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The Darwinian Rhetoric of Science in Petr Kropotkin's *Mutual Aid. A Factor of Evolution* (1902)**

Riccardo Nicolosi*

Summary: The paper explores the significance of rhetorical argumentation in Petr Kropotkin's treatise *Mutual Aid. A Factor of Evolution* (1902). It argues that Kropotkin's work is steeped in the tradition of a rhetoric of science that is profoundly Darwinian and in which various forms of analogic reasoning play a central role. After explaining the epistemic function of the metaphors "struggle for existence" and "mutual aid," the paper analyses Kropotkin's argumentation strategies and offers an interpretation of them as a further development and reworking of Darwinian rhetoric.

Keywords: Peter Kropotkin, Charles Darwin, Russian Darwinism, rhetoric of science, struggle for existence, mutual aid

1. Introduction

There is a surprising gap in the extensive research literature on Russian Darwinism. While the reception of Darwinism in Russia has been a subject of thorough study by historians of science, its importance as a phenomenon of scientific rhetoric has attracted little attention. An important exception is Daniel P. Todes's *Darwin without Malthus. The Struggle for Existence in Russian Evolutionary Thought* (1989). Todes's impressive monograph tells the story of Russian Darwinism in the nineteenth century by tracing various interpretations of the Malthusian metaphor of the struggle for existence.[1] Yet, metaphors are only one, however important, part of the complex rhetorical apparatus of Darwinism, and as such they must be considered contextually, with reference to other rhetorical levels. The fact that such studies are still lacking is especially remarkable in light of the fact that

[1] Todes 1989. On Darwinism in Russian culture see, among others, Scudo and Acanfora 1985; Vucinich 1988; Kolchinskii 2006.

R. Nicolosi, Prof. Dr., University of Munich, Slavic Philology, E-Mail: riccardo.nicolosi@lmu.de

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Charles Darwin's theory of evolution has long been regarded as a masterpiece of rhetoric of science.[2]

As a starting point for closing this gap in the study of Russian Darwinism, I would like to explore in my paper the significance of rhetorical argumentation in Petr Kropotkin's treatise *Mutual Aid. A Factor of Evolution* (1902), one of the most prominent interpretations of Darwin's thought in Russian culture. Kropotkin's polemical response to Thomas Henry Huxley's article "The Struggle for Existence: A Programme" (1888) was not meant to be simply a refutation of social Darwinism from the standpoint of the political theory of anarchism.[3] It is also, and primarily, a scientific argument in favour of a particular interpretation of Darwin's theory of evolution, with Kropotkin representing a stream in Russian Darwinism that is critical of Malthus and that sees the main factor of evolution in cooperation rather than competition between organisms. I will argue that Kropotkin formulates his argument in the tradition of a rhetoric of science that is profoundly Darwinian and in which various forms of analogical reasoning play a distinct role. First (1) I will explain the epistemic function of the metaphors "struggle for existence" and "mutual aid" in the context of Darwin's and Kropotkin's rhetorical argumentation, and in doing so, I will give a short outline of the historical and scientific context of Russian Darwinism. Following from this (2) I will analyse Kropotkin's argumentation strategies and offer an interpretation of them as a further development and reworking of Darwinian rhetoric based on different forms of analogical reasoning. In this context, Darwin's and Kropotkin's "imaginary illustrations" play a central role.

2. The Rhetoric of "Struggle for Existence" and "Mutual Aid"

There is now a wide consensus among researchers that in the late nineteenth-century Darwinism was less about correct or mistaken interpretations of Darwin's theory, but more a product of discursive practices, at the core of which was Darwin's rhetoric. Darwin's "long argument"[4] in *On the Origin of Species* (1859) has a specific rhetorical dimension, which should be understood as a reference to what Aristotle called "logos," that is dialectical reasoning whose goal is to arrive at an acceptance or rejection of a debatable thesis by determining its plausibility. This is not rhetoric as an art of emotional persuasion in the sense of the theory of affects with its appeal to "ethos" and "pathos" (Rhet. I, 2, 1356a). Rather, it is a form of situated argumentation through persuasion, which – as Chaïm Perelman asserts – is important in "nondemonstrative" scientific discourse, where "rea-

[2] On Darwin's rhetoric of science see, among others, Young 1985; Campbell 1987; Campbell 1989; Bulhof 1992; Pera 1994, esp. 71–88; Campbell 1990; Waters 2003; Gross 2006, esp. 81–97; Depew 2009; Beer 2009. On rhetoric of science in general see, among others, Gross 1990; Simons 1990; Pera and Shea 1991; Pera 1994; Kitcher 1995; Nate 1996; Harris 1997; Gross and Keith 1997; Fahnestock 1999; Ceccarelli 2001; Gross 2006; Depew and Lyne 2013. For a critical reflection on rhetoric of science and some of its radical constructivist positions see McGuire and Melia 1989; McGuire and Melia 1991.

[3] On this interpretation see, among others, Kinna 1995; Morland 1997, esp. 125–180; Glassman 2000; Morris 2002; Marks 2003, esp. 38–57.

