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Evolutionary prolegomena to a pragmatism epistemology of belief

0. Introduction

Since its origins, evolutionary theory has offered a new key for the understanding of nature, and suggested to us a new and promising way of understanding ourselves. Since Darwin's time, but with an increasing intensity in the last three decades, evolutionary theories have shed new light on human behavior through the reconstruction of its evolutionary history. Trying to extend the scope of evolutionary principles beyond the genetic dimension, evolutionary biology and then evolutionary psychology and anthropology have tried to shape a unified account of human nature that, under the banner of an evolutionary narrative, would equally apply to morphological, functional, and behavioral traits. Since the early times of Sociobiology to more recent studies on cultural evolution, the evolutionary sciences have progressively consolidated into an epistemological paradigm according to which human capacities and behaviour have progressively evolved out of the prolonged interaction with the environment. Trying to equally avoid purely biological and purely cultural accounts, the evolutionary paradigm has progressively paved the way for an understanding of human nature that is bridging the gap between the long lasting dualisms of nature and culture, genes and information, instinct and learning. Orientation to evolutionary success, evolutionary fitness, and adaptation are the categories invoked in order to explain why a given behaviour, practice, or institution might have evolved and survived the environmental challenges while others would have perished.

Long before this recent trend in evolutionary sciences, pragmatism had undertaken the evolutionary turn and, through the conception of a natural history of knowledge¹, had applied it to the epistemology of belief². Such a turn defines the foundational moment of pragmatism, through the well known Peircean article on the "Fixation of Belief" (Peirce

¹ A notion notably spread by John Dewey. Charles S. Peirce, who sporadically used similar notions (natural history of thought, natural history of concepts) was never really fond of it. Yet, while in a letter to Dewey written in 1904 he expressed his doubts concerning a naturalistic approach to epistemology such as the one Dewey was developing, his commitment to an evolutionary theory of logic and epistemology is nevertheless steadfast. Skagestad 1979 reviews Peirce's complex attitude towards evolutionism both as a speculative and a scientific doctrine.

² As it is well known, though sometimes forgotten, pragmatist naturalism has nearly nothing to do with contemporary programs that propose to explain cognitive, social, moral, etc. traits through the identification of their biological basis. The substitution of a physical basis of reduction (classical naturalism) with a biological basis – as is the case with neuroethics – remains largely within a reductionist program that pragmatism totally rejects. As I will try to show, the reference to the evolutionary paradigm does not have to be understood in causal terms – its function is not to provide a causal theory of cognition, morality or other. It rather serves as an hypothesis aiming at critically understanding the practices of belief fixation in their broadly evolutionary context.

1877) and through the less known but equally important Deweyan articles “Some Stages of Logical Thought” (Dewey 1900) and “The Influence of Darwinism on Philosophy (Dewey 1909).

In this article, I would like to review some of the basic pragmatist commitments to evolutionary naturalism, bringing them into dialogue with contemporary evolutionary thinking. Employing the categorial framework of evolutionary sciences and discussing some recent acquisitions in these disciplines, I will put under test the pragmatist maxim – defended by both Peirce and Dewey – that experimental inquiry has to be preferred over its competitors in reason of its superior adaptiveness.

In trying to submit epistemology to such a naturalist outlook, I will of course follow none of the recent and well known attempts at naturalizing epistemology, and the evolutionary argument I offer develops along rather different lines. In devising this path of research, I am well aware of the risks implicit in any effort at extending the scope of Darwinian categories beyond their original domain. Notably, I am well aware of the theoretical slipperiness slippery inherent in any Darwinized epistemology, as this seems to entail a collapse of the causal and the normative dimensions of explanation. In due course I will try to make clear how an evolutionary account, while affecting our understanding of the normative dimension, does not compromise the proper autonomy of normativity.

1. Evolutionism, Darwinism, and the pragmatist naturalistic account of knowledge and intelligence

It is well known that before and independently from the Darwinian revolution, many philosophical traditions have proposed an evolutionary-like approach to culture based upon historical arguments. In a way, we did not need wait for Darwin in order to understand that cultural artefacts evolve in time. Nevertheless, evolutionary approaches to culture and cultural artefacts differ from historical accounts as much as they differ from biological explanations. A clear distinction between evolutionary and historical conceptions of epistemic and cultural artefact is crucial if we wish to understand the claim that pragmatist epistemology is evolutionary rather than historical or historicist. In order to make this distinction, it is necessary to specify what is the added value of the evolutionary as compared to the historicist approach.

The distinctive mark of the evolutionary as compared to the historical approach concerns the *meaning* assigned to the fact of variation over space and time. Historicism has in fact, and well before pragmatism, developed rich accounts of how ideas, practices, and institutions change in time. In taking up the Darwinian revolution, pragmatism was embarking on a different quest: it was looking for a broader inscription of human epistemic behavior (the fixation of beliefs) in the domain of natural behavior (the adaptation of organisms to environments). In defining thinking as that trait which distinguishes human agency from animal behavior, pragmatism was, by the same token, claiming that thinking is amenable to some form of naturalistic account along lines that were different from those lately followed by practitioners in the cognitive sciences. Pragmatists were trying to grasp the meaning of human rationality considered as the adaptive solution developed through selective mechanisms for ensuring the fitness of the human species within its environment. A solution that relied on the rather paradoxical move of an organism trying to emancipate

itself from its evolutionary roots in order to better accomplish its own evolutionary function. The evolutionary argument enables precisely this global bracketing of transcendental conceptions of thinking and knowledge as irreducible to nature; at the same time locates rationality and knowledge within the natural process of the interactions of organisms with their environments. In so doing, pragmatism was attacking the ancient prejudice of human singularity in its more secluded citadel: that of logic and epistemology. To this extent, we should consider pragmatism as contributing to that displacement of man from the center of the universe that had begun with Copernicus and developed through the Darwinian and the Freudian revolutions.

According to an evolutionary perspective, knowledge and intelligence are, like any other human trait, the result of complex processes aimed at evolving behavioural responses apt to face the challenges of specific environments³. If we consider mainstream evolutionary science⁴, in order to count as evolutionist, an explanation should account for three distinct but related aspects:

1. The existence of some observable variation at the phenotype level (differences among individuals);
2. A different survival rate of the diverse phenotype variations;
3. The transmissibility of the differences through generations⁵.

