# Rationality and Controversy: Reading Darwin Through Dascalian Eyes

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**Abstract** Marcelo Dascal has made a major contribution to the study of rationality and argumentation. In the present text, I explore the impact of his approach on *the analysis of* Charles Darwin's 'one long argument', as Darwin calls his theory *of* the origin of species. Dascal's typology and analyses of polemic interactions – in particular, his analyses of controversies and their role in scientific argumentation – *provide* a strong tool for the understanding of the structure and performance of Darwinian argumentation. The backbone of Darwin's theory lies *in* comparison between opposing positions. Furthermore, *Dascal's approach* allows one to see the philosophical possibilities and implications of Darwin's naturalistic view of 'rationality', on the basis of Dascal's *distinctions* and relations between 'hard' and 'soft' rationality. On the one hand, Darwin's explanatory efforts fit into the domain of the *latter* one, typical of polemic debates. On the *other hand*, the reading of Darwin can show how Dascal's approach to rationality can be earthly embedded.

**Keywords** Marcelo Dascal • Charles Darwin • Rationality • Argumentation • Controversies

The contribution made by Marcelo Dascal to a new understanding of the philosophy and history of science is well known. In this paper, I intend to show how Dascal's groundbreaking work on rationality and the theory of controversies leads to a new reading of Darwin's theory of the origin of species.

In a broad sense, rationality can be understood as an activity of our faculty of reason, and there is no way of stepping outside rationality in order to think about

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this. 'Reason' is both 'observer' (what is going on?) and 'participant' (what should I do?). In this sense, thinking about rationality is thinking of it 'in action' (as 'doing something' in 'some way'), and then as 'rationality in context'. While it is 'in action' and, therefore, 'in context', rationality deals with a range of alternatives which includes the 'necessary' as well as the 'possible'. I consider the 'necessary' to be a particular niche within the much wider scope of the activity of reason.

Following Dascal's characterization of 'hard rationality',[1] I will refer to this niche as the realm of 'hard rationality'. Dascal says:

> By 'hard' rationality I understand a conception of rationality that has standard logic and its application as its fundamental model. This conception views logical inconsistency as the paradigmatic expression of irrationality and regards certainty as the principal aim and sign of knowledge. Since mathematics is the most successful implementation of rationality, hard rationality privileges what it takes to be the basic reasons of this success. Accordingly, it considers, as conditions of rational thinking and praxis or as their preferred manifestations, parameters such as: uncompromising obedience to the principle of contradiction; precise definitions formulated in terms of necessary and sufficient conditions; conclusive argumentation modelled upon deduction; formalization of this procedure by means of a symbolic notation and computability; axiomatization of domains of knowledge; and the like. (Dascal 2005a: 57–58)

The realm of 'hard' rationality is certainly very restrictive. Fortunately, as Aristotle had shown us in the past, now Dascal shows us that the rational domain is much larger, and that the realm of the possible is not abandoned to irrationality. For Dascal, the rationality of the possible belongs to the domain of 'soft rationality', and, in a different way to Aristotle's views concerning the rationality of the possible, his 'soft rationality' also includes much of science:

> By 'soft' rationality I understand, broadly speaking, a conception of rationality that seeks to account for and to develop the means to cope with the host of situations – theoretical as well as practical – where uncertainty and imprecision are the rule. Although acknowledging the applicability and usefulness of the high standards of rationality in certain fields, it rejects the identification as 'irrational' of all that falls short of them. It seals with the vast area of the reasonable, which lies in between the hard rational and the irrational. The model of the idea of soft rationality is that of a balance where reasons in favor and against (a position, a theory, a course of action) are put in the scales and weighted. But there is a deep difference between 'weighing' reasons and 'computing' them. For, except in a handful of cases, the weight of reasons are not precisely quantifiable and context-independent. Consequently, weighing them does not yield conclusive results whose negation would imply contradiction. The balance of reasons, unlike deduction, 'inclines without necessitating' – in Leibniz's felicitous phrase. ( . . . ) Soft rationality's logic is thus non-monotonic and cannot be reduced to standard deductive logic. It is the logic of presumptions that rationally justify conclusions without actually providing them, of the heuristics for problem-solving and for hypothesis generation, of pragmatic interpretation, of negotiation, and of countless other procedures we make use of in most spheres of our lives. (ibid: 58)

'Soft rationality' is therefore the appropriate area for the critical debate of alternatives, of opposing views, of weighing reasons, and for deliberating.

