of discovery and reality will lose its role as a universal legislator and evaluator…*Reality, so to say, is the outcome of its own history*.".[271] By following Putnam (1981), Ruse (1995) too comes to affirm the idea that "'objects' do not exist independently of conceptual schemes. We cut up the world into objects…".[272] Moreover, as already seen, Clark (1986) believes that objects are determined by "multiple valid species-specific descriptions"[273] and, for his part, Wuketits (from 1989 onwards) thinks that reality and its objects are the product of the constructing activities of our ancestors.

The non-adaptationist idea that conceptual schemes/cognitive sets organise experience might seem to be put into question by Davidson (1974). In the opinion of Davidson, "the notion of organization applies only to pluralities":

> "we cannot attach a clear meaning to the notion of organizing a single object (the world, nature, [an experiential domain,] etc.) unless that object is understood to contain or consist in other objects. Someone who sets out to organize a closet arranges the things in it. If you are told not to organize the shoes and shirts, but the closet itself, you would be bewildered".[274]

In other words, Davidson is convinced that the notion of a conceptual scheme organizing experience necessarily implies an experiential world already portioned/cut up into objects.[275] As noted by Brons (2016), this argument has traditionally been interpreted as suggesting

[270] Riegler, 2006, p.52. Riegler (2012, p. 247) speaks of the idea of "…assembling and fitting experiences".
[271] Diettrich, 1992, Italics mine.
[272] Putnam, 1981, p. 52, quoted by Ruse, 1995, p. 65, quoted by Lemos, 2002, p. 794
[273] Clark, 1986, p. 159
[274] Davidson, 1974, p. 14
[275] Wheeler, 2014, p. 59

Davidson's commitment to the existence of "an external reality consisting of (or pre-organized into) discrete objects and events".[276] On the grounds of this very interpretation, it would seem that Davidson's position approximates that supported by adaptationist scholars. However, as shown by Brons (2016), it is not at all clear whether Davidson's original position did in fact coincide with its traditional reading.[277] Indeed, as reported by Brons (2016), some authors (Farrell (1994), Malpas (2011), Brons himself (2012, 2013), and Wheeler (2014)) have offered interesting interpretations of Davidson's attack which distance themselves from the abovementioned traditional interpretation.[278] According to these very interpretations, Davidson's position must be read as rejecting (or "moderately" refusing) the idea that conceptual schemes do organize experience on the basis of pre-given or "inherent joints in nature".[279] Along these lines, if we follow Wheeler's (2014) reading of Davidson, it appears that Davidson's position is actually much closer to non-adaptationist perspectives rather than to adaptationist ones. According to Wheeler, the (adaptationist) idea that our experiential world is objectively divided into objects does not make sense.[280] Indeed,

"If there were objective divisions in nature, the most likely divisions in nature ["microparticles and fields"[281]] would have only a loose connection to the objects we have evolved to be and notice. We impose…[our conceptual] scheme *independently* of any pressure from the natural divisions of the world, if such there be".[282]

[276] Brons, 2016, p. 61. According to Brons (2016, pp. 61-62) this interpretation seems to find elements of confirmation also in some of Davidson's later works (1992, 1993a, 1993b).
[277] Brons, 2016, p. 62
[278] Brons, 2016, p. 62
[279] Brons, 2016, p. 62
[280] Wheeler (2014) does not speak in terms of adaptationism and non-adaptationism, but I think his discussion can be easily translated also in these terms.
[281] Wheeler, 2014, p. 65
[282] Wheeler, 2014, p. 65

Accordingly, Wheeler (2014) proposes a new interpretation of Davidson's position according to which Davidson regarded objects (or, in the words of Wheeler, "Beings") as "artifacts rather than givens".[283] Within this perspective, these *artefacted* objects appear to have been constructed during evolutionary times "by our billions-of-years-long sequence of ancestors" whose "posits", in turn, were "largely determined by [their] billions-of-years-long sequence of ancestors".[284]

In the light of this novel interpretation, Davidson's critique of the idea that conceptual scheme organizes experience does not imply that our experiences are structured on the basis of "inherent "joints" in nature or external reality"[285]. To the very contrary, it suggests that the idea of conceptual schemes organizing experience makes sense only if it implies that our conceptual schemes serve to (re-)organize the experiential world that we inherit from our ancestors and which, in a sense, is already cut up into (constructed) objects. As put it by Wheeler (2014):

> "The divisions into properties and beings that matter to organisms, including the ones that identify those very organisms, seem not to be the product of nature, but rather a very sloppy product of those very sloppy products, organisms, themselves…We make our objects. In Hegel's sense, our objects are us".[286]

This image, I think, does not only offer a way to clearly see the nexus between Davidson's position and non-adaptationism, but it also reiterates the fundamental circular character of the relation between knowledge and reality as envisaged by non-adaptationist scholars (see section 3.2). Along these lines, if we reject traditional readings of Davidson's critique on the basis of

