

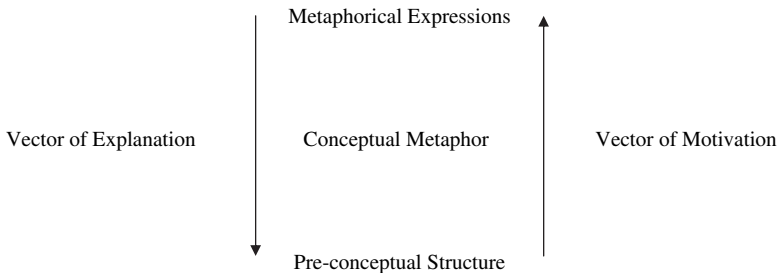
Darwin's Metaphors Revisited: Conceptual Metaphors, Conceptual Blends, and Idealized Cognitive Models in the Theory of Evolution

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Darwin's book *On the Origin of Species by Means of Natural Selection* (henceforth *The Origin*) abounds with metaphors. In fact, the very theory of natural selection is couched in a system of metaphors that exhibit striking consistency and coherence. I argue that the phenomenon for which Darwin tries to detect the basic mechanisms, that is, biological evolution, involves vast, indeterminate, and ambiguous observations that are difficult to subject to the empirical methods. This fact motivates Darwin's extensive use of metaphors to organize his observations, structure the vague concepts, and ultimately render his observations meaningful and intelligible. I demonstrate that Darwin's metaphors, as far as they are elements of Idealized Cognitive Models, prove valuable in achieving this goal. First, I identify the conceptual metaphors underlying the main metaphorical expressions and show how these conceptual metaphors give rise to entailments and inferences central to Darwin's theory. The conceptual metaphors I identify are "NATURE IS A MOTHER," "NATURE IS A BREEDER," "LIFE IS WAR," "LIFE IS A RACE," and "EVOLUTION IS PROGRESS." I also comment briefly on the conceptual blending involved in these metaphorical mappings. I then turn to characterizing the idealized cognitive models (ICMs) that function as the pre-conceptual ground in virtue of which Darwin's metaphors are meaningful, coherent, and helpful to scientific thinking. These ICMs are the ICM of STRUGGLE and the image-schema of SOURCE-PATH-GOAL.

INTRODUCTION

The cognitive-linguistic theory of metaphor envisages thought/cognition and metaphor/language as the two sides of a single indivisible structure that is grounded in the preconceptual structures of our bodily experience—or, for some cases, in our cultural practices—and which gives rise to varieties of metaphorical expressions, conventional as well as novel (Johnson, 1987; Kovecses, 2005; Lakoff, 1987, 1993; Lakoff & Johnson, 1980, 1999). This may be translated visually into the following three-level diagram in which the vector of motivation moves upward from the lowest level of pre-conceptual structures to conceptual metaphors to the surface manifestations, that is, metaphorical expressions, while the vector of explanation moves downward, in the opposite direction.



The intermediate level involves complex processes of mappings between conceptual domains or mental spaces that result in what Fauconnier and other cognitive scientists call conceptual integrations or conceptual blending. There is a variety of conceptual blend ranging from simple single-scope blend to multiple-scope blend (Fauconnier, 1994, 1997; Kovecses, 2005).

The central premise of cognitive linguistics, as regards metaphors, consists, therefore, in the assertion that metaphors are conceptual in nature. This means that for the most part human reasoning as it is actually done is metaphorical (Johnson, 1987, p. 11). Furthermore, metaphorical concepts develop out of preconceptual bodily experience (and cultural practices). A great part of our conceptual system is not disembodied formal representations but emerges from our bodily experience (Gibbs, 2006; Johnson, 1987; Lakoff, 1987; Lakoff & Johnson, 1999). It follows that humans do not experience the real world but, rather, a projected world (Lakoff, 1987; cf. Jackendoff, 1983, 1992), a world constructed by the biological nature of the human body and its interaction with the world (Gibbs, 2006; cf. Maturana & Varela, 1991).

A question then arises as to the cognitive import of metaphor in scientific thought and, in particular, that of Darwin's metaphors, the subject matter of this paper. Leary (1990) supplied numerous instances of scientific metaphors,

including Darwin's own; yet despite his emphasis on the ubiquity, creativity, and conceptuality of metaphor one finds neither an explicit account of these characteristics nor an empirical grounding of metaphor in bodily experience, both of which are cogently formulated only in the cognitive theory of metaphor. Similarly, Young (1971a, 1971b, 1985) wrote extensively on Darwin's metaphors especially on the natural selection metaphor. His treatments, however, remained within the confines of the history of ideas and philosophy of science. The logic of metaphorical mappings, conceptual blends, conceptual entailment and inferences, and above all the embodiment of thought and language are nowhere to be found in his treatment.

At a more abstract level, Richard Boyed contends that there is a species of scientific metaphors that he calls theory-constitutive metaphors, which function to ostensibly fix the reference, suggest strategies for future research, and invite the reader to the similarities and analogies between features of primary and secondary subjects, including features not yet discovered or not yet fully understood (Boyed, 1979). I argue that Darwin's metaphors belong to this category of scientific metaphors and reflect the central premises of the cognitive theory of metaphor. Thus, I argue that Darwin's theory of evolution is couched in a system of metaphors in which the concepts of NATURE, LIFE, and EVOLUTION are metaphorically structured in terms of other concepts; that the basic metaphors of *The Origin* are elements of idealized cognitive models (ICMs), and these exhibit the typical characteristics predicted by the ICM theory. That is to say, that the ICMs may or may not fit the world and that they are structured gestalts used to interpret and understand experience. That ICMs may or may not fit the world is only natural for any metaphorical mapping highlights some aspects of our experience and hides others.

That said, a precautionary remark is in order at the outset to avoid misunderstanding. This paper does not aim at refuting or invalidating Darwin's theory by saying "look, the theory of natural selection is metaphorical, therefore it is false," for the approach I adopt does not draw a sharp line between literal true reasoning and metaphorical false reasoning. On the contrary, it views metaphor as pervasive mode of language and metaphorical thinking as too natural and ubiquitous to be readily recognizable. Indeed, considering the philosophical premises of this approach, metaphorical reasoning is the norm discernable in both everyday life discourse and scientific discourse. In what follows I first discuss the theory of natural selection as expressed in a central passage in *The Origin* and subsequently present aspects of the dispute between Darwin and his critics over the metaphor of natural selection. Second, I explicate Darwin's major metaphors in terms of the conceptual metaphor theory and the conceptual blend theory. Third, I expand on the ICMs underlying Darwin's metaphors in virtue of which the metaphors of *The Origin* are meaningful, intelligible, and constitutive of the theory of evolution. Fourth, I demonstrate the integratedness of the ICM of struggle, which

I take as the central ICM in Darwin's theory. Finally, in the conclusion I reflect on some of the implications of the analysis advanced in this paper.

THE THEORY OF NATURAL SELECTION

From the inherent contradiction between the geometric rate of reproduction and the limited environmental resources there ensues a struggle for existence, the most primary condition under which all organisms live. Since the individuals of a species exhibit clear variations in their morphological organization, physiological functioning, and behavioral patterns, some of which are advantageous while others are disadvantageous, not all the individuals survive the condition of struggle for life. Only the fittest survive the struggle for existence. The fittest of these organisms will be able, according to the law of inheritance, to pass their adaptive characters to their offspring. It is through the elimination of maladaptive characteristics and preservation of the adaptive characteristics that species appear and change over time. Darwin's theory of evolution can be found epitomized in the following excerpt from *The Origin*, on which I mark in boldface the terms that signify the turns of reasoning, logical structure, and the conclusions. Darwin's basic metaphors are in italic.

If under changing conditions of life organic beings present individual differences in almost every part of their structure, and this **cannot be disputed**; **if** there be, owing to their geometrical rate of increase, a severe *struggle for life*, at some age, season, or year, and this certainly **cannot be disputed**; **then**, considering the infinite complexity of the relation of all organic beings to each other and to their condition of life, causing an infinite diversity in structure, constitution, and habits, to be advantageous to them, **it would be a most extraordinary fact if no variation had ever occurred useful to each being's own welfare**, in the same manner as so many variations have occurred useful to man. But if variations useful to any organic being ever do occur, **assuredly individuals thus characterized will have the best chance of being preserved in the struggle for life**; and from the strong principle of inheritance these will tend to produce offspring similarly characterized. This principle of preservation, or the *survival of the fittest*, I have called, *Natural Selection*. It leads to the *improvement* of each creature in relation to its organic and inorganic conditions of life; and consequently, in most cases, to what must be regarded as an advance in organization. (Darwin, 1993, p. 168 emphasis added)¹

The passage contains the following points:

¹Quotations from the *On the Origin of Species* are all from the sixth edition republished by Random House, Inc. 1993.