[4] Darwin 1872, on 404. I cite from the sixth edition of *On the Origin of Species*, which is the one Kropotkin used when working on *Mutual Aid.*

soning is not limited to formally correct inferences or to more or less mechanical calculations."[5]

This view of rhetoric as dialectical, situated argumentation, which in nineteenth century England was championed by Richard Whately in his influential *Elements of Rhetoric* (1828), is of key significance to Darwin's reasoning.[6] It is important to emphasise that rhetorical argumentation in Darwin's *On the Origin of Species* (1859) is complementary to the ideal of scientific reasoning postulated by his contemporary John Herschel. Jonathan Hodge and others pointed out that Darwin viewed his "abstract"[7] as a Herschelian demonstration of common descent and transmutation driven by natural selection. Thus, in order to establish the status of natural selection as a *vera causa*, Darwin had to prove the *existence* of transmutation by means of natural selection, the *adequacy* of natural selection to produce the effects to be explained, and the *responsibility* of natural selection for these effects.[8] Under this interpretation, C. Kenneth Waters convincingly argued for the centrality of Darwin's analogy between artificial and natural selection: "[Darwin] used artificial selection as a way of introducing his argument for the existence of natural selection and then drew an analogy between artificial and natural selection in order to argue for the adequacy of natural selection."[9] Waters points out that "starting with artificial selection was a smart rhetorical move" because Darwin "lured readers into his new ways of reasoning by introducing this type of reasoning in the uncontroversial setting of breeding techniques."[10] Furthermore, the analogy with artificial selection helped Darwin to explain how natural selection could cause the transmutation of species from common descents, in the sense of the Herschelian adequacy principle. In a context where Darwin's knowledge of the laws governing the production and inheritance of variations was insufficient in order to explain the genetic variability that would be necessary for the mechanism of natural selection to work,[11] analogy was essential, not incidental, to his argumentation.[12]

Analogical reasoning is a cornerstone of Darwin's rhetorical argumentation, with metaphors playing a key role: as is well known, Darwin uses not only the metaphor of "natural selection" but also several other metaphors as, for example: "struggle for existence," "economy of nature," "the branching tree of life" etc. The primary function of these figures of speech is not to explicate the results of a well-proven scientific insight, but to serve an as an epistemic tool.[13] In Hans Blumenberg's terminology, these are "absolute metaphors," that is, "'translations' that

[5] Perelman 1982, on 5.
[6] On Whately and Darwin see Depew 2009.
[7] Darwin 1872, on 1.
[8] See Hodge 1977; Hodge 1992. See also Lennox 1991; Lennox 2005.
[9] Kenneth 2003, on 120.
[10] Ibid., on 127.
[11] See Bowler 1984, esp. 156–172.
[12] Kenneth 2003, on 124. See also, among others, Evans 1984; Largent 2009. For a claim to the contrary, arguing that the analogy between artificial and natural selection was not a crucial element of Darwin's reasoning, see, for example, Ruse 1979, on 172–177.
[13] See Beer 2009, esp. 44–96; Young 1985, esp. 79–125; Bulhof 1992, esp. 57–91; Schnackertz 1992, esp. 26–62.

resist being converted back into authenticity and logicality."[14] What makes Darwin's metaphors and arguments by analogy so interesting from the point of view of rhetoric of science is exactly the fact that they are assigned an epistemic role despite their non-propositional character.[15] Darwin intentionally makes use of polysemy and conceptual porousness of analogy. These features guarantee a flexibility of argumentation that allowed Darwin to inscribe himself in the scientific discourse of the time and to suggest connections to the existing theories of evolution.[16]

For Kropotkin's interpretation of Darwinism, just like for the reception of Darwin in Russia in general, the metaphor of "struggle for existence" is of central importance. The various interpretations to which this concept was subjected in European Darwinism—from agonal competition to cooperative mutual aid—are not attributions that retrospectively gave a rhetorical expression to a semantically stable core of the theory. Rather, they are a result of different understandings of a figure of speech that is, as metaphors are, by definition, semantically polysemous. The term "struggle for existence" was first used in *An Essay on the Principle of Population* (1798) by Thomas R. Malthus, one of the leading theoreticians of classical English political economy. Malthus's anti-utopian treatise openly targeted early socialist utopias of the time, and primarily William Godwin's *Enquiry Concerning Political Justice* (1793). Malthus set out to refute Godwin's thesis on social progress through a redistribution of wealth and on what Godwin saw as a related question of the organic and moral perfectibility of humans by resorting to an argument that was already known in the political economy of his time: an egalitarian, rapidly growing society runs the risk of collapsing as a result of overpopulation.

In Malthus's opinion there is a divine natural law that ensures a balance between "population" and "subsistence" that grow at different rates. Because of the insurmountable sexual drive of humans, writes Malthus, "population, when unchecked, increases in a geometrical ratio. Subsistence increases only in an arithmetical ratio."[17] From this premise Malthus develops what he sees as the natural law of necessary and regular "checks," which hinder an increase in population.[18] "Misery and vice" are the most powerful of such regulative elements, and they mostly affect the poor.[19] Combined with other scourges, such as epidemics and hunger, "misery and vice" keep in balance the population numbers and the quan-

[14] Blumenberg 2010, on 3.

[15] While theoreticians of argumentation may well attribute a heuristic function to metaphor and to argument from analogy, these rhetorical devices have no validity as logical arguments. For Perelman, for example, while analogy helps to formulate a hypothesis, it does not form part of "Ontology" (Perelman 1982, on 115). See also Gabriel 1997. On the epistemic function of metaphors in the scientific discourse see, among others, Ortony 1979; Bono 1990; Danneberg 1995; Baake 2003; Brandt 2004.

[16] See Depew 2009.

[17] Malthus 2007, on 5.

[18] Malthus distinguishes between "preventive checks," such as conscious abstinence and late marriage, and "positive checks," that is, factors that increase general mortality (ibid., on 24).

