

Darwin and the animal nature of the human soul¹

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"Darwin's theory contains an essentially new creative thought. It shows how adaptability of structure in organisms can result from a blind rule of a law of nature without any intervention of intelligence." (Hermann von Helmholtz, 1869, p. 218)

Abstract

Darwin has had an increasingly important influence on psychology at the end of the 20th century. In this article I will show that his positions regarding psychology were mainly intuitive, avoiding all forms of explicit statements that might lead him to make false formulations. I will, for example, show that Darwin intuitively defended variance as a rule of nature rather than an aim towards typical or ideal types; but as there existed in those days no explicit notion on the subject, he simply avoided explicit statements on such matters. This view has been developed by contrasting my views on such matters during the 1990s with a careful reading of Lamarck, Darwin and Wallace. For psychological mechanisms, Darwin notices only that certain sensory-motor hardware have survived through an organism's reproduction, without necessarily being integrated in an organism's transformation. This is the principle of co-variation, which does not imply coordinated variation. Showing this was all Darwin aimed at as far as psychological mechanisms are concerned. The mere fact that functional synergy does not govern the behavior of organisms was enough to

¹ This paper is based on a presentation made in June 1998, at the first Congress of the USABP (United States Association of Body Psychotherapy), in Boulder, Colorado (USA). It was part of a discussion on Darwin and body psychotherapy organized by Christine Caldwell entitled *Darwin's Body: Current Research and Clinical Strategies from the Field of Evolutionary Biology*. It is probable that without Christine Caldwell's encouragement I would never have begun a serious study of what Darwin's thought, that I have developed ever since.

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demonstrate that evolution also influenced the human mind, following a Darwinian rather than a Lamarckian rationale.

1. Introduction

In discussions on how humans and animals are related, Charles Darwin's name is often used. In this paper I will try to show that in Darwin's publications the relation not only exists, but that it is complex and indirect.

The notion that humans and animals are born through the same creative process is as old as religions and philosophies (e.g., Levine, 1997). This idea has generated many models, some of which assume that each human being shares so many characteristics with other species that one can even look for the lion or the snake that is latent in every one. Drawings have always existed showing how certain bodily configurations could be associated to certain animals. Chinese astrology describes resemblances between human destinies and individual profiles. An old Chinese master taught me exercises on the five elements and exercises on the five animals. I remember, for example, the "bear" exercise, which helps people to feel their greedy fingers as claws, and how wasteful this feeling can be. He suggested that by working on the bear in me, I could be cured from my tendency to become possessive. These are examples that show ways of associating animal and human nature that Darwin never explored in his publications.

Yet many psychotherapists today use Darwin as a scientific reference when they speak of the animal nature of human beings, or Jungian notions on the animal archetypes that roam in the unconscious. The problem with these references is that, very often, they seem to ignore what Darwin wrote. Although I am not an expert on Darwin, there are a few themes that I developed as I read him I would like to develop. These are sometimes implicit notions in his publications that have been developed in recent years.

2. The Contemporary Ideological Darwin

When Darwin's book on the origin of species came out in 1859, Karl Marx had already written extensively on nature and culture. He immediately perceived that Darwin's theory was a mixture of essential ideas and politically dangerous ones. In letters he wrote to his friend and co-author Engels, he decided not to write on nature until he could reliably separate Darwin's scientific models from obvious political implications. Finally, Engels had to wait until Marx died before he could write on nature again. Most of the contemporary literature inspired by Darwin shows how scientists still haven't solved Marx's dilemma.

In the 1950's, the dominant academic position was that culture models our thoughts, while nature models our bodies. Darwin's theories were

then in disgrace², as they had been used to construct eugenic and Nazi ideologies. This trend was still powerful at the beginning of the 1970's, when I began to study psychology. Burrhus Frederic Skinner and Margaret Mead were big names. Jerome Bruner claimed he could teach nearly anything to nearly anyone. Jean Piaget was exotic when he suggested that nature provided the psychological bricks with which organisms construct their minds. It was then thought that the strategies used by an individual to construct his mind were mainly calibrated by culture.

Retrospectively, one can think that the explosion of movements defending equality of rights in Europe and the USA after 1965 were the first signs that Russia was weakening: people dared to imagine movements that defended the poor against the rich independently from communism. Some found new ways of reading Karl Marx. Bakounin and Wilhelm Reich became fashionable again. Communist and Nazi movements suddenly appeared to be two facets of the same European dynamics. A confirmation of Russia's weakness came when society reacted against this surge of leftist ideas by producing a more arrogant form of capitalism, which dared to adopt pure economical liberalism as in the 19th century. This movement began with Margaret Thatcher and Ronald Reagan in politics, and by an impressive comeback in academic circles of Darwin. New theories assumed that psychological mechanisms were mostly monitored by genetic and evolutionary dynamics. It became justifiable to reduce the budgets of education, social welfare and social sciences. Today, Piaget is still exotic, but for opposite reasons: he had shown how individuals and culture constructed minds by playing with the bricks and tools provided by nature (Lemaine & Matalon, 1985; Piatelli-Palmanrini, 1980). Since this period, European human science seems to have lost some of its creativity.

After the Second World War, everything happened as if capitalism had tried to look nicer than communism. One of the consequences of this attitude was an important funding of theories justifying the development of human sciences. Since the downfall of Soviet communism, capitalism has lost its motivations to display a kind attitude. In science, competing with Marx became meaningless, funding research on social issues useless, and research in human sciences were mostly supported if they could show that our minds function with a Darwinian and capitalistic logic (a psychology that is often referred to as the neurosciences). Since 2001, the lack of good anthropologists capable of producing theories on how Muslim countries function, and how Europe and the United States could integrate a variety of cultures in a democratic way has been missed, as politicians seem to be incapable of facing the implications of increased interactions between the nations of the world.

