SYMPATHY, EMPATHY, AND THE EVOLUTION OF DARWIN'S MORAL SENSE

by

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Dark portents of civil war were looming at the very time Walt Whitman celebrated the transformative song of empathy. "I do not ask the wounded person how he feels," he wrote in his 1855 book *Leaves of Grass*, "I myself become the wounded person."[1] The ensuing battle over slavery, an institution that Charles Darwin called "the greatest curse on Earth," would seem an unlikely place to find hope in human potential. And yet, as Whitman wrote during his volunteer service with wounded Union soldiers, "I'll pour the verse with streams of blood, full of volition, full of joy."[2] Whitman's quotation is relevant to the natural history of the moral sense for two reasons. The first is because his line represents a clear definition of empathy as it is known today, or what the Oxford English dictionary states as "the ability to understand and share the feelings of another," as opposed to sympathy, which is defined as "feelings of pity and sorrow for someone else's misfortune." As a poet, Whitman is an exemplar of the notion that words are imperfect representations of meaning and that focusing merely on the words themselves, rather than the intention behind them, represents a poverty of understanding. But this "poet of science,"[3] as Joseph Beaver memorably called him, also saw the precise study of the natural world—particularly the insights of Darwin—as a source of inspiration to find meaning in our lives. His poems utilize an almost scientific precision

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of individual detailed observations to construct his theory of meaning that each individual self can only be understood in relationship to the larger whole.

Darwin's *On the Origin of Species*[4] was published in the United States one year prior to the first fateful shots at Fort Sumter that began the bloodiest conflict on American soil. For many, particularly among the religiously devout who viewed themselves as the moral compass of civilization, it was unclear which was the greater calamity. With few exceptions, naturalists in the United States greeted the theory of natural selection the same way that celebrated paleontologist Louis Agassiz did, as "a scientific mistake, untrue in its facts, unscientific in its method, and mischievous in its tendency."[5] What was worse, critics claimed that Darwin's theory divided moral sentiments from divinity and pitted science against humanity. And yet, for Walt Whitman, the advent of Darwinism meant that "the world of erudition, both moral and physical, cannot but be eventually better'd and broaden'd in its speculations."[6] Whitman's vision of empathy was one that embraced a Darwinian nature.

However, modern scholars in science studies view the concept of empathy in disarray. They cite how its recent coinage in the early 20th century from the German term *Einfühlung* ("feeling into") and the varied and subjective interpretations with which it was initially used "offer no one definitive account of empathy, nor a reduction of one kind of empathy experience into another," to quote Susan Lanzoni in the introduction to a special issue of *Science in Context* devoted to the topic.[7] While such varied uses are clear and abundant, following Whitman, this paper will argue that an evolutionary understanding of empathy built consistently from Darwin's initial theory to establish an empirical framework by the mid-1960s. This continuity was demonstrated most clearly in

empirical research with non-human primates in the two decades following World War II. Whereas empathy research in the area of aesthetics and psychoanalysis took on a variety of forms and methodologies, primate experimentation followed a hypothetico-deductive approach that sought to narrow the parameters and develop a definition that was both specific and inclusive between human and non-human primates. Ironically, given the initial hostile reception that Darwin received in America, some of the most important work in this area was conducted by scientists in the United States itself.

Many critics have argued that there is a problem in that Darwin used the earlier term *sympathy* to describe the evolutionary foundations of the moral sense.[8] However, given that the word *empathy* wouldn't be invented in English until the early twentieth century, it is the meaning with which Darwin uses the word that ultimately matters rather than the word itself. The evolution of Darwinian sympathy into empathy wouldn't occur until after World War II, but conventional wisdom among historians places the emergence of the latter as a term during the expansion of German militarism in the first decade of the twentieth century.[9] Edward Titchener, a student of German philosopher and psychologist Wilhelm Wundt, is credited with being the first to translate the term *Einfühlung* as empathy in 1908 and discussed it in greater detail in his lectures on the *Experimental Psychology of the Thought Processes* in 1909.[10] However, the earliest known use of empathy in English, which does not appear to have been cited before, actually comes from an 1895 article in *The Philosophical Review* by E.L. Hinman referring to an article by Kurd Lasswitz entitled "Ueber psychophyische Energie und ihre Factoren."[11] Here it is referred to as "psychophysical energy […] defined as the relation of the whole energy at any change of the central organ to the intensity," though the

reviewer helpfully notes that no measurements of such energy are yet possible. It is widely thought that *Einfühlung* was translated into English as empathy and then retranslated back as *empathie*, however there is reason to think that this is incorrect. There were also earlier uses in Germany of the word *empathie* such as in Gustav Weisse's 1864 *Das Philologische Abiturienten-Examen* where he refers to "die Empathie der epikurischen und die Apathie der stoischen Schule" or the empathy of the Epicurean and apathy of the Stoic schools of thought.[12] That this is so shouldn't be particularly surprising given that *empathie* was originally a French word and Germans occasionally coopted useful terms from their neighbor despite the long history of antagonism between these countries.

