

We have now, I think, sufficiently shown the truth of our first principle, namely, that when any sensation, desire, dislike, etc., has led during a long series of generations to some voluntary movement, then a tendency to the performance of a similar movement will almost certainly be excited, whenever the same, or any analogous or associated sensation, etc., although very weak, is experienced; notwithstanding that the movement in this case may not be of the least use. Such habitual movements are often, or generally inherited; and they then differ but little from reflex actions. When we treat of the special expressions of man, the latter part of our first principle, as given at the commencement of this chapter, will be seen to hold good; namely, that when movements, associated through habit with certain states of the mind, are partially repressed by the will, the strictly involuntary muscles, as well as those which are least under the separate control of the will, are liable still to act; and their action is often highly expressive. Conversely, when the will is temporarily or permanently weakened, the voluntary muscles fail before the involuntary. It is a fact familiar to pathologists, as Sir C. Bell remarks,¹¹ 'that when debility arises from affection of the brain, the influence is greatest on those muscles which are, in their natural condition, most under the command of the will'. We shall also, in our future chapters, consider another proposition included in our first principle; namely, that the checking of one habitual movement sometimes requires other slight movements; these latter serving as a means of expression.

Darwin's principle of serviceable habits, stripped of its Lamarckian interpretation, is quite consistent with ethological interpretations of how signals evolved from what are called intention movements, and provides the foundation for current concepts of how signals become ritualized or formalized.^{C19}

CHAPTER II

*General Principles of Expression –
continued*

The principle of antithesis – Instances in the dog and cat – Origin of the principle – Conventional signs – The principle of antithesis has not arisen from opposite actions being consciously performed under opposite impulses.

We will now consider our second principle, that of antithesis.* Certain states of the mind lead, as we have seen in the last chapter, to certain habitual movements which were primarily, or may still be, of service; and we shall find that when a directly opposite state of mind is induced, there is a strong and involuntary tendency to the performance of movements of a directly opposite nature, though these have never been of any service. A few striking instances of antithesis will be given, when we treat of the special expressions of man; but as, in these cases, we are particularly liable to confound conventional or artificial gestures and expressions with those which are innate or universal, and which alone deserve to rank as true expressions, I will in the present chapter almost confine myself to the lower animals.

When a dog approaches a strange dog or man in a savage or hostile frame of mind he walks upright and very stiffly; his head is slightly raised, or not much lowered; the tail is held erect and quite rigid; the hairs bristle, especially along the neck and back;

* [For criticisms of the principle of antithesis (which has not met with much acceptance), see Wundt, *Essays*, 1885, p. 230; also his *Physiologische Psychologie*, 3rd edit.; also Sully, *Sensation and Intuition*, 1874, p. 29. Mantegazza (*La Physionomie*, 1885, p. 76) and L. Dumont (*Théorie Scientifique de la Sensibilité*, 2nd edit., 1877, p. 236) are also opposed to the principle.]

the pricked ears are directed forwards, and the eyes have a fixed stare (see Figs 5 and 7). These actions, as will hereafter be explained, follow from the dog's intention to attack his enemy, and are thus to a large extent intelligible. As he prepares to spring with a savage growl on his enemy, the canine teeth are uncovered, and the ears are pressed close backwards on the head; but with these latter actions, we are not here concerned. Let us now suppose that the dog suddenly discovers that the man whom he is approaching is not a stranger, but his master; and let it be observed how completely and instantaneously his whole bearing is reversed. Instead of walking upright, the body sinks downwards or even crouches, and is thrown into flexuous movements; his tail, instead of being held stiff and upright, is lowered and wagged from side to side; his hair instantly becomes smooth; his ears are depressed and drawn backwards, but not closely to the head; and his lips hang loosely. From the drawing back of the ears, the eyelids become elongated, and the eyes no longer appear round and staring. It should be added that the animal is at such times in an excited condition from joy; and nerve-force will be generated in excess, which naturally leads to action of some kind. Not one of the above movements, so clearly expressive of affection, is of the least direct service to the animal. They are explicable, as far as I can see, solely from being in complete opposition or antithesis to the attitude and movements which, from intelligible causes, are assumed when a dog intends to fight, and which consequently are expressive of anger. I request the reader to look at the four accompanying sketches, which have been given in order to recall vividly the appearance of a dog under these two states of mind. It is, however, not a little difficult to represent affection in a dog, whilst caressing his master and wagging his tail, as the essence of the expression lies in the continuous flexuous movements.