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[1] Although Dascal may not share my view of the 'necessary' as a niche within the 'possible', it does not affect my agreement with his characterization of 'hard' rationality and his distinction between 'hard' and 'soft' rationality.

How does this work? Dascal's original contribution to the answer to this question can be found in his taxonomy of types of polemic (1994, 1998, 2005a, b). As shown by his chart for mapping their structure, which can be found in several of his works, these are 'discussions', 'disputes', and 'controversies'. They differ in relation to their objective, extent, procedures, preferential move, and closure. In discussions, the shared commitments, propositions, rules, and criteria allow the participants to clearly state and 'solve' the problem or divergence, which is seen as an error which can be successfully corrected. This is the realm of certainty, which belongs to 'hard rationality'. In disputes, there is a well-defined divergence which cannot be solved in the light of the divergent standpoints concerning ideas, attitudes, sentiments, and preferences. The important thing is to win over the opponent, regardless of how argumentatively persuasive the victor can be, and the dispute is 'dissolved'. In 'disputes', irrationality can win the day. 'Controversies', on the other hand, provide the ideal location for 'soft rationality'. They involve deep divergences concerning standpoints related to ideas, attitudes, preferences, rules, and methods, or about how they should be interpreted. They are 'quasi-dialogical', in the sense that, over and above the participants, there is a third party (the audience) which also acts as final arbiter (the scientific community).

Throughout his major work, the *Origin of Species*, Darwin undertakes a dialogue with some of the great minds of his time, while at the same time being an ordinary interlocutor. He does this by means of 'one long narrative' or 'one long argument', as he calls the *Origin*, which can be seen as consisting of a sequence of arguments in a debate with his contemporaries. The main idea he wants to convey is that species are produced in nature by means of natural selection. Is this a 'rational' attempt at explanation, and of what kind? I will focus on Darwin's definition of 'explanation', be it explanation of facts, concepts, theories, or procedures, and on the argumentative strategies he adopts which satisfy the conditions accounted for by a Dascalian approach.

Darwin was not a professional epistemologist. He was not concerned with defining the meaning of 'explanation' before undertaking the task of showing how new species originate in nature. In only one passage in his writings (and this is not a piece of his scientific writing, but of his *Autobiography*), does he give something which is close to a definition of this: "From my early youth I have had the strongest desire to understand or explain whatever I observed, that is, to group all facts under some general laws" (Darwin 1958: 141)? Thus, instead of looking for a definition by which to understand the Darwinian meaning of 'explanation', we can go through Darwin's scientific writings and see the way he uses the expression 'explanation' and its cognates in order to form this meaning. This will reveal a multifaceted meaning of the term 'explanation' and will help us discover the Darwinian view of 'rationality'. If we begin with the analysis of 'explanation' and its cognates, we can demarcate a semantic horizon where innovative meanings of 'explanation' occur, in addition to more traditional ones which account for the facts which are given to us by experience, by giving reasons for believing and supporting our expectations, clearly understanding and throwing light on facts and concepts, and according to a pattern or model that is acceptable to the scientific community (Darwin 1872: 383, 400).

As we go deeper into the analysis of these initial markers and gradually come to understand its semantic significance, we can see that the meaning of 'explanation' is based on five main points, each with its own spectrum of connotations. These points are as follows: (1) *comprehension of the meaning of facts*, (2) *giving reasons*, (3) *an argument*, (4) exhibiting *a causal nature*, and (5) a collection of *procedures*. Initially, these features do not seem to be innovative, but they take on a new significance with Darwin's treatment. Although it is not possible to offer an exhaustive analysis here, I will give a number of examples to illustrate just how Dascalian Darwin's explanatory efforts become.

