Introduction

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ABSTRACT: In *The Expression of Emotions in Man and Animals* Darwin argued that emotions are not unique to humans, but can be found in many species; that many of the same social occasions that generate emotions in humans do so in other animals. He asked why this particular expression for a particular emotion, and his answer formed part of his demonstration of the continuity of the species and was thus crucial to his evolutionary theory. Darwin was one of the first scientists to use photographs as illustrations and to use the judgment method for studying the signal value of an expression—which has become the most frequently used method in the psychology of expression. The contents of the present volume extend, support, and sometimes contradict Darwin's remarkable contribution to the field of the expression of emotions.

KEYWORDS: Charles Darwin; emotions; expression of emotions; judgment method

We celebrate the 130th anniversary of the publication of Charles Darwin's book *The Expression of Emotions in Man and Animals* in this volume. It was published 13 years after *The Origin of Species* and one year after *The Descent of Man*. He originally intended *Expression* to be a chapter in *Descent*, but it grew too long. He began keeping the notes that formed the basis of this book in the 1830s.

It is an extraordinary book, radical for his time and for today. The only evidence that he gathered directly was the answers to a series of questions he sent to world travelers asking them about the expressions they observed for different emotions. His analysis of their replies suggested that expressions are universal, which is what is to be expected if there is a common descent. In itself this evidence did not support his explanation of the origins of mankind, for if we had all descended from Adam and Eve, we would have had the same expressions. What it did do, which he pointed out quite explicitly, was chal-

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lenge the racist theories of his day that claimed that Europeans were descended from a more advanced progenitor than the progenitors of Africans. By showing a common descent Darwin affirmed, in his words, "the unity of mankind."

Darwin argued that emotions are not unique to humans, but can be found in many species. Even bees get angry, Darwin said. It is only in recent years that those studying animal behavior have stopped shying away from the danger of anthropomorphism to recognize Darwin's wise observations that many of the same social occasions that generate emotions in humans do so in other animals.

Darwin asked a question that few before or after him have asked. Not just what expression occurs, not just when an expression occurs—although he did address these questions, he also asked why this particular expression for a particular emotion. His demonstration of the continuity of the species—that emotions are not unique to humans—which was crucial to his evolutionary theory, came from his answer to the "why this expression?" question.

He described three explanatory principles. According to the principle of *serviceable habits*, actions that originally had some usefulness would be preserved as signals. The retraction of the upper lip in a canine, exposing teeth preparatory for biting, was preserved as a display (in current terms) of the size of the weapon that might be used. In similar fashion the dog stands erect, hair on it's back upright to appear large, and thus threatening. (The concepts of *ritualization* and *intention movements* are terms current in ethology related to this principle). To explain why the dog slinks, with back down and close to the ground when affectionate or submissive, Darwin invoked his principle of *antithesis*. This stance occurs because it is the opposite of the movements for aggression. Darwin showed that these two principles applied equally to explaining the stance of an aggressive man (serviceable habits) as compared to the helpless man shrugging (antithesis) (see FIG. 1) For expressions that could not be explained by either of these two principles, Darwin invoked the principle of *direct action of the nervous system.*

His book is also a compendium of fascinating observations about the expressions of humans and other animals. We purse our lips when we concentrate on doing something, such as threading a needle. We open our mouth when listening intently. We want to touch with our faces those we love. We can bite affectionately, as do other animals. And so on, almost endlessly.

Darwin was one of the very first scientists to use photographs as illustrations, commenting in the introduction to his book how important it was to show exactly the details of expression. He was also the first scientist to use what has since become the most common method for studying the signal value of an expression—what is today called the *judgment* method. Darwin showed pictures, taken by the great French neurologist Duchenne du Boulogne[1,2] (who had published a study 10 years earlier on the anatomy of facial movement), to people and asked them what emotion was depicted.