The American ethologist Erich Klinghammer commented on Darwin's description of the dog: 'While Darwin's description of the dog's behavior is excellent, it does not always lead to attack, it depends on the

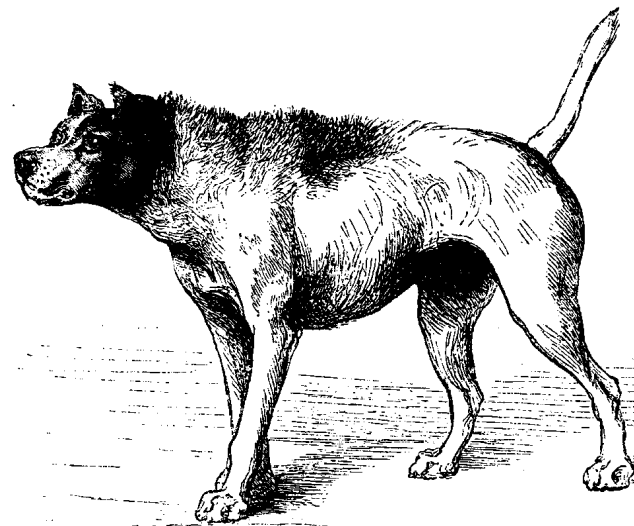


Fig. 5. Dog approaching another dog with hostile intentions.
By Mr Riviere

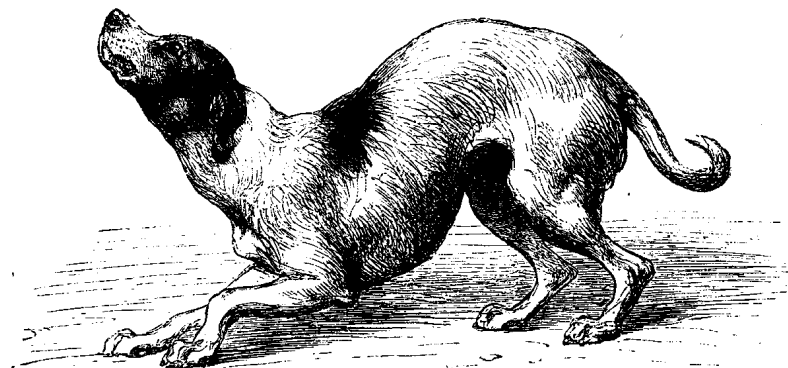


Fig. 6. The same in a humble and affectionate frame of mind.
By Mr Riviere

circumstances, i.e., are the dogs on neutral ground, or on the home ground of one of the dogs? I would call this threat behavior, and it is usually not followed by an attack.'

Klinghammer also noted that Darwin discusses the dog's behavior *vis à vis* another person, rather than another dog. He disagrees with Darwin's statement that submissive or threatening behavior is of no service to the animal: 'Saying that the friendly behavior is merely the antithesis of the threat behaviors is not a sufficient explanation; because this friendly behavior has an immediate effect on the owner or another dog.'

The American ethologist and behavior geneticist Daniel G. Freedman commented on Darwin's discussion of the dog: 'Darwin is aware of submissiveness, but the naturalistic notion of, say, wolves forming an hierarchical pack is missing. Social hierarchies is a major concept in animal observation today, and many of Darwin's examples of antithesis would be now seen in terms of hierarchy.'

