



Did Darwin Foreshadow Evolutionary Psychology?

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Abstract

In recent years the growth and influence of evolutionary psychology has been astonishing. Concepts which have been developed by prominent evolutionary psychologists in recent years can generally be traced back, not to The Origin of Species, but to Darwin's two later books on evolution, The Descent of Man and Selection in Relation to Sex (1871) and Expression of the Emotions in Man and Animals (1872). Such concepts include reciprocal altruism, sexual selection and human cognitive abilities, sex differences in human mate choice and emotional expressions as adaptations. By considering Darwin's writings on each of these topics, it is concluded that he foreshadowed the development of evolutionary psychology as an accepted academic discipline.

Keywords: Darwin; Evolutionary psychology; Sexual selection; Reciprocation; Emotional Expression

Introduction

Over the last half century, a series of approaches have been developed in an attempt to apply Darwinian theory to enhance our understanding of the human condition. Such approaches draw on theoretical and empirical developments in ethology during the 1960s and 70s and include sociobiology, human behavioural ecology and evolutionary psychology. Of these, the output from and interest generated by evolutionary psychologists has outpaced other evolutionary approaches. Today evolutionary psychology has both a growing influence on the academic human sciences and regularly appears in news media outlets.

One question we might consider is what sort of a role did Darwin's writing play in instigating and propagating evolutionary psychology? While Darwin is rightly credited with developing a grand unifying theory of organic evolution by natural selection, his contribution to our understanding of human behaviour has arguably remained unrecognised in most quarters.

Sex and Emotions–Darwin's other Great Works

While The Origin of Species ('Origin', the accepted abbreviation, 1859) was largely concerned with the evolution of structure and function in other species, by the end of the 1860s Darwin [1] had begun to turn his attention to our own species and in particular how our behaviour and internal states came about. In 1871 and 1872 he published two books concerned with human evolution. The Descent of Man and Selection in Relation to Sex was published on 24th February 1871, followed on the 26th November 1872 [2], by The Expression of the Emotions in Man and Animals. The former ('Descent', again the accepted abbreviation) fleshed out Darwin's ideas on sexual selection whereby, rather than the forces of nature, the opposite sex acts as the selective force. The latter ('Expression', once again the accepted abbreviation) suggested our emotions had evolved to serve universal functions [3]. In a sense both of these books considered psychological aspects of our species and as such, we argue here, foreshadowed the emergence of evolutionary psychology.

In order to illustrate this argument, we briefly consider extracts of Darwin's own writings on a number of conceptual foundations around which current evolutionary psychological research is based. These include:

- Inclusive fitness theory and the concept of kin selection
- Human reciprocal altruism
- Sexual selection theory as applied to language and cognition
- Sex differences in human mate choice
- Emotional expressions as adaptations

While each of these areas has been developed over the last half century, we suggest that Darwin's writings in *Descent and Expression* predicted such conceptual developments. We illustrate this by quoting Darwin's actual words with regard to these predictions.

Inclusive Fitness Theory and the Concept of Kin Selection

One of the biggest problems that evolutionists face is why some organisms engage in altruistic behaviour [4]. If natural selection is based on the principle of increased reproduction and survival, then we might ask why do many organisms aid other organisms which might then be more likely to reproduce instead of the altruist? Interestingly in *Origin*, Darwin documented his concerns with the 'problem of altruism':

"[I]f it could be proved that any part of the structure of any one species had been formed for the exclusive good of another species, it would annihilate my theory, for such could not have been produced through natural selection" [1].

Prior to the 1960s most people (evolutionists included) considered that the reason individual organisms aided others was in order to help their population or species to survive. This suggests natural selection acts at the level of the group. During the 1960s, however, two evolutionary biologists, John Maynard Smith and George Williams, argued convincingly that this notion of 'group selection' could not evolve when in competition with individual selection due to 'subversion from within' [5-7]. This means that individuals who acted altruistically to aid the group would be outcompeted by other individuals which favoured themselves over the group. And yet throughout the animal kingdom there are well documented cases of individuals aiding group members from birds which help others raise offspring to the African wild dogs which, following a kill, regurgitate meat to other pack members. This situation reaches its zenith in social insects such as bees, ants and wasps where sterile workers ('neuters') forgo reproduction and instead raise the offspring

of their queen. According to a simple understanding of Darwinism this appeared to be a thorn in the side for evolutionists. In fact, Darwin himself recognised this specific problem with social insects writing in *The Origin of Species*:

"[O]ne special difficulty, which at first appeared to me insuperable, and actually fatal to my whole theory. I allude to the neuters or sterile females in insect communities: for these neuters...being sterile they cannot propagate their kind" [1].