Attempting to conceive knowledge and intelligence along naturalistic evolutionary lines requires us to mould epistemology in this general framework, as this enables us to explain the extent to which a naturalistic account of knowledge differs from well established historicistic accounts. It is easy to see the extent to which these principles can be put to work to describe knowledge and intelligence as naturalistic phenomena. Both beliefs and methods for their fixation present wide individual variation. Their differential fitness is easy to prove, and cultural transmission and social learning are suited mechanisms for the intergenerational transmission of beliefs and methods. Such an approach requires, of course, that we consider culture as being itself explicable in evolutionary terms. Recent attempts at offering evolutionary accounts of culture include both theories applying the notion of culture beyond the limits of the human species⁶ and theories showing the co-evolutionary relationship of genetic and cultural dimensions⁷. In both cases, if we wish to fully develop the evolutionary conception and to understand humans as the “Darwin Machines” they are, then also beliefs and methods for their fixation must be explained according to a general evolutionary paradigm.

³ In the radical formulation proposed by Plotkin, any form of adaptation is ‘knowledge’ and so human knowledge is only a limited part of a broader ‘biological knowledge’ of which each species has its part. We need not go that far in order to acknowledge the evolutionary meaning of intelligence and knowledge. Durham 1991, Plotkin 1994, Boyd-Richerson 1995, Speber 1999, Laland-Brown 2002, and Richerson-Boyd 2005 are all good examples of recent attempts at studying culture and cultural artefacts along evolutionary lines.

⁴ For a classical statement, see Lewontin 1970. See also Plotkin 1994: ch. 3.

⁵ I leave open the difference between Lamarckian-like approaches that considers transmission through phenotypes, and Darwinian-like that exclude the case of direct – phenotype to phenotype – transmission. At the level of evolutionary theories of culture this distinction appears to be less relevant than in biological theory.

⁶ For a recent survey, see Laland-Galeff 2009.

⁷ See Boyd-Richerson 1995 and Durham 1991.

Evolutionary thinking applied to human behavior bases its heuristic force upon the hypothesis that reconstruction of human evolution before historical time (or exploration of biological continuity between man and proximate living species) can help us understand aspects of contemporary human experience. To this extent, it has long been thought that knowledge of our evolutionary history would have been of no use in logic and epistemology. As a consequence, while attempts at studying rationality according to the explanatory paradigm of the cognitive science have multiplied in the last decade, the number of evolutionary accounts remains surprisingly modest. It is, then, of the utmost philosophical importance to notice that well in advance of the contemporary cognitive revolution, pragmatism had opened the way for an evolutionary account of human knowledge and rationality. This approach, while inscribed in a widely scientific paradigm, did not aim at producing a new token of scientific-like philosophy nor was it after a psychological, biological, or whatever reductive account of epistemic categories. For this reason, a thorough concern for normativity has remained at the heart of pragmatist evolutionary and naturalistic accounts of epistemology. In appealing to evolution, in fact, pragmatism aimed at reshaping the whole epistemological enterprise.

In order to appreciate the specific perspective offered by pragmatist evolutionary theories, and in order to understand how a normative account could be couched in evolutionary terms, it is useful to recall the main questions that evolutionary explanations generally address:

- Causal questions, concerning the biological determinants of behavior;
- Functional questions, concerning the function accomplished by a given behavior;
- Phenotype questions, concerning the evolutionary history across an agent's lifespan;
- Genotype questions, concerning the evolutionary history of a behavior across evolutionary time;
- Historical questions, concerning the effects of cultural evolution on phenotype and genotype transformations.

All those questions aim at understanding why a given behavioral pattern appears in a given species and how it evolves in time.

If we focus on the epistemology of beliefs (the basis of pragmatist epistemology), an evolutionary theory should try to explain how this peculiar way of controlling the behavior through modifying cognitive states emerged in the human species, and how and why different methods of control have evolved in different cultures. In the same manner in which the use of technological tools has deeply changed from Paleolithic era to this day, human ways of fixing beliefs have also undergone deep transformations⁸. An evolutionary account should, to that extent, acknowledge the existence of different methods for the fixation of beliefs, assess their comparative evolutionary fitness, provide an explanation of how these methods could have spread differentially, explain how they are transmitted over generations. If such an account is undertaken within the boundaries of epistemology, then it should, moreover, explain how the normative dimension, so crucial for any epistemological theory, is handled within such a framework. In particular, it will have to

⁸ This, at least, is the general hypothesis which is at the basis of the idea of a natural history of knowledge and thinking.

explain how validity, truth, acceptance, justification, objectivity and other epistemic concepts can be defined in ways that take into consideration the evolutionary hypothesis that humans have evolved epistemic concepts and practices as behavioral strategies within their evolutionary history and not as steps of a disembodied, spiritual, and de-historicized quest for truth.

While such an account remains to be written, pragmatism has at least provided the general theoretical framework necessary in order to develop a fully evolutionary account of our rational powers. Locating rational faculties and outcomes in the evolutionary framework, pragmatism aimed firstly at displacing a general understanding of thought and knowledge as representative functions disconnected from the natural setting of their historical evolution and of their evolutionary function. This is the first consequence that follows from the Peircean move consisting in defining the thinking activity through its function in fixing beliefs, and in defining beliefs through their function in the control of action rather than in producing representations. Through this move, pragmatism has established an unprecedented and strong theoretical connection between logic and the behavioral sciences, opening the way for an evolutionary account of rationality.

Evolutionary sciences have barely faced the question of the evolutionary meaning of the different strategies of belief fixation. Even when cultural aspects are examined, they are rather considered from the perspective of their specific content and of the rules of their transmission⁹. The novelty of the pragmatist approach lies precisely in that it does not tackle with the standard evolutionary issue of the comparative degree of fitness of different beliefs (i.e. whether it is evolutionary preferable to believe in spiritual causes or to look for material causes). It rather focuses on the *ways* through which we acquire the beliefs we have and, I would add, to the way we transfer, challenge and revise those beliefs. Considered from the perspective of evolutionary approaches, the epistemological question of the validity of different methods for the fixation of beliefs is faced through the reference to their adaptive function. This crossing of normative and evolutionary criteria is what makes more interesting and at the same time more perilous any attempt at evolutionary explanation in epistemology. In the pragmatist tradition, normative and evolutionary criteria are brought together via the conception of beliefs as guides for action. Through their fixation and transformation, the human species attunes its behavioral responses to the changing contexts of environmental situations. In this way, normative categories can enter the evolutionary frame of explanation, and at the same time evolutionary conditions enter the epistemological framework, as fitness and adaptation become relevant criteria in discussing normative pertinence.

It is well known that for most of the philosophical traditions – and for enlightenment and post-enlightenment culture especially – human rationality is prioritized (though often not on evolutionary basis) over other (traditional, embodied) ways through which beliefs are fixed; and it is following this thread that pragmatist philosophy has developed its well-known theory of belief and inquiry. Pragmatism, at least up to a certain extent, shares the modern privilege on rationality and reformulates it in evolutionary terms. It then offers an epistemological account according to which rational forms of inquiry have evolved out of non-rational methods for belief fixation because of its superior evolutionary fitness.