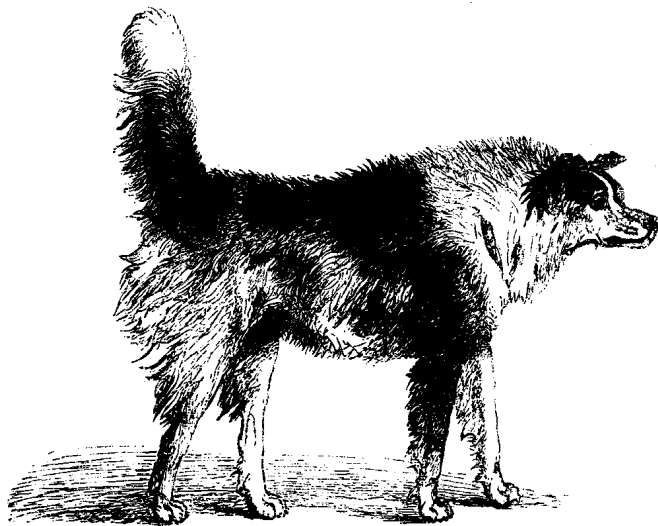


Fig. 7. Half-bred shepherd dog in the same state as in Fig. 5.
By Mr A. May

Fig. 8. The same caressing his master.
By Mr A. May



We will now turn to the cat. When this animal is threatened by a dog, it arches its back in a surprising manner, erects its hair, opens its mouth and spits. But we are not here concerned with this well-known attitude, expressive of terror combined with anger; we are concerned only with that of rage or anger. This is not often seen, but may be observed when two cats are fighting together; and I have seen it well exhibited by a savage cat whilst plagued by a boy. The attitude is almost exactly the same as that of a tiger disturbed and growling over its food, which every one must have beheld in menageries. The animal assumes a crouching position, with the body extended; and the whole tail, or the tip alone, is lashed or curled from side to side. The hair is not in the least erect. Thus far, the attitude and movements are nearly the same as when the animal is prepared to spring on its prey, and when, no doubt, it feels savage. But when preparing to fight, there is this difference, that the ears are closely pressed backwards;

the mouth is partially opened, showing the teeth; the fore-feet are occasionally stuck out with protruded claws; and the animal occasionally utters a fierce growl. (See Figs 9 and 10.) All, or almost all, these actions naturally follow (as hereafter to be explained), from the cat's manner and intention of attacking its enemy.

Let us now look at a cat in a directly opposite frame of mind, whilst feeling affectionate and caressing her master; and mark how opposite is her attitude in almost every respect. She now stands upright with her back slightly arched, which makes the hair appear rather rough, but it does not bristle; her tail, instead of being extended and lashed from side to side, is held quite stiff and perpendicularly upwards; her ears are erect and pointed; her mouth is closed; and she rubs against her master with a purr instead of a growl. Let it further be observed how widely different is the whole bearing of an affectionate cat from that of a dog, when with his body crouching and flexuous, his tail lowered and wagging, and ears depressed, he caresses his master. This contrast in the attitudes and movements of these two carnivorous animals, under the same pleased and affectionate frame of mind, can be explained, as it appears to me, solely by their movements standing in complete antithesis to those which are naturally assumed when these animals feel savage and are prepared either to fight or to seize their prey.

Freedman commented, 'Another concept not available to Darwin was territoriality, e.g., as exemplified by dog's spreading urine markings and male cat spraying. Dogs are used around the world to warn of strangers who are transgressing their territory. Cats are loners in their territory and challenge only other cats, whereas dogs pack-up easily and as we know bark at human strangers as well.'

In these cases of the dog and cat, there is every reason to believe that the gestures both of hostility and affection are innate or inherited; for they are almost identically the same in the