- The first “if” introduces the idea that organisms exhibit variations inter- and intra-species.
- The second “if” introduces the idea that organisms reproduce in a rate that exceeds the sustenance capacity of the world they come to populate.
- “Then” draws the conclusion that the individual variations are either adaptive or maladaptive.
- From 1 and 2 there follows the struggle for existence. And since variations imply differential adaptive values only the fittest survives the condition of struggle. This is the conclusion introduced by the word “assuredly.”
- The survivors “replicate” themselves through reproducing offspring with similarly advantageous characteristics. Moreover, these characteristics are improvement and advancement.

This is what Darwin calls the theory of “descent with modification by natural selection.” It is a consequence “of one general law leading to the advancement of all organic beings—namely, multiply, vary, let the strongest live, and the weakest die” (Darwin, 1993, p. 360). In the passage quoted above there are a number of metaphors that, I contend, constitute a system of interrelated metaphors central to and constitutive of Darwin’s theory of evolution. Before embarking on a close analysis of these metaphors I want to dwell briefly on the dispute over Darwin’s metaphor of “*NATURAL SELECTION*” and the significance of this dispute for the analysis that follows.

DISPUTE OVER THE “NATURAL SELECTION” METAPHOR

No metaphor is so striking in its conformity to the fact that metaphor embodies untranslatable cognitive content as the metaphor of natural selection. Darwin refused with admirable scientific zeal to yield to sympathetic as well as unsympathetic criticisms of his contemporaries. Alfred Russell Wallace wrote a friendly letter to Darwin saying “I am led to conclude that the term [natural selection] itself, and your mode of illustrating it, however clear and beautiful to many of us, are yet not the best adopted to impress it on the general naturalist public” (Quoted in Young, 1971a, p. 472). Wallace published his opinion about the term in “Creation by Law” under the title “Mr. Darwin’s metaphors liable to Misconception.” Some naturalists accused Darwin of something like blindness for being unable to see “that Natural Selection requires the constant watching of an intelligent ‘chooser,’ like man’s selection.” Another naturalist complained, in a letter to Darwin, about the same difficulty that arises “almost entirely from your choice of the term ‘natural selection’ and so constantly comparing it in its effects to Man’s Selection, and also your so frequently personifying nature as “selecting,” as “perfecting” as “seeking the good of the species” (Young, 1971a,

p. 472). But Darwin believed that there was “a great advantage to bringing into connection natural and artificial selection.” His reply to his critics was this: “The term Natural Selection has been so largely used abroad and at home that I doubt whether it could be given up, and with all its faults I should be sorry to see the attempt made.” And in a remark that subtly betrayed the deep cultural inspiration of his theory, Darwin added, “whether it will be rejected must now depend ‘on the survival of the fittest’.” In the third edition of *The Origin*, Darwin added this argument:

In the literal sense of the word, *no doubt, natural selection is a false term*; but who ever objected to chemists speaking of the elective affinities of the various elements?— and yet an acid cannot strictly be said to elect the base with which it in preference combines. It has been said that I speak of natural selection as an active power or Deity; but who objects to an author speaking of the attraction of gravity as ruling the government of the planets? Every one knows what is meant and is implied by such metaphorical expressions; and they are almost necessary for brevity. So again it is difficult to avoid personifying the word Nature. (Darwin, 1993, p. 109, emphasis added)

Moreover, Darwin added another argument that revealed the programmatic nature of his theory and forcefully called into mind Richards Boyed’s idea of theory-constitutive metaphor. In a letter to Herschel, who criticized natural selection as “the higgledy-piggledy” he wrote:

I feel quite easy about the ultimate success of my view . . . because I find so many young & middle-aged truly good workers in different branches, either partially or wholly accepting my views, because they find that they can thus group & understand many scattered facts. (Young, 1971a, p. 478)

In view of Darwin’s acknowledgement of the metaphorical nature of his theory and, at the same time, his adherence to his metaphors one cannot but ask the following questions: why was Darwin so unwilling to give up on his term? What would he lose in replacing his metaphor with another literal or metaphorical term? Why was he so persistent in his refusal to reconsider his term despite the fact that he recognized that it was ‘a false term’?² Was his refusal to reconsider his metaphorical terms justifiable?

²In “The Polemical Mr. Darwin” John Angus Campbell advances three reasons for Darwin’s language. He writes: “the role of polemicist was forced upon Darwin first of all by the limitations of scientific Language . . . Darwin had no such unambiguous language available to him and had to communicate his ideas through the medium of everyday language in order to communicate them at all . . . Second, the role of polemical advocate and interpreter was forced on him by the accident of time and circumstance . . . faced with the choice of seeing his ideas announced to the world through the subsequent writings of another [Alfred Russell Wallace], or sitting forth his own version at a

The answer to these questions is twofold. First, Darwin's term is an excellent example of what Boyed (1979) called "theory-constitutive metaphor." The function of this type of metaphor is to ostensibly fix the reference, suggest strategies for future research, and invite the reader to the similarities and analogies between features of primary and secondary subjects, including features not yet discovered or not yet fully understood.³ Second, Darwin's metaphor is an emphatic one and hence substituting it with another term would have deprived Darwin's theory of its untranslatable cognitive content and undermined the metaphorical system in virtue of which the theory has assumed a powerful explanatory potential. Black defines emphatic metaphors as follows:

time and in a form not of his choosing, Darwin ceased research, began composition and within a year published *On The Origin of Species* as an abstract of a larger work to come ... Third, Darwin was forced to accept the role of polemicist by the limitations of his evidence. Though he warns "analogy may be a deceitful guide," *The Origin* relies upon analogy in particular and imagery in general to develop an argument whose conclusions are not certain but, at least, only probable" (Campbell, 1975, pp. 367–377). The reasons advanced by Campbell as the circumstances that conditioned Darwin's language can be reduced to two broad categories. The first is external historical conditions, to which Campbell's first and second reasons belong. The second is scientific condition internal to Darwin's theory, namely, the insufficiency of evidence. In the present study I limit myself to focusing on the universal cognitive properties of metaphor evinced in the special case of Darwin's metaphors. Although the external conditions, historical and cultural, are crucial for understanding *The Origin* they are not central to the purpose of this study.

³According to Boyed "[T]here exists an important class of metaphors which play a role in the development and articulation of theories in relatively mature sciences. Their function is a sort of catachresis—that is, they are used to introduce theoretical terminology where none previously existed ... [They are used] to accomplish the task of accommodation of language to the causal structure of the world. By this I mean that task of introducing terminology, and modifying usage of existing terminology, so that linguistic categories are available which describe the causally and explanatorily significant features of the world" (Boyed, 1975, pp. 357–358). As an example of this class of metaphors Boyed points to the metaphors used in cognitive psychology, which are derived from the terminology of computer science. He writes: "if one looks at theory construction in relatively mature sciences like cognitive psychology, one finds theory-constitutive metaphors in abundance ... the following examples are but a subset of the actual cases [Boyed's list is longer than the one I quote here]

1. The claim that thought is a kind of "information processing," and that the brain is a sort of "computer."
2. The suggestion that certain motoric or cognitive processes are "programmed"
3. The view that learning is an adaptive response of a "self-organizing machine"
4. The view that consciousness is a "feedback" phenomenon.

In short, theory-constitutive metaphor functions as a linguistic procedure that ostensibly fixes the reference, suggests research program, and leads scientists to explore similarity between the primary and secondary subjects of the analogy established by scientific metaphor. It is no exaggeration, therefore, to regard theory-constitutive metaphor as "extra sense" in the service of scientific inquiry.

A metaphorical utterance is emphatic . . . to the degree that its producer will allow no variation upon or substituting for the words used— . . . especially . . . the ‘focus,’ the salient word or expression, whose occurrence in the literal frame invests the utterance with metaphorical force. (Black, 1979, p. 26)

Furthermore, emphatic metaphors, according to Black, are not decorative or ornamental, but “intended to be dwelt upon for the sake of their unstated implication” (Black, 1979). To be sure, the “natural selection” metaphor could have been replaced by another, probably more accurate one such as natural elimination or automatic extermination (of the weakest). However, this substitution would have undermined the whole structure of Darwin’s theory and compelled him to write the book anew and reformulate his theory in such a way that the final outcome would have been a radically different theory. This is so because emphatic and theory-constitutive metaphors embody cognitive contents irreducible to literal meaning and generate entailments and confer coherence on discourse.

Moreover, the natural selection metaphor is not the only metaphor that plays a constitutive role in Darwin’s theory. In fact it is only one metaphorical element of the idealized cognitive model of struggle, which I shall explicate more fully below. Darwin explicitly indicated that he had borrowed the term “struggle for existence” from Malthus treaties on the principle of population (Darwin, 1872, p. 21, 91; cf. Bowler, 1989, pp. 173–175).

He also indicated that the term “struggle for existence” was used “in large and metaphorical sense” (Darwin, 1993, p. 90). Without the metaphor of “struggle for existence,” which is the basic metaphorical gestalt underlying Darwin’s theory, the other metaphors such as “natural selection” and “the survival of the fittest” would have been impossible.