[19] Malthus intended his treatise to be not just a justification of the social *status quo* and to polemicise against social utopias, but also a criticism of contemporary political measures aimed to alleviate poverty. See Wrigley 2004, esp. 229–248.

tity of food in the world.[20] Malthus sees human life as a permanent "struggle for existence"[21] governed by competition and class differences, a never-ending cycle where periods of population growth are followed by regulatory "checks" and, finally, by a decrease in population numbers.

There is a certain (unintentional) irony in the fact that Malthus's theory of population, grounded as it is in the conviction that the nature of socio-economic and anthropological facts is unchangeable, was a decisive inspiration behind Darwin's theory of evolution. Reading Malthus's treatise gave Darwin an insight into the discrepancy between an exponential growth of organisms and naturally limited resources, which "inevitably" results in a struggle for existence.[22] Darwin used the metaphor of a "struggle for existence" to define the complex relationships both between organisms (within the same or different species) and between organisms and abiotic conditions—the relationships that drive natural selection. It is important to stress that Darwin was well aware of the metaphorical dimension of the term "struggle for existence." In *On the Origin of Species* he writes: "I should premise that I use this term in a large and metaphorical sense including dependence of one being on another, and including (which is more important) not only the life of the individual, but success in leaving progeny."[23] As Darwin clarifies, the metaphoric expression "struggle for existence" oscillates between a literal meaning in the sense of organisms fighting for survival, and an indirect meaning of living creatures being dependent on each other and on the environment. In *On the Origin of Species* Darwin plays consciously with both semantic layers, so that the agonal element of the struggle partly acquires the militant connotations of a "war of nature,"[24] while the "mutual relations of all organic beings"[25] implies a state opposite to that of confrontation: a cooperation of living beings with each other.[26]

As is well known, this intentional polysemantic metaphor led the readers to interpret his theory in different ways.[27] The Russian nineteenth-century cultural tradition, in which Kropotkin's concept of mutual aid is rooted, was critical of those elements of the theory of evolution that were closely identified with Malthus's teachings: the vision of "overpopulation as the generator of conflict and of intraspecific competition as its result."[28] By that time Malthus's thoughts on political economy had already been met with scepticism among Russian intelligentsia. Most importantly, Malthus's theory was practically incompatible with the geographic reality of Russia. It simply took too much imagination to conceive of the possibility that a relentless struggle for limited food and space resources might break out in this sparsely populated country. This critical reception of Malthus's

[20] Malthus 2007, on 5: "By the law of our nature which makes food necessary to the life of man, the effects of these two unequal powers must be kept equal."
[21] Ibid., on 18.
[22] Darwin 1872, on 50.
[23] Ibid.
[24] Ibid., on 61.
[25] Ibid.
[26] Campbell 1987, on 81.
[27] See, among others, Crook 2007; Engels and Glick 2008; Glick 2014.
[28] Todes 1987, on 538. See also Todes 1989; Korostelev 1978.

ideas was also ideologically grounded, as Malthus became an embodiment of the enemy figure for different political and ideological groups within the Russian intelligentsia. For example, Vladimir F. Odoevskii, a follower of Friedrich W. J. Schelling, saw in Malthus, and in English political economy in general, manifestations of a logical analytical thinking that obstructed the idealistic path towards the Absolute.[29] For conservative and radical thinkers alike Malthus was a symbol of inhumane individualism, preaching the principle of competition in accordance with the British philosophy of liberal economics. To this, the Russian critics counterposed the social-economic concept of a peasant commune (russ.: *obshchina*).[30]

When Darwin's theory of evolution was translated into Russian (the first translation of *On the Origin of Species* appeared in 1864), the Malthusian elements in it were almost unanimously rejected. In particular, the agonal implications in the metaphor of a "struggle for existence" (russ.: *bor'ba za sushchestvovanie*) met in Russia with little sympathy in either political discourse or in that of natural sciences. Partly it was due to the fact that Darwin's work first became known in Russia in Heinrich G. Bronn's German translation (1860), where the "struggle for existence" became "Kampf um's Daseyn."[31] Nikolai Chernyshevskii, a devotee of Godwin, remarked in 1873: "the vileness of Malthusianism has passed into Darwin's doctrine."[32] Remarkably, most Russian biologists also refuted the idea of competition between organisms as a motor of evolution. They found Darwin's idea of nature, in which the primary forces are overpopulation and intraspecific competition, misleading.

Various alternative theories emerged, whose common denominator was that in them the struggle for life was not an important factor of evolution.[33] Botanist Andrei N. Beketov represented a neo-Lamarckist position in stressing a direct influence of the environment on organisms. Botanic geographer Sergei I. Korzhinskii came up with a theory of heterogenesis in which he made a case for discontinuous variations in nature that would be incompatible with the mechanisms of struggle for existence and natural selection. Finally, zoologist Karl F. Kessler developed a theory of "mutual aid" (russ.: *vzaimnaia pomoshch'*), according to which the central element of an evolutionary struggle for life is the struggle of organisms

[29] See Mann 1998, esp. 152–199. In his *Russian Nights* (1844) Odoevskii refers to Malthus as "the last absurdity in mankind, […] a man who focused in himself all the crimes, all the fallacies of his epoch, and squeezed strict and mathematically formulated laws of society out of them" (Odoevsky 1997, on 50–51).

[30] For example, the westerner Aleksandr Herzen, whose ideas were supposed to provide guidance to the Russian populists (*narodniki*), claimed: "The Russian peasant commune […] is the perfect antithesis of Malthus's celebrated proposition: it allows everyone without exception to take his place at the table." Quoted after Todes 1987, on 540. See also Leo Tolstoy's criticism of Malthus in *Tak chto zhe nam delat'?* (completed in 1886, first published in English as *What To Do?* in 1887), and of the struggle for existence as a postulate of social Darwinism in *Anna Karenina* (Part 5, Chap. IX; Part 7, Chap. XXX; Part 8, Chap. XII).