[283] Wheeler, 2014, p. 62
[284] Wheeler, 2014, p. 64
[285] Brons, 2016, p. 61
[286] Wheeler, 2014, pp. 65-66

Wheeler's interpretation, Davidson's argument ceases to be a potential threat to the tenability of non-adaptationist positions.[287]

4.2. Did dinosaurs exist before us? A problem of backward causation

As seen, non-adaptationist scholars think that reality with its regularities is posited in the course of phylogenetic evolution rather than given in an outside world. Said differently: non-adaptationist thinkers hold that our reality and its regularities are brought about by us (intended as species), our own species-specific sensory and cognitive faculties. So far so good, unfortunately this very picture seems to give rise to an inherently paradoxical situation where the existence of past things seems to depend on the existence of future things. In what follows, I will present an argument intended to highlight this very paradoxical state of affairs implicated by non-adaptationist approaches to EE. Thus, I will demonstrate that such approaches are only partially hit by this argument, in so far as they are understood as offering nothing more than an epistemological point of view.

As noticed by Stefano Caputo (2015), it appears that constructivist antirealist thinkers (whose position, in our discussion, coincides with that of non-adaptationist epistemologists) hold that the existence of things, *past things included*, depends on us, Homo sapiens, who by nature are endowed with a species-specific cognitive and perceptual apparatus.[288] However, as Caputo affirms, the idea that past things are *causally* dependent on future things is absurd since it implies a form of *backward causation*, which goes against our common sense as well as our

[287] It is beyond the scope of this thesis to ultimately decide on the correct reading of Davidson's argument. Here, for obvious reasons, I support Wheeler's interpretation.
[288] Caputo, 2015

scientific and philosophical beliefs about causation.[289, 290] By following a scheme developed by Caputo (2015) himself, we can put this in a more formal way:

"…It seems that … [constructivist antirealism] entails the acceptance of:

1. There are no mountains independently of us

2. There have not been dinosaurs independently of us.

…Also note that the following theses are considerably accredited from a scientific point of view:

[3]. Some mountains already existed five million years ago

[4]. Homo sapiens did not exist yet five million years ago

[5]. The dinosaurs did exist two hundred million years ago

[6]. Homo sapiens did not exist yet two hundred million years ago,

from which respectively follows

[7]. Some mountains did exist before Homo sapiens (and the latter came into existence after them)

[8]. The dinosaurs did exist before Homo sapiens (and the latter came into existence after them).

…Now, (9) seems to be an acceptable way (and generally accepted in philosophy) to explicate a sentence such as "x does not exist independently of y":

[289] Caputo, 2015

[290] According to the Stanford Encyclopedia of Philosophy: "The notion of backward causation…stands for the idea that the temporal order of cause and effect is a mere contingent feature and that there may be cases where the cause is causally prior to its effect but where the temporal order of the cause and effect is reversed with respect to normal causation, i.e., there may be cases where the effect temporally, but not causally, precedes its cause". Faye, J. 2001 [2015]. Backward Causation. https://plato.stanford.edu/entries/causation-backwards/, accessed 22/05/2017

[9]. x does not exist independently of y = if y did not exist, x would not have existed either

…From (9) and respectively (1) and (2), it follows though

[10]. If we did not exist (the members of the Homo sapiens species), mountains would not have existed

[11]. If we did not exist (the members of the Homo Sapiens species), dinosaurs would not have existed".[291]

As reported by Caputo, in the light of propositions 7&10 and 8&11, it appears that constructivist antirealists support a form of backward causation: future things bring about past things (or, by echoing Caputo's example, Homo sapiens brought about dinosaurs and even some mountains).[292] According to Caputo, this picture is misleading and goes against scientific

[291] Caputo, 2015, translation mine,
"Sembra che...[l'antirealismo costruttivista] comporti l'accetazione di:

1. Non ci sono montagne independentemente da noi
2. Non ci sono stati dinosauri independentemente da noi.

Si osservi inoltre che sono tesi notevolmente accreditate scientificamente le seguenti:

3. Alcune montagne esistevano già cinque milioni di anni fa
4. L'Homo sapiens non esisteva ancora cinque milioni di anni fa
5. I dinosauri sono esistiti duecento milioni di anni fa
6. L'Homo sapiens non esisteva ancora duecento milioni di anni fa,

da cui seguono rispettivamente

7. Alcune montagne esistevano da prima dell'Homo sapiens (e questi è veneuto all'esistenza dopo di quelle)
8. I dinosauri sono esistiti prima dell'Homo sapiens (e questi è venuto all'esistenza dopo di quelli)

Ora (9) sembra essere un modo accetabile (e generalmente accettato in filosofia) di esplicitare una frase come "x non esiste indpendentemente da y":

9. x non esiste independentemente da y = se non fosse esistito y non sarebbe esistito nemmeno x.