NATURE IS A PERSON

In *The Origin*, Darwin proposes a theory that aims at explaining organic evolution, the continuous appearance of new life-forms and equally continuous disappearance of other forms, and identifying the mechanisms underlying these evolutionary processes without appealing to unscientific notions, whether theological or metaphysical. Darwin’s theory, however, is built upon an analogy and a system of metaphors derived from a specific ICM. In the first chapter entitled “Variation under Domestication” Darwin presents us with the crucial analogy, that is, artificial selection, in terms of which organic evolution is understood and explained. The importance of this analogy cannot be exaggerated, for it plays a decisive formative role in both the development and articulation of Darwin’s theory. Secord tells us that:

Darwin always viewed the study of domestic animals and plants as an essential introduction to his theory of evolution. His manuscript essays of 1842 and 1844 opened with the subject, as did the unfinished long manuscript *Natural Selection and the Origin itself*. Darwin felt he was “following the example of Lyell in *Geology*,” extrapolating from observable events to the unseen . . . The selection hand invisible in nature, was manifested for Darwin in Man’s selection as a breeder. Darwin always maintained that the analogy with domestication had played an essential role in his discovery of the natural selection. (Secord, 1981, pp. 164–165)

According to this analogy and at first glance one may say that the concept of NATURE is metaphorically structured in terms of the concepts of PERSON or BREEDER. Although this is true, it is nonetheless insufficient, for it does not adequately and exhaustively describe this metaphorical structuring. Darwin’s metaphor is too intricate to be described and explained merely by invoking the concepts of PERSON and BREEDER. Artificial selection is a technical term used by Darwin to denote breeding, producing, and nurturing new varieties of a species. However, the lexical items “breed,” “breeding,” “breeder,” are themselves institutionalized⁴ (in Lyons’ terminology) or dormant⁵ (in Black’s terminology) metaphor that created a polysemic word. Considered from etymological point of view the word “breed” is a verb that originally indicated female animals’ natural capacity to produce or hatch young offspring. Through metaphorical extension the word came to mean to keep animals for the purpose of producing young, especially by selecting the best parents for mating, and hence the derivative noun “breeder.” The word also came to mean to bring up and educate (Oxford Dictionary of English Etymology, 1966). The breeder metaphor, then, structures the concept of human agent in terms of the concept of female animal, which by definition is a mother. Accordingly, the conceptual metaphor underlying the dead or dormant metaphor “breeder” is “*THE BREEDER IS A MOTHER.*”

⁴John Lyons finds it difficult to “draw a sharp distinction between spontaneous [metaphorical] extension or transfer of meaning by individual speakers on particular occasion and their use of the existing, or institutionalized, and transferred meanings of a lexeme that are to be found in a dictionary” (Lyons, 1995, pp. 59–60). However, it is not impossible to make this distinction in the metaphorical use of the word ‘breed’ and its derivative forms. The original literal meaning of this lexeme is “to produce or hatch young by female animals.” The metaphorical extension of this lexeme in its various forms was institutionalized and incorporated into the English dictionary to form polysemic word. It remains to point out that Lyons’ distinction between ‘institutionalized’ and ‘spontaneous’ metaphors corresponds to the distinction made by Lakoff and Johnson between “conventional” and “creative” metaphors.

⁵Black (Black, 1979) rejects the distinction between “dead” and “alive” metaphors arguing that “dead” metaphor is not a metaphor at all. He proposes a tripartite distinction between extinct, dormant, and alive. The latter has two aspects; the emphatic and the resonant aspects. However, except for the emphatic and resonant aspects of metaphors Black does not elaborate or justify his classification.

Since the breeder metaphor was institutionalized and dead metaphor that assumed different yet related meanings to its origin, it provided a more or less clearly delineated experiential gestalt ready for use to structure other less delineated concepts. This was exactly what Darwin did by coining the metaphorical term "natural selection." The conceptual metaphor underlying the natural selection metaphor is this: "*NATURE IS A BREEDER.*" Darwin's creative metaphor "natural selection," therefore, directly invokes this metaphor and indirectly another conventional metaphor, frequently used and deeply rooted in the subconscious of the English speakers, namely, the "*mother nature*" metaphor. Thus, Darwin reached the lowest metaphorical stratum indirectly, for the bedrock on which these metaphors were built was the conceptual metaphor "*NATURE IS A MOTHER.*" I reconstruct Darwin's complex metaphor of natural selection as follows. The first conceptual metaphor is "*THE BREEDEER IS A MOTHER.*" The second metaphorical layer is "*NATURE IS A BREEDER.*" And by inference we reach the third conceptual metaphor "*NATURE IS A MOTHER.*" This metaphorical inference can be represented as follows:

The breeder = X

Mother = Y

Nature = Z

If X is Y

And Z is X

Therefore Z is Y

This inference, which rests on the transitivity principle, does not add a new piece of information, for "*NATURE IS A MOTHER,*" is the basis for all the metaphorical concepts I have identified. The conceptual metaphor "*NATURE IS A MOTHER,*" which structures the concept of nature in terms of the concept of mother, is transparent in many metaphorical expressions in *The Origin*. For instance Darwin writes:

"Though nature *grants* long periods of time for the work of natural selection *she* does not grant an indefinite period." (Darwin, 1872, p. 133)

"Nature may be said to have taken pains to reveal *her* scheme of modification . . . but we are too blind to understand *her* meaning." (Ibid. p. 636)

"*She* can act on every organ . . . on the whole machinery of life. Man selects for his own good: nature only for that of the being which *she tends.*" (Ibid. p. 111, emphasis added)

The concept of mother belongs to what Lakoff calls cluster model. It “is based on a complex model in which a number of individual cognitive models combine, forming a cluster model” (Lakoff, 1987, pp. 74–79). It is an element in a PART-WHOLE schema of the family—an ICM that comprises, beside the concept of mother, the concepts of father and son or children. It is also an element of the birth model, genetic model, nurturance model, and genealogical model. It is in virtue of being an element of these ICMs that the concept of mother derives its range of meanings. In characterizing the mother concept I will draw on the nurturance and birth models, specifying only the following structural properties:

- A mother gives birth to children.
- A mother is a purposeful person.
- A mother is nurturing and caring person.
- A mother follows certain strategies for improving and nurturing her children.
- A mother nurtures her children for their own good and benefit.

The conceptual metaphor “*NATURE IS A MOTHER*” creates similarities between the two domains, generates entailments, inferences, and provides coherent metaphorical gestalt. Consider the following entailments and inferences:

NATURE IS A MOTHER

A mother gives birth to children.

Therefore nature gives birth to new species (see Darwin, 1993, p. 168).

NATURE IS A MOTHER

A mother works to improve her own children and for their good and benefit.

Therefore nature works in such a way that “each creature tends to become more and more improved” (Darwin, 1993, p. 160).

NATURE IS A MOTHER

A mother cannot intentionally harm her children.

Therefore nature “will never produce in a being any structure more injurious than beneficial to that being” (Ibid. p. 256).

NATURE IS A MOTHER

A mother may unintentionally harm her children.

Therefore nature may produce overspecialization and “regression in the scale of organization” (Ibid. pp. 161–63) but the overwhelming general characteristics is toward more developed organization.

Darwin was greatly influenced in his early life by the attractive idea of adaptation and overall harmony in nature, a notion that had been developed by Paley in his book *Natural Theology*. This influence was clear in Darwin’s 1844 essay in which he “implied that species normally exist in a state of perfect adaptation . . . where the struggle for existence is unnecessary” (Bowler, 1989, p. 179). Furthermore, Bowler indicates that “Paley’s argument form design was

essentially utilitarian: it stresses the usefulness of each character as it contributed to the adaptation of the species to its environment" (Bowler, 1977, p. 31).

Even when Darwin turned Paley's idealist philosophy upside down the idea of adaptation and the utilitarian principle in nature lingered on in the Mother Nature metaphor, which structures certain aspects of nature in terms of the concept of mother. This is why one finds in *The Origin* such statement as: "Thus from the war of nature, from famine and death the most exalted object which we are capable of conceiving, namely the production of the higher animals, directly follows" (Quoted in Ospovat, 1980, p. 172).

Moreover, and certainly more important as far as evolution is concerned, nature, as I mentioned above, is a breeder in the sense conveyed by the term artificial selection. The natural evolutionary dynamics underlying and governing the organic world—dynamics that are not directly accessible and empirically tangible, are structured in terms of the concept BREEDER or SELECTOR, especially that of artificial selection, which is itself a subcategory of the more general concept of selection. That is to say that the structured experience, the gestalt, of the concept BREEDER is imposed on the organic world to make it graspable and intelligible. The concept of breeder may be characterized along five dimensions:

- An agent.
- Has a purpose or goal.
- The agent has certain criteria for selection.
- The agent selects from varied entities.
- The agent produces new varieties or subspecies.

Each metaphor serves the purpose of providing an understanding of different aspect of the phenomena of nature and life. Let us consider some of the entailments and inferences generated by this conceptual metaphor.

NATURE IS A BREEDER

Breeder produces new varieties among species.

Therefore nature produces new species (see Darwin, 1993, p. 168).

NATURE IS A BREEDER

Breeders are purposeful and selective.

Therefore nature is purposeful and selective in favoring some individuals and disfavoring others. (see Wallace's letter to Darwin quoted above).