[31] Kolchinskii 2006, on 179.

[32] Quoted after Todes 1987, on 541. Likewise, panslavist Nikolai Ia. Danilevskii, whose *Darwinism. A Critical Investigation* (*Darvinizm. Kriticheskoe issledovanie*, 1885–1889) became an influential anti-Darwinist text, saw in the transfer of the utilitarian idea of competition from Malthus's economic theory onto the organic world the greatest weakness of Darwin's theory of evolution. See Vucinich 1988, esp. 118–150.

[33] For a detailed overview of these theories see Todes 1989, esp. 45–122.

with abiotic conditions, and not intraspecific conflict.[34] For Kessler, the need for safety and reproduction demands that organisms join forces rather than compete with each other, and the fittest are defined by their ability to cooperate. In his summary of Kessler's thesis Todes writes: "Mutual aid contributed to evolution in two ways. First, it increased the resources and life span of a species, and so the likelihood that the direct action of the environment would create new forms; and second, it increased the chances that these forms would prosper."[35]

Kropotkin, a Russian leader of the international anarchist movement, responded enthusiastically to Keller's ideas. Since 1876 in exile in London, he read Kessler's writings in 1883 and saw in them "a further development of the ideas expressed by Darwin himself in *The Descent of Man.*"[36] His pamphlet *Mutual Aid. A Factor of Evolution* (1902) was written as a response to Thomas H. Huxley's essay *The Struggle for Existence: A Programme* (1888), in which "Darwin's bulldog" (such was Huxley's nickname) postulated that the struggle for existence was an inevitable feature of human life, too: "so long as the natural man increases and multiplies without restraint, so long will peace and industry not only permit, but they will necessitate, a struggle for existence as sharp as any that ever went on under the *régime* of war."[37] To this Malthusian vision of life Kropotkin opposes a natural history of mutual aid which he conceptualizes as a natural instinct that is equally shared by humans and animals. Kropotkin does not discount the significance of struggle for life in evolution. However, in his understanding it is mostly a struggle of organisms with abiotic factors, which often promotes mutual help:

> In the animal world we have seen that the vast majority of species live in societies, and that they find in association the best arms for the struggle for life: understood, of course, in its wide Darwinian sense—not as a struggle for the sheer means of existence, but as a struggle against all natural conditions unfavorable to the species. The animal species, in which individual struggle has been reduced to its narrowest limits, and the practice of mutual aid has attained the greatest development, are invariably the most numerous, the most prosperous, and the most open to further progress. […] The unsociable species, on the contrary, are doomed to decay.[38]

In Kropotkin's eyes, the theory of mutual aid is a correction of a false understanding of Darwinism. For him the struggle for life—just like for Darwin himself, whom Kropotkin quotes—is to be understood "in its large and metaphorical sense"[39] rather than literally. In fact, however, Kropotkin's reading is a more radical take on a particular semantic layer inherent in the Darwinian concept, whereby stress is placed on an interdependence of organisms and their cooperation. This leads to a striking proliferation of Darwinist metaphorical tropes, since the concept "mutual aid" is but another metaphor in which social and biological realities are placed in a relationship of similarity. This metaphor is polysemous in the

[34] Kessler 1880.
[35] Todes 1987, on 546.
[36] Kropotkin 2006, on xiii.
[37] Huxley 1888, on 168.
[38] Kropotkin 2006, on 242.
[39] Ibid., on 1.

same way as Darwin's metaphor is: "mutual aid" means both "mutual protection" and "sociability" with all implied connotations.

For Kropotkin, this rhetorical polysemy compensates for the insufficient empirical rigour of his theory. His ideas are ultimately not compatible with the belief in natural selection. Unlike intraspecific competition, mutual aid cannot be a *vera causa* for an evolution of physical traits in organisms or for an emergence of new species.[40] During the first two decades of the twentieth century, Kropotkin devoted numerous studies to this weak point of his theory and propagated a neo-Lamarckist vision of evolution. In this view, an unmediated influence of the environment on organisms and an inheritance of acquired traits are direct causes of variations, whereby cooperative species are subject to these factors more than individualistic ones.[41]

In *Mutual Aid* these difficulties of the theory are not yet explicitly formulated. Instead, the reader is presented with an image of animal ecology where the "Law of Mutual Aid"[42] plays a key role. Without being able to explain clearly how this "Law" can function as a "factor of evolution," Kropotkin resorts to providing discursive evidence for his hypothesis by means of rhetorical arguments that rely heavily on Darwin's own line of reasoning, made sometimes even more radical in Kropotkin's interpretation. In adopting Darwin's characteristic style of argumentation and using it for his ends, Kropotkin attempts to convey the impression that his treatise offers the correct interpretation of Darwin's theory of evolution.