² In his Afterword of Darwin's 1998 edition of *The Expression of the Emotions in Man and Animals*, Paul Ekman gives a vivid account of how difficult it was to work on Darwin in the USA of the 1950's.

2.1. If only Darwin had been a Nice Guy

Ethologists, from Konrad Lorenz to Paul Ekman, have tried to invent a nice, functional, coherent Darwin. The idea is that a functional relation between organisms and their environment can explain every basic animal and human trait rationally, functionally, and coherently. Such a system leaves room for a sort of Walt Disney-like cruelty, imposed by necessity. The reasons why we cry, why we shout, why we love are well founded, as they harmonize the way we fit with our environment. The cruel demands of life are integrated with the same sort of formulae as those used by theologians and philosophers who tried to demonstrate that God had created a perfect world.

Alexander Lowen (e.g., Lowen, 1958, pp. ix & 81), for example, seems convinced that humans have an innate emotional repertoire, shared with animals, which must be used when we feel emotions if we want to avoid physical and mental illnesses. They may be right, but I do not believe that Darwin is the author that can be quoted to support this familiar clinical hypothesis. In an article on Reich's "bioenergy", David Boadella (1980, p.3) manages to provide a quote in which he manages to make Darwin say that emotional expressions are "of much importance for welfare, and that "repression of all outward signs softens our emotions"³. This quote is a nice illustration of two points:

(I). It is possible to find quotes in Darwin's book on expressions that support the hypothesis that expressing emotions is required for an individual's balance. In the particular case the quote is at the end of his summary of what he thinks. It is thus a justified quote... unless one has read the whole book with an open mind.

(II). It illustrates the shifting nature of Darwin's thoughts, who may say one thing at some moments, and another at others. In this instance he probably wanted to finish his book on a positive note.

2.2. The Nasty Realism of the British Mind

Darwin, by the way, whom I'm reading just now, is absolutely splendid. There was one aspect of teleology that had yet to be demolished, and that has now been done. Never before has so grandiose an attempt been made to demonstrate historical evolution in Nature, and certainly never to such good effect. One does, of course, have to put up with the crude English method. (Engels to Marx, 12.12.1859)

England did not conquer the world with nice ideas. Read the historical plays written by the young Shakespeare, such as *Henry VI* or *Richard III*. They were produced under royal rule, yet never have plays shown the cruelties of monarchy with such precision. While on the European continent, philosophers from Spinoza to Marx were desperately trying to produce the image of a coherent world in which reason could prevail; Englishmen from Hume⁴ to Darwin were showing that such attempts led nowhere.

³ Darwin 1872, concluding remarks and summary, p. 359.

⁴ Hume was a friend of Adam Smith (1987), who wrote *The Wealth of Nations*, and influenced both economical liberalism and Karl Marx. Adam Smith can be said to be the fa-

Hume had shown that a reasonable mind was at best a madman's fantasy or projection. Darwin and Wallace wanted to show that natural history followed a line of logic so crude that even the most stupid god could have thought of it (Desmond and Moore, 1991, pp. 8-9). Inspired by physics and mostly chemistry, they had the ambition of finding a few simple underlying mechanisms capable of producing the immense variety of phenomena studied by biologists. Although at some moments they at least hoped that natural selection chose the best, Darwin was finally forced to admit that the fittest were just those who reproduced (1871, p.403), a capacity which seems to be randomly distributed. For example, Bach, Darwin and Tolstoy had several children, but Mozart, Beethoven and Van Gogh didn't. The number of children produced does not correlate with genius. In this article I will stress the chaotic nature of the processes described by Darwin.

3. How Useless Emotional Expression Can Be

Darwin was not trying to demonstrate that humans function like other species, or that we should. He was attempting to strengthen Lamarck's evolutionary theory by showing how particular mechanisms evolved from one species to another, and how they were integrated when they were inherited, a task Lamarck had not managed to complete in a satisfactory way. Some mechanisms are curious, others attaching; some involve a specific muscular action, while others trigger general psycho-physiological reactions. These numerous "wonderful" reflexes are described as remnants and traces of a history.

In *The Expression of the Emotions in Man and Animals* (1872), Darwin repeatedly specifies that these inherited reflexes may be "...not of the least use..." for humans (e.g., pp. 54 & 345). Developing an expression may have helped cats to adapt to certain natural constraints, but when men inherit this expression it may lose its original function. In some cases, the fact that a behavior is not functional is proof that it has been inherited, as its presence cannot be explained functionally (e.g., it does not help an organism to survive): "...trembling is of no service, often of much disservice, and cannot have been at first acquired through the will, and then rendered habitual in association with any emotion." (p. 70). He points out (p. 88-98) that sounds of anger are different in different species, and that the impact of musical melodies is often a far more powerful expressive tool than those sounds we have inherited from animals. For example, tears are "...eminently liable still to act, thus betraying, though there were no other signs, the pathetic thoughts which were passing through the person's mind." (p. 174). Even the relief provided by some expression is considered incidental:

ther of an age when economy rules the world. Given his humanistic sympathies he probably did not expect that economic reason is today used as a justification for massive mistreatment of populations.

Although in accordance with this view we must look at weeping as an incidental result, as purposeless as the secretion of tears from a blow outside the eye, or as a sneeze from the retina being affected by a bright light, yet this does not present any difficulty in our understanding how the secretion of tears serves as a relief to suffering. And by as much as the weeping is more violent or hysterical, by so much will the relief be greater – on the same principle that the writhing of the whole body, the grinding of the teeth, and the uttering of piercing shrieks, all give relief under an agony of pain. (Darwin, 1872, p. 175)

4. Darwinian modern psychology

4.1. "Messy" architectures and "fuzzy" logics

Marvin Minsky was not a psychologist, but his book - *The Society of Mind* - is a most readable account of the research carried out by a generation of researchers in artificial intelligence at the Massachusetts Institute of Technology. They were looking for a simple model through which they could generate powerful processes for robots, and Darwin's model seemed ideal for this task. Minsky's title suggests that a mind is a loosely organized society of small independent modules. This basic metaphor has influenced many psychologists and neurologists. One of its main advantages was to get rid of the over-structured universe of functionalism, and leave enough room for "messy" architectures and "fuzzy" logics.