NATURE IS A BREEDER

A breeder "picks out those individuals ... which possess something of the characteristics he seeks and breeds his next generation solely from these. Thus he isolate the desired characteristics and by selecting further variations in the same direction can improve it in later generation" (Bowler, 1989, p.166).

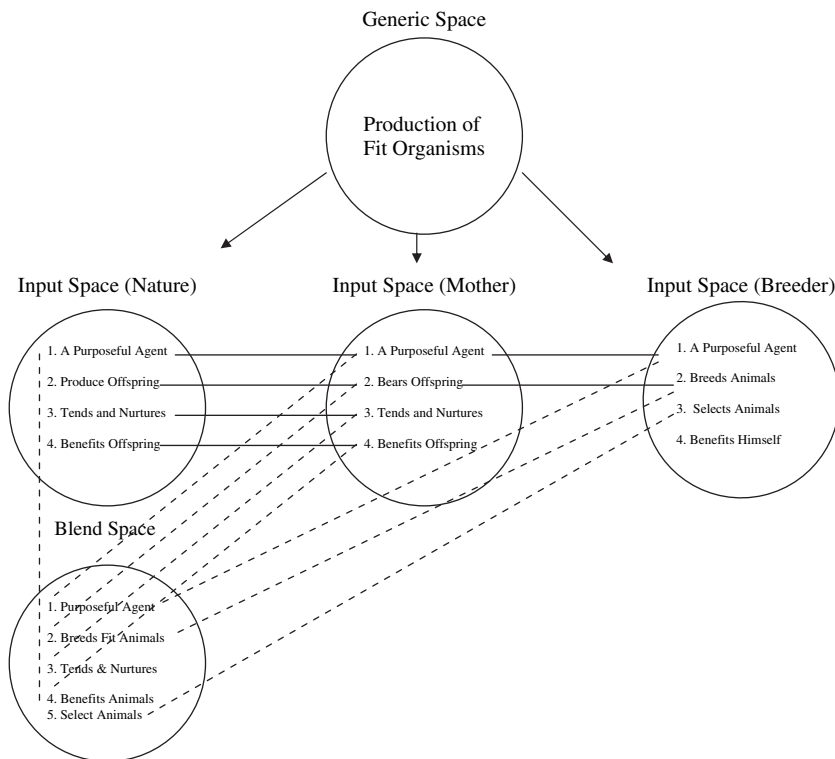
Therefore “in living bodies, variation will cause the slight alterations, generation will multiply them, and natural selection will pick out with unerring skill each improvement” (Darwin 1993, p. 232).

NATURE IS A BREEDER

Breeders isolate the unfavorable individuals and deem them to extinction.

Therefore nature exterminates those individuals with maladaptive characteristics hence prevents them from producing new offspring with the same maladaptive characteristics (Darwin, 1993, p. 168).

In Darwin’s theory NATURE emerges as a hybrid concept that is produced in consequence to complex cognitive processes that Fauconnier and Turner call conceptual blend. The entailments and inferences noted above are consequences of a conceptual blend, a cognitive process according to which five mental spaces are set up in the mind; three input spaces, one generic and the fifth is the blend space. The following diagram is a highly simplified representation of the conceptual mappings between input spaces, through the generic space and onto the blend space.



This conceptual blending, which underlies the conceptual metaphor “*NATURE IS A BREEDER*” and “*NATURE IS A MOTHER*,” highlights or rather creates selectivity and planning in nature through mapping the properties of the mental spaces of mother and breeder onto the mental space of nature. The mapping, therefore, results in personifying nature and ultimately allows us to comprehend nature in terms of human motivations, characteristics, and activities.

LIFE IS STRUGGLE

In addition to these metaphors there is the metaphor of “struggle for existence,” by far the most significant metaphor in *The Origin*, which functions as an ICM to shape the theory of natural selection, confer coherence on the use of other metaphors, and join them together in a seamless structure. One may justifiably conclude that the concept of life is metaphorically structured in terms of the concept STRUGGLE. Nonetheless, Darwin used different metaphorical expressions, such as “competition,” “strife,” “race,” “war,” “exertion,” “strain,” “toil,” “competition,” “combat,” “battle,” “contest,” “match” . . . etc., in addition to the metaphorical expression “struggle for life.” Thus, there is a multiplicity of conceptual metaphors in *The Origin* such as: “*LIFE IS WAR*,” “*LIFE IS A RACE*,” “*LIFE IS A COMPETITION*,” “*LIFE IS STRUGGLE*,” “*LIFE IS A BATTLE*,” “*LIFE IS STRIFE*,” . . . etc. I want to contend that these conceptual metaphors are made possible by virtue of belonging to the more abstract concept of “struggle,” to struggle as a radial category of senses. It is clear that the lexical item “battle” is not identical with “strain” or “match,” yet they belong to one general radial category of senses via having family resemblance.⁶ A careful reading of *The Origin* attests to the fact that among the most salient instantiations of the conceptual metaphor “*LIFE IS STRUGGLE*” are “*LIFE IS A RACE*” and “*LIFE IS WAR*.” Hence I confine the following analysis to the explication of these two conceptual metaphors. The concept of race may be characterized in terms of at least five structural properties as follows:

- There are two or more participants in a race.
- In a race there is a goal that each participant strive to achieve first and/or best.

⁶It is “a common observation” and “by now almost a truism” that absolute synonyms are extremely rare” (Lyons, 1995, pp. 60–61, Taylor, 1989, 55–56). Just as the polysemic word ‘breed’ is a category of senses that includes the senses I have discussed in the main body of the text the word ‘struggle’ is another category of senses that contains several other synonymous words. ‘Struggle’ as a category of senses, therefore, consists of overlapping synonymous words that facilitate a number of conceptual metaphors such as: “*LIFE IS TOIL*,” “*LIFE IS STRAIN*,” “*LIFE IS A MATCH*,” “*LIFE IS CONTEST*,” “*LIFE IS COMPETITION*” . . . etc . . . etc.

- A race is an event conventionally regulated by rules that set, among other things, the goal of the race and how it may be achieved.
- A race is supervised and run by a referee (or referees) who rationally decides the winner and the loser.
- A race ends with the recognition of a winner and losers.

The conceptual metaphor “*LIFE IS A RACE*” gives rise to entailments and inferences similar to that of the mother and breeder metaphors. Consider for example the following entailments and inferences.

LIFE IS A RACE

In a race each participant strives to achieve the goal of the race first and/or best.

Therefore in life “every single organic being may be said to be striving to the utmost to increase in numbers” (Darwin, 1993, p. 94).

LIFE IS A RACE

In a race only the best survive the competition.

Therefore in life only the fittest survives (Ibid. p. 168).

LIFE IS A RACE

A race requires referees who decide which team or participant is the winner.

Therefore, in life, natural selection decides which organic beings should survive and which shouldn’t (Ibid. p. 168).

The Origin is rich in war metaphors such as victor, victory, battle, arm, and weapon. Consider for example the following passage:

How low in the scale of nature the law of *battle* descends, I know not . . . The *war* is, perhaps, severest between the males of polygamous animals, and these seem oftenest provided with special *weapons*. The males of carnivorous animals are already well *armed*; though to them and to others, special means of *defense* may be given through means of sexual selection, as the mane of the lion, and the hooked jaw to the male salmon; for the *shield* may be as important for *victory*, as the *sword* or *spear*. (Italics added, 1872, p. 118)

These metaphorical expressions along with many others in *The Origin* justify the conclusion that “*LIFE IS WAR*” is a conceptual metaphor underlying the many metaphorical expressions in *The Origin*. The concept of war possesses, more or less, the same structural invariants as that of the concept of race, but also includes additional structural properties. These are:

- War ends with the victory of one force and the destruction of the other.
- The outcome of war depends on the weapons, equipments, strategies, tactics . . . etc.

The following are some of the entailments and inferences generated by this conceptual metaphor.

LIFE IS WAR

The outcome of war depends on weapons, strategies, tactics... etc.

Therefore in life "success will often depend on ... having special weapons or means of defense... and a slight advantage will lead to victory" (Darwin, 1872, p. 623).

LIFE IS WAR

War ends with the destruction of one of the combating forces.