⁹ This is generally the case in all theories of cultural evolution, where culture is often conceived in terms of information.

Rationality would have then increased our capacity to adapt. While this generally optimistic account of rationality continues to benefit from a high level of consensus within philosophy, recent studies in cultural and psychological evolution challenge this vision, countering the philosophical privilege accorded to rational inquiry in belief fixation.

While evolutionary biologists have provided strong arguments in favor of the evolutionary superiority of imitative strategies based upon the “conformity bias”, in a similar way evolutionary psychologists and anthropologists have highlighted the evolutionary fitness of adaptive ways of thinking based on the reiteration of inaccurate and even wrong forms of reasoning (Gigerenzer 2000). These accounts provide new evidence and important theoretical perspectives that should be taken into account in order to further develop the pragmatist approach to rationality as fixation of beliefs. In what follows I will review and discuss some debates in contemporary evolutionary sciences. In so doing, I intend to gather theoretical evidence for a naturalistic pragmatist approach to epistemology.

2. From the fixation to the justification of beliefs: an argument from evolutionary anthropology

In order to avoid the pitfalls of an illegitimate reduction of normativity to causal explanations, before bringing the epistemology of belief under the perspective of the evolutionary paradigm I will introduce and explain the distinction between *fixation* and *justification* as analytically separated moments of the general process of belief fixation. While the epistemological grounds of this distinction are generally established and well understood, their application with reference to specific processes of belief fixation is often ambiguous. According to this distinction, I propose to split the process of belief fixation in two steps: the first step concerns the way an agent comes to fix a given belief as a guide for his conduct; the second step concerns the way he will justify, if asked, why he holds that belief and/or accomplishes the related actions. It is important to keep this distinction in mind because these aspects are often blurred and it is sometime hard to understand whether an argument is directed towards the first or the second dimension. Fixation and justification, in fact, possess different epistemological requirements and the epistemological adequacy of one does not (and should not) influence our assessment of the epistemological adequacy of the other. While the fixation is directly connected with the practical effects of holding the belief, the justification is related to the social practice of granting its legitimacy and ensuring its transmission¹⁰. In referring to two different roles of normativity in rational practices, this distinction is especially important for advancing a pragmatist inquiry into inquiry.

¹⁰ For a discussion of non-rational (unconscious, structural, etc.) means of belief fixation in traditional societies, see Edgerton (1992: ch. 8). Edgerton does not focus on the adaptive value of the epistemic disjunction of processes of belief fixation and belief justification and transmission. Durham 1991 has developed an evolutionary theory of culture that relies explicitly on the agent’s capacity to assess competing cultural variants according to their differential consequences. He convincingly shows with great experimental detail that differences in cultural patterns such as systems of marriage, incest rules, etc. can be brought to ecological differences between populations. The capacity to assess the value of beliefs in term of fitness is shown to coexist in many cases with justification of its validity which are not based on evidence but rather on magic, mythological, or religious arguments.

Evolutionary anthropology has frequently coped with the issue of the epistemological validity of beliefs held by agents living in traditional societies not accustomed to the scientific mentality¹¹. Efforts at justifying traditional beliefs against supposedly more rational beliefs produced by western science has often proven troublesome when the distinction between the two dimensions of fixation and justification was missing. Both within the anthropological practice of observation and in theoretical speculations, *rationality of agency has often been confused with rationality of justification*: traditional beliefs were assessed with reference to the logical coherence of the justifications offered rather than according to their pragmatic function in controlling agency. In recent decades, anthropological approaches such as behavioural ecology have tried to show the rationality of traditional beliefs and behavior through an examination of their adaptive efficacy. To this extent, sexual, familial, nutritional and other ordinary practices have been examined in order to show their fitness (evolutionary rationality) in the context of the specific environment inhabited by a given human group. Materialist, biosocial, sociobiological, socioecological and other similar patterns of explanation¹² share the adaptationist view that a given behavior (and, for humans, the beliefs that sustain it) is rational if it answers to some ecological constraint and favours the organism's adaptation to a given environmental system. While none of these theories have a direct impact on epistemology, they are nevertheless useful as they indicate how to assess the validity or rationality of a belief with reference to its adaptive fitness rather than to the validity of its justification.

Here I will briefly recall three empirical cases in order to show the epistemological relevance of this distinction for an evolutionary approach to the fixation of beliefs¹³. The first concerns the reproductive practice of many hunter-gatherer societies where women usually tend to restrict the number of infants to no more than two. Such a practice has been considered maladaptive as it does not maximise the inclusive fitness: having more children, in fact, people would increase the diffusion of their genetic pool. Detailed studies of the material conditions of hunter gatherer have shown that two is the maximum amount of infants that can be reared without seriously increasing the risk of starvation for reasons related to the foraging activities accomplished by women¹⁴. A second example concerns the food habit of hunter gatherer whose hunting practices appear irrational from the point of view of their calories in-taking efficacy. A closer examination of the dietary properties of the different types of available food shows that while hunting (as compared to foraging) is not efficacious in terms of calories in-taking, it provides other important nutritive elements whose lack would otherwise affect health¹⁵. A third case concerns the Indian taboo that prohibits the eating of cows. Its apparent irrationality (waste of readily available food) has been contested on the ground of its efficacy in preserving the labour force which is needed

¹¹ Classical examples can be found in Wilson 1970 and Hollis-Lukes 1982.

¹² Harris-Ross 1987, Laland-Brown 2002, Quiatt-Reynolds 1993. For a clear and detailed account of the main evolutionary approaches to human behavior and for a riche bibliography see Laland-Brown 2002.

¹³ Here I will not take side in the dispute concerning the adaptive value of beliefs. My argument requires only that a possible mismatch between pragmatic validity and justification of beliefs might take place. For a critical examination of adaptationist theories, see Edgerton (1992).

¹⁴ See Laland-Brown 2002: ch. 4 and related bibliography. A similar case is examined, with the same conclusions, in Durham 1991: ch. 2.

¹⁵ Harris-Ross 1987 p. 585.

in order to sustain an agricultural economy and in order to privilege crop culture over animal breeding as the latter is a less efficacious exploitation of scarce land resources¹⁶.

In all these and other similar cases, evolutionary anthropology claims that adaptive rationality of practices and beliefs is often associated with irrationality of justifications offered in their defence. Customary, mythological, religious explanations are often invoked – both by natives and by anthropologists – for explaining the endorsement of given beliefs, while the proper ground for their adoption is practical and the fixation has experimental evolutionary grounds of which the agent is no more aware than the observer. Here we notice a striking mismatch between the evolutionary causes of a given practice and the account that individuals can offer of the reasons why they behave as they do and/or hold these specific beliefs. Since, from a pragmatist perspective, the value (and validity) of a belief resides in its worth as a guide for action and not in its representative content, the irrationality of a justification should not, *prima facie*, compromise the intrinsic rationality (and validity) of the belief considered as a guide for action.