Functionalists assume that the universe is a hierarchical organization wherein each element influences the whole, and the whole influences each element. Minsky's metaphor, as well as a whole range of "post-modern" models, suggests that sometimes a part can influence a whole, sometimes a whole can influence its parts, sometimes a whole does not influence its parts, and sometimes a part does not influence the whole. Concretely, sometimes a family structure generates schizophrenia, sometimes a schizophrenic child traumatizes his parents, sometimes there is no relation between a child's schizophrenia and the history of its family, and sometimes all these possibilities are at work simultaneously. Or sometimes a muscular tension can be associated to a repressed emotion and sometimes not.

Modules have ways of combining that follow certain innate rules of a biological game, but the game can be played several ways. Some combinations are rigidly innate; others patiently await orders from the environment to become active; still others can be played with like clay. Arteriosclerosis is a good example of the last possibility. In a society where little cholesterol is eaten and where people move a lot this illness is seldom observed. In the USA it is often observed because of certain customs (e.g., eating fatty food, jobs in which one tends to use the same posture all the time). These customs do not generate the illness in all citizens, only in those who have a hereditary predisposition. Theories built on such assumptions can explain how a person may lead an "unhealthy" life comfortably for more than a hundred years, while some people who never smoked die at forty.

The flexibility of this model is attractive. So is its capacity to clean the field of psychology of many interesting — but not really proven — ideas. The classical notion of psychosomatic thus needs a radical revision (Heller 2005b). Classical psychotherapeutic models transforming all parents into guilty pathogenic agents are also seriously put into question. This does not mean that these old ideas do not contain a grain of truth, or even a large amount of truth. It just implies that a lot of re-thinking is required.

In Geneva, Guy C  llierier’s way of understanding Minsky’s metaphor is that our whole mind is – as in Darwin’s model – a competition between modules and between organizations of modules (as in Darwin, 1871, pp. 391–393). Why some modules become prominent in some individuals (e.g., a certain concentration of serotonin in the cerebrospinal fluids which can be associated to suicide risk), why certain organizations of modules emerge at certain moments (e.g., a capacity to be a good therapist), why some modules stabilize themselves during the whole life of a person (e.g., a capacity to write good novels), remains essentially a mystery.

4.2. Functional identity of mind and body

I hope that I have convincingly argued that Darwinian models are no more scientific or true or politically neutral than others. But I also hope to have shown that they raise challenging questions.

Eugenicist and Nazi ideologies understood Darwin to believe in functional identity between race body and mind, for example, that a person with a hunchback must have a crooked soul. My understanding of Darwin is that he never believed in functional coherent organizations, and that therefore there is no reason why a body should necessarily express the hidden truths of a soul⁵. The laws of randomness are enough to explain why in some cases others have the impression that a body expresses the inner particularities of a person while in other cases the appearance is even misleading. Thus, with the hunchback example, at least, the following comments come to my mind:

1. A hunchback may not have a crooked soul at all
2. A hunchback may have a crooked soul
3. A person may have a hunchback and a crooked soul for independent reasons
4. A person may have a crooked soul and a straight back
5. Characterizing a person by a few adjectives is a temptingly stupid and dangerous intellectual habit
6. I don’t know what a crooked soul is, although I have massaged crooked spines.

The implication is that models that stress functional identity and the necessity to express emotions cannot be supported by a theory such as Darwin’s. Emotions are made of reflexes developed by various species, but not entities that necessarily contain wisdom. Darwin is thus in line with the current position of respectable English education, which assumes that that expressive emotional behaviors are seldom recommended.

⁵ As suggested by James Hillman in *Suicide and The Soul*.

In this discussion it seems to me important to remember that survival is influenced by certain traits of an organism, that insure the survival of all the traits of an organism, even those that are of no use but do not hinder survival. Imagine you have an old car that you repair by taking bits and pieces from whatever other old car you can find. The final product might be amusing, but will never compete with a new car coherently designed from screws to shape. Our organism is more like the old car than like the new one.

Finally, human reflexes can simultaneously function in parallel ways, reacting to a multitude of heterogeneous stimulations. If we could only react holistically, we would not be able to manage the numerous heterogeneous stimulations that continuously bombard an organism.

4.3. The tools of expression

Now a snake, especially a wary old python like Kaa, very seldom shows that he is angry, but Baloo and Bagheera could see the big swallowing-muscles on either side of Kaa's throat ripple and bulge. (Rudyard Kipling, 1894, The Jungle Book, p.47)

4.3.1. The poor coherence of co-variation

Paul Ekman has accumulated impressive evidence to support the notion that some motor patterns are consistently associated to emotional experiences in all cultures of the world. The association exists as much for the person who experiences emotions as those who perceive the expression. For example, neuro-physiological studies show that when an emotion is experienced, certain neurological structures and certain forms of physiological arousal (e.g., heart beat, skin conductance, etc.) are often activated in the person who experiences an emotion and those that are the witness of the expression. This spontaneous association between the psychophysiology of several organisms is at the root of many social rituals (arts, religion, media, etc.). The assumption is that such associations exist in one hundred percent of humans who do not have major neurological or psycho-pathological disturbances.

I suspect that Darwin, if he was still alive, would have felt more comfortable when he noticed that the data presented by Ekman (1980) show that at least 30% of the human population do not have the complete set of expected emotional dynamics.