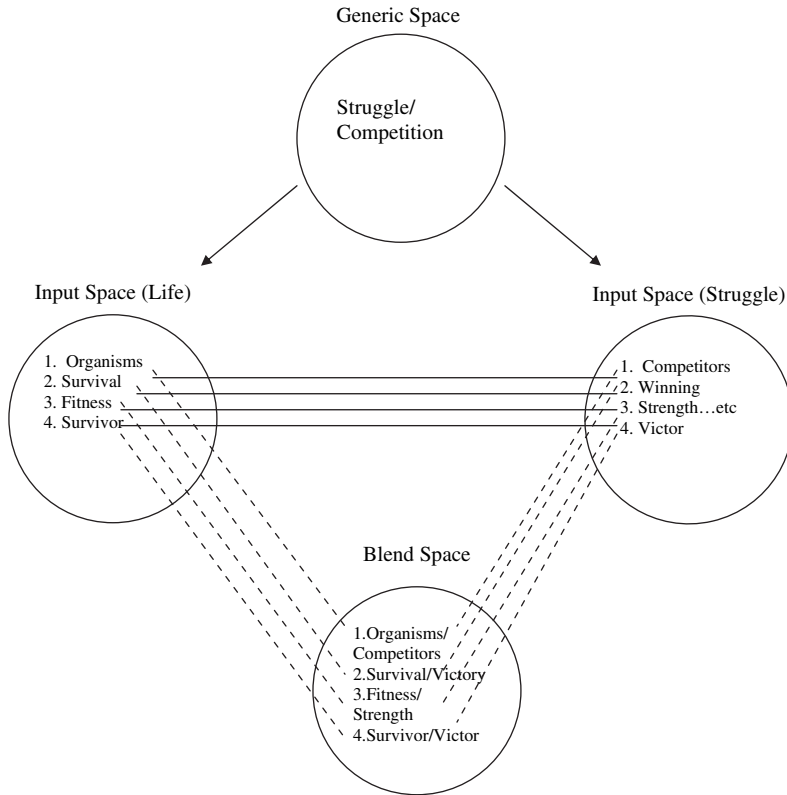
Therefore in life "each species is constantly suffering enormous destruction at some period of its life, from enemies or from competitors" (Ibid. p. 96).

The term "the survival of the fittest" is also a metaphor or, more accurately, an inference or by-product of the ICM of struggle. The word "fittest" is as general a category as the word "struggle." The degree of generality of the words "struggle" and "fittest" is striking, and hence facilitate somehow free imaginative use of the members of these categories as metaphors. This is why the word "fittest" fits perfectly well in the ICM of struggle. In the same manner that "struggle" is a general category of senses that encompasses different but related members such as war, race, and competition, so does the category of "the fittest." It comprises several kinds of fitness such as strength, fleetness, and swiftness. This becomes clear when we find out that the typical examples of fitness provided by Darwin are "fleetest," "swiftest," and "strongest" (Darwin, 1872, pp. 120–121).

As I have tried to show the conceptual metaphor "LIFE IS STRUGGLE" gives rise to certain entailments and inferences that follows as logical consequences of the cognitive processes of conceptual integration. The following diagram is a schematic representation of the conceptual blend involved in the metaphor "LIFE IS STRUGGLE."

EVOLUTION IS PROGRESS

The concept of evolution is another metaphorically structured concept. In *The Origin* there are many recurring metaphorical expressions that are made possible by virtue of the underlying conceptual metaphor "*EVOLUTION IS PROGRESS*." Progress is the general processual facet of the *SOURCE-BATH-GOAL* schema, which consists of four structural elements; starting point, trajector, trajectory, and target point. Translating this schema into organic evolution it becomes apparent that the imaginary beginning of life on earth corresponds to the starting point, the organic beings to the trajector, time that lapsed since the beginning of life to the trajectory, and the present to the target point. Progress is the word that captures the movement of the trajector along the path and toward the goal. Thus, the conceptual metaphor "*EVOLUTION IS PROGRESS*" accounts for the following metaphorical expressions:



“[I]t may not be a logical deduction, but to my imagination, it is far more satisfactory to look at [different species of organic beings]⁷ as . . . consequences of one general law leading to the *advancement* of all beings—namely, multiply, vary, let the strongest live and the weakest die.” (Darwin, 1993, p. 360, emphasis added)

“[A]nd this [the amount of differentiation and specialization of the several organs] will include the *advancement* of the brain for intellectual purposes.” (Ibid. p. 161, emphasis added)

⁷In this excerpt Darwin talks about different instincts as products of the same law, namely, the law of natural selection. I believe that replacing “different instincts” with “different species” is not a distortion of the text, for the whole book is about how natural selection carves all living forms including their instincts.

"It [natural selection] leads to the *improvement* of each creature in relation to its organic and inorganic condition of life; and consequently, in most cases, to what must be regarded as an advance in organization." (Ibid. p. 168, emphasis added)

"The ultimate result is that each creature tends to become more and more improved in relation to its condition. This *improvement* inevitably leads to the gradual *advancement* of the greater number of living beings throughout the world." (Ibid. p. 160, emphasis added)

In all the cases I have examined we can find confirmation of the idea that "each metaphor has a source domain, a target domain, and a source-to-target mapping . . . [and] is motivated by the structure of our experience" (e.g., Lakoff, 1987, p. 276; cf. Black, 1979). However, the source domains of the metaphors I have so far examined do not always belong exclusively to "embodied experience and preconceptual structure of our sensibility" (Johnson, 1987, p. 14). The conceptual metaphors "*NATURE IS A PERSON*" and "*LIFE IS STRUGGLE*" are not necessarily or purely outgrowths of primary bodily experience that involves sensory-motor interaction with the world. Instead, they are, I believe, both bodily as well as cultural modes of existence. At any rate these metaphors function to render the indirect and elusive nature of the target domains intelligible and graspable. For instance, the source domain of the mother metaphor is the intimately familiar and clearly delineated concept MOTHER. The target domain is the vast, unclear, and elusive concept NATURE. And finally there is the mapping of some of the properties of the former onto the latter. This mapping is motivated by the structure of our experience; that the concept of mother emerges from our cultural experience of this fundamental experiential gestalt while the concept of nature is by far less basic and vague. The metaphorical mapping dispels this vagueness and facilitates reasoning. In what follows I will show how the metaphors of *The Origin* are exploited to reach a higher level of metaphorical thinking by virtue of being integral elements of the ICM of struggle.

In conclusion I want to comment briefly on the question of consistency, or lack thereof, in metaphorical entailments and inferences. As can be seen in the above analysis the metaphors "*LIFE IS A RACE*" and "*LIFE IS WAR*" do not generate evidently contradictory entailments and inferences, nor do the metaphors "*NATURE IS A MOTHER*" and "*NATURE IS A BREEDER*." Logical consistency, however, is neither inherent characteristic of metaphorical mappings nor evidence to the validity of the cognitive theory of metaphor. A number of cognitive scientists (e.g., Murphy, 1996; Quinn, 1991) claim that the conceptual metaphor theory is flawed on the basis that multiple metaphorical mappings to one target domain may yield contradictory entailments and inferences. This is certainly a fallacy for at least two related reasons. First, metaphorical mappings are imaginative rather than logical (Gibbs, 1994). If our imagination is not always quite logical it is not a weakness of the cognitive theory of metaphor

that it makes explicit the contradictory inferences our imaginations tend to generate. Quite the contrary, for the cognitive theory of metaphor expands our understanding to encompass domains of enquiry that are replete with puzzling phenomena; phenomena that seem to be illogical. Second, metaphorical mappings are recruited for pragmatic purposes rather than logical ones. They aim at coping with specific, but different, contexts of cognition. If conceptual metaphor A is successful in context X it is not necessarily so in context Y, hence the need for multiple mappings. Thus contradictoriness in metaphorical mappings does not really pose any serious challenge to the cognitive theory of metaphor (Gibbs, 1994; Kovecses, 2005; cf. Lakoff, 1993).

THE BODILY AND CULTURAL BASIS OF THE ICM OF STRUGGLE

The metaphors of “struggle for life,” “natural selection,” and “the survival of the fittest” are element of the ICM of struggle that is integrated with the ICM of SOURCE-PATH-GOAL. In what follows I demonstrate the bodily basis of the ICM of struggle, and point to its internal consistency, identify war and race as among the best exemplars of the category of struggle, and finally show how the elements of this model are joined to one another in a structured gestalt. I demonstrate the interrelation of the model’s elements by introducing slight change into the model and seeing how the model disintegrates due to the fact that its elements presuppose and entail one another.

Let us now dwell for a little while on the metaphors of the theory of natural selection and see in an elementary way how they relate to each other and then probe into its pre-conceptual ground, the bodily experience of struggle. Consider the metaphors of the theory of natural selection:

Struggle for existence

The natural selection

*The survival of the fittest*⁸

These are not disconnected and haphazard terms but an integral, self-sufficient, and self-sustaining whole, composed of interdependent components that operate together to generate a coherent and consistent image that emerges from the structured gestalt of struggle. The gestalt of struggle can readily be traced back to bodily experiential structure. It emerges from the awareness of the human body,

⁸Darwin writes about natural selection and the survival of the fittest as if they are synonymous. According to the view I advance in this paper the two metaphors describe two different aspects of the idealized cognitive model of struggle where the survival of the fittest follows natural selection in the same way that the effect follows from the cause in the idealized cognitive model of causality.

its need, and movement in the physical world in which it experiences forces that push and pull it away from achieving its purposes. Think, for example, of the baby in its early repeated exertions to walk and balance itself on the ground (cf. Johnson, 1987, p. 74), its attempts to reach things and grasp them, its attempts to overcome and gratify its many needs, of its ascending or descending stairs. Think also of moving against winds while walking on deep fine sands, or swimming in rough water, carrying or moving a heavy object, or physically wrestling with somebody. In these experiences along with many others we physically come to touch and meet the most rudimentary and intimate experiential gestalt of struggle. We feel forces that prevent us from accomplishing our intentions and we exert ourselves to overcome these forces and ultimately achieve our goals.