Titchener's translation, however, followed from the speculations of Theodor Lipps who used *Einfühlung* to explain such diverse mental experiences as optical illusions, the emotional experience of art, understanding the mental states of others, as well as "strange experiences of consciousness or sensory phenomena" related to "the mind's eye." For Lipps, while *Einfühlung* was described as an instinct, the experience was a purely human activity, often spiritual. However, his attempt to connect such disparate experiences through contemplation alone led to some unhelpful clarifications such as "negative *Einfühlung*," in which the experience is rejected, being defined as sympathy, while "positive *Einfühlung*" could best be understood as "sympathische *Einfühlung*," or sympathetic empathy.[13]

It is clear that in the use of the word sympathy Darwin was referring to an individual "feeling into" the emotional state of another based on a shared perspective as was meant by the German word *Einfühlung*. The first mention Darwin makes of

sympathy in his published work comes from his 1871 book *The Descent of Man* where he offers multiple examples of this trait in the behavior of non-human primates.[14] From Alfred Brehm's *Tierleben*, or *Life of Animals*[15] as it was known in England, Darwin drew the example of a young Hamadryas baboon of about six months old who was left behind after the troop fled up a steep cliff to escape Brehm's greyhounds. However, with the young baboon surrounded by these experienced hunting dogs, one large male baboon ("a true hero," in Darwin's estimation) charged down the rock face to confront the dogs and rescue the youngster.[16] Darwin also cites the example of a young *Cercopithecus* that was seized by an eagle but held tight to a branch to prevent from being carried off. Responding to its cries, other members of the troop "rushed to the rescue," surrounded the eagle and pulled out so many feathers that the eagle dropped its prey in order to escape.[17] "It must have been sympathy in the cases above given," Darwin wrote, "which led the baboons and the Cercopitheci to defend their young comrades from the dogs and the eagle."[18] In one final anecdote Darwin describes a keeper that he met at the Zoological Gardens who showed him "some deep and scarcely healed wounds on the nape of his own neck" that he received from a baboon. However, in the same compartment, was a little American monkey (of which no species name is offered) that this keeper had befriended. Darwin wrote that this monkey was "dreadfully afraid of the great baboon" but, upon seeing his friend in danger, "rushed to the rescue, and by screams and bites so distracted the baboon that the man was able to escape…running great risk of his life."[19]

Darwin is clear that he viewed sympathy as distinct from love, either parental or familiar as in the case of a man's love for his dog and *vice versa*. Citing Adam

Smith's *Theory of Moral Sentiments* and Alexander Bain's *Mental and Moral Science*, Darwin wrote, "the basis of sympathy lies in our strong retentiveness of former states of pain or pleasure. Hence, 'the sight of another person enduring hunger, cold, fatigue, revives in us some recollection of these states, which are painful even in idea.' We are thus impelled to relieve the sufferings of another, in order that our own painful feelings may be at the same time relieved."[20] Likewise, Darwin notes, we are able to participate in the pleasures of others through the same process.[21]

This dual understanding of sympathy is something that Darwin had long held as an important part of the moral sense as his notebook entries indicate. The years 1838 and 1839 contain the only notes on this topic until Darwin published his mature ideas in 1871-2 (it was in 1838 that he conducted the observations he later described in *The Expression of the Emotions in Man and Animals*).[22] These early notes therefore contain important clues on the development of his ideas on sympathy and the evolution of the moral sense. In the first entry of his Notebook M concerning "Metaphysics on Morals and Speculations on Expression," Darwin emphasizes that sympathy can be evoked through both delight and sorrow as well as artistic works such as fine poetry or a particular strain of music. He speculates that, following Edmund Burke,[23] that sympathy must also incorporate the German concept of *schadenfreude*, or what Darwin calls "pleasure in beholding the misfortunes of others."[24] In this way Darwin identified two separate conceptions of sympathy from the very beginning: 1) sharing the felt experience of what another individual feels, or emotional contagion, and 2) taking the perspective of, or mentalizing, another individual's situation while having a unique emotional experience because of this understanding. In an entry dated August 24, 1838, Darwin noted that he

was reading Dugald Stewart's introduction to Adam Smith's life and writing. According to Smith, Darwin wrote, "we can only know what others think by putting ourselves in their situation, & then we feel like them." However, he ultimately finds Smith's concept "unsatisfactory" because, unlike Burke, it does not explain pleasure."[25] He goes on to write, on September 6th, that "putting ourselves in their situation" can also apply to non-sentient entities where "we may often trace the source of this 'inward glorying' to the greatness of the object itself or to the ideas excited & associated with it."[26] This product of sympathy Darwin associates with the sublime, in which, because of the grandeur of what we contemplate, the "superiority we transfer to ourselves in the same manner as we are acted on by sympathy." The following year, on May 5th, 1839, Darwin wrote in another notebook on the moral sense, that he viewed sympathy to be an instinct shared by other social mammals and formed the basis for altruistic behavior. "Without regarding their origin, we see in other animals they consist in such active sympathy that the individual forgets itself, & aids & defends & acts for others at its own expense."[27] In this way, Darwin added to emotional contagion and perspective-taking a third category of sympathy that involved prosocial concern for others.