Some self-proclaimed Darwinian psychologists, like Tomkins, Izard and Ekman assume the existence of a small set of basic emotions. This assumption can be easily traced to the theories of Spinoza and Hume on affects and passion, but not Darwin. Darwin's list of emotional phenomena contains no basic set of emotions, unless one assumes that the emotions he mentions the most often are basic. However even this argument cannot be associated with Ekman's list as contempt is a basic emotion for Ekman, while it is only mentioned twice by Darwin. Once again, I am not assuming that Darwin's position is more useful than others. My only aim is to stress that certain arguments claiming to have Darwin's support need

to find other sources to stand on their feet. Ekman's theory, for example, has produced a wide series of empirical studies to support it. I do admit, however, that when there is a discrepancy between Darwin and Darwinians, I often have more sympathy for Darwin's point of view.

Darwin's list of emotional phenomena is heterogeneous. What follows is the sort of listing one can extract from Darwin's book on expression:

- Meaningful motor patterns: (I) the screaming and weeping of infants, sobbing, tears; (II) obliquity of the eyebrows, depression of the corner of the mouth, breathing becomes slow and feeble; (III) laughter, ludicrous ideas, secretion of tears, smiling, high spirits, being tickled, deep inspiration followed by short interrupted spasmodic contractions of the chest and especially of the diaphragm, head nods, drawing back the corners of the mouth, opening the mouth; (IV) frowning, ill-temper, moroseness, obstinacy, sulkiness and pouting, the firm closure of the mouth; (V) uncovering the teeth, sneering, defiance, the uncovering of the canine tooth on one side of the face; (VI) derisive smile, shrugging the shoulders, sneering, smiling in certain ways, partial closure of eyelids, wrinkling of the nose, we protrude and raise both lips, nodding and shaking the head, shoulders lift up almost to the ears; (VII) elevation of the eyebrows, opening of the mouth, protrusion of the lips, erection of the hair, contraction of the platysma muscle, dilatation of the pupils; (VIII) confusion of the mind, turning away the body while blushing.

- Emotions: (I) suffering and weeping; (II) low spirits, anxiety, grief, dejection, despair; (III) joy, high spirits, love, tender feelings, devotion; (IV) Reflection, meditation, ill-temper, sulkiness, determination; (V) hatred and anger; (VI) Disdain, contempt, disgust, guilt, Pride, Helplessness, Patience, Affirmation and Negation; (VII) surprise, astonishment, fear, horror; (VIII) self-attention, shame, shyness, modesty, blushing.

This list is not exhaustive in two senses. Darwin mentions others, and his theory has room for a quasi-infinite number of such items. Darwin's approach passes through fine observations and theoretical fine-tuning based on the configuration of details. Producing a coherent model does not seem to preoccupy him, nor even of being a realistic aim.

There is a wide range of phenomena where Darwin, like Lamarck, has the impression that anatomic structures, physiologic mechanisms, psychological dynamics, and motor patterns co-developed to produce a way of interacting with the environment. Darwin could assume that a close fit between anatomy, physiology, psychology and behavior could characterize some instincts, although even for instincts Darwin tends to assume relatively indirect relations between instincts and behavioral systems.⁶ Thus, a cow does not have the means to become regularly carnivorous, and a lion does not have the means to become regularly vegetarian. Each of these animals has a design that corresponds to a type of menu, but with a certain fuzziness that leaves space for "non-typical" behaviors during moments of crisis. Cows can eat meat, but they do not have developed capacities to hunt, and their digestive apparatus is designed for grass. Similarly, sexual social relations have specific anatomic correlates. I can assume the existence of a social instinct because socialization is related to the development of physio-anatomic structures that allow fine motor skills with which tools of refined communicative strategies can be managed.

⁶ Darwin's theory on instinct is developed in the 1871 *The Descent of Man*, and selection in relation to sex.

The fuzziness of the relation between fine motor sensory-motor systems and an instinct to socialize may even reflect the fuzziness of the contours of what are often called instincts (Heller, 2005a). The development of the neo-cortex, increased differentiation of hands and feet which allowed the formation of incredibly refined digital skills, and the capacity to speak are examples of physio-anatomic developments that support the notion that there could be an instinctual basis for the capacity to socialize; but, as in language, the content of this socialization also depends on less biologically structured capacities of accommodation.

To describe the relation between emotions and bodily traits, Darwin explores other realms of intra-organism coordination, which are closer to the notion of co-variation than functional grouping: the bodily elements that are integrated by emotional dynamics have not been designed for them.

Darwin was already an adult during the titanic debate between Geoffroy Saint-Hilaire and George Cuvier on Lamarck's theory of evolution⁷. Cuvier stressed that an anatomic architecture must follow a certain set of rules to function adequately. For example, bodily architecture follows the laws of mechanics, and must therefore deal efficiently with the constraints imposed by gravity. This was, for Cuvier, an argument against evolutionary theories, because it did not allow transformations to occur as creatively as Lamarck had supposed. Cuvier could not imagine how the numerous transformations that lead from one species to another could be integrated, given the intricate connections described by physiologists. Cuvier had a point. It is more plausible to assume that God engineered the architecture of each organism from scratch to ensure that a body could function adequately. Darwin and Wallace answered Cuvier's critique by insisting on the point that only small changes could be integrated, which explains why evolution theory requires a time frame of millions of years, and why a multitude of small differences can be observed between individuals of the same species. Darwin also managed to use Cuvier's argument as proof that the theory of evolution is plausible. The coherence of an organism (e.g., weight distribution in the field of gravity) requires the development of anatomic and chemical structures that are not directly needed to fit in a specific environment. These features are there because their presence helps to maintain a certain coherence of the general architecture. They do not have a specific adaptive function. It is those dispersed bodily features