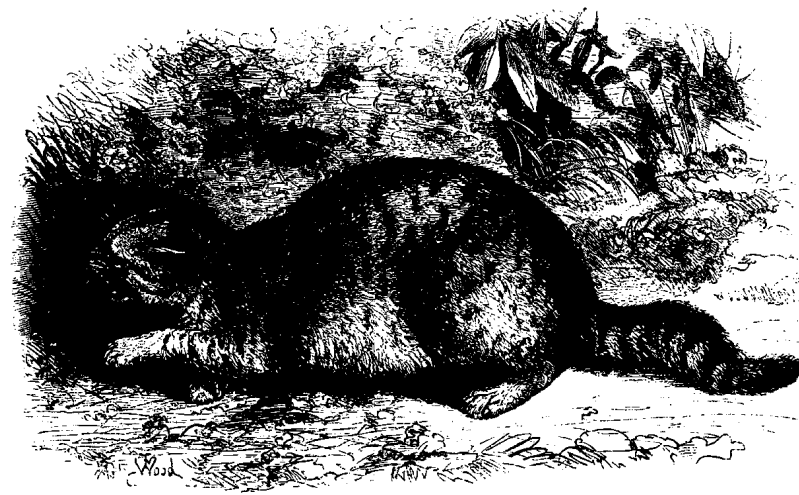


Fig. 9 Cat, savage, and prepared to fight. Drawn from life by Mr Wood



Fig. 10 Cat in an affectionate frame of mind. By Mr Wood

different races of the species, and in all the individuals of the same race, both young and old.

I will here give one other instance of antithesis in expression. I formerly possessed a large dog, who, like every other dog, was much pleased to go out walking. He showed his pleasure by trotting gravely before me with high steps, head much raised, moderately erected ears, and tail carried aloft but not stiffly. Not far from my house a path branches off to the right, leading to the hot-house, which I used often to visit for a few moments, to look at my experimental plants. This was always a great disappointment to the dog, as he did not know whether I should continue my walk; and the instantaneous and complete change of expression which came over him, as soon as my body swerved in the least towards the path (and I sometimes tried this as an experiment) was laughable. His look of dejection was known to every member of the family, and was called his *hot-house face*. This consisted in the head drooping much, the whole body sinking a little and remaining motionless; the ears and tail falling suddenly down, but the tail was by no means wagged. With the falling of the ears and his great chaps, the eyes became much changed in appearance, and I fancied that they looked less bright. His aspect was that of piteous, hopeless dejection; and it was, as I have said, laughable, as the cause was so slight. Every detail in his attitude was in complete opposition to his former joyful yet dignified bearing; and can be explained, as it appears to me, in no other way, except through the principle of antithesis. Had not the change been so instantaneous, I should have attributed it to his lowered spirits affecting, as in the case of man, the nervous system and circulation, and consequently the tone of his whole muscular frame; and this may have been in part the cause.

I am less convinced that this is an instance of antithesis. Instead, it seems better explained as dejection or what Darwin called 'lowered spirits'. He apparently did not accept this as the full explanation because it happened so quickly and the occasion, from his point of view, was so slight.

We will now consider how the principle of antithesis in expression has arisen. With social animals, the power of intercommunication between the members of the same community - and with other species, between the opposite sexes, as well as between the young and the old - is of the highest importance to them. This is generally effected by means of the voice, but it is certain that gestures and expressions are to a certain extent mutually intelligible. Man not only uses inarticulate cries, gestures, and expressions, but has invented articulate language; if, indeed, the word *invented* can be applied to a process, completed by innumerable steps, half-consciously made. Any one who has watched monkeys will not doubt that they perfectly understand each other's gestures and expression, and to a large extent, as Rengger asserts,¹ those of man. An animal when going to attack another, or when afraid of another, often makes itself appear terrible, by erecting its hair, thus increasing the apparent bulk of its body, by showing its teeth, or brandishing its horns, or by uttering fierce sounds.

As the power of intercommunication is certainly of high service to many animals, there is no *a priori* improbability in the supposition that gestures manifestly of an opposite nature to those by which certain feelings are already expressed, should at first have been voluntarily employed under the influence of an opposite state of feeling. The fact of the gestures being now innate, would be no valid objection to the belief that they were at first intentional; for if practised during many generations, they would probably at last be inherited. Nevertheless it is more than doubtful, as we shall immediately see, whether any of the cases which come under our present head of antithesis, have thus originated.

Darwin here grants the importance of intercommunication. If he had followed that line of reasoning, it would have been logical to suppose that opposite movements would be selected for their signal value. He would then have explained the smile, for example, as being selected for communication over the course of evolution, because it is a movement different from all the negative facial

expressions of emotion – anger, fear, disgust or sadness. As the antithetical emotion, one would expect the smile to stand out in marked contrast to the other expressions and indeed that is what we have found. It is the only positive facial expression, contrasting with five negative expressions (fear, anger, disgust, sadness and contempt). One can recognize that someone is smiling from a further distance (100 metres) than any of the negative facial expressions.^{C20} And when expressions are presented for only a fraction of a second, the smile is recognized more accurately than the negative emotional expressions.