A century after Darwin wrote these words, in 1963, however, a young ethologist by the name of William Hamilton solved the social insect problem. He did so by demonstrating how individual social insects can pass on more copies of their genes by providing aid to their close relatives (nest mates) and pass their genes on indirectly via their sister, the queen. This was the beginning of a shift to the gene level perspective of altruism. According to Hamilton [8], natural selection favours genetic success (fitness) rather than simply individual reproductive success. Hence, for social insects, by helping others to survive and breed some pass on their genes indirectly. While social insects, with their neuter workers, represent an extreme form of indirect breeding, we can also expand this notion of passing our genes on indirectly by demonstrating altruism to our relatives to all social species. This is particularly true of our own species. To Hamilton, our inclusive fitness (the proportion of our genes we are able to pass on) is the sum of our direct fitness (producing offspring ourselves) and indirect fitness (providing aid which helps non-direct kin such as nephews and nieces to survive and reproduce). This 'inclusive fitness theory' helps to explain most incidents of altruism in social species. Hence, when we see animals giving aid to others in the group, in the vast majority of cases, such support is provided to relatives in the group. John Maynard Smith called the part of natural selection whereby individuals give aid to relatives 'kin selection'.

It is often documented that the evolutionists of the 1960s solved Darwin's 'ant problem'. What people often fail to realise, however, is that Darwin was already considering the answer lies in kin selection theory by suggesting in *Origin* that the answer to such altruism would eventually be resolved by consideration of 'selection on the family' [1]. Hence, while the likes of Maynard Smith, Williams and Hamilton are rightly credited with the development of the concepts of inclusive fitness and kin selection to help explain prosocial behaviour, Darwin had both identified the problem and provided a good hint as to its solution.

Human Reciprocal Altruism

While, as outlined above, most examples of altruistic

behaviour in social species can be explained by observations of individuals providing aid to close relatives who share a high proportion of their genes, not all cases of self-sacrificing behaviour can be traced back to this process. There are also well-established acts of altruism between non-relatives [9]. For example, unrelated subordinate olive baboons often pair up to take it in turns to outcompete a dominant conspecific for female attention [10]. Likewise, unrelated vervet monkeys form reciprocal relationships where they take turns in providing appropriate predator alarm calls [11]. Until these could be explained within the inclusive fitness framework, simple group selection could not be excluded. The main solution to this problem was put forward by another young evolutionist named Robert Trivers [12] in 1971. Trivers, who was mentored by Hamilton [8], developed the concept of reciprocal altruism to explain these apparently self-sacrificing acts between unrelated individuals. Trivers' summarised his explanation of reciprocal altruism in one sentence:

“Whenever the benefit of an altruistic act to the recipient is greater than the cost to the actor, then as long as the help is reciprocated at some later date, both participants will gain” [12].

In a nutshell this is a version of ‘you scratch my back and I’ll scratch yours’ with the additional proviso that the benefit should outweigh the cost on each occasion. This might sound odd since, if you give me, say an apple, and a week later, I give you an apple it sounds as if neither benefit. But in the harsh conditions of our ancient ancestral past if I’m extremely hungry one week and you are the next then providing an apple could be a lifesaver for each of us. Although Trivers [12] proposal was very much a theoretical one, since he developed it, a number of examples have been documented which demonstrate such reciprocation [9-11]. In order for it to work it is necessary that individuals encounter each other regularly (so that they are recognised) and that they have reasonably well-developed cognition (in order to recall the aid and respond appropriately). Hence, it’s not surprising that most examples of reciprocation have been documented in primate species [9]. Today it is well recognised as an important feature of human prosocial behaviour.

So Trivers was the first to recognise this system of reciprocation could evolve to aid both parties. Or was he? In fact, a century earlier writing in *Descent*, Darwin sowed the seeds for such a fruitful idea:

“[E]ach man would soon learn from experience that if he aided his fellow-men, he would commonly receive aid in return. From this low motive he might acquire the habit of aiding his fellows” [2].