Da (9) e rispettvamente (1) e (2) seguono però

10. Se non fossimo esistiti noi (i membri della specie Homo sapiens) non sarebbereo esistite le montagne
11. Se non fossimo esisititi noi (i membri della specie Homo Sapiens) non sarebbero esistiti i dinosauri".
The numerical order of the propositions here used (both in the text and in the notes) does not correspond with that employed in the online version (which is mistaken), but I guess it coincides with that of the original version.
[292] Caputo, 2015

and philosophical tenets about causation and its nature.[293] Along these lines, Caputo holds, showing that constructivist antirealist approaches imply a form of backward causation (which by its nature is paradoxical), means demonstrating their fundamental untenability.[294] In the light of this, within the context of our discussion, showing that non-adaptationist perspectives imply a form of backward causation would mean demonstrating their inherent invalidity.

As Caputo notices, by following Rorty (1998), some constructivist antirealists could try to resist the accusation of supporting backward causation by replacing the notion of a "causal dependency of things from our concepts" with that of a "*representational dependency*".[295] Since we cut up reality into objects and their properties on the basis of our cognitive structures, if we had possessed different cognitive structures, reality would have appeared different to us.[296] However, as Caputo (2015) shows, this image is at fault. Indeed, by drawing upon Ferraris's work (2001, 2012), Caputo demonstrates that constructivist antirealist approaches confuse epistemology with ontology, that is "…what we know, and are able to represent to ourselves, and what there is".[297] According to Caputo, even if our concepts mediate our contact with reality, this does not mean that reality and its objects are brought about by our concepts.[298] In other words, to exemplify this latter point, even if our concepts shape "our access to reality", this does not mean that dinosaurs did not exist before we developed a concept of "dinosaur".[299] In the light of this, Caputo goes on to argue, two main yes-no options are opened to the constructivist antirealist (or, in our discussion, to the non-adaptationist thinker): either she admits that there were dinosaurs before we came into existence, but nobody with the ability of representing/conceptualizing them was there, or she states that no dinosaurs have existed

[293] Caputo, 2015
[294] Caputo, 2015
[295] Caputo, 2015, translation mine, "dipendenza causale delle cose dai nostri concetti", "*dipendenza rappresentazionale*" (Italics in original)
[296] Caputo, 2015
[297] Caputo, 2015, translation mine, "...quello che sappiamo, e siamo in grado di rappresentarci, e quello che c'è".
[298] Caputo, 2015
[299] Caputo, 2015, translation mine, "il nostro accesso alla realtà"

regardless of the fact that nobody was there to represent/conceptualize them.[300] Whereas the first option is epistemologically sound, but ontologically empty, the second option appears to fundamentally imply a form of backward causation.[301]

Now, to schematise Caputo's (2015) results and to apply them to non-adaptationist approaches, we obtain that, in trying to defend themselves from the accusation of supporting a form of backward causation:

I. Non-adaptationist approaches seem to mistake epistemology for ontology.

II. To avoid this confusion, the non-adaptationist thinker can embrace either an epistemologically sound perspective which, however, is ontologically devoid, or hold a paradoxical ontological position which in fact imply retrocausality. In the first case, the non-adaptationist scholar admits that there were dinosaurs independently of us, in the second case, she contrariwise affirms that there have not been dinosaurs independently of us.[302]

However, one can ask, do non-adaptationist approaches actually mistake epistemology for ontology? Moreover, are the abovementioned options (II) the only possible two to which the non-adaptationist epistemologist can appeal? I believe there are more options for non-adaptationism than just the two offered by Caputo.

On the one hand, common-sense realists (Clark, Ruse, and Wuketits) hold that the world of our experience and interpretation is all there is and our beliefs about an object are true if they cohere with other beliefs and experiences (see chapter 2). Thus, within this perspective, dinosaurs can be said to have existed not in virtue of a (structural) correspondence between our

[300] Caputo, 2015
[301] Caputo, 2015
[302] Caputo, 2015

belief about dinosaurs and dinosaurs in-themselves, but in virtue of the fact that our belief in dinosaurs is supported by a number of other beliefs (i.e. there was something before we came into existence) and evidence (i.e. fossils). As Ruse (1989) puts it in a passage of "The View from Somewhere: A Critical Defense of Evolutionary Epistemology" which has been quoted by Wuketits (2000, p. 36) and which surely well expresses also Clark's view:

"We still have the real world, but it is the world as we interpret it. What is being rejected is not reality in any meaningful sense. No one is saying, for instance, that *dinosaurs* did not exist, or that if you see a fierce tiger, you can simply put your hand through it and wish it out of existence. It is simply to acknowledge that reality and thinking about it are inseparable and that the belief in something beyond this is meaningless and redundant".[303]

In the light of what said above and in the light of the just mentioned common-sense realist assumptions that "the real world…is the world as we interpret it" and that "reality and thinking about it are inseparable", one could argue that Clark, Ruse, and Wuketits do indeed confuse an epistemological level with an ontological one. It seems that Clark, Ruse, and Wuketits do indeed mistake "…what we know, and are able to represent to ourselves, and what there is"[304]. As a consequence, common-sense realists are left to choose whether to reinterpret their position in epistemological terms or ontological ones. As seen, if they choose the first option, they reach a reasonable epistemological conclusion, which is ontologically unsound; if they choose the second option, they end up facing a problem of backward causation.