These examples bring to the fore an epistemological problem concerning the rationality of the strategies of belief-fixation: if fixation (as distinguished from justification) through traditional transmission is adaptively efficacious, then the agent is rational in relying on social transmission of valid beliefs but irrational in that he has no access to the explanatory reasons (health, reproductive success, etc.) that lie behind the social fixation of a given belief. Agents would then be rational from the perspective of the fixation and irrational from the perspective of the justification. If things are so, it seems irrational to rely on one's own inquiring mind and it seems to be rational to rely on traditional wisdom and socially transmitted knowledge. If this is a scientifically adequate account of rationality as an evolutionary strategy, then the pragmatist account of the fixation of beliefs appears under a different light and the methods of tenacity, authority, and apriorism conceptualized by Peirce and Dewey, as opposed to rational inquiry, come under a much more positive light. Or, to see things under a different perspective, Peirce's traditionalism appears to be not much as an infelicitous consequence of his political conservatism and more a necessary implication of his (though partial and multifaceted) commitment to naturalism.

3. The ability to imitate: an evolutionary argument against the superiority of rational inquiry

This detour through evolutionary anthropology shows that in wishing to account for rationality in terms of fixation of beliefs, pragmatism was legitimately extending the evolutionary paradigm to epistemology. At the same time, this naturalistic approach requires that no particular privilege is accorded to rationality with respect to other methods of belief fixation unless this superiority is proven on the adaptive ground. The distinction between fixation and justification, moreover, enables us to identify a discrepancy between the rationality implicit in behavior (and incorporated in rational practices of fixation through experience) and the irrationality of justifications used in order to explain why these behaviors are adopted.

¹⁶ Harris-Ross 1987 p. 445 ss

A belief might be practically justified – and its social transmission valuable and adequate – while at the same time agents who shape their behavior according to it might be incapable of providing the proper reasons why that belief is valid. While the fixation has taken place according to an experimental process, its justification follows a different pattern. This epistemological distinction seems to support the idea that criteria of fixation can be different from criteria of justification: the apparent irrationality which consists in holding counterintuitive beliefs (why have only two children if this reduces evolutionary fitness? Why hunt if gathering yields more calories? Why not eat cows and starve if we can farm and breed them?) can be accounted for evolutionarily. It assures the protection of useful and hard-to-fix beliefs against the challenges of individuals that are *prima facie* damaged by acting upon them.

Custom, tradition, religion provide justifications that put adaptively important beliefs beyond the reach of individual attempts at casting them into doubt and replacing them. In so doing, conformist ways of fixing beliefs guarantee the stability of evolutionarily fit beliefs over time. This is a strong evolutionary argument in defence of traditional (e.g. non rational) forms of justification, that does not call into question their experimentally justified core. To this extent, mythical and religious justifications can be seen as evolved strategies for assuring the stability of beliefs against individual attempts at unduly modifying them¹⁷.

According to classical epistemology, similar practices of justification are taken to be irrational, as they are examined exclusively at the epistemic level of the individual cognitive activity, where non-rational justifications are rightly considered as invalid¹⁸.

Pragmatist epistemology offers a better ground for assessing the epistemological adequacy of beliefs, as it takes into account also the collective dimension of the fixation and transmission of beliefs across individuals and generations.

In order to make this argument more persuasive, we should examine some further evolutionary implications of the social dimension of learning. I have shown that the distinction between the reasons through which a belief is fixed and those through which it is justified implies that an agent can possess a belief which is adequate (a belief which is justified in the evolutionary sense here adopted) but without knowing the reasons why it is justified¹⁹. Such a distinction fits easily into the pragmatist mould, as according to pragmatism validity is defined with reference to practical consequences, not to theoretical grounds of justification. We can then legitimately say that beliefs can be practically fixed according to evolutionary reasons and theoretically justified through different kind of cultural reasons (ideological, religious, mythical, historical etc.). Accordingly, the process of fixation has to be considered as being temporally and socially much more complex than the individual process which consists in an individual critically assessing the reasons for his taking a belief to be true (the standard approach in contemporary epistemology). The fixation of beliefs is a process that can (and usually does) engage a plurality of individuals

¹⁷ We can consider this line of argument a sort of anthropological variant of a long tradition in philosophy that despises individual forms of reasoning.

¹⁸ This is the level at which the anthropological debate over the rationality of primitive or traditional behavior has mostly been carried on. See Wilson 1970 and Hollis-Lukes 1982 for classical accounts.

¹⁹ This of course counters openly the canonical definition of knowledge as justified true belief. According to the evolutionary perspective, a belief counts as valid knowledge even if the agent sticks to it for the wrong reasons, as what matters in the definition is not the epistemic content of the belief (that cows are sacred) but its practical consequences (that agents refrains from raising and eating them).

over an extended period of time, through reiterated experimental tests spanning across generations²⁰. The separation of fixation from justification and the acknowledgment of their different epistemic meaning shows the inadequacy of those epistemologies that define the rationality of beliefs with exclusive reference to the processes of their justification. Evolution of situations and beliefs over time poses a serious threat to the value of beliefs that agents hold without valid justification. The same belief might be adaptive at a given time and become maladaptive following an environmental change with which it was not able to cope. Unawareness of the justificatory grounds on which the belief was fixed might render its revision more difficult. I will examine this aspect in the next section²¹.

But justificatory accounts which are inadequate on the basis of their epistemic content (eg. a magic explanation) can still be evolutionary adequate. Traditional forms of justification, in fact, reinforce processes of social learning, conservation, and transmission which are indispensable in order to let the evolutionarily fit beliefs spread across individuals and be transmitted across generations: covered with religious or mythical authority, the belief is protected against the risks of individual manipulation and is charged with an authority that makes its enforcement more steadfast. In this way, beliefs acquire a higher stability, a property that is of the utmost importance for beliefs if they are to control behavior.

This hypothesis finds support in recent works in evolutionary disciplines that have shown the adaptive fitness of conformism and the superiority of social learning (doing what others do) over individual learning (relying on one's own reason and experience)²². As remarked by Plotkin and experimentally tested in recent literature²³, the adaptive fitness of individual learning is not *ceteris paribus* always superior to that of social learning, but depends upon ecological parameters such as the frequency of environmental changes with which organisms have to deal. In fact, "intelligence²⁴ is an adaptation that allows animals, including ourselves, to track and accommodate to changes that occur within a given range of frequency. Slower rates of change are better faced by the genetic and developmental machinery, while higher rates of change are better faced by tracking mechanisms whose own states are not altered by the transient events to which they respond (typically individual forms of learning). Intelligence has evolved in order to deal with changes that occur at rates somewhere between these two" (Plotkin 1994: 150).