3. Kropotkin's Darwinian Rhetoric

Kropotkin's reliance on Darwin's argumentative strategies is evident already in the first sentences of the introduction to *Mutual Aid*, where he recounts his observations of animal life that he conducted as a naturalist while on expeditions to Eastern Siberia and northern Manchuria in the 1860s. This is a reference to the famous first pages of *On the Origin of Species*, where Darwin talks about his journey on board the HMS Beagle and his observations of the flora and fauna of South America.[43] To explicate his hypothesis on the process of evolution, Kropotkin phrases his personal, direct observations in a more dramatically charged form than Darwin, drawing a vivid picture of the "struggle for existence which most species of animals have to carry on against an inclement Nature."[44] This literary ekphrasis of natural destruction helps make the significance of "Mutual Aid and

[40] Todes 1989, on 136.
[41] Girón 2003.
[42] Kropotkin 2006, on xiii.
[43] Ibid, on xi: "Two aspects of animal life impressed me most during the journeys which I made in my youth in Eastern Siberia and Northern Manchuria." Darwin 1872, on 1: "When on board H.M.S. 'Beagle', as naturalist, I was much struck with certain facts in the distribution of the inhabitants of South America […]."
[44] Kropotkin 2006, on xi: "The terrible snow-storms which sweep over the northern portion of Eurasia in the later part of the winter, and the glazed frost that often follows them; the frosts and the snow-storms which return every year in the second half of May, when the trees are already in full blossom and insect life swarms everywhere; the early frosts and, occasionally, the heavy snowfalls in July and August, which suddenly destroy myriads of insects, as well as the second broods of the birds in the prairies […]."

Mutual Support […] for the maintenance of life, the preservation of each species and its further evolution"[45] more plausible. It is, in other words, not so much a matter of proving the hypothesis as of illustrating it by means of rhetorical *evidentia*, i.e. of a detailed and vivid description.

Kropotkin's metarhetorical reflexions on the polysemic nature of the metaphor "struggle for existence," which carries the main argumentative weight in *Mutual Aid*, are also Darwinian. However, while Darwin, as we have already seen, explicates the broad semantic field that the metaphor covers, Kropotkin turns against restricting the meaning of a "struggle for life" to a "competition between each and all," with the animal world seen "as a world of perpetual struggle among half-starved individuals, thirsting for one another's blood."[46] Kropotkin points out that he understands the metaphor differently, and offers his own definition—which seems just as restrictive as Darwin's: for Kropotkin it is about "mutual support, mutual aid, mutual defence amidst animals belonging to the same species."[47] Kropotkin supports this antithetic argument through the use of a classical appellative figure of speech—a rhetorical question, which, interestingly, he addresses to nature: "But if we resort to an indirect test, and ask Nature: 'Who are the fittest: those who are continually at war with each other, or those who support one another?' we at once see that those animals which acquire habits of mutual aid are undoubtedly the fittest."[48] Here Kropotkin resorts to the rhetorical device of personification (*fictio personae*) with respect to nature, which plays an important, though ambiguous, role also in Darwin's treatise.[49]

Kropotkin, thus, replaces the agonal implication of competition in the metaphor "struggle for life" through another metaphor, that of "mutual aid," which is just as polysemous as the Darwinian one. "Mutual aid" must be understood both in a direct, literal sense and in an indirect, metaphoric one, as referring to cooperation and sociability. As so often in Darwinism, this reframing takes place with reference to Darwin himself as an argument from authority. Kropotkin refers to passages in *The Descent of Man* (1871) where Darwin discusses sociability among animals and humans.[50] Darwin's goal is to show that social instincts are the foundation of a "moral sense," which should allow him to postulate a continuity between animals and humans also in this respect. Understood thus, sociability *can* present an evolutionary advantage: "With those animals which were benefited by living in close association, the individuals which took the greatest pleasure in society would best escape various dangers; whilst those that cared least for their comrades, and lived solitary, would perish in greater numbers."[51]

For all that, Darwin is cautious in drawing conclusions. He understands cooperation as a phenomenon that can only be observed in groups of animals, not in whole species. Nor does he exclude the possibility that "cooperative forms were

[45] Ibid., on xii.
[46] Ibid., on 2–3.
[47] Ibid., on 5.
[48] Ibid.
[49] See Beer 2009, esp. 44–70.
[50] See Darwin 2004, esp. 123–144.
[51] Ibid., on 129.

still engaged in a metaphorical struggle for existence among themselves."[52] Kropotkin, however, interprets Darwin's statements as an unambiguous proof of the centrality of mutual aid as a factor of evolution. This thesis can be supported not so much by means of hypothetico-deductive reasoning as through a variety of figures of rhetorical argumentation clearly borrowed from Darwin. Like Darwin, Kropotkin emphasises the inductive, Baconian nature of his theory that is based on an "abundance of facts."[53] Together with that he must acknowledge that it is not in all realms of organic life that mutual aid can be observed. In doing so he makes a pragmatic move, i.e., just like Darwin, he "invites his skeptical interlocutors to pursue the inquiry in order to gain future benefits,"[54] linking it with an argument *ad ignorantiam*:

> Mutual aid is met with even amidst the lowest animals, and we must be prepared to learn some day, from the students of microscopical pond-life, facts of unconscious mutual support, even from the life of micro-organism. Of course, our knowledge of the life of the invertebrates, save the termites, the ants, and the bees, is extremely limited; and yet, even as regards the lower animals, we may glean a few facts of well-ascertained cooperation.[55]

A further rhetorical argument that Kropotkin—just like Darwin[56]—readily employs is the *reductio ad absurdum* to the point of ridicule. An example can be found in the beginning of chapter III, where he discusses the "absurd" notion that humans might be the only species in whose evolution mutual support has played no role:

> It is evident that it would be quite contrary to all that we know of nature if men were an exception to so general rule: if a creature so defenceless as man was at his beginnings should have found his protection and his way to progress, not in mutual support, like other animals, but in a reckless competition for personal advantages, with no regard to the interests of the species. To a mind accustomed to the idea of unity in nature, such a proposition appears utterly indefensible.[57]