On the other hand, complete constructivist epistemologists seem to avoid any "collapse between ontology and epistemology"[305]. By maintaining an agnostic point of view on reality,

[303] Ruse, 1989, p. 220, Italics mine
[304] Caputo, 2015, translation mine, "...quello che sappiamo, e siamo in grado di rappresentarci, e quello che c'è".
[305] Silvestro, 2008, Recensione di *Pragmatismo, Filosofia analitica, Epistemologia*, in «ReF n.32», online version: https://www.quodlibet.it/recensione/562 (accessed 24/05/2017), translation mine. "collasso tra ontologia e epistemologia"

complete constructivism must be understood as an "epistemic theory"[306] not interested in ontological kinds of speculation.[307] According to complete constructivists we are not in the condition of saying whether there exists an ontological independent outside world or not. Nonetheless, they think, from an epistemological point of view we have good reasons to avoid resorting to such an entity or, as Riegler (2001) says, "[to] forgo…recourses to a mind-independent reality".[308] As put it by Diettrich (2001),

"…it is no longer an epistemological imperative to start from an independently predefined ontological reality which is said to determine in the long run both the strategies of mastering nature and the theories of analysing it…".[309]

Within this perspective, the belief in the existence of dinosaurs is still said to be true (viable) in virtue of its coherence with other beliefs and experiences and in relation to our sensory and cognitive capacities. However, this very belief does not have any ontological status. Thus, whereas common-sense realists such as Clark, Ruse, and Wuketits appear to confuse epistemological considerations with ontological assumptions, we have good reasons to hold that complete constructivist epistemologists maintain their discussion mainly at an epistemological level.[310, 311]

[306] Quale, 2007, p. 231. Here Quale refers to "radical constructivism" in general, but his definition of "epistemic theory" does certainly hold also for complete constructivist theories à la Diettrich and Riegler as well.
[307] Riegler, 2001, p. 2
[308] Riegler, 2001, p. 5
[309] Diettrich, 2001, p. 7
[310] That complete constructivist philosophers are mainly concerned with epistemology has been noticed also by Randrup (2004), even if just with respect to Diettrich's work.
[311] While we can be pretty sure of Riegler's subscription to agnosticism and thus to an inherently epistemological position, the same cannot be said of Diettrich. To be precise, Diettrich (2004, p. 59) affirms that "*...events can be defined as the results of cognitive or scientific interpretations,* just as visual patterns can only be defined as invariants of cognitive operators. *A modification of the interpretations of events used (for example, in the presence of a novel theory) may well affect the past.* But because this has not happened during historical times, the illusion arose of both the facticity of the past and the objectivity of the laws of nature" (Italics mine). Here Diettrich could seem to embrace an ontological position. However, I think we have good reasons for picturing Diettrich's position in the terms of an agnostic and epistemological one. On the one hand, the forementioned passage is part of a section entitled "Epistemological autoreprodcution" which, I think, guarantees Diettrich's awareness of the epistemological character of his discussion. On the other hand, as seen

As mentioned above, according to Caputo (2015) two main options are opened to the non-adaptationist scholar who wants to make sense of the existence of things in the past, by avoiding the "collapse between ontology and epistemology"[312]: on the one hand, a sound epistemological option, but empty from an ontological point of view; on the other hand, an ontological option which, however, leads to a paradoxical scenario.[313] In the first case, the non-adaptationist scholar states that dinosaurs came into existence before us, but nobody at that time could conceptualize/represent them; in the second case, the non-adaptationist scholar deny the idea that dinosaurs existed independently of us, but, in doing so, she affirms a form of backward causation.[314] Given these two possibilities, common-sense realists could try to avoid embracing a paradoxical position, by appealing to the first option. Thus, by following Wheeler (2014) and Faye (2016), common-sense realists could say that dinosaurs did exist before human beings came into existence, but at that time there were no *truth-makers*.[315, 316] Along these lines, common-sense realists could argue that although "…[fossil evidence, that is] what makes a decidable sentence [(i.e. "dinosaurs did exist")] about a material object true or false exists in the world independently of any actual investigation[,]…this reality endows the sentence a truth value only because what makes it true is acting as a 'truth-maker' in virtue of its relation to the history of cognitive human beings".[317] This, as Caputo (2015) would put it, is an epistemologically sound position, which, however, has no ontological value.[318]

in chapter 2 (note 143), Diettrich is part of the editorial board of the journal "Constructivist Foundations". Since the journal opens with a list of aspects which are shared by all radical constructivist positions and agnosticism figures among these, I assume that Diettrich (who espouses a complete constructivist approach) subscribes to an agnostic perspective too.