For Darwin, the instinct of sympathy was the single factor upon which he rested the basis of the moral sense. Its evolutionary development, he argued in *The Descent of Man*, involved four important stages that "any animal whatever, endowed with well-marked social instincts, would inevitably acquire."[28] The first is that a social animal would "take pleasure in the society of its fellows" and wish to aid them in certain general ways. However, these services would not be extended to every individual of their species indiscriminately, but "only to those of the same association," or group. Secondly, once

the mental faculties of a given species had become highly developed, “images of all past actions and motives would be incessantly passing through the brain of each individual.” This would leave the animal with a “feeling of dissatisfaction” if they had yielded to a temporary selfish desire rather than to the “enduring and always present social instinct.” This would be the early formation of what we call conscience. Thirdly, once the ability to communicate through language had developed and the wishes of community members could be made known, “the common opinion how each member ought to act for the public good, would naturally become to a large extent the guide to action.” In other words, gossip, or what he refers to as “public opinion” would motivate individuals to act for the good of the community, “the power of which rests on instinctive sympathy.” Finally, “habit” would play an important part in guiding each individual’s behavior and would ultimately promote “obedience to the wishes and judgment of the community.” Darwin’s use of the term habit, of which more will be discussed below, involves both the individual level of behaviors that follow a regular tendency or practice, as well as at the group level involving cultural norms.

In this way, sympathy was the key instinct that Darwin utilized to understand, not just the basis of the moral sense, but the origin and future of human society. Once sympathy emerged during the course of evolution it was a trait acted upon by natural selection to become a hereditary instinct, much like the emotion of fear; but how powerfully it was felt depended on the strength of the association and the force of habit. The selection pressure on “instinctive sympathy” was still the environment, but it wasn’t the physical environment that would direct adaptations in anatomical evolution; the social environment provided its own selection pressures on individual behavior, traits that were

further mediated by the local culture. The same can be said for Darwin's concept of sexual selection, a factor that he spends significantly more time discussing in *The Descent of Man* and which is considered that book's signature contribution. However, while sexual selection sought to explain the anatomical differences between males and females, the mechanism continued to be natural selection at the individual level. Darwin's argument for instinctive sympathy, however, offered a significantly different approach because it was here that Darwin embraced a mechanism of evolution championed by Jean-Baptiste Lamarck and coupled it with selection at the group level in order to explain the evolution of human moral behavior.

Darwin had first introduced the idea that there could be hierarchies of selection in *On the Origin of Species* as an explanation for the biological altruism displayed by the eusocial *Hymenoptera* (ants, bees, and wasps). Of course, the central premise of Darwin's theory of natural selection was that all characteristics of a species–whether physical, like the elaborate antlers of an Irish Elk, or behavioral, like the formation of a V-shaped flock in migratory geese–were traits that had evolved through successive, slight modifications passed down over many generations. Because these modifications would only be passed on if they were beneficial, any trait that brought harm to their possessor would ultimately be discarded. "Natural selection will never produce in a being anything injurious to itself, for natural selection acts solely by and for the good of each," Darwin wrote.[29] Therefore, any characteristic that violated this premise "would be absolutely fatal to my theory." However, the eusocial *Hymenoptera* presented a "special difficulty" that demanded explanation. Not only do individuals sacrifice themselves for the group, such as bee

stings in which an individual will die in defense of the colony, but the vast majority of group members have given up reproduction altogether.

Darwin's solution to the problem was what he referred to as "community selection," or what today is called group or multilevel selection, in which certain traits are selected because they are advantageous at the individual level while others are advantageous at the family or group level. In both cases, the trait is selected because it allowed more offspring to be born who also carried that particular trait. Darwin was vague in his first book as to how the different hierarchies of selection interacted or what factors could account for the evolution of some traits at the individual level while others were only at the group level. However, it is clear that in the use of higher levels of selection as an explanation for biological altruism, Darwin was still utilizing the mechanism of natural selection based in individual reproductive success. As he concluded, "we can perhaps understand how it is that the use of the sting should so often cause the insect's own death: for if on the whole the power of stinging be useful to the community, it will fulfill all the requirements of natural selection, though it may cause the death of some few members." In other words, if proportionately more individuals survived when they had a given trait than died because of it, natural selection could be understood as the primary mechanism. In this unique situation of eusociality, in which only queens reproduced while the vast majority of female workers remained sterile, individuals could retain a trait "injurious to itself" because queens ultimately had higher reproductive success as a result.[30]