⁷ After Lamarck's death, Cuvier launched a bitter fight against Geoffroy Saint Hilaire's version of evolution theory. This spectacular argument was interrupted by the Second French Revolution in July 1830. The change of regime was not favorable to Cuvier, so that again Lamarck and Saint-Hilaire's evolutionary perspective received some institutional support. The second of August, during his breakfast, the aging Goethe asked his secretary Eckermann: "What do you think of these events? The volcano is erupting: everything is in flames, and these are no more proceedings in camera." Eckermann was convinced that Goethe was talking of the Paris uprising and Charles X's abdication. However, Goethe quickly corrected his secretary's misinterpretation, by saying that the Cuvier/Saint-Hilaire debate was the important event of the summer (a free translation of Denis Buican, 1994, p. 44).

that can then be used to form emotional expression, as detailed in the book's *concluding remarks*:

Actions of all kinds, if regularly accompanying any state of mind, are at once recognized as expressive. These may consist of movements of any part of the body, as the wagging of a dog's tail, the shrugging of a man's shoulders, the erection of the hair, the exudation of perspiration, the state of the capillary circulation, laboured breathing, and the use of the vocal or other sound producing instruments. Even insects express anger, terror, jealousy, and love by their stridulation. With man the respiratory organs are of especial importance in expression, not only in a direct, but in a still higher degree in an indirect manner. Few points are more interesting in our present subject than the extraordinarily complex chain of events which lead to certain expressive movements. Take, for instance, the oblique eyebrows of a man suffering from grief or anxiety. When infants scream loudly from hunger or pain, the circulation is affected, and the eyes tend to become gorged with blood: consequently the muscles surrounding the eyes are strongly contracted as a protection: this action, in the course of many generations, has become firmly fixed and inherited: but when, with advancing years and culture, the habit of screaming is partially repressed, the muscles round the eyes still tend to contract, whenever even slight distress is felt: of these muscles, the pyramidals of the nose are less under control of the will than are the others, and their contractions can be checked only by that of the central fasciae of the frontal muscle: these latter fasciae draw up the inner ends of the eyebrows, and wrinkle the forehead in a peculiar manner, which we instantly recognize as the expression of grief and anxiety. (Charles Darwin, 1872, p. 350f)

In this fascinating text, we see the detailed way in which Darwin follows a causal chain. The causal chain has little to do with psychological factors, or with adaptive requirements: it is a strictly behavioral chain of events that has been gradually associated with the formation of expression that can activate emotional feelings in several organisms. The same can be said of other bodily elements, like the cardio-vascular system that is constantly used during emotional displays. Some may suggest that this emotional usage of physiological systems is not always good for one's health, and may generate psychosomatic illnesses like chronic high blood pressure. This body-affect coordination clearly functions at a nonconscious level, but consciousness can be informed of what is happening, and associate these phenomena to conscious emotional impressions. In psychotherapy, one can often observe how difficultly consciousness can access a precise listing of the bodily activities that are activated in association to an emotional experience. Most of the time, a person is aware of a small percentage of the physiological and motor events involved in an expression. Using video in psychotherapy is one way of putting this effect in evidence (Cohen & Beebe, 2002; Downing, 2005; Gammer, 2005, pp. 33-40). By repeatedly looking at a sequence, an individual can gradually spot the various behavioral items activated during a specific moment of an interaction. For example, some expressive movements can be consciously controlled, such as 'the obliquity of the eyebrows and the drawing down of the corners of the mouth' (p. 353), while 'the increased action of the heart' (p. 354) is inaccessible to consciousness. On the other hand, the organization of these units is clearly nonconscious:

When an animal erects its hair, assumes a threatening attitude, and utters fierce sounds, in order to terrify an enemy, we see a curious combination of movements which were originally voluntary with those that are involuntary. (p. 354)

Thus, for Darwin, an emotion uses a variety of heterogeneous mechanisms that only partially fit with each other because they had never been *designed* to be grouped, while the elements of an instinct are at least partially designed to fit with each other. One of the reasons why Darwin studied emotions is probably that it was a good way of showing how habits inherited from other species could be integrated in human psychological dynamics, even if they had been more or less transformed in the process. Each of the components of an emotion has an evolutionary history, but that does not imply that these histories are connected. Some are consistently associated with an emotion in some species but not in others.

5. Variation and Mutation

Darwin's messy vision of an organism's structure is particularly evident when one considers Darwin's writings on variation and mutation. If bodies formed a harmonic coherent entity, intra-species variation could be more problematic than it is.

Any attempt to find specific similarities across individuals in a species is doomed to failure. The same can be said for invented categories such as race or psychiatric diagnostic. There is a long tradition of attempts to find mental and body traits that fit all those included in such categories (e.g., all Caucasians, or all Schizophrenics) that, from Darwin's perspective, were doomed to fail. Even if one takes a specific motor pattern, such as smiles, the variance is staggering. Smiles combine differently with other motor units, have different rhythms, time patterns, and shapes (Ekman, et al, 1988). These differences are due to numerous causes: faces have different shapes (just look at lips around you, and try to find two that are alike); different teeth to support lips, different bones, different muscle tones; nervous connections organize themselves in different ways; cells all have their individual genetic characteristics. Most specific bodily items can characterize an individual — a fact that is exploited by the police (e.g., fingerprints or even the genetic codes). The variability is an asset for a species. The more variety there is, the greater the chance is that when confronted with an unknown event it might contain individuals capable of dealing with the phenomenon. The modern trend of ideologies based on economical considerations (mostly communism and capitalism) is un-Darwinian when they try to restrict the variety of apples, cultures, economic systems, or individuals (e.g., politically correct individuals should all be non-smokers, healthy, for human rights, for equality, etc.). Clearly nature adapts by creating variety rather than by attempting to create a perfect organism. The reason for this is more explicitly explained by Wallace's 1858 model. Nature does not strive for perfection, because there is nothing like an entity called nature. The only selective fact is that some entities survive more easily. The more varied a species, the more probable its chance to have members with an advantageous particularity. Thus, the simple law of selection by survival is based on variance, and would never have been able to become the engine of the propagation of

life if perfection had been the criteria. This variance was explained by Mendel when he discovered the dynamics of genes and their capacity to mutate in Czechoslovakia. However, although this discovery was made in the 1850s, Darwin died without realizing that the variations that fascinated him could be described and explained. Even Wallace, who died later, never integrated the theory of genes.