[312] Silvestro, 2008, translation mine, "collasso tra ontologia e epistemologia"

[313] Caputo, 2015

[314] Caputo, 2015

[315] Wheeler, 2014, p. 67 and Faye, 2016, p. 206

[316] Although Wheeler's argument does refer to electrons and Faye's claims do not refer to past things in particular, we can easily apply both of them also to our Jurassic friends.

[317] Faye, 2016, p. 205

[318] Caputo, 2015

As previously seen, complete constructivist thinkers do not mistake epistemology for ontology, but do recognize that their account of cognition and reality has indeed only an epistemological import. However, contrary to what Caputo (2015) holds, by maintaining their discussion at an epistemological level, complete constructivist thinkers do not end up admitting that dinosaurs did in fact exist, but nobody at that time was there to conceptualize them. According to complete constructivists, we cannot be completely sure that dinosaurs existed, since as put it by Quale (2007):

"…the question of 'what really happened' is, from the point of view of cognition, a meaningless one. All we can do is construct our cognitive knowledge of the past to be viable – that is to say, a description (a story) that is as compatible as possible with present-day experience (which may include personal memory, hearsay, records, artefacts, fossils, evidence, …), and with whatever theoretical framework and ontological assumptions we may want to adopt".[319]

Of course, this does not mean that every theoretical model will do: a theoretical model of the world is scientifically "good" only if "*it is viable for us in the context of science*" [320] – that is to say, if it agrees with "accepted observational data" and abide to the "rules of the game", the rules of the scientific domain interested.[321] Thus, without trespassing on an ontological dimension, the complete constructivist thinker can nonetheless maintain an agnostic perspective on the existence of dinosaurs and, at the same time, affirming that on the ground of our current experience and knowledge we have good reasons to believe in dinosaurs. In the light of this, a new feasible way is opened to the non-adaptationist thinker who wants to avoid the "collapse between ontology and epistemology"[322], but also to gratuitously recognize that

[319] Quale, 2007, p. 248
[320] Quale, 2007, p. 248, Italics in original
[321] Quale, 2007, p. 247
[322] Silvestro, 2008, translation mine, "collasso tra ontologia e epistemologia"

dinosaurs did exist as Caputo's option dictates. Also this way, however, despite its epistemological feasibility, implies the renounce to a "theory of the object"[323] and is, thereby, ontologically empty.

4.3. Conclusion

In this chapter, I have taken into consideration two main orders of critiques to non-adaptationist approaches. On the one hand, I have reread Davidson's attacks to conceptual relativism in evolutionary epistemological terms and directed them against non-adaptationist perspectives. On the other hand, I have discussed to what extent non-adaptationist approaches are liable to the accusation of supporting a form of backward causation and how this would undermine their tenability. Thereby, I have provided arguments in defence of non-adaptationist positions.

In section 4.1 and its relative sub-sections 4.1.1 and 4.1.2, I have presented Davidson's arguments and defended non-adaptationist standpoints from the charge of respectively supporting 1) the idea that there can be untranslatable conceptual schemes fitting the very *same* uninterpreted empirical content and 2) the idea that it is possible to organize experience (the latter intended as a "single object"[324] not pre-cut in different entities).

As seen in section 4.1.1, Davidson's first critique (1) must be read as directed against "…the metaphor of *a single space* within which each [conceptual] scheme has a position and provides a point of view".[325] Put it into evolutionary epistemological terms, Davidson's first critique appears to be directed against the idea that there is a single experiential world with

[323] Ferraris, 2008, pp. 197-198, quoted in Silvestro, 2008, translation mine. "teoria dell'oggetto"
[324] Davidson, 1974, p. 14
[325] Davidson, 1974, p. 17, Italics mine

respect to which different cognitive apparatus have different positions and generate untranslatable/incommensurable worldviews (or theories about the world or strategies to deal with nature). In that context, I argued that whereas Davidson's critique does at best affect adaptationist positions (in case they conceive different species-dependent worldviews to be incommensurable) and surely undermine non-adaptationist perspectives holding a strong form of untranslatability, it leaves untouched non-adaptationist approaches affirming a weak form of untranslatability. Indeed, since according to this latter perspective, different species-specific cognitive apparatus fit different species-dependent experiential worlds, and not a *same* and *single* uninterpreted empirical content, the situation envisioned by Davidson's argument does not occur.[326]

As mentioned above, Davidson's second critique (2) is aimed at demonstrating the untenability of the idea that conceptual schemes do organize experience, where the latter is pictured as a "single object" and not as something already portioned into different entities. As seen in section 4.1.2, according to a traditional reading of Davidson's argument, in criticizing the abovementioned idea, Davidson commits to the existence of "an external reality consisting of (or pre-organized into) discrete objects and events".[327] If read in this way, Davidson's argument would seem to approximate adaptationist positions and to undermine non-adaptationist ones. Indeed, according to the latter, I) cognition serves to organize experience and II) reality, its objects, and their properties are the product of the organizing/constructing activity of our ancestors. However, as seen, Davidson's position is not so clear-cut and there exist other interpretations of Davidson's critique which present it under a completely different light. Among others, Wheeler's (2014) interpretation of Davidson's argument reveals an unexpected proximity between Davidson's point of view and non-adaptationist perspectives. According to Wheeler, rather than pointing towards the idea that conceptual schemes organize

[326] Cf. footnote 262
[327] Brons, 2016, p. 61

experience by following "inherent "joints" in nature or external reality"[328], Davidson's argument does actually seem not to imply any reference to a pre-categorized external world. By suggesting the idea that conceptual schemes serve to (re-)organize the experiential world that we inherit from our ancestors and which, in a sense, is already cut up into (constructed) objects, Davidson's argument appears to support non-adaptationist positions, rather than undermine them.