Darwin wrote about his findings on the picture reproduced in FIGURE 2:

> One half of the face is made, by galvanizing the proper muscles, to smile; whilst the other half is made to begin crying. Almost all those (viz. nineteen out of twenty one persons) to whom I showed the smiling half of the face instantly recognized the expression; but, with respect to the other half, only six persons out of twenty one recognized it—that is, if we accept such terms as grief, misery annoyance as correct, whereas fifteen persons were ludicrously mistaken; some of

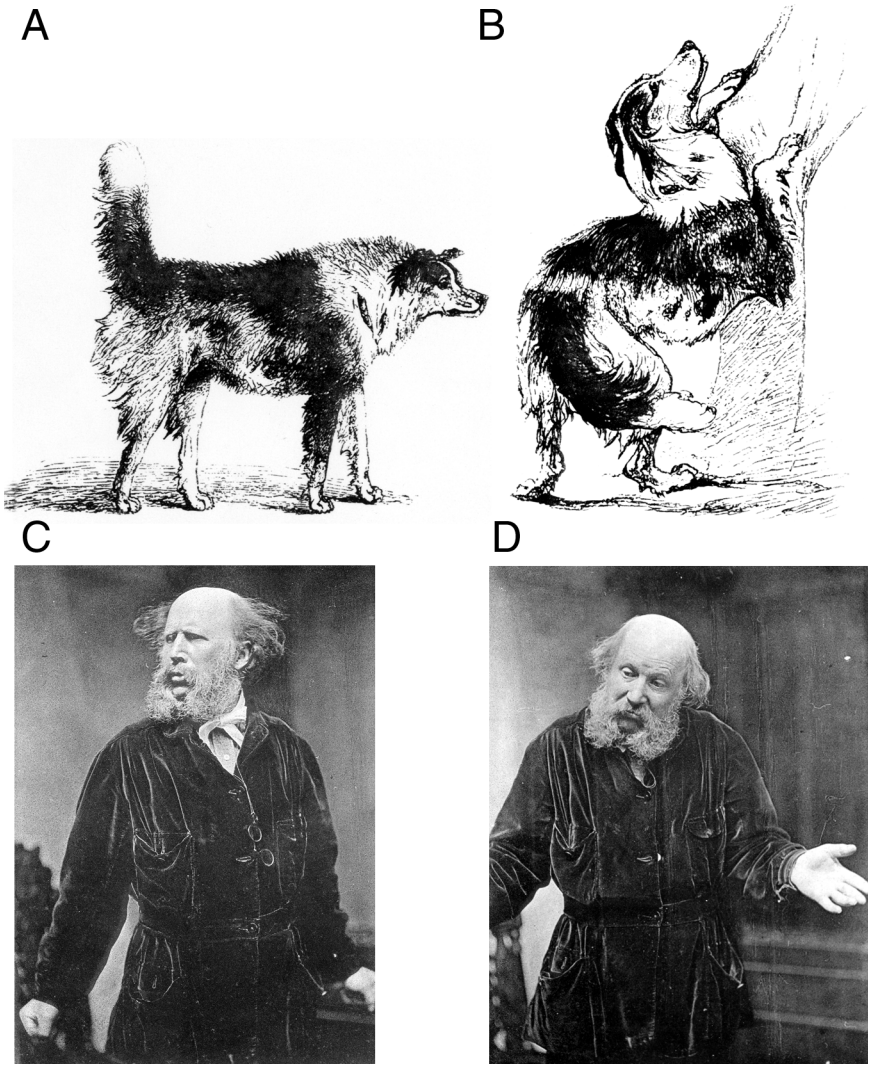

FIGURE 1. Darwin's illustrations of an aggressive **(A)** and a submissive **(B)** dog and an aggressive **(C)** and a helpless man **(D)**.[3]

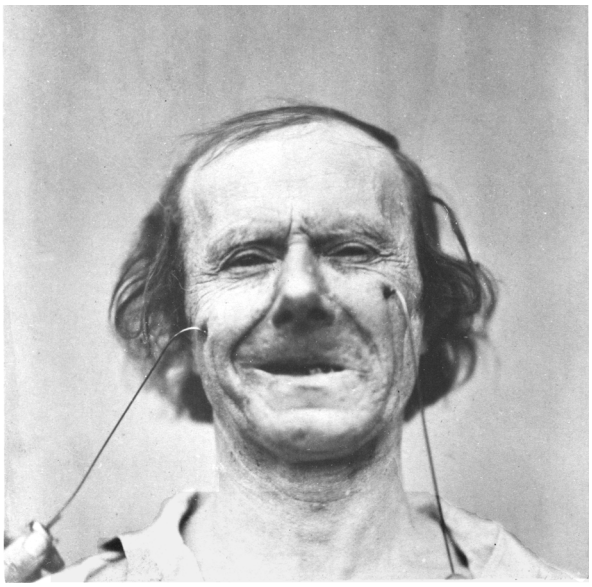

FIGURE 2. Darwin's illustration of a half-smiling, half-crying face used to elicit responses of observers.[3]

> them saying the face expressed fun, satisfaction, cunning, disgust, etc. We may infer from this there is something wrong in the expression. Some of the fifteen persons may, however, have been partly misled by not expecting to see an old man crying, and by tears not being secreted [p. 151].[3]

This method—showing pictures and studying the responses of those who observe them, the emotions they attribute to them—has become the most frequently used method in the psychology of expression.