²⁰ This is notably the case for all those nutritional, health, reproductive, etc. behaviors that define a culture and whose grounds of justification can be unavailable to most or all of its members. The Deweyan notion of inquiry accounts easily for the rationality of such temporally extended and socially shared process of knowledge production. I offer a detailed account of it in Frega 2006b.

²¹ On maladaptation in cultural evolution see Durham's analysis of the conflict between genetic and cultural evolution, when "cultural change acts against the ability of human beings to survive and reproduce" (Durham 1991: 368). For a discussion of the main causes of maladaptive cultural selection, see Durham 1991: 370-373. On the spread of maladaptive beliefs and practices in human cultures, see Edgerton 1992.

²² Debates in evolutionary psychology and anthropology have not faced directly the epistemological question of the fixation of beliefs. The most proximate topic is that of learning as the process through which knowledge is acquired. We can consider learning as a way for fixing beliefs. The distinction between individual and social learning corresponds therefore to that between inquiry-based (learning through direct experience) and non inquiry-based (learning as assimilation of beliefs held by others) methods of fixation.

²³ As examples, see Whitehead-Richerson 2009, Kameda-Nakanishi 2002, and Kameda-Nakanishi 2003.

²⁴ Rationality or intelligence corresponds to individual learning as opposed to conformism and social learning on one side and instinct on the other.

This might legitimate the hypothesis that the evolutionary passage from tenacity and authority to rational forms of inquiry²⁵ is not a linear progress from error to knowledge, but the discovery of new methods for the fixation of belief in social environments characterized by increasing rates of change. As a consequence, their superiority is not universal because based upon purely epistemological reasons (its truth-tracking properties), but local because based upon adaptive reasons (reliance on individual rather than social learning is more efficacious when environmental rates of variation are high).

In this sense, we could consider modernity as a sort of ecological niche in which individual learning pays more than social learning in terms of adaptation. If intelligence (and methods of belief fixation) have evolved as devices “for dealing with predictable unpredictability” (*ibid.*, 161), competing patterns of belief fixation will have then to be assessed – at least up to a certain point – against their comparative ability to reach this goal in different kinds of environments.

The trade off between social and individual learning is part of a more general evolutionary issue which concerns the different strategies that living beings develop in order to face uncertainties about the future and which go from the most rigid instinctive and automatic responses to the highest variability of critical intelligence. Intelligence and rationality have the same adaptive function as instincts but differ in the rapidity of response they grant. As a consequence, their degree of fitness cannot be assessed *a priori* and in a general manner but is a function of the time-scale of changes in the environment. In particular, instinctive responses prove more effective where changes take place on the longer time-scale, while individual learning is more efficacious where variation is rapid (time-scales shorter than the individual life span). In the same manner, social and individual forms of learning are different strategies of belief fixation and control of behavior whose fitness and adequacy varies depending upon the frequency of changes that the agent (and the society to which he belongs) has to face. In societies that are stable and whose environments reduced occasions of variation, social learning seems to be preferable to individual learning, and the individual’s incapacity to access the justifications for his own beliefs a quite reasonable price to pay in exchange of a satisfying adaptive equilibrium.

Recent works in evolutionary psychology have examined the differential adaptive fitness of different epistemic strategies such as individual learning – a strategy of information acquisition in which the individual relies only on his abilities to gather information directly from the world – and social learning – a strategy of information acquisition in which the individual relies on what other individuals transmit to him. Going against the grain of received wisdom concerning the undisputed superiority of critical intelligence over conformist adoption of dominant beliefs, these researches have shown that “odd as it may seem, in many kinds of variable environments, the best strategy is to rely mostly on imitation, not on your own individual learning” (Richerson-Boyd 1995: 12). The “ability to imitate”, as many empirical studies have conclusively shown²⁶, enables one to “generate the cumulative cultural evolution of new adaptations at blinding speed compared with organic evolution” (Richerson-Boyd 1995: 13). The finding that in many environmental conditions the imitative-conformist strategy proves to be more adaptive than strategies based on

²⁵ In the sense of Peirce’s epistemology of Belief.

²⁶ See notably works from Tomasello and discussion in Laland-Gatleff (2009).

individual learning is an experimental finding with far reaching epistemological consequences.

Simulation with mathematical models²⁷ has shown that in situations of relative stability (corresponding roughly to ordinary environmental situations), equilibrium (i.e. adaptation through stable beliefs) is obtained when about 90% of the individuals imitate, while only 10% rely on individual learning. This shows the higher adaptive value of imitative behavior, as it frees the individual from the costs of learning (learning is time consuming and can lead to wrong and maladaptive beliefs) and provides him with sufficiently reliable knowledge that has been selected through the adaptive process: “as long as environments are not completely unpredictable, the average payoff at the evolutionary equilibrium is greater than the average payoff of individuals who do not imitate” (Richerson-Boyd 2005: 87). The consequence is that evolutionary arguments favour imitation and conformism over critical thinking as a more adaptive strategy both for the individual and for the group: “when learning is difficult and environments do not change too fast, most individuals imitate at evolutionary equilibrium. At that equilibrium, an optimally imitating population is better off, on average, than a population that does not imitate” (Richerson-Boyd 2005: 89). In evolutionary terms, this means that “selection favours a heavy reliance on imitation whenever individual learning is error prone or costly, and environments are neither too variable nor too stable. When these conditions are satisfied, our models suggest that natural selection can favour individuals who pay *almost* no attention to their own experience, and are *almost* totally bound to what Francis Bacon called the “dead hand of custom”” (Richerson-Boyd 2005: 118). Conformism as imitation of the dominant behavior then follows: when deciding who to imitate, the choice to imitate the behaviour adopted by the majority generally proves to be the most adaptive.

Translated into the language of pragmatist epistemology, this means that reliance on traditional and a priori methods for the fixation of beliefs can be, and often is, evolutionarily preferable compared to relying on one’s own reason. Evolutionary epistemology supports the idea that from the evolutionary perspective, to adopt a belief only because others have done the same in the majority of cases proves to be a valid strategy, while reliance on one’s own reasoning skills is adaptively adequate only in a smaller percentage of occasions, and where particular environmental conditions (frequency of change within a given range) occur. These arguments have of course a statistical basis and no predictive power on a given situation, but their validity in the long run should be part of our understanding of the place and nature of rationality in human agency.