Darwin is always clearly aware of the necessity of theoretical and argumentative mediation in our efforts to explain how or why things are as they are. In a remarkably modern way, he emphasizes that explanation always *depends on a given theoretical view or assumption* and, in particular, on the *comparison of different views*. This comparison nearly always involves the consideration of all the ontological and epistemological ingredients Dascal points out in characterizing the structure of controversies. Most of the time, Darwin refers to his opponents by name and compares divergences and convergences item by item. Comparing the accuracy and wide scope of his view with his opponents' is one of Darwin's basic strategies for building and defending his theory. One important result of this strategy is that 'explaining' means *presenting the best possible explanatory alternative*. Thus, as a result of its explanatory superiority, this best alternative, i.e., Darwin's own theory, becomes the *only possible (rational) explanation* (as in the case of Darwin's defence of the common origin of all pigeons). Another result of this is to show that difficulties decrease or even disappear with a deeper analysis of the matter (as in the case of Darwin's treatment of the difficulties raised against his theory).

Each opposing view includes ontological and epistemological presuppositions, and the criteria and procedures which lie at the heart of their explanatory hypotheses. Understanding them requires both a contextual and a pragmatic analysis, and there may be disagreement on specific points or on all of them together. A pragmatic analysis of how they linguistically express their disagreements and standpoints, as well as of the nonlinguistic factors that may interfere with the defence of their ideas and criticisms, helps us to understand the nature of their disagreements.

A further point in favour of the role played by controversies or dialogical structures in Darwin's thought is the connotation of 'explaining' as *formulating the right questions* (about what, how, why) and *generating patterns of questions and answers* in order to introduce and guide his investigation and respond to objections. In the third chapter, entitled the Struggle for Existence, Darwin says:

> BEFORE entering on the subject of this chapter, I must make a few preliminary remarks, to show how the struggle for existence bears on Natural Selection. ( . . . ) How have all those exquisite adaptations of one part of the organization to another part, and to the conditions of life, and of one organic being to another being, been perfected? ( . . . ) Again, it may be asked, how is it that varieties, which I have called incipient species, become ultimately converted into good and distinct species which in most cases obviously differ from each other far more than do the varieties of the same species? How do those groups of species, which constitute what are called distinct genera, and which differ from each other more than do the species of the same genus, arise? All these results, as we shall more fully see in the next chapter, follow from the struggle for life. (Darwin 1872: 48–49)

In the sixth chapter, where he deals with the difficulties facing the theory, he classifies the four main objections to it as follows:

> First, why, if species have descended from other species by fine gradations, do we not everywhere see innumerable transitional forms? Why is not all nature in confusion, instead of the species being, as we see them, well defined? Secondly, is it possible that an animal having, for instance, the structure and habits of a bat, could have been formed by the modification of some other animal with widely different habits and structure? Can we believe that natural selection could produce, on the one hand, an organ of trifling importance, such as the tail of a giraffe, which serves as a fly-flapper, and, on the other hand, an organ so wonderful as the eye? Thirdly, can instincts be acquired and modified through natural selection? What shall we say to the instinct which leads the bee to make cells, and which has practically anticipated the discoveries of profound mathematicians? Fourthly, how can we account for species, when crossed, being sterile and producing sterile offspring, whereas, when varieties are crossed, their fertility is unimpaired? (Darwin 1872: 133)

Darwin's explanatory attempt is then projected into the realm of *forming conjectures,* thereby showing the possibility and legitimacy of forming hypotheses and working with *suppositions* and *presumptions* where direct evidence is not available to support his claims. In other words, this explanatory effort proceeds within the field of what Dascal calls 'soft rationality'.