After having discussed Davidson's critiques and shown that they left untouched non-adaptationist approaches, in section 4.2, I have analysed a different kind of critical arguments directed against non-adaptationism. Non-adaptationist positions appear to be accusable of bearing with themselves an inherently paradoxical situation, where the existence of past things seems to depend on the existence of future things. Also known as backward causation, this state of affairs goes against common-sense as well as philosophical and scientific assumptions about causation and its nature.[329] By following Caputo (2015), I argued, showing that non-adaptationist perspectives do de facto imply a form of backward causation would mean demonstrating their fundamental untenability. To see whether this is the case or not, I looked at what non-adaptationist authors do de facto argue.

On the one hand, by maintaining a non-realist standpoint and by confusing epistemology with ontology, common-sense realist scholars end up supporting a form of backward causation. To avoid the accusation of supporting such a paradoxical state of affairs, the only option opened to common-sense realists seems that of admitting that past things (i.e. dinosaurs) did exist independently of us, but in that past, nobody was there to conceptualize/imagine them. This, as seen, is an epistemological sound position, which however appears to be empty from an ontological point of view. On the other hand, by not mistaking epistemology for ontology, complete constructivist epistemologists keep their

[328] Brons, 2016, p. 61
[329] Caputo, 2015

discussion at an epistemological level and resist the accusation of supporting some actual form of backward causation. Moreover, by maintaining an agnostic metaphysical point of view, complete constructivists think we cannot be completely certain that dinosaurs did actually exist. Since we cannot be sure of what happened in the past, the complete constructivist argues, the only thing we can do is appealing to the most viable theoretical model at hand to explain current evidence. Thus, without risking trespassing on an ontological dimension, the complete constructivist thinker can nonetheless maintain an agnostic perspective on the existence of dinosaurs and, at the same time, affirming that on the ground of our current experience and knowledge we have good reasons to believe in dinosaurs. Along these lines, complete constructivist scholars offer another way to those common-sense realists who want to avoid the "collapse between ontology and epistemology"[330], but also to gratuitously recognize that dinosaurs did exist as Caputo's option imposes. This, however, remains only an epistemological possibility, empty from an ontological point of view.

By maintaining their discussion at an epistemological level - either because forced to do it (common-sense realists) or because naturally driven towards this direction (complete constructivists) -, non-adaptationist approaches can resist the accusation of supporting a form of backward causation, but at only at the expenses of a "theory of the object"[331].

In conclusion, non-adaptationist perspectives turn out to not be liable to Davidson's critiques of conceptual relativism and to be able, to a certain extent, to rebut the accusation of supporting retrocausality. This very fact consolidates the tenability of non-adaptationist approaches to EE and brings fresh grist to their mill.

[330] Silvestro, 2008, translation mine, "collasso tra ontologia e epistemologia"
[331] Ferraris, 2008, pp. 197-198, quoted in Silvestro, 2008, translation mine. "teoria dell'oggetto"

5. Conclusion

Today some philosophers continue to overlook the powerful insights that evolutionary theory might provide to epistemology. As noticed by Faye (2016), by ignoring the evolutionary origins of our cognitive and perceptual apparatus, these philosophers continue to "…occupy themselves with a conceptual analysis of propositions neglecting the fact that these propositions have a human origin".[332] In my thesis, I have sought to demonstrate the importance of considering evolution when studying human knowledge. As seen, not only does evolution determine our cognitive capacities, but it also shapes their field of action as well as their limits.[333] In the light of this, a collaboration between epistemology and evolutionary theory has appeared to be essentially unavoidable.