While community selection was used to explain the "special difficulty" of biological altruism, the same concept would be used to explain the origin of instinctive

sympathy but with the addition of a Lamarckian mechanism. As Darwin wrote in *The Descent of Man*, "sympathy, is, like any other instinct, greatly strengthened by habit."[31] While this initial statement could be interpreted as little more than an acknowledgement of behavioral plasticity, it is clear that Darwin is introducing a quite different form of evolution once he expands his argument. Noting that he likely overestimated the importance of natural selection in his previous book, Darwin explained that his two chief aims had been merely to show that, first, species were not separately created, and second, that natural selection was the primary mechanism of change, "though largely aided by the inherited effects of habit, and slightly by the direct action of the surrounding conditions."[32] These two factors, central to the Lamarckian inheritance of acquired characteristics, were necessary to emphasize because of "the paramount importance" of the social instincts and how they were acquired, "namely, through natural selection, aided by inherited habit."[33] Because behavioral habits followed over many generations "probably tend to be inherited," Darwin concluded that there "is not the least inherent improbability, as it seems to me, in virtuous tendencies being more or less strongly inherited."[34] In this way, Darwin made little distinction between the horizontal transmission of cultural behavior and the vertical transmission of hereditary instincts.

Darwin briefly considered that the selfish motivation for reciprocity, along with experience and imitation, could be the reason for an enhancement of instinctive sympathy.[35] However, he argued that the primary mechanism would have been unconscious in the same way it was for altruism among the *Hymenoptera*. Darwin reasoned that the "ape-like progenitors of man" would have felt sympathy for others in the same way all social species do: they "would have felt uneasy when separated from

their comrades…would have warned each other of danger, and have given mutual aid in attack or defence."[36] With strictly social animals, Darwin argued, natural selection can act indirectly on the individual by preserving variations that are only beneficial to the community as a whole. Instinctive sympathy would therefore have increased, "for those communities, which included the greatest number of the most sympathetic members, would flourish best and rear the greatest number of offspring."[37] However, Darwin consistently stated that instinctive sympathy was geared primarily towards the in-group. Consequently, when two tribes of primeval humans came into competition, the one whose members "were always ready to give aid to each other and to sacrifice themselves for the common good, would be victorious over more other tribes; and this would be natural selection."[38] As a result, "the social and moral qualities would tend slowly to advance and be diffused throughout the world."[39]

It was through this mechanism of Lamarckian group selection, or what might more appropriately be called "cultural group selection" following Boyd and Richerson,[40] that Darwin explained the origin of civilization and also based his argument against racism and eugenics. As small tribes were united into larger communities, each individual began to apply their instinctive sympathy towards larger groups, and eventually to all members of the same nation. "This point being once reached, there is only an artificial barrier to prevent his sympathies extending to the men of all nations and races" (although he noted that, if these other groups have large differences in appearance or habits, "experience unfortunately shews us how long it is before we look at them as our fellow-creatures.").[41]

In the same way that sympathy expands to other races and nations, this instinct would also extend outwards "to the imbecile, the maimed, and useless members of

society,"[42] for whom Darwin said we build asylums, institute poor-laws, establish hospitals, and provide vaccines. Darwin noted that this certainly allows the weak members of society to propagate and, comparing the situation to animal breeding for which he was intimately familiar, "must be highly injurious to the race of man [for] hardly any one is so ignorant as to allow his worst animals to breed."[43] However, Darwin ultimately fell back on humanity's advanced instinct of sympathy to conclude that we must reject eugenics and offer aid to the helpless. We could not "check our sympathy, if so urged by hard reason without deterioration in the noblest part of our nature."[44] In nearly identical terms as Walt Whitman he concluded that, ultimately, "from the power of the imagination and of sympathy we put ourselves in the position of the sufferer."[45]

While Darwin identified three categories of affective sympathy: sharing the felt experience of another, or emotional contagion, perspective-taking, or mentalizing the situation of another, and prosocial concern that would promote ending another's pain as a means of ending our own, he predicted there would be associated expressions that communicated these affective states. Darwin offered several observations of nonverbal expressions of sympathy, the most striking for him being the occurrence of tears for the sorrow or joy of another individual that result in stereotypical muscle contractions in multiple human populations around the world.[46]

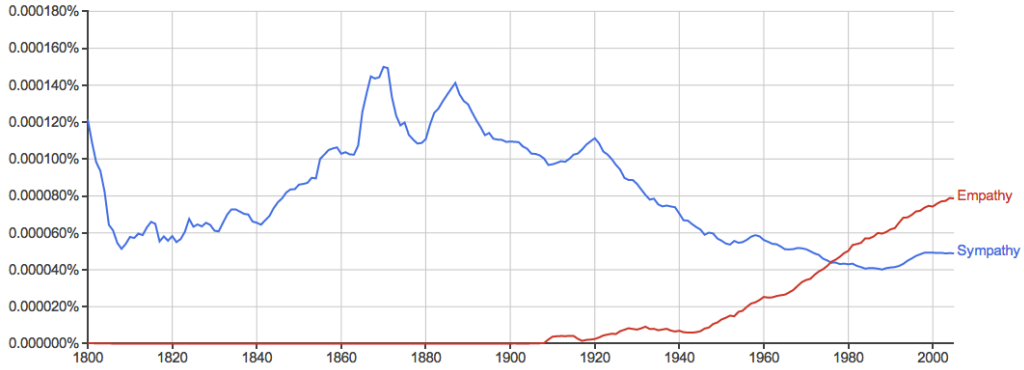
Darwin noted that his observation of multiple species of monkeys, chimpanzees, and orangutans showed that they regularly utilize similar facial muscles when screaming or frowning, such as the contraction of the corrugators that allow the eyebrows to be lowered and brought together. Likewise, gorillas lower their under lip and dilate their nostrils when emitting loud yells in a similar fashion as humans. However, Darwin wrote