For Darwin, *reason* is the cognitive faculty by means of which *reasons* for our claims and beliefs are created or recognized, and 'explanations' are produced and fairly evaluated. Without excluding 'hard rationality' from the way in which Darwin refers to 'reason', we can infer that Darwin would gladly accept Dascal's concept of 'soft rationality'. Darwin says:

> If our reason leads us to admire with enthusiasm a multitude of inimitable contrivances in nature, this same reason tells us, though we may easily err on both sides, that some other contrivances are less perfect. (Darwin 1872: 163)

In Darwin's view, the emotional and the intellectual interpenetrate each other in our efforts as cognitive beings. A good example of this can be seen in the 'scientific' description Darwin gives of the larval cirripedes:

> In the second stage, answering to the chrysalis stage of butterflies, they have six pairs of beautifully constructed natatory legs, a pair of magnificent compound eyes, and extremely complex antennae; but they have a closed and imperfect mouth, and cannot feed. (Darwin 1872: 389)

*Reason* operates together with imagination in determining the following: 'To arrive, however, at a just conclusion regarding the formation of the eye, with all its marvellous yet not absolutely perfect characters, it is indispensable that the reason should conquer the imagination' (Darwin 1872: 146).

As the means or elements by which we give support to our expectations and claims, *reasons* constitute a list of items which go far beyond traditional 'logical' and 'empirical' reasons. The list includes *facts and empirical processes*, *studies*, *principles*, *kinds of reasoning*, *definitions,* and *theoretical views* on *beliefs*, *suppositions*, *mental habits*, *the authority of the scientific community*, nontraditional *procedures*, and *argumentative strategies.* In the whole explanatory context, *causal attributions* are privileged *reasons* for evaluating given explanatory suppositions. As to the question of the sort of things we ask about or give reasons for, Darwin's list

is flexible, diversified, and far from conventional. It includes *propositions*, *beliefs*, *suppositions*, as well as *facts*, *principles*, *difficulties,* and *attitudes* (*tendencies or inclinations to believe, accept*, *or reject beliefs and suppositions*). A network containing all these elements in a mutually supportive way is then created. Darwin explains the normal classificatory procedure of naturalists when they organize the Natural System by means of their (unconscious) adoption of the theory of the community of descent with modification as a guiding principle. This theory, in turn, is established by the integrity of an explanatory context in which the criteria for accessing the success of our explanations are determined.

'Explanation' as 'giving reasons' leads us to the meaning of 'explanation' as *an argument*. Darwin refers to the *Origin* as 'one long argument' and asks the reader to judge his theory in the light of this argument as a whole: 'AS THIS whole volume is one long argument, it may be convenient to the reader to have the leading facts and inferences briefly recapitulated' (Darwin 1872: 404). The connotation of 'explanation' as *an argument* has a multifarious character in Darwin's work. We cannot reduce Darwin's argument to the traditional models of 'deductive' or 'inductive' reasoning, since his *reasoning of probability* does not fit with strictly inductive patterns. Rather than establishing inductive generalizations, Darwin takes the particular cases he examines as 'exemplary', and this allows us to see more clearly the general reasons that already exist and are to be taken into account in explaining the general phenomena they illustrate. *Deduction* is an expression Darwin uses very often throughout the text, and this usage meets the general requirement for deductive arguments, in the sense that if their premises are true, the truth of these premises is then a condition for the truth of the conclusion.

In fact, most reconstructions of the general argument presented in the *Origin of Species* tend to show its hypothetical-deductive features. The Principle of Natural Selection is given as the necessary conclusion for the following premises: the Principles of Variation (PV), the Struggle for Existence (PSE – sometimes referred to as Malthus' Principle), Variation in Fitness (PVF), and Inheritance (PI). These reconstructions meet the condition according to which in deductive arguments it cannot be the case that if the premises are true (PV, PSE, PVF, PI), the conclusion (PNS) is false. However, there are at least two other scientific conditions which have to be met by deductive arguments in their normal version and which are not met by these reconstructions. In virtue of the semantic nature of the conceptual framework of the argument, the premises (at least PSE and PVF) are not independent from each other, in the sense that they cannot be corroborated independently. Furthermore, the premises are not independent from the conclusion, on which they depend for their intelligibility, as long as we cannot conceive of PSE without conceiving of PNS, and vice versa. Whatever the logic of the argument may be, it does not belong to the realm of *hard rationality*.