This argument reinforces those from anthropological literature, as the opposition of social and individual learning can be superposed to that between justification and fixation: the evolutionary anthropology of epistemic practices shows that individuals are right in adopting beliefs for which they have no justifying grounds (they are right in being conformist) and societies protect themselves from excesses due to individual’s resorting to their own reason through the mythologisation of beliefs. This of course is not the whole of the story, and evolutionary biologists are generally aware of the fact that while social learning is an adaptively fit strategy when situations are stable, it becomes dangerous when situations change and new behavioral patterns are required.

²⁷ For a survey, see Boyd-Richerson 2005.

The disjunction between the logic of fixation and that of justification as well as the reliance on social learning become evolutionarily problematic in the face of rapid change. Once in fact the connection between justification and fixation is lost, the transformation of behavior and the fixation of new beliefs becomes problematic, because the route to experience is blocked and stable beliefs are withdrawn from experimental critique.

The same happens with fixation of beliefs based upon social learning: while this enables individuals to reduce learning costs, it exposes them to the risk of adopting the wrong beliefs when beliefs received by fellows and not tested against experience are used as basis for action. Both cases imply that methods of fixation of belief based upon social mechanisms are more suited to stable contexts, where they grant efficacious forms of cultural transmission at lower individual costs, but becomes more ineffective when environments become instable, as risks of inaccurate transmission exceed costs of individual learning. As should be expected, the same factors that guarantee stability of beliefs over time hinder adaptation when change is required. To put things differently, in highly variable environments thinking with one's own head – engaging in inquiry – pays more than relying on tradition and other forms of social transmission of knowledge, while in highly stable environments (socially stable and naturally stable), tradition and imitation are more adaptive. Such a conclusion, which finds compelling support in evolutionary disciplines, provides an important clue for assessing the tuning of pragmatist epistemologies to evolutionism, and the extent to which evolutionary arguments can support the pragmatist conception of a natural history of knowledge and intelligence.

It's probably worth recalling Dewey's claim, in *The Quest for Certainty*, that the three revolutions of the modern era (political, economical and scientific) have given rise to such radical transformations of the human environment that human attitudes towards their epistemic states have been deeply transformed. In particular, the scientific attitude of actively entertaining (as opposed to escaping) doubt, the liberation of individual resources made possible by capitalism and the celebration and protection of the individual realized by democracy transform the social environment in which human beings happen to live. As a consequences, a change occurs also in the strategies upon which individuals rely when fixing their beliefs, putting into question the value of stability, challenging the adaptive superiority of tradition, authority, and conformism, fostering the adoption of an inquiring attitude in all quarters of experience. These revolutions, while freeing the individual from the social constraints in all domains of agency, have rendered social life more dynamic and changing and in so doing have radicalized the structural instability of the human environment. In these conditions, it is likely that individual learning have begun to pay more than social learning, while costs of conformist behavior would have increased considerably.

From this perspective, Kant's apology for *sapere aude* could be seen as the formulation in philosophical terms of a deep transformation in the relationship of human agents to their environments: starting from the modern era, relying on individual learning becomes progressively more adaptive and conformism needs to be compensated for by more frequent critical revisions of beliefs. This evolutionary reading is consistent with both Peircean and Deweyan epistemologies. With reference to Peirce, it supports his idea that the different methods for the fixation of beliefs are not the progressive steps of a

positivistic process of epistemological progress, but answers fitted to different kind of situations. As Peirce has stressed on several occasions, ordinary situations (and most of moral and political settings according to him were so) are such that authority has to be preferred to inquiry as a method for the fixation of beliefs²⁸, while in scientific and professional practices inquiry's fitness remains uncontested. With reference to Dewey, this reading further develops his conception of inquiry as being justified on evolutionary grounds, and his naturalistic conception of continuity between animal and human adaptive strategies (the natural matrix of inquiry) and between common sense and scientific forms of inquiry (the cultural matrix of inquiry).

While evolutionary scientists are keen to acknowledge the importance of language, social learning and other cognitive skills in shaping the cultural evolution, insufficient attention has been devoted so far to the fact that the new methods for the fixation of beliefs and the new attitude towards beliefs that have emerged in the modern era constitute a momentous turning point in the history of human evolution. It would be interesting, to this extent, to test mathematical models of learning equilibrium with reference to contemporary societies where reliance on individual learning strategies (creativity, autonomy, independence, innovation) is fostered and supported in any domain of life on a scale that has no comparison in history. And it is surely of the utmost interest that modern western society constitutes the first and probably the only example of a culture that has placed individual learning unconditionally above social learning, and that has celebrated individual experimental learning above any other kind of traditional forms of justification. These transformations are radical enough to legitimate the evolutionary conviction that reliance on inquiry is not a human universal or transcendental condition, but an evolved trait that becomes dominant for adaptive reasons in the contemporary world.

In the same way in which evolutionary biologists suppose that increased rate of changes in climate might have favoured the adoption of different cultural variants in pre-historical times, analogous trends seems to be at play in the context of the historical evolution of methods of belief fixation. During this last, in fact, increased capacity to control and transform the natural and successively the social and biological environment might have transformed the adaptive fitness ratio of individual to social learning and, as a corollary, reinforced the evolutionary superiority of rational patterns of inquiry and critical methods for the fixation of beliefs.

As the discussion as showed, an epistemology of belief cannot limit its scope to the mere explanation of the ways in which beliefs are fixed, but should be extended to the examination of how beliefs are transmitted and transformed. Here, once again, the findings of evolutionary science can help us in devising a proper solution to one of the central problems of epistemology²⁹. The trade-off between social and individual learning and the fact that the extremely fruitful results produced by relying of social learning are inevitably associated with the risk of maladaptive outcomes have been conceptualized in the

²⁸ I tend to prefer the expression of 'social learning' to that of 'authority', as the first is epistemically neutral and is compatible with many different ways of fixing belief, not only with that which consists in abiding to power.

²⁹ In Frega 2006b I have discussed some epistemological implications of this extension with reference to Dewey's epistemology of practice.

pragmatist idea that our attitudes towards beliefs are ruled by two distinct patterns. On one side, each human epistemic act is accomplished against the background of an unarticulated set of beliefs that agents take for granted (there is no *tabula rasa*). On the other, the dynamic of belief-doubt-belief is considered to be the motor of our epistemic life. In this way, pragmatism has translated into epistemological language the evolutionary idea that it is evolutionarily fit to rely on others (and in so doing neglect to personally test one's own belief), although the pragmatists acknowledge that this might not be sufficient for adaptive needs. While the behavioral and psychological evolutionary basis of this trade off has been widely studied, its epistemological significance remains nearly unexplained. This is precisely the explanation that pragmatism, since its historical origins, has attempted.