Of all the argumentative devices he borrows from Darwin, Kropotkin accords a central function to analogy. The metaphoric dimension of the concept of mutual aid serves as a basis upon which Kropotkin lays out argumentation by analogy, which, like in Darwin's texts, establishes a relation between the semantic fields of the biological and the social. As we have already seen, Darwin could make the idea of natural selection plausible mainly by drawing a comparison with the breeding of animals and cultivation of plants, as is implied in the metaphor "natural selection." In order to strengthen this analogy, Darwin repeatedly uses an

[52] Todes 1989, on 11.
[53] Kropotkin 2006, on 8.
[54] Pera 1994, on 79. See also Depew 2009, esp. 243–245.
[55] Kropotkin 2006, on 8.
[56] See Pera 1994, on 79–80; Depew 2009, on 243–244.
[57] Kropotkin 2006, on 62.

additional argument *a fortiori*, also known as a double hierarchy argument, which is a feature of analogical reasoning:[58]

> As man can produce, and certainly has produced, a great result by his methodical and unconscious means of selection, what may not natural selection effect? Man can act only on external and visible characters: Nature, if I may be allowed to personify the natural preservation or survival of the fittest, cares nothing for appearances, except in so far as they may be useful to any being. She can act on every internal organ, on every shade of constitutional difference, on the whole machinery of life.[59]

Kropotkin, too, can only make his hypothesis that mutual aid is a motor of evolution plausible through an analogy between observable phenomena that characterise the development of humans and phenomena whose existence is presumed in nature. Like Darwin, that is, by following the logic of analogical reasoning in conjunction with the double hierarchy argument, Kropotkin explains, for example, that it would be downright impossible for a keen competition to occur between living beings in nature, and that the Malthusian principle is false, because high mortality rates in the first months of life prevents such competition from developing:

> In reality, the chief argument in favour of a keen competition for the means of existence continually going on within every animal species is – to use Professor Geddes' expression – the "arithmetical argument" borrowed from Malthus. But this argument does not prove it at all. We might as well take a number of villages in South-East Russia, the inhabitants of which enjoy plenty of food, but have no sanitary accommodation of any kind; and seeing that for the last eighty years the birth-rate was sixty in the thousand, while the population is now what it was eighty years ago, we might conclude that there has been a terrible competition between the inhabitants. But the truth is that from year to year the population remained stationary, for the simple reason that one-third of the newborn died before reaching their sixth month of life; one-half died within the next four years, and out of each hundred born, only seventeen or so reached the age of twenty. The new-comers went away before having grown to be competitors. It is evident that if such is the case with men, it is still more the case with animals.[60]

The last sentence in the quote is precisely such an argument *a fortiori*, which builds up an analogy between the human and the animal worlds and helps Kropotkin to infer (admittedly, without making a particularly convincing argument) that keen competition in nature almost doesn't occur. This quote also exposes an important consequence of analogical reasoning for Kropotkin's argument. While Darwin is careful to contain the anthropomorphic implications of the analogy between artificial and natural selection, for which reason he "attempts to deconstruct the mythological personage Nature"[61] in later editions of *On the Origin of Species*, Kropotkin is not prepared to relinquish an anthropomorphic image of the animal

[58] See Pera 1994, on 77–79. On double hierarchy arguments see Perelman 1982, esp. 102–104; Fahnestock 1999, esp. 105–108.
[59] Darwin 1872, on 65. See also ibid., on 49.
[60] Kropotkin 2006, on 55.
[61] Beer 2009, on 64.

kingdom. In fact, in his version of the theory of evolution he goes even further in anthropomorphising animals. This is understandable, since if it is true that mutual aid and sociability are instincts that justify an anarchistic form of life among animals and humans alike, then modern state institutions have been repressing a more evolutionary advantageous form of existence. Such claim, though, is only plausible if similar patterns of behaviour can be observed among animals and humans. However, since Kropotkin's understanding of mutual aid is grounded primarily in the concept of human solidarity,[62] he has no choice but to anthropomorphise all of the animal kingdom.

In order to demonstrate that human solidarity grows from the natural instinct of mutual aid, Kropotkin makes use of Darwin's argumentation strategy in *The Descent of Man.* When presenting his central thesis concerning the descent of man from a "less highly organised form,"[63] Darwin explores the multiple evolutionary levels of each of his examples simultaneously. The readers are presented with a rapid succession of evidence from the social and sexual life of animals, "primitive men," "savages" and "civilised men." This contrasting of various evolutionary stages, meant to demonstrate continuity and development at once, turns *The Descent of Man* into a fascinating *theatrum naturae* with countless actors and micro-stories. In Kropotkin's text, the result is not so much the intended image of a biological continuity between animals and men as that of anthropomorphised social animals, who feel and act like social human beings. Of special interest in this context are his examples of how sociability is expressed among animals when it lacks any apparent utilitarian purpose. This makes birds into creatures that appear to spend most of their time engaging in play and sports:

> To take flights in flocks for the mere pleasure of the flight, is quite common among all sorts of birds. […] In the Steppes of South Russia [the kestrel] is (or rather was) so sociable that Nordmann saw them in numerous bands, with other falcons […] coming together every afternoon about four o'clock, and enjoying their sports till late in the night. […] In fact, it would be much easier to describe the species which live isolated than to simply name those species which join the autumnal societies of young birds – not for hunting or nesting purposes, but simply to enjoy life in society and spend their time in plays and sports.[64]

In Kropotkin's book animals know "friendship, […] grief and sorrow," and develop a "collective sense of justice."[65] They are further anthropomorphised by the telling of micro-stories that provide a dynamic illustration of how mutual aid works among them. The following example is taken from a passage where Kropotkin talks of "social and intelligent birds" defeating through a joint effort the attacks of predators on the shores of Russian lakes in springtime:

> And here are the robbers – the strongest, the most cunning ones, those 'ideally organized for robbery.' And you hear their hungry, angry, dismal cries as for hours in succession they watch the opportunity of snatching from this mass of living beings

[62] See, for example, Kropotkin 2006, on xvi.
[63] Darwin 2004, on 676.
[64] Kropotkin 2006, on 18–19, 30.
[65] Ibid., on 24, 47.