Many of the explanatory procedures Darwin makes use of do not belong to this realm either. Throughout the *Origin* Darwin refers to and makes use of a number of procedures usually classified as 'scientific', but other procedures and argumentative strategies he uses are quite innovative. For instance, in the case of *experiments*, Darwin does not focus on these as providing an 'empirical proof' in terms of

immediately conclusive evidence, but as being part of a wider explanatory context, where *the interplay of the actual and the possible* has a distinctive role. In every case, from *illustrations*, *analogies*, and *comparisons* in general to *experiments*, Darwin makes efficient use of *imagination*. However, it is in the use of *metaphors* that imagination achieves its most powerful expression. *Metaphors* are essential not only for conceptual clarification, as in the case of what is meant by naturalists when they talk about 'metamorphoses of parts', or the introduction of new concepts, as in the case of 'natural selection':

> Naturalists frequently speak of the skull as formed of metamorphosed vertebrae; the jaws of crabs as metamorphosed legs; the stamens and pistils in flowers as metamorphosed leaves; but it would in most cases be more correct, as Professor Huxley has remarked, to speak of both skull and vertebrae, jaws and legs, &c., as having been metamorphosed, not one from the other, as they now exist, but from some common and simpler element. Most naturalists, however, use such language only in a metaphorical sense; they are far from meaning that during a long course of descent, primordial organs of any kind – vertebrae in the one case and legs in the other – have actually been converted into skulls or jaws. Yet so strong is the appearance of this having occurred, that naturalists can hardly avoid employing language having this plain signification. According to the views here maintained, such language may be used literally; and the wonderful fact of the jaws, for instance, of a crab retaining numerous characters which they probably would have retained through inheritance, if they had really been metamorphosed from true though extremely simple legs, is in part explained. (Darwin 1872: 386)

The 'literal' (real) and the 'metaphorical' are revealed as interchangeable parts or phases of one and the same dynamic explanatory process.

At decisive points of the defence and justification of his theory, Darwin makes use of *metaphors,* as in the case of his allegation concerning the 'imperfection of the geological records'. This imperfection is explained by 'Lyell's metaphor':

> ... Sir Charles Lyell now gives the support of his high authority to the opposite side; and most geologists and palaeontologists are much shaken in their former belief. Those who believe that the geological record is in any degree perfect, will undoubtedly at once reject the theory. For my part, following out Lyell's metaphor, I look at the geological record as a history of the world imperfectly kept, and written in a changing dialect; of this history we possess the last volume alone, relating only to two or three countries. Of this volume, only here and there a short chapter has been preserved; and of each page, only here and there a few lines. Each word of the slowly-changing language, more or less different in the successive chapters, may represent the forms of life, which are entombed in our consecutive formations, and which falsely appear to have been abruptly introduced. On this view, the difficulties above discussed are greatly diminished, or even disappear. (Darwin 1872: 289)

Attempts to both clarify and justify can be seen united in Darwin's view of classification in terms of languages:

> It may be worth while to illustrate this view of classification, by taking the case of languages. If we possessed a perfect pedigree of mankind, a genealogical arrangement of the races of man would afford the best classification of the various languages now spoken throughout the world; and if all extinct languages, and all intermediate and slowly changing dialects, were to be included, such an arrangement would be the only possible one. Yet it might be that some ancient languages had altered very little and had given rise to few new languages, whilst others had altered much owing to the spreading, isolation, and state of civilisation of the several co-descended races, and had thus given rise to many new dialects and languages.