Based on these and many other bodily experiences a specific preconceptual gestalt, the ICM of STRUGGLE event, takes shape and offers itself as a ground on which our conceptual system builds up to underpin meaning, communication, and understanding. One recognizes in these experiences the structural invariants of STRUGGLE image-schema. These are:

- Two or more forces are involved in struggle each strives to achieve certain goals that are at loggerheads with each other.
- One force achieves its goals at the expense of the other forces.
- The outcome of this conflict is not arbitrary but governed by some sort of rules or natural laws.

Furthermore, I suspect that the STRUGGLE schema is often, if not always, coupled with the SOURCE-PATH-GOAL schema so that the achievement of any participating force of its goal results in the advancement and progress of that force along the path and toward its ultimate goal. Therefore I will add the following structural element:

The force that achieves its goal advances along a path that leads to an ultimate goal.

These structural elements can be made transparent by using certain linguistic elements or grammatical constructions. The English verb “to struggle” may be followed by the prepositions “for,” “with,” “against,” “up,” “along/on.” Alternatively it may be put in “to infinitive” construction in both cases to profile certain aspects of the STRUGGLE image-schema and its accompanying SOURCE-PATH-GOAL image-schema. Consider for example the following sentences:

- (a) She struggled (her way) up to the top of the mountain.
- (b) I struggled (hard) to achieve success in my business.
- (c) He struggled his way through the crowd.

- (d) We must struggle against his prejudices for a more tolerant attitude to our beliefs.
- (e) She struggled for compensation with the administration of her previous company.
- (f) He has been struggling against cancer since 2000.
- (g) The two leaders are struggling for power.
- (h) The shopkeeper struggled with the thief.
- (i) She struggled along on a tiny income.

While the prepositions “with,” “against,” highlight the opposing force or forces in the event of struggle, the preposition “for” and the grammatical construction “to infinitive” highlight the goal profile. Similarly, the prepositions “along/on” and “through” profile the path of the SOURCE-PATH-GOAL schema, which is often combined with the STRUGGLE schema. Furthermore, more than one preposition can be used to profile more than one aspect of the STRUGGLE schema and SOURCE-PATH-GOAL schema as in (f) and (g).

Human cultures elaborate and accentuate the struggle gestalt by inventing struggle events such as games and races, and fuel the sentiment of competition. In some other time human groups engage in wars, which are exemplary events of struggle. In such human moments the experiential gestalt of struggle, that is the STRUGGLE image-schema, attains its clearest mode, for races and wars among other activities exhibit high degree of prototypicality of struggle and manifest all the structural elements of STRUGGLE schema in its fullest mode when it appears as unified structured gestalt.

RACE AND WAR: PROTOTYPES OF THE STRUGGLE SCHEMA

“Struggle” is a concept of a particular action and a category of events at the same time. As a concept “struggle” has a specific structure and as a category it has a number of individuals or members. The structure of the concept STRUGGLE derives from the corresponding category of struggle especially from the prototypes of that category, which give the category its peculiar character. There are numerous events that deserve to be called struggle. Verbal duels, football matches, chess games, computer games, wrestling, boxing, swimming, races, working hard, challenging one’s self to achieve some goal, election campaigns, and wars can all be regarded in some sense instances of struggle. This list can be greatly extended by adding events that are metaphorically structured in terms of the concept of struggle. All these events exhibit family resemblance. However, they are not all equal in being representatives of their category, a fact indicating that some of them are better exemplars than others are.

Cognitive linguists and some cognitive psychologists argue that humans do not categorize things, natural or cultural, by applying the (in) famous checklist of “necessary and sufficient properties” (see e.g., Lakoff, 1987; Taylor, 1989). Instead, entities (and let the word “entities” be understood in the widest sense) differ in terms of the nature of cognitive processes of categorizing them. Categorization consists of cognitive processes that aim at reaching beyond the individual concrete (or abstract) entities to grasp their essence by grouping individual entities under one category. There are entities whose categorization follows from our genetically determined perceptual apparatus such as colors. There are “colors” that cannot be perceived such as infrared and ultraviolet because their wavelengths are beyond the visible spectrum and consequently cannot be categorized. Furthermore, there are colors that are more basic than others are, and therefore used as basic categories under which other less basic colors are subsumed. There are also things whose categorization is determined by their immediacy relative to our bodily functioning and gestalt perception such as chairs, dogs, trees, etc. If the context does not require specification or certain degree of generality we call any chair “a chair” not “furniture” or “desk chair.” This is so because our gestalt perception and bodily function determine what seems at the first glance arbitrary categorization.

For other entities the “sufficient and necessary properties” or feature bundle categorization is the cognitive processes underlying their categorization such as rational numbers, natural numbers, even numbers, etc. Still there are actions whose categorization is image-schematic one such as struggle events. Our bodies undergo recurring existential experiences that we come to call struggle experience and “absorb” them as preconceptual gestalt with definite characteristics through not always readily accessible to our awareness. Lakoff (1987) and Taylor (1989) seem to understand image-schematic and prototype categorizations as mutually exclusive.

The struggle events are categorized by first image-schematic and second prototype categorization. Once the recurring image-schema has been established or built into our bodily awareness with its invariable structural elements, it turns into a prototype to group or subsume all events that exhibit family resemblance to the prototype (that is the image-schema) under one category. Struggle I believe is a prototype category as well as an image-schema. Race and war are among the best instantiations of the image-schema of struggle and hence best represented, as prototype, the concept of struggle; a concept built on and derived from the unified and structured gestalt of struggle.

Let us now resume my discussion of Darwin’s terms to clarify and elucidate the idea of the unified and structured gestalt. Each term in Darwin’s metaphorical system mentioned above characterizes one aspect or structural element of the experiential gestalt of struggle. As Johnson has indicated “experiential gestalt have internal structure that connects up aspects of our experience and leads

to inferences in our conceptual system” (Johnson, 1987, p. 44). Here are the structural elements of the ICM of struggle-juxtaposed next to the Darwinian struggle.

THE ICM OF STRUGGLE

- A conflict between two or more forces for some goal.
- The conflict is governed by conventional laws or natural laws or both.
- The conflict ends with one force achieving the goal of the conflict and the other losing it.

THE DARWINIAN STRUGGLE

- Struggle for life
- Natural selection
- The survival of the fittest

I will illustrate this rather abstract ICM with its prototypical instantiations of race and war. Think of the running competition as a kind of STRUGGLE. The running competition is regulated and governed by a number of rules and conventions that spill out, for example, the starting point of the running event, the length of the track, the permissible and impermissible movements, and above all what each runner should strive to achieve. I would like to think of this conventionally regulated condition as “the struggle for existence.” The running competition is supervised and run by referees who guarantee that the competition is performed in conformance with the running competition regulations, and most importantly decide which runner is the winner. This part of the running competition event is “the natural selection.” The final result of the running competition, namely, the runner who wins is “the survival of the fittest.”

War, which is a kind of struggle, may elucidate this metaphorical complex as well, for Darwin employed numerous metaphorical expressions that are related to one another by virtue of being items of the ICM of war. The concept of war involves two (or more) armies each one aiming at the destruction of the other, for some reasons that each army takes as a matter of survival. This is the equivalent of Darwin’s struggle for existence. War “always” ends with victorious and defeated armies. This outcome is the survival of the fittest. It is not a matter of chance who wins the war and who loses it but rather the business of “natural laws” that comprise, among other things, consideration of conventional war strategies, tactics, knowledge, power, weaponry, and the performance of each army during the battle. These decide the outcome of any war. The aggregate of these experiences and knowledge is the analog of Darwin’s natural selection. All this seems to be explicitly acknowledged by any Darwinian,

but what is important about this picture is its implication for the cognitive linguistics that has been developed in the past two decades or so by such pioneers as Langacker, Lakoff, and other cognitive scientists. Thus it is clear now that the theory of natural selection is isomorphic with the ICM of struggle, which is extended metaphorically to structure the phenomenon of evolution including all the concepts involved (cf. Black, 1979). Without this metaphorical extension of the ICM of struggle and the many accompanying concepts there could be no evolutionary theory at all.

THE INTEGRATEDNESS OF THE MODEL OF STRUGGLE

It is important to note that the ICM of struggle is an idealized one, that is to say, it may or may not fit every event that we consider as a kind of struggle (Lakoff, 1987, p. 70). The phenomenon whose basic nature Darwin tried to discover, that is, the organic evolution, involves, among others, the concepts NATURE, EVOLUTION, and LIFE. The concept LIFE is first metaphorically structured in terms of the concepts of WAR and RACE, which are prototypes of a more general concept, namely, the concept of STRUGGLE. Second, and since a metaphor is "the tip of a submerged model" the concept of struggle is at the same time a category of senses and an ICM with internal elements having definite structure. As is the case in every ICM, the elements of this ICM "do not exist independently of the whole" (Lakoff, 1987, p. 284) and any attempt to break it down or analyze it "will destroy the meaningful unity that makes it the particular gestalt that it is" (Johnson, 1987, p. 44). Since I argue that the metaphors of *The Origin* are elements of the ICM of struggle the latter must exhibit these characteristics, namely, that its meaningfulness is derived from being a unified gestalt with internal structure; that it may or may not fit the world; and finally it is used to understand the temporal dimension of the natural world of organic beings.