that no evidence could be found of any nonhuman primates producing tears and argued that human-specific eye muscle contractions triggered the activation of the lachrymal gland and the secretion of tears. Likewise, laughter was commonly observed in groups of children and anthropoid apes, the latter of whom "utter a reiterated sound, corresponding with our laughter," but only in humans would laughter extend to the point of tears.[47] That weeping as well as laughter was most common in children when around others, with marked tendencies for emotional contagion when many children begin laughing or crying once one child starts, led Darwin to hypothesize that such expressions were largely communicative aspects of sympathy.[48] "The movements of expression in the face and body, whatever their origin may have been, are in themselves of much importance for our welfare. […] They reveal the thoughts and intentions of others more truly than do words, which may be falsified," or, in nonhuman animals, absent.[49]

While Darwin himself did few experiments he nevertheless generated testable predictions that followed from his theoretical argument. In *Expression of the Emotions in Man and Animals* (1872) he stated that his conclusions could be empirically verified by determining whether the same principle by which one expression could be explained was applicable in other allied cases and whether these principles applied equally "both to man and the lower animals." One such principle was that the affective states of sympathy had been gradually acquired until they became instinctive, and Darwin predicted that their expression would likewise have become instinctive (in much the same way that a sexually selected trait and the attraction that same trait had among the opposite sex were linked).[50] The underlying framework of Darwin's theory for the evolution of sympathy is that both the feeling and the expression had developed in synchrony, each promoting the

other in a communicative-affective feedback loop. As such, independently of the will, Darwin hypothesized that expressions representing powerful emotions would often mean that "nerve-force is generated and set free whenever the cerebro-spinal system is excited" in another individual witnessing the movements associated with this strong affective state.[51] In other words, the perspective taking that occurs when witnessing the expression of a strong affective state triggers emotional contagion as the observer's nervous system responds to recreate the felt experience of another, and, in many cases, prosocial concern is the result. "We readily perceive sympathy in others by their expression; our sufferings are thus mitigated and our pleasures increased; and mutual good feeling is thus strengthened."[52]

Darwin's theory for the evolution of sympathy and the "moral sense" therefore contained three discrete components: 1) "emotional contagion," 2) "perspective taking," and 3) "prosocial concern." Psychologists and animal behaviorists would pursue each of these components to establish the modern scientific formulation of empathy.



Sympathy vs. Empathy, 1800-2005, Google Ngrams Database[53]

It would be the horrors of the Second World War that would mark the beginning of the age of empathy as a research focus in psychology. According to Google Ngrams and

their scanned database of more than 5 million books, there was a sharp rise in the use of the term empathy beginning in 1944-5 with it eventually eclipsing the use of sympathy by 1975. During the same period the term sympathy was simultaneously falling into disrepute, reducing in frequency of use by two-thirds between 1920 and 1988. However, while the aesthetic and psychoanalytic explorations of empathy took a variety of directions, laboratory experiments with primates offered the empirical grounding necessary for a precise definition.

In some ways it is surprising that empathy became such a hot topic of research in experimental psychology in the post-war period. This was the era of the "killer ape" following Raymond Dart's discovery of australopithecine fossils associated with the discarded remains of partially consumed mammals. It was unlikely that such an assemblage could have developed by chance and Dart interpreted these animals as victims of our hominin forebears, who were now revealed to be "confirmed killers."[54] As Dart would describe in the article "The Predatory Transition from Ape to Man" in 1953, the human lineage was descended from "carnivorous creatures, that seized living quarries by violence, battered them to death, tore apart their broken bodies, dismembered them limb from limb, slaking their ravenous thirst with the hot blood of victims and greedily devouring livid writhing flesh."[55]

But Dart was far from the only anthropologist depicting violent and predatory habits in the human past. The horrors of the Second World War seemed to inspire such speculations. For the American primatologist Sherwood Washburn, our ape-like ancestor was "already a hunter," but through him emerged a killing instinct honed by evolution. "Man is naturally aggressive," wrote Washburn along with C.S. Lancaster in *Man the*