Along these lines, in the introductory remarks (chapter 1), I took care to stress the advantages of an evolutionarily informed epistemology which, as seen, bears with itself the virtuous mark of both historicism and naturalism. In that context, I argued that evolutionary epistemology stems from both historical epistemology and naturalised epistemology, but ultimately goes beyond them. On the one hand, Darwinism represents a way to inscribe traditional epistemological problems within a powerful historical framework informed by the most recent biological findings and theoretical models. This very framework, as seen, can help epistemologists to appreciate the evolutionary facets of some traditional epistemological questions as well as objects. Moreover, by not limiting the epistemological investigation to the individual and his/her particular beliefs, but by taking into consideration also societal as well as phylogenetic aspects of knowledge, Darwinism comes to provide epistemology with a much more comprehensive point of view on the nature of human knowledge. On the other hand, by

[332] Faye, 2016, p. 32
[333] Faye, 2016, p. 31

reconnecting human beings and knowledge to their evolutionary origins and by underlining the necessity of considering biological evolution in studying knowledge, evolutionary epistemology comes to support also a naturalised epistemological point of view.[334] However, as seen, evolutionary epistemology partially distances itself from traditional naturalised epistemology and comes to enlarge the scope of the latter. On the one hand, evolutionary epistemology comes to extend the meaning of knowledge up to include "non-linguistic behaviour".[335] On the other hand, whereas within NE knowledge appears to be just a human prerogative, EE comes to understand knowledge as every "knowledge relation" that, regardless an organism's capacity of language, every organism entertains with its environment.[336]

After demonstrating the virtues of an evolutionary approach to the study of knowledge, I set to answer my research questions. How does evolution affect our image of the world? How does our evolutionary history constrain our knowledge and shape our place in the world? As mentioned in the introductory remarks, the answer to these questions essentially depends on the choice of a certain evolutionary epistemology and its relative evolutionary theory. Thanks to the discussion in chapter 2 and 3, it should have become now clear that we have good reasons for answering the abovementioned questions from a non-adaptationist evolutionary epistemological point of view.

After presenting different adaptationist and non-adaptationist evolutionary theories (section 2.1) and epistemologies (sections 2.2 and 2.3), in chapter 3 I demonstrated that non-adaptationist perspectives are to be preferred over adapationist ones. Contextually, I considered two key situations where non-adaptationist approaches have the upper hand over adaptationist EE. Firstly, I argued against the adaptationist idea that the success of our adaptive strategies can be explained only by adopting a hypothetical realist stance, that is, in the light of the

[334] Bradie and Harms, 2016
[335] Gontier, IEP
[336] Gontier, 2006, p. 9 and Gontier, IEP

existence of an independent and objective external reality lying beyond the domain of our experiences which can be known only in a partial and preliminary way. Thus, by following the non-adaptationist lesson, I showed that both the success of our cognitive tools and our experiences of resistance and pain can be explained also without postulating an objective reality beyond our experiential world. On the one hand, our survival is guaranteed by the fact that our cognitive (and organic) capacities allow us to meet the requirements of our own world (which is species-dependent), and not those of a supposed independent reality. On the other hand, our experiences of resistance and pain do not say anything about an ultimate reality, but only that some construction networks of ours are old and thus difficult to modify. In the light of this, since non-adaptationist scholars are able to account for the same set of phenomena considered by adaptationist thinkers without positing, however, any further entity beyond our experiential domain, I argued that non-adaptationist perspectives provide us with a much more consistent way to explain the success of our cognitive faculties as well as our experiences of resistance and pain. Since we have no compelling reasons for explaining these very phenomena by appealing to a world-in-itself, I concluded, non-adaptationist approaches should be preferred over adaptationist ones.

Secondly, non-adaptationist approaches should be preferred over adaptationist ones, because, unlike the latter, are immune to the anti-naturalist attacks which pivot on the presence of an epistemic circularity. On the one hand, by subscribing to a realistic and dualistic perspective on the mind-world relation, adaptationist EE remains stuck in an unresolvable circular movement. On the other hand, by rejecting any mind-world dualism and any reference to an external world, non-adaptationist positions manage to tame the reality-cognition circularity and turn it in their favour. According to non-adaptationist scholars, a complete constructivist worldview (knowledge about the world) is consistent because it is able to "reconstruct itself" in a coherent way, in a way that is viable for us at this stage of evolution,

rather than, as in the case of adaptationist approaches, because it keeps faith with an independent and objective external world.[337] Thus, the fact that the abovementioned epistemic circularity impedes any comparison of our worldview with an independent external world is not a problem for complete constructivist perspectives, because they indeed hold that the best we can do is producing a coherent model which only needs to reconstruct itself. Along these lines, unlike adaptationist scholars, non-adaptationist ones are able to account both for the reliability of knowledge in general and their constructivist worldview in particular. Moreover, by abandoning the traditional theory of knowledge and by welcoming epistemic circularity as a fundamental part of theirs, non-adaptationist approaches offer a valid alternative to anti-naturalist perspectives.