Sexual Selection Theory as Applied to Language and Cognition

As we saw earlier, in *Descent* Darwin fleshed out the concept of sexual selection. That is, individuals develop adaptations in order to compete for, or impress, the opposite sex. Many evolutionists believe it’s important to treat natural and sexual selection as different forces because, as Darwin realised, they can push in different directions. An example of this is the elaborate train of the peacock which has evolved to attract peahens, but also makes them more visible to predators. In contrast to natural selection, sexual selection was largely ignored by scientists for many years after the publication of *Descent*. In psychology it had virtually no impact until the end of the 1980s/early 1990s. At this point a number of prominent figures began to argue that we can make use of sexual selection theory to predict and explain a number of aspects of our behaviour and internal states [13-16]. This includes the notion that the large leap forward in human cognitive processes which has occurred since we diverged from the anthropoid apes, might have been driven by sexual selection. Around the turn of this century two North American evolutionists, Geoffrey Miller and Tecumseh Fitch independently suggested that the complexity of our language may have been driven in part by sexual selection. Miller suggested that ancestral men used their linguistic abilities to impress ancestral women and that, later on, both sexes selected intelligent partners since this would give any offspring produced an advantage [17]. Likewise, Fitch has suggested sexual selection played an important role in the evolution of language and that the development of early forms of music were part-and-parcel of this evolution [18,19]. In fact, Miller and Fitch have made use of published research on bird song both as a model for language development and as an indicator of fitness to the opposite sex.

Such researchers (alongside others) have rightly been recognised for their pioneering work on the evolution of language and of other cognitive abilities. But once more the ground-breaking ideas of a relationship between sexual selection and human linguistic abilities were suggested by Darwin. Writing in chapter two of *Descent* he suggested:

“When we treat of sexual selection we shall see that primeval man ...probably first used his voice in producing true musical cadences, that is in singing....and we may conclude from a widely-spread analogy, that this power would have been especially exerted during the courtship of the sexes” [20].

Moreover, he later states

“I conclude that the musical notes and rhythms were first acquired by the male or female progenitors of mankind for the sake of charming the opposite sex” [20].

Note that in these statements, Darwin was making it explicit he feels some form of musical communication preceded the evolution of language and that there are parallels with avian species. This music first, spoken language second has subsequently been labelled the musical protolanguage theory of language evolution [19].

To give Miller and Fitch [17,18] their due, they do make it clear that they drew heavily on Darwin's writing to inform their own research (in fact Fitch has written comprehensively on Darwin's contributions to our understanding of language evolution). Despite this, today, outside of some very specialist areas of research, Darwin's contribution to our understanding of the psychology of language remains largely unrecognised.

Sex Differences in Human Mate Choice Criteria and Behaviour

While sexual selection theory had very little impact on psychology for over a 100 years after the publication of *Descent*, by the end of the 1980s this was about to change. In 1989 American evolutionist David Buss [21] published the results of a cross-cultural survey into mate choice preferences in close to 10,000 respondents from all around the world. The survey asked respondents to rate, on a scale of 0-3, a number of features that each person would ideally like to see in a romantic partner. What Buss found was that most of the preferences were largely similar in males and females. Both men and women gave an equal rating to indicators of commitment, dependability and, in particular, to love. That is, around the world both sexes want someone they are in love with and who they can trust. Where they differed was, however, quite revealing. Men regarded physical attraction in a woman more highly than women did for men. In contrast, women regarded indicators of wealth and status more highly in a partner than did men. Based on these and other findings Buss [22] published *The Evolution of Desire* in 1995 (subsequently updated in 2003 and 2016). In it he suggested that, when it comes to reproduction, men and women have faced different recurrent adaptive challenges and because of this they have evolved somewhat different mate choice preferences. Because the costs are lower for men, they will be more competitive for female partners by seeking status. Women, for their part, having more to lose, (think of the costs of gestation, birth and lactation) have evolved to be the choosier sex. Also, because women have a more age-limited period of fertility than men. Then men will be more concerned about beauty and youthfulness (both signals of fertility) in a partner.

Over the last thirty odd years Buss has gone on to conduct many studies designed to test these ideas about human sex differences. He has done much to champion the importance

of female choice as a driving force in the evolution of male behaviour. Today he is rightly regarded as the leading evolutionary expert in this field. Once again, however, Darwin predicted the importance of female choice in numerous passages in *Descent*. An example of this is:

"Nevertheless, when we see many males pursuing the same female, we can hardly believe that the pairing is left to blind chance—that the female exerts no choice, and is not influenced by the gorgeous colours or other ornaments with which the male alone is decorated" [20].

Also

"The female could in most cases escape, if wooed by a male that did not please or excite her; and when pursued, as so incessantly occurs, by several males, she would often have the opportunity, whilst they were fighting together, of escaping with, or at least temporarily pairing with, some one male" [20].

And finally

"We are naturally led to enquire why the male, in so many and such distinct classes, has become more eager than the female, so that he searches for her, and plays the more active part in courtship" [20].

Interestingly, Darwin saw this as being as true for humans as it is for other species. The above quotes clearly predicted the findings of Buss for our own species. (Note, Buss did, of course cite Darwin's *Descent* in *The Evolution of Desire*).