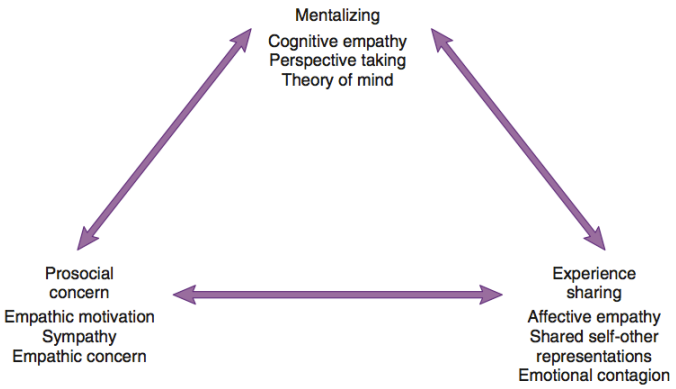
Hunter. "He naturally enjoys the destruction of other creatures…Other human beings were simply the most dangerous game."[56] Joining him was Nobel prizewinning ethologist Konrad Lorenz, who wrote in *On Aggression* that our tool-bearing australopithecine ancestors "promptly used their new weapon to kill not only game, but fellow members of their species as well."[57] Likewise, there was the science populariser Robert Ardrey, who recrafted Dart's vision for a new generation of readers in the 1960s with his book *African Genesis*. "We were born of risen apes, not fallen angels," he wrote, "and the apes were armed killers besides."[58]

While the primary experimental research on empathy took place in the United States in the post-war period, in 1921 the German psychologist Wolfgang Köhler demonstrated emotional contagion by documenting motor mimicry in chimpanzees.[59] The first positive demonstration was accomplished by having one individual climb on top of piled crates in order to reach a hanging banana as a second chimp observed from below. Köhler documented how the observer frequently stretched out their own arm as the climber reached for the prize, a clear example of mimicry suggesting that they were taking the perspective of the other as Darwin hypothesized.

But the key support arrived with a series of papers published in the United States between 1958 and 1963.[60] Psychologist Robert E. Miller and colleagues at the University of Pittsburgh sought to test Darwin's prediction that expressions of fear in animals had evolved as communicative signals for other members of their group. By first training a monkey to press a bar in order to prevent a mild electric shock, the researchers went on to demonstrate that the expression of fear by a second monkey that received a shock in an adjoining cage activated an identical reaction in the first, motivating them to press the bar

even though they felt no shock themselves. This reaction was the same even when the expression was seen on a silent television monitor or in the form of a still photograph. As the researchers predicted, the monkeys' "empathic relationship [was] dependent upon some nonverbal communication of affects."[61]

The final of the three components would be confirmed in 1964 when psychiatrists Jules Masserman and Stanley Wechkin of the North Western University Medical School in Chicago employed a similar approach but added the additional element of an "altruistic" choice.[62] After training monkeys to associate bar pressing with causing a shock to be administered in the adjoining cage, the researchers offered the first monkey a food reward if they would intentionally administer a shock to the second. Few accepted this devil's bargain. The researchers discovered that the majority of monkeys, even those who were strangers to one another, "will consistently suffer hunger rather than secure food at the expense of electroshock to a conspecific."[63]



The state of empathy research today within experimental psychology. As can be seen there are three components that involve 1) "emotional contagion," 2) "perspective taking," and 3) "prosocial concern," the same as Darwin discussed with sympathy in 1871. From Zaki and Ochsner (2012) "The neuroscience of empathy," *Nature Neuroscience* 15(5):675-680.

There are many stories in the history of science in which flawed methodology or reasoning resulted in multiple wrong turns until experimental designs could be refined

and more precise results identified. While Darwin was certainly wrong in many particulars, not least his theory of pangenesis as the basis of heredity, the historical epistemology of empathy represents a valuable case study in which initial hypotheses motivated the research that ultimately validated the original claims. It may not be a coincidence that Darwin published these ideas just six years after the American Civil War. As his correspondence with Asa Gray during the conflict clearly shows, Darwin had an intense hatred of slavery and his sympathies for a Northern victory were tied to his vision of moral progress. As he wrote to Gray on June 5, 1861, "Some few, & I am one, even wish to God, though at the loss of millions of lives, that the North would proclaim a crusade against Slavery. In the long run, a million horrid deaths would be amply repaid in the cause of humanity. . . Great God how I shd like to see that greatest curse on Earth Slavery abolished."[64]

While the science of empathy revealed a path towards reconciliation between the empirical research of the mid-twentieth century with the predictions from the nineteenth, the wounds inflicted during the American Civil War would be slow to heal. However, in the example of Walt Whitman we find someone who rejected such binary opposites, whether between North versus South, science versus art, and even the love of man versus woman. He reminds us that to celebrate others is to celebrate ourselves, even during our darkest hour. In 1892, while bedridden from a paralytic stroke and barely able to hold a pen to paper, this great poet of science offered a final paean to his early inspiration in a work entitled *Darwinism—(then Furthermore)*. "Meantime, the highest and subtlest and broadest truths of modern science wait for their true assignment and last vivid flashes of light—as Democracy waits for its."[65]