The notion that organisms could produce variability was known by Darwin, although that notion had not then Mendel's data to substantiate it. Darwin could not stand this explanation, probably because it ridiculed – by its simplicity – the years he passed sniffing around the maze of possible explanations:

Some authors believe it to be as much a function of the reproductive system to produce individual differences, or very slight deviations of structure, as to make the child like its parents. But the much greater variability, as well as the greater frequency of monstrosities, under domestication or cultivation, than under nature, leads me to believe that deviation of structure are in some way due to the nature of the conditions of life, to which the parents and their more remote ancestors have been exposed during several generations. (Charles Darwin, *The Origin of Species, Laws of Variations*, p.173)

Ten years after this Lamarckian objection to Mendel's future theory, in chapter XXII of his 1868 book on *Domestication*, Darwin reformulates his opinion thus:

We will now consider, as far as we can, the causes of the almost universal variability of our domesticated productions. The subject is an obscure one; but it may be useful to probe our ignorance. Some authors, for instance Dr. Prosper Lucas, look at variability as a necessary contingent on reproduction, and as much an aboriginal law as growth or inheritance. Others have of late encouraged, perhaps unintentionally, this view by speaking of inheritance and variability as equal and antagonistic principles. ... When we reflect on the individual differences between organic beings in a state of nature, as shown by every wild animal knowing its mate; and when we reflect on the infinite diversity of the many varieties of our domesticated productions, we may well be inclined to exclaim, though falsely as I believe, that Variability must be looked at as an ultimate fact, necessarily contingent on reproduction.

Darwin persistently refuted this hypothesis, with increasingly complicated arguments that could only bore readers, even in these days. He obviously sensed that the topic had something in it that he could not eliminate, even if it had not matured in a satisfying way.

When scientists began to integrate Mendel's findings in a Darwinian theory, they perceived mutations as a form of natural creativity that provides piano keys on which natural selection can play. Thus Lamarck's intuition that a form of natural creativity does exist makes sense, but it does not have the configuration that corresponded to the imagination of the Age of Reason. The crucial point, for Darwin and Wallace, was that by assuming a capacity to create variation, survival could account for life without assuming a holistic nature capable of making decisions. Such a system cannot even generate general biological laws, such as imposing universal sterility between animal species, which is only due to "...incidental on constitutional differences in the reproductive system of the intercrossed species" (Darwin, 1859, p. 436).

The importance of variability and mutation for nature's creativity bypasses an eventual requirement for a global coherent restructuring within a species. Just looking at our 10,000 year-old history is enough to show that all the attempts made by social history have never managed to modify the basic logic of human nature.

6. A theoretical conclusion: Lamarck, Darwin and Wallace

6.1. Lamarck

I will conclude this article with a few remarks on the early history of evolutionary theory, which shows how deeply variance is rooted in Darwin's approach, even if this issue is not explicitly thought out by him.

In the first book that described a theory of animal evolution leading to humanity (1802), Jean-Baptiste Lamarck presented a beautifully written clear account of biological history that remains eminently readable today. He afterwards developed his theory in considerable detail (1809, 1815). English biologists mainly attacked him on a small detail that, according to them, makes the whole difference (they never liked the French!).

The discussion between Darwinism and Lamarckism has followed an argumentation that I will summarize in the following way: Lamarck spent his life describing the architecture of evolution, without finding a plausible underlying set of mechanisms to explain how the process worked. In some passages he proposed his "second law", in which he suggests that certain observable evolutionary processes could be explained by assuming that certain often used habits can become inheritable. This second law offers a plausible model, which fitted the available data, on which Lamarck never spent much time. There is no way one can reduce or discard Lamarck's immense achievement by putting this second law in the foreground, yet this is precisely what was done by anti-Lamarckians and pseudo-Lamarckians ever since. Piaget, who was one of my teachers, always defended the value of Lamarck's work, but only because he liked his second law. Although he was a trained biologist, I am not sure he had carefully read evolutionary biologists (Lamarck or Darwin). Because of this debate, I thought that reading Lamarck today was a waste of time. I nevertheless once opened Lamarck's 1802 publication to quote the sort of statements Darwinians were so angry about. To my great astonishment I discovered an incredibly well written text, full of treasures. The beauty of style and clarity of thought is so stunning, that it has become for me one of the most wonderful scientific texts ever written (except for the last chapter). I therefore began to explore Lamarck with at least as much enthusiasm as Darwin and Wallace. I, for example, discovered his neurological developments that are folkloric at times, but also full of insights. The notion that the limbic brain might be the seat of emotions, and that the brain could be stratified in three main layers, as suggested by self-proclaimed Darwinian neurologists (e.g., Delgado, 1960 & MacLean, 1969) is already fully developed in 1815.

As a working hypothesis, the second law was enough to allow him to work. After all, even if they are now using a different model, biologists still agree that certain characteristics are inheritable.