Basic emotional expressions arose as adaptations

When it came to explaining human behaviour and internal states, for the first half of the twentieth century, two theoretical movements held sway: cultural relativism and behaviorism. Cultural relativism was developed by social and cultural anthropologists as a reaction to the conception of Western superiority. The idea here is that, rather than assuming Western 'civilisations' are superior to non-Western ones, we should assess the practices and beliefs of other cultures by their own standards. Part-and-parcel of this conception of culture is the notion that humans are born as 'blank slates' with pretty much everything having to be absorbed from their particular culture. This view was spelled out by the father of cultural anthropology Franz Boas when in 1934 he stated:

"[T]he genetic elements which may determine personality [are] altogether irrelevant as compared with the powerful influence of the cultural environment" [23].

Such a view therefore left little or no room for evolved internal states and responses. A similar view was widely

held by behaviorist psychologists who, taking their lead from John Watson and Burrhus Skinner, conceived the minds of neonates as blank slates with no more than very basic innate reactions [24]. The behaviorist perspective on human nature held that, while evolution by natural selection had taken place, all abilities were learned, and we should ignore the notion of inherited capacities.

Due to these prevailing views, Darwin's Expression with its notions of universal evolved emotional states was generally considered to be misguided. In fact, one of Boas' own protégées Margret Mead suggested that emotional states varied greatly between people from different cultures [25]. She even suggested in her bestselling book *Coming of age in Samoa* that Samoan men and women did not experience sexual jealousy and hence free love prevailed. If some cultures did not experience some of the emotional states that Darwin considered both adaptive and universal, then clearly, he got this badly wrong.

Or did he? While the concept of the infinitely malleable nature of human internal states was widely accepted during much of the twentieth century, in 1971 the tide began to turn. In that year Paul Ekman and Wallace Friesen decided to test Darwin's notion of universal human emotions. They travelled to a remote area deep inland within New Guinea to meet with tribes people who had little or no contact with the outside world. Using a translator, they found the tribes people were able both to identify specific Western emotional expressions and to produce them under the same sort of circumstances that people in industrialized countries did. On the basis of this and a large number of similar studies, Ekman and Friesen [26] uncovered evidence that there are at least six universal human emotional expressions (fear, sadness, joy, surprise, rage and disgust) and suggested these were used in adaptive ways. For example, a fear response might well signal to friends and relatives that there is danger. Likewise, a sad face demonstrates that someone is in need and draws others to them to provide support. Then in 1973 the human ethologist Irenäus Eibl-Eibesfeldt [27] documented how children, who were born blind and deaf, produced identical emotional expressions to those born with vision and hearing. Importantly, they used these emotional expressions under the same emotion-inducing circumstances as sighted children. Given the babies born blind and deaf could not have imitated other children, Eibl Eibesfeldt [27] has taken his findings as evidence that a number of our basic emotional expressions are innate.

The studies of Ekman and Friesen [26] and of Eibl Eibesfeldt [27] provide strong evidence that our most basic emotions are universal just as Darwin had predicted back in 1872 [2]: "I have endeavoured to show in considerable detail that all the chief expressions exhibited by man are the same

throughout the world" [2].

Moreover, it is now known that chimpanzees, our closest relatives, react differently to various human expressions and as children develop the ability to understand human emotions, they simultaneously develop the ability to identify primate vocalizations for aggression, fear and submission [28]. Such findings can be taken as supporting evidence of continuity between humans and primates. These findings fit in well with Darwin's own conclusion:

"We have seen that the study of the theory of expression confirms to a certain limited extent the conclusion that man is derived from some lower animal form" [2].

Interestingly, while Margaret Mead conducted much fascinating anthropological research since her days studying in Samoa, follow up studies have shown that sexual jealousy is as common here as elsewhere [22]. Perhaps the notion of a tropical island society where free love without jealousy exists, was a myth the public were all too ready to believe.

Conclusion

In conclusion, in writing his two latter books on evolution, *The Descent of Man and Selection in Relation to Sex* and *Expression of the Emotions in Man and Animals*, Darwin demonstrated a growing interest in human internal states and in behaviour. A number of areas of research and theory into the relationship between our behaviour and evolution were considered in these books. These areas include consideration of reciprocation of altruistic behaviour and selection at the level of the family. He also outlined ideas concerning the role of sexual selection in boosting human intellectual abilities and how mate choice decisions can lead to differences between the sexes. Finally, he considered human emotions as having continuity with other primates and as such evolved from a common ancestor. Many of the statements that Darwin made in these two texts were far-sighted and can clearly be seen as foreshadowing the development of the modern-day discipline of evolutionary psychology.

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