[1] Walt Whitman, *Leaves of Grass* (Brooklyn, New York, 1855), p. 39.
[2] Walt Whitman, "Song of the Banner at Daybreak," in *The Patriotic Poems of Walt Whitman* (Doubleday, Page & Company, New York, 1918), p. 22.
[3] Joseph Beaver, *Walt Whitman—Poet of Science* (King's Crown Press: New York, 1951).
[4] Charles Darwin, *On the Origin of Species By Means of Natural Selection, Or the Preservation of Favoured Races in the Struggle for Life*, (John Murray, London, 1859).
[5] Louis Agassiz, "[Review of] On the Origin of Species," *American Journal of Science and Arts*, Ser. 2, No. 30, pp. 142-154 (p. 154).
[6] Walt Whitman, "Darwinism—(Then Furthermore)" in *Complete Prose Works* (David McKay, Philadelphia, 1892), pp. 326-7.
[7] Susan Lanzoni, "Introduction: Emotion and the Sciences: Varieties of Empathy in Science, Art, and History." *Science in Context*, 25, pp. 287-300 (p. 288).
[8] List sources that highlight Darwin's use of sympathy.
[9] Lanzoni, *op cit.* (note 7).
[10] Edward Titchener, *Lectures on the Experimental Psychology of the Thought-Process*, (The MacMillan Company, New York, 1909).
[11] "For the capacity factor of psychophysical energy the name 'empathy' is proposed. Empathy is then a physical quantity, a physiological brain-function, and is defined as the relation of the whole energy at any change of the central organ to the intensity." E.L. Hinman, "Summaries of Articles, *Uber psychophyische Energie und ihre Faktoren*. K. Lasswitz. *Ar. f. sys*. Ph., I, 1, pp. 46-64. From Lasswitz's book *Die modern Energetik in ihrer Bedeutung fur die Erkenntniskritik*. *The Philosophical Review*, p. 673.
[12] Gustav Weisse, Das Philologishe abiturienten-examen oder Das wissenswürdigste aus der griechischen und römischen literatur und der alten geographie. Ein vorbereitungs-leitfaden für abiturienten, (Berlag von Johann Urban Rern., Breslan, 1864), p. 56.

[13] Theodor Lipps, *Ästhetik: Psychologie des Schönen und der Kunst* (Verlag von Leopold Voss, Leipzig, 1920), p. 21.
[14] Charles Darwin, *The Descent of Man, and Selection in Relation to Sex*, Vol. 1 (John Murray, London, 1871).
[15] Alfred Brehm, *Brehm's Life of the Animals, Vol. 1* (A.N. Marquis & Company, Chicago, 1895).
[16] Darwin, *op. cit.* (note 8), p. 76. The story Darwin cites comes from Brehm, *op. cit.* (note 9), p. 48.
[17] *Ibid.*
[18] *Ibid.*, p. 78.
[19] *Ibid.* In the second edition Darwin adds a footnote quoting Scottish philosopher Alexander Bain that "effective aid to a sufferer springs from sympathy proper." *Mental and Moral Science: A Compendium of Psychology and Ethics* (Longmans, Green, and Co., London, 1868), p. 245; cited in Darwin, *The Descent of Man* (John Murray, London, 1874), p. 103, n. 15.
[20] *Ibid.*, p. 81. The quoted section comes from Bain, *op. cit.* (note 13), p. 279.

[21] *Ibid.*
[22] Charles Darwin, *The Expression of the Emotions in Man Animals* (John Murray, London, 1972), p. 19.
[23] Edmund Burke, *Philosophical Inquiry into the Origin of Our Ideas of the Sublime and Beautiful: with an Introductory Discourse Concerning Taste* (London, 1757), Part I, Section XIV, "The Effects of Sympathy in the Distresses of Others."
[24] Charles Darwin, "Notebook M: Metaphysics on morals and speculations on expression," p. 58, (undated, written sometime between 22 July and 7 August, 1838). [Online]. Available at website The Complete Work of Charles Darwin Online [http://darwin-online.org.uk], http://darwin-online.org.uk/content/frameset?viewtype=side&itemID=CUL-DAR125.-&pageseq=1 [accessed 15 January 2014].
[25] *Ibid.*, p. 108, (24 August, 1838).
[26] *Ibid*., p. 19v. (6 September, 1838).
[27] Charles Darwin, "Old & useless notes about the moral sense & some metaphysical points," p. 42, (5 May, 1839). [Online]. Available at website The Complete Work of Charles Darwin Online [http://darwin-online.org.uk], http://darwin-online.org.uk/content/frameset?pageseq=50&itemID=CUL-DAR91.4-55&viewtype=text [accessed 15 January 2014].
[28] Darwin, *op. cit.* (note 8), pp. 71-3.
[29] Darwin, *op. cit.* (note 4), p. 201. The quote would change slightly in the sixth, and final, edition in 1872 to read "Natural selection will never produce in a being *any structure more injurious than beneficial to that being*, for natural selection acts solely by and for the good of each." (pp. 162-3).
[30] Ironically, Darwin saw the persistence of sterility in Hymenoptera females other than the queen as a refutation of Lamarck. "I am surprised that no one has advanced this demonstrative case of neuter insects, against the well-known doctrine of Lamarck." Darwin, *op. cit.* (note 4), p. 242.
[31] *Ibid.*, p. 82.
[32] *Ibid*., p. 152-3.
[33] *Ibid*., p. 162.
[34] *Ibid*., p. 164; p. 102. Darwin also notes, "Whether the several foregoing modifications would become hereditary, if the same habits of life were followed during many generations, is not known, but is probable." *Ibid.*, p. 117. In *Expression of the Emotions in Man and Animals* there are many similar statements, e.g., "Actions, which are at first voluntary, soon became habitual, and at last hereditary, and may then be performed even in opposition to the will." Darwin, *op. cit.* (note 17), p. 357.
[35] *Ibid.*, p. 82. Also where he writes, "The moral sense is fundamentally identical with the social instincts; and in the case of the lower animals it would be absurd to speak of these instincts as having been developed from selfishness." Darwin, *op. cit.* (note 17), pp. 97-8.
[36] *Ibid.*, pp. 161-2.
[37] *Ibid.*, p. 82.
[38] *Ibid.*, p. 166.
[39] *Ibid.*, p. 163.