The idea that non-adaptationist approaches should be preferred over non-adaptationist ones got strengthen through chapter 4. In this chapter, I tested the tenability of non-adaptationist positions by attacking them from two sides. Contextually, I provided arguments in their defence. In the first section of the chapter, I considered two Davidson's critiques to conceptual relativism and directed them against non-adaptationist approaches to EE. On the one hand, Davidson's first critique appeared to be directed against the idea that there is a single experiential world with respect to which different cognitive apparatus have different positions and generate untranslatable/incommensurable worldviews (or theories about the world or strategies to deal with nature). In that context, I argued that whereas Davidson's critique does at best affect adaptationist positions (in case they conceive different species-dependent worldviews to be incommensurable) and surely undermine non-adaptationist perspectives holding a strong form of untranslatability, it leaves untouched non-adaptationist approaches affirming a weak form of untranslatability. Indeed, since according to this latter perspective, different species-specific cognitive apparatus fit different species-dependent experiential

[337] Diettrich, 2004, p. 60

worlds, and not a *same* and *single* uninterpreted empirical content, the situation envisioned by Davidson's argument does not occur. On the other hand, Davidson's second critique aimed to demonstrate the untenability of the idea that conceptual schemes do organize experience, where the latter is pictured as a "single object" and not as something already portioned into different entities. As seen, according to a traditional reading of Davidson's argument, in criticizing the abovementioned idea, Davidson commits to the existence of "an external reality consisting of (or pre-organized into) discrete objects and events".[338] If read in this way, Davidson's argument would seem to approximate adaptationist positions and to undermine non-adaptationist ones. However, as Wheeler has noticed, rather than pointing towards the idea that conceptual schemes organize experience by following "inherent "joints" in nature or external reality"[339], Davidson's argument does actually seem not to imply any reference to a pre-categorized external world. By suggesting the idea that conceptual schemes serve to (re-)organize the experiential world that we inherit from our ancestors and which, in a sense, is already cut up into (constructed) objects, Davidson's argument appears to support non-adaptationist positions, rather than undermine them.

In the second section of chapter 4, I discussed the paradox of backward causation which, at first sight, would seem to undermine non-adaptationist approaches to EE. As seen, non-adaptationist positions appear to be accusable of bearing with themselves an inherently paradoxical situation, where the existence of past things seems to depend on the existence of future things. Also known as retrocausality, this state of affairs goes against common-sense as well as philosophical and scientific assumptions about causation and its nature.[340] In that context, I demonstrated that by maintaining their discussion at an epistemological level - either because forced to do it (common-sense realists) or because naturally driven towards this

[338] Brons, 2016, p. 61
[339] Brons, 2016, p. 61
[340] Caputo, 2015

direction (complete constructivists) -, non-adaptationist approaches can resist the accusation of supporting a form of backward causation. This, however, irremediably bears with itself a price to pay: the definitive renounce to a "theory of the object"[341].

In the light of the results of chapter 3 and 4, I think we have good reasons for embracing a non-adaptationist evolutionary epistemological perspective. Along these lines, the questions from which this thesis got started can finally be answered in an informed way. How does our evolutionary history affect our image of the world? How does evolution constrain our knowledge and shape our place in the world? As seen, within non-adaptatioist perspectives, our species-specific relationship with the world is governed by a process of continuous reconstruction (accommodation) and construction (assimilation) of our environment. Thus, rather than being passive beings shaped by the pressure of a species-independent world, we appear to be active organisms engaged in a dialectical relationship with our environment. This state of affairs, which is at the basis of every organismic evolutionary theory, has an irremediable impact on the way we picture our world. As seen, at the level of our everyday life, it is possible to talk of an independent and objective external world as well as of a correspondence relation between our beliefs and our common-sense world. The belief in an external reality has in fact proved to be highly adaptive and has enhanced our chances of survival.[342] Nevertheless, as Wuketits would put it, "…such a belief does not tell us anything *true* about the supposed ultimate reality"[343]. Along these lines, non-adaptationist thinkers suggest, our belief in a species-independent reality must be inscribed within a species-specific perspective, that is within a non-realist or agnostic point of view. Since we cannot go beyond the world of our experience and interpretation, we have no reason to postulate the existence of an independent outside world. In this way, our beliefs about the world (our theories about the

[341] Ferraris, 2008, pp. 197-198, quoted in Silvestro, 2008, translation mine. "teoria dell'oggetto"
[342] Wuketits, 2006, p. 42
[343] Wuketits, 2006, p. 42

world) would not result to be true in virtue of a correspondence with states of affairs given an external world, but only on the basis of their coherence with other beliefs relative to the same species-specific system of beliefs. This non-adaptationist image does have an irremediable impact also on the way we conceive science's aims and limits. According to non-adaptationist scholars, science does not tell us anything about an objective world, but it is limited to those objects that have some (survival) functions for us or that are viable in our experiential world. Moreover, since both our world(view) and our cognitive capacities (also extended through the use of experimental facilities) are caught up in a continuous process of transformation and redefinition, it appears to be very unlikely that science will ever attain a "theory of everything".[344]

As seen, this non-adaptationist perspective has only an epistemological import, but it appears to be devoid from an ontological point of view. Some authors, among others Faye (2016) and Randrup (2004), have recently proposed other non-realist approaches to evolutionary epistemologies. Judging whether these scholars have managed to provide a weighty "theory of the object"[345] alongside an epistemological doctrine must be, however, left to another work.

[344] Diettrich, 1992
[345] Ferraris, 2008, pp. 197-198, quoted in Silvestro, 2008, translation mine. "teoria dell'oggetto"

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