4. Adaptation and adaptiveness in the fixation of beliefs

As I have stated above, the evolutionary epistemology of beliefs, while acknowledging the justificatory role of evolutionary concepts such as those of adaptation and fitness, maintains a sharp conceptual distinction between epistemic and evolutionary criteria, and avoids any attempt at reducing the first to the second. According to the pragmatist evolutionary epistemology, in fact, adaptive fitness is neither a substitute for truth (as the adaptive fitness of false beliefs has been proven) nor an ultimate criteria of validity. In prompting fitness as a regulative criteria in epistemology, evolutionism does not aim at collapsing efficacy and truth, and as a consequence does not imply the adoption of a dogmatically relativistic epistemology, nor the dismissal of objectivity³⁰. To the contrary, it is precisely the dialectic tension between adaptive fitness and truth or adequacy that explains the extreme interest of evolutionary approaches.

To make this point clearer I have to introduce a further distinction, that between *adaptation* as the result of evolutionary processes and *adaptiveness* as the fact of having proven to be fit (Laland-Brown 2002: 132 ff, Symons 1990)³¹.

A belief or behavior is said to be *adapted* when it is the outcome of a process of adaptation³², which means that its genesis can be traced back to evolutionary processes. To say that a belief or behavior is *adaptive* means only that it fits the requirements of a given situation, independently from any evolutionary consideration. As Symons has pointed out, neither is adaptiveness a sure proof of adaptation, nor is adaptation a necessary or sufficient condition of adaptiveness. Therefore, a given trait can be *adapted* while not being

³⁰ As Plotkin (1994: 231) has admitted, evolutionary approaches to epistemology are notably problematic with respect to justification. I take this simply to mean that even within an evolutionary perspective the concept of truth (or of other notions accomplishing the same epistemic function) cannot be entirely reduced to that of adaptation. Yet we have to admit that the evolutionary approach determines a certain reduction of the importance of the category of truth (a point clearly seen by Dewey, who argued for the epistemological priority of the category of judgment over that of truth).

³¹ For a scholarly presentation of the philosophical and scientific debate over the notion of adaptation, see Orzack-Sober 2001. For a precise definition of the differences and overlaps between the adaptationist and the adaptivist programs, see Symons 1990. For present purposes strictly biological arguments are here expanded to culture, a task not originally intended in traditional discussions of adaptation and adaptiveness.

³² This is the proper object of evolutionary science, whose aim is to locate a given trait within the evolutionary process that has produced it.

adaptive (the many cases of maladaptive traits prove this), or it can be *adaptive* while not being the product of adaptation. In what follows I will extend the scope of this evolutionary distinction to cultural traits, in order to show the extent to which normative considerations can be brought within the evolutionary paradigm³³.

Evolutionary epistemology considers knowledge and intelligence to be the outcome of a process of adaptation through which they have evolved as human flexible responses to the challenges of natural and social environments. Yet evolutionary epistemology should avoid any conflation of adaptation and truth: the fact that a given belief or method of fixation has been selected as the outcome of a process of cultural adaptation cannot be assigned any *a priori* normative consequences. Evolutionary epistemology should then refer to adaptationist explanations in order to understand the nature of knowledge and rationality, without resorting to adaptative arguments in order to provide normative justification to existing beliefs or practices. Its aim is to trace the processes of belief fixation (and their outcomes) to the evolutionary processes of cultural adaptation.

This is consistent with what Peirce and Dewey attempted to do through the project of a natural history of knowledge. Both have in fact explicitly rejected the idea that a given belief might be true because fit/adaptive (shortcut reduction of truth to usefulness, cash value), while at the same time acknowledging that adaptiveness and not truth is the first condition of efficacy according to which human thinking should be understood. In adopting an evolutionary stance in epistemology, therefore, one is in no way committed to the claim that because a belief is presently stable (or dominant) it has to be fit and, as a consequence, it is in some degree justified (and so withdrawn from doubt). The capacity to inquire is certainly adapted, and some or most of our beliefs are adaptive. But if we collapse the adaptationist and the adaptive dimensions, the consequence is that we lose the fallibilistic grip on knowledge, and normativity is reduced to factual efficacy. This reduction is a move that no pragmatist should be willing to make. According to this distinction, the adaptivist perspective is the theoretical framework that sets the theoretical stage for a comparative examination of different methods for the fixation of beliefs, enabling us to submit to the evolutionary scrutiny the adapted practices of belief fixation³⁴.

The goal of such an evolutionary approach to epistemology consists primarily in orienting epistemology in a new direction: urging us to abandon as unduly narrow the conception of knowledge, science or inquiry as exclusively or primarily oriented towards the discovery and fixation of justified true beliefs, the evolutionary approach sets epistemology on the path of an understanding of knowledge and rationality more attuned with their cultural function as tools of adaptation. From this perspective, cognitive functions are considered as having evolved in order to empower our capacity to adjust to varying environments, to increase our control of situations, to augment our inclusive fitness³⁵. In order to do this, humans use beliefs as guides for action and develop strategies for fixing and transmitting them across individuals, groups, generations. In the course of time and in the width of space, different methods for the fixation of beliefs have been developed and consolidated,

³³ For a survey, see Lalande-Brown 2002. In philosophy, and notably within pragmatism, it is Joseph Margolis that has mostly stressed the importance of a naturalistic approach to epistemology grounded in a unified explanation of natural and cultural traits. See his most recent works (2009 a, 2009b). See also Rescher 1990.

³⁴ A task I will briefly describe in the following pages.

³⁵ See the definition offered by Reeve and Sherman of adaptation as “phenotypic variant that results in the highest fitness among a specified set of variants in a given environment” (quoted in Orzack-Sober 2001: 363).

so that even nowadays we are confronted with different ways of settling disagreement, testing beliefs, facing new and unexpected situations, transmitting and critically revising existing beliefs. Those methods have differential adaptive value, as their capacity to sustain human adaptation varies not only from method to method (this is the pragmatist claim at the origin of the epistemology of belief) but also, for any given method, from context to context.

To adopt an evolutionary approach to epistemology means that no *a priori* privilege can be assigned to one method over the others. Any effort at comparing different methods of belief fixation, therefore, should not be undertaken with reference to their differential capability at attaining truth – as it has always been the case in epistemology – but with reference to their respective adaptive fitness. And it is on this ground too that the pragmatist claim of the evolutionary superiority of inquiry over competing methods of fixation should be assessed. If rational inquiry has to be preferred to other forms of fixation, this is because it has proven to be the evolutionarily optimum solution to the overall problem of how to reduce costs of adaptation to existing conditions while maximizing the flexibility of adjustments in the face of changing environments.