[40] Peter J. Richerson and Robert Boyd, *Not By Genes Alone: How Culture Transformed Human Evolution*, (University of Chicago Press, Chicago, 2008).
[41] *Ibid.*, pp. 100-1.
[42] Darwin, *op. cit.* (note 8), p. 103.
[43] *Ibid.*, p. 168.
[44] *Ibid.*, pp. 168-9.
[45] Darwin, *op. cit.* (note 17), p. 305.
[46] Darwin cites examples of indigenous New Zealand women who cry "in the most affecting manner, a chief who "cried like a child because the sailors spoilt his favourite cloak by powerding it with flour," a Tierra del Fuego native who had lost a brother "and who alternately cried with hysterical violence, and laughed heartily at anything which amused him," and Sandwich Islanders for whom "tears are actually recognized as a sign of happiness." *Ibid.*, pp. 155-6; 175.
[47] *Ibid.*, p. 201; 217-8.
[48] *Ibid.*, pp. 175-7; 190-7; 217-9.
[49] *Ibid.*, pp. 365-6.
[50] *Ibid.*, pp. 358-9.
[51] *Ibid.*, p. 349.
[52] *Ibid*., pp. 365-6.
[53] Based on a search for the comma-separated phrases: "Sympathy,Empathy" (not case-sensitive). From the corpus of English books with a smoothing of 3. On the utilization of Google Ngrams in historical cultural analysis see Jean-Baptiste Michel, et al., "Quantitative Analysis of Culture Using Millions of Digitized Books," *Science*, 331, 6014, pp. 176-182; Frederick W. Gibbs and Daniel J. Cohen, "A Conversation with Data: Prospecting Victorian Words and Ideas," *Victorian Studies*, 54, 1, 2011, pp. 69-77.

[54] It was later discovered that the animal remains that Dart found scattered throughout hominin caves were actually the leftovers from African carnivores such as lions and leopards. Australopithecines had not been the predators; they were the prey.
[55] Raymond Dart, "The Predatory Transition From Ape to Man." *International Anthropological and Linguistic Review* 1:201-217.
[56] Sherwood L. Washburn and C.S. Lancaster, "The Evolution of Hunting," in Richard Barry Lee and Irven DeVore (eds.), *Man the Hunter* (Transaction Publishers, New Jersey, 1973), p. 299.
[57] Konrad Lorenz, *On Aggression* (Harcourt, New York, 1966), p. 239.
[58] Robert Ardrey, *The African Genesis: A Personal Investigation into the Animal Origins and Nature of Man* (Dell Publishing, New York, 1961), p. 354.
[59] Wolfgang Kohler, *Intelligenzprüfungen an Menschenaffen* (Berlin, 1921).

[60] See, for example, I. Arthur Mirsky, Robert E. Miller, and John V. Murphy, "The Communication of Affect in Rhesus Monkeys: I. An Experimental Method," *Journal of the American Psychoanalysis Association*, 1958, 6, 433-441; Miller, Murphy, and Mirsky, "The relevance of facial expression and posture as cues in the

communication of affect between monkeys," *Archives of General Psychiatry*, 1959, 1, 480-88; Miller, Banks, and Ogawa, "Communication of Affect in 'Cooperative Conditioning' of Rhesus Monkeys," *Journal of Abnormal and Social Psychology*, 1962, 64, 343-348; Miller, Banks, and Ogawa, "Role of Facial Expression in 'Cooperative-Avoidance Conditioning' in Monkeys," *Journal of Abnormal and Social Psychology*, 1963, 67, 24-30.

[61] Miller, John V. Murphy, and I. Arthur Mirsky, "Relevance of Facial Expression and Posture as Cues in Communication of Affect Between Monkeys," *Archives of General Psychiatry* 1: 480 (480-488).

[62] Jules H. Masserman, Stanley Wechkin, and William Terris, "'Altruistic Behavior in Rhesus Monkeys," *American Journal of Psychiatry*, 1964, 121, 584-5.

[63] *Ibid*., p. 585.

[64] Charles Darwin, Correspondence 9:163.

[65] Walt Whitman, "Darwinism—(Then Furthermore)" in *Complete Prose Works* (David McKay, Philadelphia, 1892), pp. 326-7.