In order to reveal these characteristics I will perform a simple experiment of successive stages. In the course of this experiment the Darwinian metaphorical system undergoes a "metamorphosis" of two simultaneous processes. The first process is a gradual dismantling of its "building blocks," while the second process, which immediately imposes itself on us as the only plausible or legitimate alternative, is a gradual substitution of new and similarly metaphorical components of another complex or system. By the last stage of the experiment we will have a new and different metaphorical complex, which I will call the "shadow terms." These new metaphorical terms generate different entailments and inferences and reflect different images about nature, life, and evolution. Let us, then, consider again the Darwinian metaphorical model and see if we can

introduce legitimate and systematic modifications into it and attend to what that modifications may entail. This is the Darwinian metaphorical complex:

Struggle for Existence
Natural Selection
The Survival of the Fittest

To begin with, Darwin himself indicated, “in the literal sense of the word, no doubt, natural selection is a false term” (Darwin, 1872, p. 109). He complained bitterly about his critics’ “inability” to understand his metaphor. Some of his critics “have imagined that natural selection induces variability, whereas it implies only the preservation of such variations as arise and are beneficial to the being under its conditions of life” (Darwin, 1872, p. 109). Throughout *The Origin* Darwin kept emphasizing his understanding of natural selection as gradual, mechanistic, non-innovative, and indirect preservation of the favorable characteristics via the continuous extermination of the detrimental characteristics (see e.g., pp. 88, 108, 109, 112, 121, 127, 141, 168, 260, 626). He writes: “Natural selection acts only by the preservation and accumulation of small inherited modifications, such profitable to the preserved being” (Ibid. p. 127). It is again the “preservation of favorable individual differences and variations, and the destruction of those, which are injurious” (Ibid. p. 108). The preservation of the favorable individual is a by-product of the destruction of those individuals with injurious variations. Darwin’s discussion of natural selection as the cause of extinction but not the cause of variations is explicit in this regard (Darwin, 1872, pp. 141–143). This is also clear from Darwin’s many scattered observations in his book that variations are due to inheritance whose mysterious laws were unknown to him or to his contemporaries (Ibid. pp. 29–34). Individual variations continuously crop up just when natural selection appears on the scene turning a blind eye to those individuals possessing favorable characteristics and killing off those with detrimental ones. According to this understanding it is very reasonable to think that the positive and active function of Natural Selection is to exterminate the unfit. What does natural selection do to the fit? Nothing! It just ignores them. Bowler tells us that Darwin had “a long-standing emotional suspicion that death indeed played a creative role in the world” (Bowler, 1989, p. 173). It eliminates the least fit. Of course there is the other side of this elimination, namely, the accumulation of the favorable characteristics, but the fact remains that natural selection is the agent of extinction more than the direct agent of evolution. Natural selection metaphor, however, highlights one side and hides the other exactly as Lakoff and Johnson have demonstrated. I believe that it is legitimate to try to substitute the term natural elimination (admittedly an equally metaphorical term though less anthropomorphic) for the term natural selection and see what the resultant metaphorical complex looks like. We will have the following metaphorical complex:

Struggle for Existence
Natural Elimination
The Survival of the Fittest

The first observation we note is that the “natural elimination” term looks awkward between the other two terms. It does not dovetail with them and instead of cementing them it undermines them. For natural elimination cannot be the elimination of the fit or the fitter. The following example from Darwin makes this clear:

If, for instance, a bird of some kind could procure its food more easily by having its beak curved, and if one were born with its beak strongly curved, and which consequently flourished, nevertheless there would be a very poor chance of this one individual perpetuating its kind to the exclusion of the common form; but there can hardly be a doubt, judging by what we see taking place under domestication, that this result would follow from the preservation during many generations of a large number of individuals with more or less strongly curved beaks, and from the destruction of a still larger number with the straightest beaks. (Darwin, 1872, pp. 121–122)

As it is clear from this passage the elimination must be the elimination of the least fit (in the above example the ones with the *straightest* beaks). Moreover, the ever emerging and never eroded variations between the individuals of each species, the pre-condition for natural selection and the very raw material on which it acts, are concealed by Darwin's metaphorical term the “survival of the fittest.” This means that Darwin's metaphor does not perfectly fit the world though it fits in the ICM of struggle. While “the survival of the fittest” dovetails perfectly well with “natural selection” and “struggle for existence,” the insertion of the metaphor “the natural elimination” in the body of the Darwinian metaphorical complex compels us to make further modification. The elimination of the least fit entails the survival of the weak, the weaker, the strong, the stronger, and the strongest, that is to say the survival of the fittest, the fit, and the less fit. The resultant metaphorical construction after this logical modification looks like this:

Struggle for Existence
The Natural Elimination of the Least Fit
The Survival of the Fittest, the Fitter, the Fit, and the Less Fit

I was compelled to make this modification as a logical consequence to the entailment generated by the “natural elimination” metaphor in the same way the “natural selection” metaphor generates its entailments, “the survival of the fittest.” A moment's reflection on this new metaphorical construction makes us recognize its frailty due to a lingering residue from the previous metaphorical

complex, the ICM of struggle. For what is the meaning of a “struggle for existence” in which the weak, the weaker, the least strong, the strong, and the strongest are allowed to exist? This is truly not a struggle and more emphatically not a struggle for existence. In the chapter entitled “Struggle for Existence” Darwin wrote:

I use this term [struggle for existence] 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. Two canine animals, in time of dearth, may be truly said to struggle with each other, which shall get food and live. But a plant on the edge of a desert is said to struggle for life against the drought, though more properly it should be said to be dependent on the moisture. (Darwin, 1872, p. 90, emphasis added)

Thus Darwin intended to use the metaphor “struggle” to mean, in addition to its literal meaning, its very opposite, that is “symbiosis” or “structural interdependence.” He explicitly acknowledged that “plants and animals remote in the scale of nature are bound together by a web of complex relations” (Ibid. p. 101) so that the existence of one depends on the existence of another and the flourishing of one species is made possible through the thriving of another. He gave sufficient examples of these complex relations between the organic beings. Here is one example:

The mistletoe is *dependent* on the apple and a few other trees, but can only in a farfetched sense be said to struggle with these trees, for, if too many of these parasites grow on the same tree, it languishes and dies. . . as the mistletoe is disseminated by birds, its existence *depends* on them; and it may methodically be said to struggle with other fruit-bearing plants, in tempting the birds to devour and thus disseminate its seeds. (Ibid. p. 90; cf. 405, emphasis added)

From these passages it is clear that the objective world does not fit the metaphorical ICM of struggle in which the theory of natural selection is couched. Yet the force of this ICM is so strong that when Darwin extrapolated from such observations or stated some generalizations he systematically returned to the ICMs to which he committed himself and tied his theory and wrote statements like:

Not that under nature the relations will ever be as simple as this. *Battle after battle* must be continually recurring with varying success; and yet in the long run the *forces* are so nicely balanced, that the face of nature remains for long period of time uniform, through assuredly the merest trifle would give the *victory* to one organic being over another. (Ibid. p. 100, emphasis added).

The complex, ambiguous, and elusive relationship between different species of ants, for instance, is structured metaphorically in terms of slave-master metaphors, which are components or more accurately by-products of the ICM of war, if the latter is sufficiently elaborated. This model is articulated with the ICM of race by a single world, that is, "struggle." Certain species are called master-species or slave-making species while some other species are called slave-species. This ICM involves an array of words such as "combat," "capturing," "enslaving," "serve," "tyrant," "slave-making expeditions," "victorious" . . . etc. Again the target domain, the indeterminate relationship between the different species, is metaphorically structured by the mapping of the clearly and experientially delineated properties of the source domain, the slave-master metaphor, onto the target domain. Nevertheless some passages of this section betray the precarious nature of the metaphorical structuring. The following are excerpts from this section:

This ant [*Formica rufescens*] is absolutely dependent on its *slaves*; without their aid, the species would certainly become extinct in a single year. The males and fertile female do no work of any kind, and the workers or sterile females, though most energetic and courageous in *capturing slaves*, do no other work. They are incapable of making their own nests, or of feeding their own larva. When the old nest is found inconvenient, and they have to migrate, it is the slaves which determine the migration, and actually carry their masters in their jaws. So utterly helpless are the masters, that when Huber shut up thirty of them without a slave, but with plenty of the food which they like best, and with their own larva and pupa to stimulate them to work, they did nothing; they could not even feed themselves, and many perished of hunger. Huber then introduced a single *slave* (*F. fusca*), and she instantly set to work, fed the survivors, made some cells and tended the larva and put all to right. (Ibid. p. 334, emphasis added)

In a passage about the intriguing relationship between a slave-making species (*F. sanguinea*) and a slave-species (*F. fusca*) Darwin wrote:

When the nest is slightly disturbed, the *slaves* occasionally come out, and like their *masters* are much agitated and *defend* the nest: when the nest is much disturbed, and the larva and pupa are exposed, the slaves work energetically together with their *masters* in carrying them away to a place of safety. Hence it is clear, that the *slaves* feel quite at home. (Ibid. p. 335, emphasis added)

In another passage describing the relation between the *F. sanguinea* and *F. fusca* Darwin wrote:

One day I fortunately witnessed a migration of *F. sanguinea* from one nest to another, and it was a most interesting spectacle to behold the masters carefully

carrying their slaves in their jaws instead of being carried by them, as in the case of *F. rufescens*. (Ibid. p. 336)

Once more Lakoff's prediction concerning the variability of ICMs fitting the world is confirmed. Here the slave-master metaphors, which are by-products of the ICM of struggle, do not even remotely fit the world, for the observations Darwin described in this section do not resemble the relation between the slaves and the masters in human society, which is the origin, that is the source domain, of the ICM of struggle. There are no masters who carry their slaves and no slaves aware of being enslaved defend their masters' land with such ferocious vehemence. Moreover, there are no human masters who would go extinct within "a single year" without slaves. These observations, which resist being forced into some metaphors, are the only visible and tangible characteristics of the relation between these species of ants. It is quite plausible that there exist other features beyond the reach of our current comprehension that are incompatible with the slaves-masters metaphors. There is no doubt that there is some sort of a relation here, but the slave-master metaphor does not adequately fit the phenomenon. The words "slaves," "masters," "capturing," and other lexical items evoke the whole ICM of struggle and this drags with it a pattern of typical concepts that involves war, revolution, mutiny, oppression, dispassion, freedom, inequality, and many other concepts characteristic of the global pattern of power relations in human society. The slave-master metaphors confirm the fact that meaning, which in this particular context, the meaning of "struggle for existence," involves encyclopedic cognitive structures, embedded in patterns of knowledge and beliefs about the world. If there is a species that is so utterly helpless to even feed itself it is fairly reasonable to think that the other side of the equation may be a species that cannot survive without "helping" the first species. I should like to reiterate that the reason for mentioning this is not to question the validity of the theory of natural selection, but merely to explicate the notion that meaning emerges from words being linked to cognitive models and these are embedded in encyclopedic knowledge about the world. When these cognitive models are metaphorically extended to structure some target domain it will generate understandings consistent with the encyclopedic knowledge characteristic of the cognitive models. Thus it is only natural that Darwin's understanding of the relationship between the above mentioned species of ants was shaped by the system of metaphors he used. If we free ourselves for a moment of the metaphor "struggle for existence," we may plausibly describe the relationship between those species of ants as symbiotic. Needless to say that Darwin could not see this possibility because the concepts involved in slave-master metaphors fit perfectly well not with nature but with the higher and dominant metaphor of "struggle for existence." But let us now substitute the metaphorical expression "struggle for existence" with another more or less consistent with the observations conveyed by many examples in *The*

Origin. The term that I believe fits these examples is “symbiotic existence.” The resultant metaphorical complex will look like this:

Symbiotic Existence.

The Elimination of the Weakest.

The Survival of the Weaker, the Weak, the Strong, the Stronger, and the Strongest.

I shall call these terms the shadow terms (of Darwin's ICM), avoiding calling them the shadow ICM for the reasons that will become clearer as I discuss those terms. Reflecting on the shadow terms one may be tempted to conclude that they describe Darwin's observations as well as his ICM does. Whenever one looks upon nature one finds striking gradation of adaptability, be it within the species or between them. One does not see “the fittest” but instead a scale of fine differences in adaptability. Furthermore, one does not see natural selection “picking out” the fittest but often sees the weakest of organisms die away or killed off before reaching the reproductive age due to its inherent weakness. Besides, the interdependence between organisms is as striking as struggle is, if not more. Nonetheless, Darwin's metaphors are much more superior to the shadow terms for the reason that Darwin's metaphors constitute a metaphorical system of internal coherence and consistency and in which each metaphor presupposes and entails the others. “Struggle for existence” presupposes individual variations and limited resources and entails “natural selection.” “Natural selection” presupposes “struggle for existence” and entails “the survival of the fittest.” “The survival of the fittest” presupposes “natural selection” and entails “progress.” The coherence and consistency of Darwin's terms are consequences of very well selected metaphors intuitively understood and directly meaningful by virtue of being linked to ICMs based on experiential gestalts.

By contrast the shadow terms do not form or based on an ICM of any kind. As Lakoff and other cognitive scientists aver ICMs are either propositional in nature such as the ICM of the seven-day-cycle of the week (Lakoff, 1987, pp. 68–69), or bodily experiential gestalt such as FRONT-BACK and UP-DOWN schemata (Ibid. Chapter 17) and BALANCE schema (Johnson, 1987, Chapter 4). Monday, for example, is meaningful only relative to its frame or ICM of the seven-day week cycle, for there is no objective Monday existing “out there” in the world. “The fog in front of the mountain” is meaningful thanks to presupposed FRONT-BACK schema that is extended metaphorically to structure the scene that the sentence describes. Bearing this in mind let us examine the consistency of the shadow terms. The first thing that strikes one as odd is the blatant inconsistency inherent in the shadow terms. How is it possible that in a symbiotic existence the weakest is eliminated or destroyed? Understood metaphorically, that is anthropomorphically, in such mode of existence it is the weakest that

is taken care of and not eliminated. In what is supposed to be a symbiotic mode of existence such as that of the family life or socialist organization of communities the more able provides for the least able. If, on the other hand, one understand “symbiotic” term as mere structural interdependence such as the one apparent between the body’s organs or a machine’s parts then the elimination of the weakest becomes out of place and a complete misnomer. The second thing to note about these terms is that they do not explain evolution, but rather projects a static picture of life in which there is only very insignificant change, a picture in which death does not play, as Darwin believes, a “creative role.”

I should like to underline the fact that in analyzing Darwin’s ICMs I continuously appealed to the observations of the outside world not to any alleged inconsistency internal to the model, for there was none. By contrast in analyzing the shadow terms I constantly avoided any reference to the facts of the outside world and focused on the inconsistency inherent in the relations between the shadow terms, for they did not constitute an ICM.

In the course of this experiment we have seen how the Darwinian ICM of struggle underwent a radical change, which resulted in new metaphors, albeit inconsistent ones, and with them a new picture of nature emerged. The internal structure that holds Darwin’s metaphors together is characteristic of the ICM. The unity and meaningfulness of the ICM of struggle emerge from recurring and significant patterns of bodily experience that are further elaborated by cultural practices and generally named “struggle.” Nor is that all one can say about the coherence and meaningfulness the Darwinian ICM. For the unity and meaningfulness of the ICM of struggle are reinforced by integrating it with the SOURCE-PATH-GOAL schema that I have identified above. Thus struggle for existence is not merely a struggle, but significantly a progressive struggle, one that leads, in successive waves of struggle, to more advance and higher conditions in the scale of nature (Darwin, 1872, p. 160). The following is a schematic representation of the integrated schemas of struggle and SOURCE-PATH-GOAL.

STRUGGLE-----STRUGGLE-----STRUGGLE-----STRUGGLE-----STRUGGLE
 SOURCE-----PATH-PATH-PATH-PATH-----GOAL

The dotted line indicates the progress of the fittest, the outcome of struggle, to more advanced position along the path of evolution. The integrated schemas of struggle and SOURCE-PATH-GOAL account for the “misunderstanding” of the theory of natural selection. Darwin complained bitterly about the inability of his critics to understand his theory. As I have tried to show, in actuality there is no such “misunderstanding,” for our cognitive models of struggle and SOURCE-PATH-GOAL schema are the underlying ground for understanding the meaning of Darwin’s theory.

CONCLUSION

Metaphor is central to imagination as much as imagination is central to cognition. More important, perhaps, is that imagination is embodied and hence cognition is fundamentally embodied. Furthermore, scientific metaphors do have cognitive imports that constitute the scientific theories in which they are embedded. The overarching goal of this paper is to provide additional evidence to the validity of these statements. About one century ago Boas asserted that the concrete experiences of the phenomenal world were infinitely diverse, hence linguistic categorization, whether in the grammar or in the lexicon, was inevitable as well as necessary. Consequently, linguistic categorization is largely reductive and considerably arbitrary. Linguistic categorization, I want to suggest, is the first-order adaptation of cognition to the world. Still, this cognitive adaptation is not fully sufficient or efficient, hence the necessity for a second-order adaptation; the metaphorical mapping. Metaphor generates understandings of the phenomenal world that are beyond the resources of the grammar and the lexicon, via cognitively interbreeding the categories of the first-order adaptation, to capture experiences that escape or resist linguistic categorizations. It is important to note that the distinction between first-order adaptation and second-order adaptation is not identical to the distinction between the literal and the figurative, for linguistic categorization is to a great extent metaphorical. Given that this is a valid claim metaphor will be, so to speak, a linguistic sixth sense that allows us to see beyond the linguistic categorization, but one that is nonetheless conditioned by embodiment and the culture-specific symbolic order.

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