Part of the pragmatist argument in support of inquiry is, in fact, that it pays, i.e. that inquiry is a method for the fixation of beliefs (and consequently for the control of behavior) that is adaptively superior to competing alternative solutions. This shift from the evolutionary level of the adaptationist explanation to the behavioral level of the adaptive explanation is coherent with evolutionary theory, as behavioral changes are in themselves an integral part of evolutionary processes: natural evolution is constantly operating, and cultural evolution is part of it³⁶. As a consequence, change in strategies for the fixation of beliefs has to be considered as being part of this evolutionary process: naturally grounded in our biological endowment, culturally articulated in manifold and varying forms.

The adaptivist perspective is notably at work in some pragmatist inquiries such as those that Dewey accomplishes in *Experience and Nature*, where he tries to trace some philosophical dualism (mind and body, spirit and nature) to an historically circumscribed effort to face given environmental challenges. Here the adoption of the adaptivist perspective provides a critical tool for the deconstruction of beliefs that, having become rigid, block present experience instead of helping it flourish. The adaptive perspective is important because the fixation of beliefs has a normative content that cannot be explained in terms of causal evolutionary processes but demands reference to efficacy in dealing with existing problematic situations (the expression coined by Dewey as an equivalent to the biological concept of environment). In that perspective, adaptive fitness is a criterion of success and, to a certain extent, a heuristic tool for the study of beliefs: we assess a religious, ethical, political, etc. belief on the ground of its consequences in controlling present experience and we judge it, following the pragmatist maxim³⁷, according to its

³⁶ Present behavioral changes “allow researchers to find out whether and how a species is evolving, and explore the characteristics of the evolutionary process” (Laland-Brown 2002: 143). For a defence of a coevolutionary approach see Durham 1991, and Laland-Brown 2002 and Richerson-Boyd 2005 for a more recent statement.

³⁷ Here, of course, a precision is required. While, in fact, Peirce’s use of the maxim was rather intended as a method for the fixation of the *meaning* of a given term or belief, its use as a critical tool in assessing the value of moral, political, aesthetics, etc. beliefs and practices is compatible with the general pragmatist outlook and finds clear examples in Dewey’s and James’ writings.

consequences on human experience (whether and how it works). Further research will have to explore in greater details, and experimentally, the different adaptive value of distinct strategies of belief fixation with reference to different adaptive environments³⁸. Two lines of research can be devised. The first one should test competing strategies of belief fixation with reference to the specific ‘ecological niches’ in which they have been developed. In the same way that comparative anthropology describes and explains different social structures and customs as the result of different adaptive strategies – partly determined by the diversity of environments, we should put to test the hypothesis that different methods for the fixation of beliefs can coexist as diverse adaptive variants of the species specific universal trait consisting in using the cognitive powers for establishing fit patterns of behavior. The second line of research should assess the adaptive value of different and competing methods of belief fixation with reference to different domains of human experience beyond that of scientific practice. This could be done notably in moral inquiry, studying how different strategies of fixation cope with different environments, and trying to draw comparative conclusions on the different degrees of fitness.

Conclusions

In this paper I have tried to show that evolutionary approaches to culture cannot be ignored if we wish to get a fuller understanding of rationality and knowledge. From this perspective, pragmatism has accomplished a central task in shaping the main epistemological categories in terms compatible with the evolutionary approach to human culture and agency. An important outcome of this inquiry is that it makes it easier to distinguish different contextual strategies and to assess their comparative strengths and weaknesses. According to the evolutionary paradigm, beliefs and methods of fixation evolve as forms of adaptation, as cultural evolution is only natural evolution pursued with different, species-specific means. As a consequence, epistemology should become answerable to evolutionary criteria and, in the long run, its objects should be accountable in terms of their adaptive fitness. Such an approach, as I have shown, implies neither that epistemic validity should be reduced to adaptability, nor that persistence or diffusion of a belief should be taken as proof of its validity. But it implies that cultural artefacts (ideas, values, conceptions, customs) evolve as responses to evolutionary challenges and cannot, therefore, be assessed exclusively in terms of purely cultural criteria such as ‘morality’ or ‘truth’.

The evolution of culture and of the psychological prerequisites that any competent member of (or participant in) a given culture must possess’ introduces a strong discontinuity in human evolution. Such discontinuity concerns notably the capacity to adapt more rapidly to changing environments both through the revision of given patterns of behavior (change of beliefs) and through the accumulation of information (the ‘ratchet effect’ due to social learning³⁹). It is in this new evolutionary context that a trade off between individual and social learning emerges, fostering the individual use of intelligence

³⁸ Interesting hints come from evolutionary theories of adaptation that have tried to develop cultural criteria of adaptation that take into account the specific characters of the human species. See Colby 1987 and Gordon-Izquierdo (2009).

³⁹ Tomasello 1999.

but at the same time making generally more adaptive the reliance on conformist patterns of learning. This paradigm dominates the long history of human evolution, accounting for a degree of evolutionary learning which at the same time is incomparably higher than that displayed by any known animal species, but also incomparably lower compared to that of modern and contemporary societies.

The deep social, epistemological, political, and economical revolutionary transformations of the modern era introduced a further evolutionary discontinuity, increasing the premium attributed to individual learning on social learning and, in so doing, increasing enormously the possibilities of the ratchet effect. This revolution frees the human species from the need of a *quest for certainty* and opens the path for a different anthropological attitude towards stability and change. This revolution – a phase of the cultural evolution itself – seems to explain a reliance on individual intelligence that defies evolutionary laws. This fact is confirmed by the increasing demand for autonomy and responsibility that, for the last three hundred years, has been put upon the shoulders of individual agents. From this perspective, the rise of individualism, the culture of critical thinking, the affirmation of democratic society and human rights are all manifestations of this evolutionary change in adaptive strategies that increases dramatically the payoff of individual learning strategies with respect to social ones.

If we wish to remain faithful to the pragmatist evolutionary epistemology, we should refrain from claiming that presently adaptive and cherished institutions such as democracy, human rights, experimental science, and rational inquiry are the final and definitive solutions to political, social and epistemological problems; we should also drop all efforts at searching for uncontroversial, transcendental, ultimate or a priori foundations or justifications for our cherished institutions. In the co-evolutionary process in which the human species is engaged, present conditions assign adaptive superiority to strategies relying on individual autonomy and, as a consequence, on individual learning strategies. But our awareness of the extreme risks that are associated with this increased rate of change are growing, and our faith in the evolutionary fitness of present beliefs and institutions might be soon brought to an end. Evolutionary processes being open, nobody can tell how long this cultural form of adaptation will continue to guide human struggles for existence, nor which one will one day take its place. This is as it always has been in our evolutionary history.

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