The British philosopher Helena Cronin has raised the possibility that the ease of recognizing the smile may not be due to its being the antithetical expression, but because our brains might be primed to recognize smiles. If that is so, the scientists working on how single cells in the brain respond to faces should find there are smile-specific cells. To my knowledge no one has yet studied this possibility.

With conventional signs which are not innate, such as those used by the deaf and dumb and by savages, the principle of opposition or antithesis has been partially brought into play. The Cistercian monks thought it sinful to speak, and as they could not avoid holding some communication, they invented a gesture language, in which the principle of opposition seems to have been employed.² Dr Scott, of the Exeter Deaf and Dumb Institution, writes to me that 'opposites are greatly used in teaching the deaf and dumb, who have a lively sense of them'. Nevertheless I have been surprised how few unequivocal instances can be adduced. This depends partly on all the signs having commonly had some natural origin; and partly on the practice of the deaf and dumb and of savages to contract their signs as much as possible for the sake of rapidity.* Hence their natural source or origin often

* See on this subject Dr W. R. Scott's interesting work, *The Deaf and Dumb*, 2nd edit., 1870, p. 12. He says, 'This contracting of natural gestures into much shorter gestures than the natural expression requires, is very common among the

becomes doubtful or is completely lost; as is likewise the case with articulate language.

Many signs, moreover, which plainly stand in opposition to each other, appear to have had on both sides a significant origin. This seems to hold good with the signs used by the deaf and dumb for light and darkness, for strength and weakness, etc. In a future chapter I shall endeavour to show that the opposite gestures of affirmation and negation, namely, vertically nodding or laterally shaking the head, have both probably had a natural beginning. The waving of the hand from right to left, which is used as a negative by some savages, may have been invented in imitation of shaking the head; but whether the opposite movement of waving the hand in a straight line from the face, which is used in affirmation, has arisen through antithesis or in some quite distinct manner, is doubtful.

If we now turn to the gestures which are innate or common to all the individuals of the same species, and which come under the present head of antithesis, it is extremely doubtful whether any of them were at first deliberately invented and consciously performed. With mankind the best instance of a gesture standing in direct opposition to other movements, naturally assumed under an opposite frame of mind, is that of shrugging the shoulders. This expresses impotence or an apology – something which cannot be done, or cannot be avoided. The gesture is sometimes used consciously and voluntarily, but it is extremely improbable that it was at first deliberately invented, and afterwards fixed by habit; for not only do young children sometimes shrug their shoulders under the above states of mind, but the movement is accompanied, as will be shown in a future chapter, by various subordinate movements, which not one man in a thousand is aware of, unless he has specially attended to the subject.

Dogs, when approaching a strange dog, may find it useful to show by their movements that they are friendly, and do not wish

deaf and dumb. This contracted gesture is frequently so shortened as nearly to lose all semblance of the natural one, but to the deaf and dumb who use it, it still has the force of the original expression.'

to fight. When two young dogs in play are growling and biting each other's faces and legs, it is obvious that they mutually understand each other's gestures and manners. There seems, indeed, some degree of instinctive knowledge in puppies and kittens, that they must not use their sharp little teeth or claws too freely in their play, though this sometimes happens and a squeal is the result; otherwise they would often injure each other's eyes. When my terrier bites my hand in play, often snarling at the same time, if he bites too hard and I say *gently, gently*, he goes on biting, but answers me by a few wags of the tail, which seems to say 'Never mind, it is all fun'. Although dogs do thus express, and may wish to express, to other dogs and to man, that they are in a friendly state of mind, it is incredible that they could ever have deliberately thought of drawing back and depressing their ears, instead of holding them erect - of lowering and wagging their tails, instead of keeping them stiff and upright, etc., because they knew that these movements stood in direct opposition to those assumed under an opposite and savage frame of mind.