6.2. Darwin and Lamarck

The Darwins loved Lamarck. Darwin's grandfather, Erasmus Darwin presented his version of Lamarck's theory to England when the country was at war against Napoleon's France. He transmitted his love to Charles Darwin. He was known all over Great Britain for his Lamarckian stance, and had a more important place in the *Encyclopaedia Britannica* than Charles Darwin until the 1870s⁸. Darwin read and discussed Lamarck with admiration repeatedly, and used the notion that certain habits could become inheritable until he died. In his 1872 volume on emotions, for example, he presents blushing as a behavior that can be inherited (p. 311). His critique of Lamarck was not that this law was unacceptable, but insufficient. As I have shown in this article, it is against his nature that one ideal law can explain everything. He assumed that only a set of laws could support the complexities of evolutionary dynamics. One likely candidate was Lamarck's second law, but others must also be at work. He spent decades of his life thinking about what other mechanisms could also be involved. Reading authors such as Malthus, he arrived at the conclusion that there must also be a mechanism that selects the stronger organisms, and those who had particularly relevant capacities. These would have more chance of surviving and of reproducing. He even assumed that survival did not require a particular natural regulation system to have an impact on future generations. Darwin is for me a sort of obsessional rat that incessantly explored all the corridors of the intellectual maze of hypotheses he could think of, which is why some of his books can become tedious at times (e.g., when he criticized the first versions of Mendel's notion that nature spontaneously produced variety).

6.3. Wallace, Darwin and Lamarck

Alfred Russel Wallace was much younger. I wonder if he ever read more than a few pages of Lamarck before 1860. For him, Darwin was a famous explorer, who had published *The Voyage of The Beagle* in 1845, a book in which evolution and Lamarck had never been discussed. Wallace explored jungles from which he sent creatures to museums and rich English men. Darwin was one of his most reputed clients. When, during his lonely nights in the jungle, he imagined a theory that explained all the complexities of evolution with only one law, he knew that no one had ever published a theory based on the notion that evolution did not need a single mechanism to develop. The mechanism he was thinking of is a sort of non-mechanism. There is no system that selects creatures, but only spontaneous variations that sometimes survive more easily than others, and

⁸ Siegfried Frey has one of the editions in which Erasmus is presented as an important figure of British biology.

proliferate more comfortably. This is an observable fact rather than a law. Yet this fact has immense implications. Having also read Malthus, he saw the advantages of getting rid of all notions that assumed nature was a holistic system, or that life energy had a goal. He could show that nature, and even evolution, only required the laws of Newton to be understood. Bio-logic only depended on certain properties that only influence the future because they exist. With this theory, he claimed, one can throw mechanisms such as those proposed by Lamarck in the waste paper basket ("Lamarck's hypothesis is very different from that now advanced").

Enthusiastically, he sent his 1858 paper to Darwin, asking him to present it to a certain number of reputed friends of his, and to publish it. As Darwin had never published his many notes on evolution, Darwin decided to dive in and proclaim that he had long thought like his young friend, and should therefore be proclaimed co-discoverer of Wallace's theory:

If Wallace had my manuscript sketch written out in 1842 he could not have made a better short abstract! Even his terms now stand as heads of my Chapters. (Darwin's letter to Lyell, 18 June 1858)

Because Darwin had claimed that his theory was exactly the same as Wallace's, in *The Origin of Species* he focused on the survival of the fittest as the central mechanism of evolution. But in all his later works, he manifested what was referred to later by Darwinians as a 'lingering attachment to the Lamarckian theory of inheritance of acquired characters'.⁹

When Wallace arrived in England a few years later, *The Origin of Species* had become a best seller and every one associated Darwin's name to the new theory of evolution, based on the notion that the survival was a sufficient event to explain biological evolution. Wallace was nevertheless a happy "younger brother" as long as he lived, but today his books cannot be found in bookstores. He took his revenge when he published his version of *Darwinism* in 1890, 8 years after Darwin's death. It is this version of Darwinism that is used today by most authors (e.g., François Jacob, 1998). In this book Wallace presents his theory as being the ideal summary of Darwin's theory, and most biologists have accepted this translation of Darwin's often-meandering thoughts. It is amazing to me how, even today, experts who claim to be Darwinian seem to read him as if they zapped through his text each time he wrote a Lamarckian formulation, or disagreed with what Wallace wrote on Darwinism. This is not only true with "Darwinian models", but also for the editors of Darwin's book on emotion, namely Konrad Lorenz and Paul Ekman.

Wallace's 1876 review of Darwin's *The Expression of the Emotions in Man and Animals* is instructive of what is puzzling for most with Darwin's theory of emotions¹⁰. To illustrate my point I will quote it extensively to show how close it is to today's Darwinian thinking on emotions:

⁹ Darwin, *Encyclopædia Britannica*, 2002.

¹⁰ A book review printed in the January 1873 edition of the Quarterly Journal of Science. To link directly to this page, connect with: <http://www.wku.edu/~smithch/wallace/S220.htm>. (4.11.2002)

In some cases the explanations given seem far-fetched, or simpler ones appear to be overlooked. I can hardly believe that when a cat, lying on a shawl or other soft material, pats or pounds it with its feet, or sometimes sucks a piece of it, it is the persistence of the habit of pressing the mammary glands and sucking during kittenhood; nor that the frequent practice of cats rubbing against their master's legs is derived from the habit of fondling their young. The habits and ideas of infancy seem to be completely lost in adult life, and to be replaced by others widely different; and it seems hardly likely that they should persist so strongly in one or two isolated instances without leaving more frequent and less equivocal traces behind them.

When a horse breaks into a gallop, at full speed, he always lowers his tail, and this is said to be done in order that as little resistance as possible may be offered to the air. This reason seems very fanciful, when the obvious explanation occurs, that, as the whole available nervous energy is being expended in locomotion, all special muscular contractions not aiding in the motion cease. It also seems very unsatisfactory to refer the vague and undefined yet deep emotions often excited by music to a recalling or survival of "strong emotions felt during long past ages, when, as is probable, our early progenitors courted each other by the aid of vocal tones," although it is very difficult to suggest any other explanation.