> one single unprotected individual. But as soon as they approach, their presence is signalled by dozens of voluntary sentries, and hundreds of gulls and terns set to chase the robber. Maddened by hunger, the robber soon abandons his usual precautions: he suddenly dashes into the living mass; but attacked from all sides, he again is compelled to retreat. From sheer despair he falls upon the wild ducks; but the intelligent, social birds rapidly gather in a flock and fly away if the robber is an erne; they plunge into the lake if it is a falcon; or they raise a cloud of water-dust and bewilder the assailant if it is a kite.[66]

This vivid description is typical for *Mutual Aid.* Here Kropotkin switches from the plural ("robbers") to the singular ("robber"), whereby intelligent birds defend themselves as a collective against an anthropomorphised lonely predator who appears as an almost mythical robber, a desperate attacker. The narrative form is used to present an antithesis that is typical for Kropotkin's argumentation, namely the antithesis between "carnivores which do not associate" and "sociable animals" that are not carnivorous.[67] These and numerous other "living illustrations of mutual aid"[68] (in Kropotkin's own definition) directly evoke Darwin's device of "imaginary illustrations," i.e., hypothetical scenarios usually introduced by plural imperatives such as "let us suppose…," "let us imagine…" or "let us take the case of…" These imaginary illustrations play a crucial role in the argumentation of *On The Origin of Species*, especially in the section of Chapter IV called "Illustrations of the Actions of Natural Selections, or the Survival of the Fittest."[69] Kropotkin does not call his illustrations "imaginary." Instead, he stresses that these are empirical observations of nature. Their rhetorical and literary spirit, however, places them in an intermediary space between factuality and fictionality where, in my opinion, Darwin's imaginary illustrations belong, too. James G. Lennox argues that Darwin's imaginative narratives should be seen as thought experiments designed to evaluate the explanatory potential of the theory, rather than to provide evidence for the theory's truth: "Darwin wants to show people that what they think is impossible is perfectly possible."[70] Lennox also claims that Darwin uses thought experiments as a method for disarming critics of the theory.[71] To this interpretation, I would like to add that Darwin's hypothetical scenarios could be analysed also in the context of his rhetorical argumentation based on analogy, in which they have the function of arguments by example. Here is one of Darwin's imaginary illustrations that Lennox analyses:

> In order to make it clear how, as I believe, natural selection acts, I must beg permission to give one or two imaginary illustrations. Let us take the case of a wolf, which preys on various animals, securing some by craft, some by strength, and some by

[66] Ibid., on 27.
[67] See, for example, ibid., on 31.
[68] Ibid., on 28. See, for example, ibid., on 38–40.
[69] Darwin 1872, on 70–76.
[70] Lennox 1991, on 238.
[71] Lennox 2005. Lennox shows that Darwin was inspired by Charles Lyell's *Principle of Geology* (1831) in his use of imaginary illustrations. It is also possible that another source for Darwin's thought experiments was Thomas R. Malthus's *Essay on the Principle of Population.* On Malthus's counterfactual thought experiments see Nicolosi 2013. On thought experiments in biology see Schlaepfer and Weber 2018.

> fleetness; and let us suppose that the fleetest prey, a deer for instance, had from any change in the country increased in numbers, or that other prey had decreased in numbers, during that season of the year when the wolf is hardest pressed for food. Under such circumstances the swiftest and slimmest wolves would have the best chance of surviving, and so be preserved or selected,—provided always that they retained strength to master their prey at this or at some other period of the year, when they might be compelled to prey on other animals.[72]

Lennox sees this and other imaginary illustrations as Darwin's way to test the hypothesis of natural selection as the main factor of evolution. The primary advantage of a fictional but plausible enactment of a scenario, in comparison with an empirical observation, is that a careful selection of the elements that form the experimental setting makes everything rhetorically vivid. As rhetorical examples, these imaginary illustrations are close to empirical examples: according to Aristotle, from a rhetorical perspective real and fictional examples have an equal argumentative value (Rhet. II, 20, 1393a). In this context, it is significant that Darwin himself appears to discern no significant difference between fictional examples and empirical observations. Instead, each of these two forms of exemplary thinking is complementary to the other one, making it more plausible. They flow into each other and become interwoven with analogical reasoning. Thus, Darwin's imaginary illustration cited above is continued with yet another argument *a fortiori*, which is immediately followed by an empirical example:

> I can see no more reason to doubt that this would be the result, than that man should be able to improve the fleetness of his greyhounds by careful and methodical selection, or by that kind of unconscious selection which follows from each man trying to keep the best dogs without any thought of modifying the breed. I may add, that, according to Mr. Pierce, there are two varieties of the wolf inhabiting the Catskill Mountains in the United States, one with a light greyhound-like form, which pursues deer, and the other more bulky, with shorter legs, which more frequently attacks the shepherd's flocks.[73]

This flowing into each other of argument by example and argument by analogy occurs on multiple occasions in the section "Illustrations of the Actions of Natural Selections, or the Survival of the Fittest."[74] From the point of view of rhetoric, it is not surprising, seeing as here the examples follow the line of analogical reasoning rather than inductive one. Aristotle—and later Quintilian as well as Whately[75]—defines the example as a relation of "like to like" (Rhet. I, 2, 1357b),[76] thus suggesting a closer proximity between example and metaphor.[77] In this sense, Darwin's imaginary illustrations help advance Darwin's analogical reasoning that operates through relations of similarity: from fictional examples to arguments by analogy to empirical examples.