> The various degrees of difference between the languages of the same stock would have to be expressed by groups subordinate to groups; but the proper or even the only possible arrangement would still be genealogical; and this would be strictly natural, as it would connect together all languages, extinct and recent, by the closest affinities, and would give the filiation and origin of each tongue. (Darwin 1872: 370–371)

Among the argumentative strategies which are central to Darwin's one long argument are the *whole* ('one long argument, the entire narrative') and *part* (particular arguments, chapters) *movement* designed to put together the argument through successive retrospectives and projections; the consideration of his theory's *explanatory power as a whole* instead of looking at how it functions in particular cases, the *comparison of Darwin's views with those of his opponents'*; and *the treatment of difficulties/objections/exceptions* to emphasize its superior explanatory power. The *interplay of the 'real' and the 'possible'* consists in showing the absence of logical impossibility for the occurrence of what is being claimed, or the presence of its factual possibility judged from the point of view of analogy (or other relationships of similarity) with cases which are actually given. This interplay focuses on the existence or inexistence of contrary evidence and on what is logically and/or factually possible. By means of the interplay of what is actually given and what can possibly be given, the 'contrary' evidence can be shown to be only 'apparently' contrary. It becomes neutralized, losing its negative impact on our claims, or even becoming positive evidence for them:

> Although the belief that an organ so perfect as the eye could have been formed by natural selection, it is enough to stagger any one; yet in the case of any organ, if we know of a long series of gradations in complexity, each good for its possessor, then, under changing conditions of life, there is no logical impossibility in the acquirement of any conceivable degree of perfection through natural selection. (Darwin 1872: 165)

Finally, we must keep in mind, as Darwin asks us to do so from the very beginning of the *Origin*, that the *balance of reasons* is a central strategy of his argumentation:

> For I am well aware that scarcely a single point is discussed in this volume on which facts cannot be adduced, often apparently leading to conclusions directly opposite to those at which I have arrived. A fair result can be obtained only by fully stating and balancing the facts and arguments on both sides of each question; and this is here impossible. (Darwin 1872: 2)

The balance of reasons for and against a certain position is also central to Dascal's 'soft rationality'. For Darwin as well as for Dascal's model, the weight of reasons is not precisely quantified and context independent. Darwin's large array of facts and reasons when building an explanation depends on the entire network of reasons and factual evidence which he carefully examines. By exploiting alternatives and connecting the best of these to each other, the available evidence is mediated by the theoretical and contextual relationships on which it depends.

These contextual relationships form a view of nature as a self-sustained and dynamic system within which laws and principles operate. From this point of view, the order which regulates this system 'inclines without necessitating'. Nevertheless,

it is not just a Leibnizian 'inclination', nor is it a Leibnizian 'necessitation'. In Darwinian terms, the necessity ('order') we find in nature is not opposed to contingency. The order which operates in nature is what maintains it as a system, by acting on what is contingent, without which nothing would be ordered. The necessary and the contingent are not opposed to this order, and this particular relationship between them gives them a new meaning. Darwin uses the expression 'a necessary contingency', and we might add to this 'a contingent necessity'. This new approach to necessity and contingency is one of the results of what was perhaps Darwin's greatest internal conflict, that of God *vs.* Science. This is neither the rigid format of a mechanical law nor a design to account for so much suffering in the world. How is it possible to have order without an explanation in terms of design? How are laws themselves determined, and how do they operate in the world so as to produce not only regular events but new ones, such as the origin of new species? If chance is (as Darwin remarks in the *Origin* [1872: 106]) the name we give to our ignorance of cause, and if order is established through natural laws which allow for the appearance of new organic forms, then the answer to these questions requires a new way of conceiving nature. We encounter this 'regulated' world in Darwin's view of nature as a dynamic and self-sustained system whose 'laws' are conceived as the 'tendencies' determined (or made possible) by this system as long as it is self-regulated. There is no need of a 'supernatural' design. The emergence of this view brings out a feature which is very characteristic of controversies – that of innovative ideas.

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