Again, when a cat, or rather when some early progenitor of the species, from feeling affectionate first arched its back, held its tail perpendicularly upwards and pricked its ears, can it be believed that the animal consciously wished thus to show that its frame of mind was directly the reverse of that, when from being ready to fight or spring on its prey, it assumed a crouching attitude, curled its tail from side to side and depressed its ears? Even still less can I believe that my dog voluntarily put on his dejected attitude and *hot-house face*, which formed so complete a contrast to his previous cheerful attitude and whole bearing. It cannot be supposed that he knew that I should understand his expression, and that he could thus soften my heart and make me give up visiting the hot-house.

Hence for the development of the movements which come under the present head, some other principle, distinct from the will and consciousness, must have intervened. This principle appears to be that every movement which we have voluntarily performed throughout our lives has required the action of certain muscles; and when we have performed a directly opposite move-

ment, an opposite set of muscles has been habitually brought into play - as in turning to the right or to the left, in pushing away or pulling an object towards us, and in lifting or lowering a weight. So strongly are our intentions and movements associated together, that if we eagerly wish an object to move in any direction, we can hardly avoid moving our bodies in the same direction, although we may be perfectly aware that this can have no influence. A good illustration of this fact has already been given in the Introduction, namely, in the grotesque movements of a young and eager billiard-player, whilst watching the course of his ball. A man or child in a passion, if he tells anyone in a loud voice to begone, generally moves his arm as if to push him away, although the offender may not be standing near, and although there may not be the least need to explain by a gesture what is meant. On the other hand, if we eagerly desire some one to approach us closely, we act as if pulling him towards us; and so in innumerable other instances.

As the performance of ordinary movements of an opposite kind, under opposite impulses of the will, has become habitual in us and in the lower animals, so when actions of one kind have become firmly associated with any sensation or emotion, it appears natural that actions of a directly opposite kind, though of no use, should be unconsciously performed through habit and association, under the influence of a directly opposite sensation or emotion. On this principle alone I can understand how the gestures and expressions which come under the present head of antithesis have originated. If indeed they are serviceable to man or to any other animal, in aid of articulate cries or language, they will likewise be voluntarily employed, and the habit will thus be strengthened. But whether or not of service as a means of communication, the tendency to perform opposite movements under opposite sensations or emotions would, if we may judge by analogy, become hereditary through long practice; and there cannot be a doubt that several expressive movements due to the principle of antithesis are inherited.

Klinghammer commented, 'Lorenz and Tinbergen later pointed out that intention movements provide the raw material from which signals are sharpened through natural selection. It is not surprising that Darwin anticipated this. The thought that the first intentions would be practiced for many generations, and at last would be inherited is a Lamarckian interpretation that is not his usual way of looking at the evolution of behavior and morphological characteristics.'

CHAPTER III

*General Principles of Expression –
concluded*

The principle of the direct action of the excited nervous system on the body, independently of the will and in part of habit – Change of colour in the hair – Trembling of the muscles – Modified secretions – Perspiration – Expression of extreme pain – Of rage, great joy, and terror – Contrast between the emotions which cause and do not cause expressive movements – Exciting and depressing states of the mind – Summary.

We now come to our third principle, namely, that certain actions, which we recognize as expressive of certain states of mind, are the direct result of the constitution of the nervous system, and have been from the first independent of the will, and, to a large extent, of habit. When the sensorium is strongly excited nerve-force is generated in excess, and is transmitted in certain directions, dependent on the connection of the nerve-cells, and, as far as the muscular system is concerned, on the nature of the movements which have been habitually practised. Or the supply of nerve-force may, as it appears, be interrupted. Of course every movement which we make is determined by the constitution of the nervous system; but actions performed in obedience to the will, or through habit, or through the principle of antithesis, are here as far as possible excluded. Our present subject is very obscure, but, from its importance, must be discussed at some length; and it is always advisable to perceive clearly our ignorance.

The most striking case, though a rare and abnormal one, which can be adduced to the direct influence of the nervous system, when strongly affected, on the body, is the loss of colour in the