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[72] Darwin 1872, on 70–71.
[73] Ibid., on 71.
[74] Ibid., on 70–76.
[75] Whately 1836, on 74.
[76] Aristotle 1926, on 29.
[77] See Willer et al. 2007, esp. 10–20; Klein 1992; Perelman 1982, esp. 106–113.

As rhetorical examples Darwin's imaginary illustrations have the same limited power of persuasion as reasoning by analogy, because both can be easily refuted through counter-examples. Rhetoric knows two main techniques of persuasion: argumentation through enthymemes and argumentation through example. An enthymeme is a shortened form of syllogism where appeal is made to an uncontroversial general principle to argue for the plausibility of a particular case. Inductive reasoning by example lacks the probative force of quasi-logical enthymemes, which is why it was seen as of secondary importance already by Aristotle (Rhet. II, 20, 1394a). It should only be applied when no enthymeme can be proposed. A purely illustrative example, that in a strict sense of the word is not an argumentative device, can, however, be used—as Aristotle suggests—as the conclusion of an enthymeme.

This is exactly why Darwin's imaginary illustrations are a form of argumentation that, on the one hand, can highlight the theory's potential explanatory power, but on the other hand, can be easily challenged by other examples. Lennox convincingly shows how Fleeming Jenkin in his famous review of *On the Origin of Species* (1867) refutes Darwin's arguments by making use, in his turn, of imaginary illustrations as counter-arguments.[78] Likewise, in Kropotkin's case we can observe a similar move. His complex text contains, next to the narrative sequences based on empirical observations that we discussed above, also various imaginary illustrations. There are counterfactual scenarios where Kropotkin asks himself, for example, what would happen if the corporative Middle Ages had lasted longer, thus imagining an alternative development of Europe in which the competitive individualism of modernity would have had no chance to develop.[79] There are also hypothetical scenarios where Kropotkin picks Darwin's own imaginary illustrations and offers a slightly different version of them in order to disprove the ideas of Darwin himself. For example, the Russian anarchist sets out to rebut Darwin's thesis on the evolutionary significance of a severe competition between individuals of the same species by juxtaposing an imaginary illustration to Darwin's argument that an absence of intermediate forms points to an "extermination of transitional varieties." Kropotkin starts his imaginary illustration modelling a Darwinian hypothetical setting:

> If we start from the supposition that a given area is stocked with animals to its fullest capacity, and that a keen competition for the sheer means of existence is consequently going on between all the inhabitants—each animal being compelled to fight against all its congeners in order to get its daily food—then the appearance of a new and successful variety would certainly mean in many cases (though not always) the appearance of individuals which are enabled to seize more than their fair share of the means of existence; and the result would be that those individuals would starve both the parental form which does not possess the new variation and the intermediate forms which do not possess it in the same degree.[80]

[78] See Lennox 1991, esp. 230–236. Lennox interprets these imaginary illustrations as "destructive thought experiments" (p. 236).
[81] Kropotkin 2006, on 245–246.
[82] Ibid., on 52

Kropotkin's alteration of the Darwinian hypothetical setting consists in simply opening up the closed area in which Darwin lets certain processes (in this case: struggle for existence) take place. By doing so, he shows that species tend to avoid confrontation and competition by finding a different area:

> But such a combination of conditions is precisely what we do not see in Nature. Each species is continually tending to enlarge its abode; […] and new varieties among animals consist in an immense number of cases […] in forming new habits, moving to new abodes, and taking to new sorts of food. In all such cases there will be no extermination, even no competition—the new adaptation being a relief from competition, if it ever existed; and yet there will be, after a time, an absence of intermediate links, in consequence of a mere survival of those which are best fitted for the new conditions—as surely as under the hypothesis of extermination of the parental form.[81]

In this and in many other instances in *Mutual Aid* we can see how Kropotkin challenges the explanatory potential of Darwinian how-possibly scenarios, altering some elements in the hypothetical setting. In doing so, he provides counter-examples to Darwin's imaginary illustrations, which are intended to expose weak points of Darwin's theory and establish Kropotkin's version of evolutionary mechanisms. Seen as rhetorical examples, these scenarios are important elements of the kind of analogical reasoning that characterises Kropotkin's treatise—and evidence of Kropotkin's more radical take on Darwin's own rhetorical devices.

These examples, though not numerous, are enough to give the reader an indication of the importance of rhetoric for Kropotkin's argumentation. In *Mutual Aid* rhetoric is not a side effect of "aesthetic narrative,"[82] but a key element that helps build up a scientific theory that should be made plausible by means of rhetorical devices. *Mutual Aid* belongs in the tradition of a Darwinian rhetoric of science which in reference to nature is able to "discover the possible means of persuasion."[83] Rhetoric here is by no means divorced from the empirical dimension. In Darwinism especially it fulfils a vital function whose importance for the Russian context remains to be discovered.

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[83] Ibid., on 53.
[84] See Peaker 2005.
[85] Aristotle 1926, on 15.

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