Darwin was an extraordinarily attentive observer, and he attempted to explain every observation. For example:

> I believe … that the depressor muscles of the angles of the mouth are less under the separate control of the will than the adjoining muscles; so that if a young child is only doubtfully inclined to cry, this muscle is generally the first to contract, and is the last to cease contracting. When older children commence crying, the muscles which run to the upper lip are often the first to contract; and this may perhaps be due to older children not having so strong a tendency to scream loudly; and consequently to keep their mouths widely open; so that the above named depressor muscles are not brought into such strong action [p. 153].[3]

This attention to description and explanation was, Darwin felt, his chief virtue. In his autobiography he wrote:

> I have no great quickness of apprehension or wit … my power to follow a long and purely abstract train of thought is very limited … [but] I am superior to the common run of men in noticing things which easily escape attention, and in observing them carefully [p. 141].[4]

He wrote with clarity and eloquence. Considering whether we need to learn to recognize emotions in others, or whether that ability is inborn, Darwin wrote:

> I attended to this point in my first-born, who could not have learnt anything by associating with other children, and I was convinced that he understood a smile and received pleasure from seeing one, answering it by another, at much too early an age to have learnt anything by experience. When this child was about four months old, I made in his presence many odd noises and strange grimaces, and tried to look savage; but the noise, if not too loud, as well as the grimaces, were all taken as good jokes; and I attributed this at the time to their being preceded by smiles. When five months old, he seemed to understand a compassionate expression and tone of voice. When a few days over six months old, his nurse pretended to cry, and I saw that his face instantly assumed a melancholy expression, with the corners of the mouth strongly depressed; now this child could rarely have seen any other child crying, and never a grown up person crying, and I should doubt whether at so early an age he could have reasoned on the subject [pp. 353–354].[3]

Darwin used an amazingly large array of data sources, unequalled even today. He observed humans in England and gathered observations of human expressions in other cultures from world travelers. He reported his observations of the animals in the London zoo and of domestic animals. He provided information on early development, drawing primarily on observations of his own large family. He inspected photographs supplied to him of the mentally ill. And he utilized what little was known about the nervous system and emotions to make some interesting speculations.

The contents of this volume, and the meeting on which it is based, reflect the breadth of Darwin's concern. Outstanding scientists in each of four areas report on their own work and recent work by others. First are three chapters on emotion and development, from a session organized and chaired by Joseph Campos; then three chapters on emotion in animals, from a session organized by Frans De Waal; then three chapters on expression, from a session organized by myself; and finally, three chapters on the physiology of emotion, from a session organized by Richard J. Davidson. Each of these sections is concluded by the highlights of the discussion that followed its three presentations.

This book captures the resurgence of interest in emotion. In each chapter you will read about work that extends, supports, and sometimes contradicts Darwin—each standing on the contribution made by this great man in his great book published 130 years ago.

ACKNOWLEDGMENTS

I am grateful to Rashid Shaikh, Director of Programs at the New York Academy of Sciences. When I suggested to him that there be a meeting and then a book to celebrate the 130th anniversary of the publication of Charles Darwin's *The Expression of Emotion in Man and Animals*, he was very encouraging. He endorsed my proposal that there should be four sections to represent the major areas of current research—expression, development, animal behavior, and physiology—that relate to Darwin's ideas. Throughout the planning, I received helpful advice from him about the structure of the program, which is represented in this volume.

I am also grateful for the advice and work of the three panel chairmen, whom I invited to organize the sections on development, animal behavior, and physiology—Joe Campos, Frans de Waals, and Richie Davidson, respectively. They each are leaders in their fields, and they invited for their panels outstanding scientists to cover different exciting work in their respective areas. Special thanks to Joe Campos, who managed this work while dealing with major visual problems. Each of the panel chairmen, who are coeditors of this volume, provided essential advice about the organization of the meeting and took responsibility for editing the panel discussions for their sectors.

Of course, Darwin is the man to whom we all owe a debt of gratitude. He began the field and provided lucid insights, the great majority of which have been borne out in what is reported in this book.

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