The open mouth, and raised arms with open hands turned outwards, is an expression of astonishment very general all over the world. Mr. Darwin explains the open mouth by a complication of causes, but he omits to notice, what seems to me a very probable one, that it represents an incipient cry of alarm or fear, or call for help. The raising of the arms and the open hands are explained by antithesis, they being the opposite of a state of indifference or listlessness. But this seems very unsatisfactory. The attitude is too definite, too uniform, and too widespread, to be derived from such a vague and variable cause as the opposite of a position of unconcernedness. There seems, however, to be a very obvious and natural explanation of the gesture. Astonishment, among our savage ancestors, would most frequently be excited by the sudden appearance of enemies or wild beasts, or by seeing a friend or a child in imminent danger. The appropriate movement, either to defend the observer's face or body, or to prepare to give assistance to the person in danger, is to raise the arms and open the hands, at the same time opening the mouth to utter a cry of alarm or encouragement. It is the protective attitude of an unarmed man to be ready to ward off attack of some uncertain or undefined kind; and very nearly the same attitude is that which we adopt as we rush to the assistance of some one in danger, our hands ready to grasp and save him. When used by us as a mere sign of astonishment, at some strange but harmless phenomenon, it has become to a great extent conventional, but the origin here advocated is rendered probable by a remark of Mr. Darwin himself, that, as one of the expressions of fear, "the arms may be protruded as if to avert some dreadful danger;" and among savages almost every source of astonishment would excite more or less fear.

It is rather curious that an author who is not usually satisfied with anything less than a real and intelligible explanation, should yet be so ready, in some cases, to admit innate ideas or feelings. Among the numerous, and often most interesting, observations on his own children, Mr. Darwin tells us that a child six months old was distressed at seeing its nurse pretend to cry. He thinks, in this case, that "an innate feeling must have told him that the pretended crying of his nurse expressed grief; and this, through the instinct of sympathy, excited grief in him." Now, although I imagined myself much more disposed to believe in innate ideas than Mr. Darwin, I cannot see the necessity for them here. A child at that age often cries or is distressed at any strange face, or even at the sight of a friend in a strange dress. The nurse's attitude and expression were strange; they made her look unlike herself, and the child got afraid, and was about to cry. That seems to me a better explanation than that the child had an innate knowledge that the nurse was grieved.

Wallace is apparently not willing to accept the irrationality Darwin sees in evolutionary mechanisms. Although Wallace is the one who hit the head of the nail of randomness, he always thought that time smoothes the

rough edges and creates functional coherence. He thus perceives Darwin's book as attributing too much coherence, when Darwin's text actually describes a bag of oddly distributed inherited modules. That some examples are far fetched is as true of Darwin as of Wallace and Lorenz. I hope that observation methods today allow one more refined descriptions than those made by Darwin.

Most "Darwinians" seem to have a hard time integrating the assumption that inherited traits may not be of the least use. It is Siegfried Frey who introduced me to this aspect of Darwin's formulations, but he does not claim to be a Darwinian. The philosopher P.E. Griffiths (1992, 1997) quotes some of these Darwin sentences in which emotional traits "may not then be of the least use", and he willingly admits that an acquired behavior may have lost its original function; but then he quickly adds that most probably a new function was inevitably acquired:

The baring of the teeth in humans, however, is no longer a preparation to use them for fighting. At some stage during the development of the species this behaviour has lost its original function. But this is not to say that it is now useless. It has acquired an alternative role, namely that of signalling aggression to other members of the species. Its survival value in its new role may be at least as great as that which it originally possessed. (Griffiths 1997, p. 65)

Griffiths does not notice that this position is closer to Lamarck's than Darwin's. His oversight is excusable when one considers that his analysis is probably influenced by no less than Konrad Lorenz, in his Introduction of the 1965 edition of Darwin's *The Expression of the Emotions in Man and Animals*, which is only slightly less blind than Griffiths to Darwin's argumentation:

Behavior patterns are just as conservatively and reliably characters of species as are the forms of bones, teeth, or any other bodily structures. Similarities in inherited behavior unite the members of a species, of a genus, and even the largest taxonomic units in exactly the same way in which bodily characters do so. The conservative persistence of behavior patterns, even after they have outlived, in the evolution of a species, their original function, is exactly the same as that of organs; in other words, they can become "vestigial" or "rudimentary", just as the latter can. Or, on losing one function, they may develop another, as the gill slit became an ear opening when our ancestors changed from aquatic to terrestrial life. Darwin shows in the most convincing manner that analogous processes have taken place in the evolution of motor patterns, as for instance, in the case of "snarling", in which an expression movement with a purely communicative function has developed out of the motor pattern of actual biting which, as a means of aggression, has practically disappeared in the human species.

That behavior patterns have an evolution exactly like that of organs is a fact which entails the recognition of another: that they also have the same sort of heredity. In other words, the adaptation of the behavior patterns of an organism to its environment is achieved in exactly the same manner as that of its organs, that is to say on the basis of information which the species has gained in the course of its evolution by the age-old method of mutation and selection. This is true not only for relatively rigid patterns of form or behaviour, but also for the complicated mechanisms of adaptive modification, among which are those generally subsumed under the conception of learning. (pp. xii-xiii)

This is one of the many small landscapes of intellectual realms that have reinforced my impression that the human mind requires logic and coherence as much as water, even when it "may not then be of the least

use". I have gone into all these details to explain why my reading of Darwin does not correspond to what some of the leading experts of the field have said of him, and because it so happens that my theory is often close to these often forgotten arguments of Darwin's theory.

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