

## 1: Emotion since Darwin

'When I use a word,' Humpty Dumpty said in a rather scornful tone, 'It means just what I choose it to mean – neither more nor less.'

'The question is,' said Alice, 'whether you *can* make words mean so many different things.'

'The question is,' said Humpty Dumpty, 'which is to be Master – that's all.'

Lewis Carroll: *Through the Looking Glass*

### 1.1. What is an emotion?

Emotion is a striking feature of human experience. In any one day we may experience fear, love, pity, rage and many more. Emotion colours our everyday thoughts and actions and generates most of the behaviour which makes our friends and neighbours interesting. Much of Art and Literature is devoted to exploring its subtleties and, at a more practical level, emotions sway events in politics and commerce to a frightening extent. Psychology, the science of the mind, might therefore be expected to give pride of place to emotion as a topic of concern.

Unfortunately, there has never been any clear agreement as to what the word means. Amongst philosophers, 'emotion has almost always played an inferior role ... often as an antagonist to logic and reason ... Along with this general demeaning of emotion in philosophy comes either a wholesale neglect or at least retail distortion in the analysis of emotions' (Solomon, 1977, cited by Lyons, 1980, p ix). Psychologists have followed this lead. Those who are sure that they know the meaning of the word emotion have often proceeded to experiment without ensuring that what they wish to study is objectively identifiable. Those who are unsure as to its meaning have often attempted to solve the problem by purely linguistic analysis without recourse to experimental data at all. More frequently work on emotion has been avoided altogether since it is viewed as disreputable and unscientific. Some texts on learning (Kimble, 1961; Mackintosh, 1974), cognition (Neisser, 1967; Wickelgren, 1979) and even general psychology (Isaacson, Hutt, & Blum, 1965) have no mention of 'emotion' in either chapter headings or index.

So, should we follow the psychologists and throw away any idea of emotion? Are there no objectively identifiable phenomena to which

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the word can refer? Or, are the psychologists glossing over some important aspect of the control of behaviour? Certainly, the texts I have cited not only do not use the term 'emotion', they also mention only in passing many phenomena which could relate to emotion. This suggests that they may be avoiding the issue. On the other hand the colloquial use of a single word to refer to some item is no guarantee that the item is simple in structure, function or any other attribute.

The lack of an acceptable theory of emotion does not stem from a paucity of candidates (a smorgasbord of these is served in Strongman, 1978). Many books have been written presenting this or that theory of emotion. However, most have a selective view of observational and experimental evidence, often omitting whole areas of research which another theorist would deem pertinent. Both this disparity of viewpoint between theorists and the logical confusion which can be found within some theories are traceable to variations in the meaning of the word emotion. The response of philosophers to this situation is reminiscent of someone walking on tiptoe through a mine field. For example, one 'causal-evaluative theory of emotions' proceeds from the following propositions:

1. That this account is of occurrent emotional states rather than of emotions considered dispositionally;
2. That the concept of emotion as occurrent state involves reference to an evaluation which causes abnormal physiological changes in the subject of the evaluation;
3. That it is by means of the evaluative aspect that we differentiate the emotions;
4. That the concept of particular emotional states may include desires as well as evaluations and physiological changes;
5. That the central evaluative aspect gives rise to emotional behaviour via a rational, and causal, link with desires;
6. That making evaluation to be central to emotion does not mean that emotions are intangible and non-objective.

(Lyons, 1980, p.53)

To the person who wants to know why we cry or why we smile, a preamble such as this does not hold out much hope for a simple, comprehensible answer. (Note, for example, that frequently occurring, and hence presumably 'normal' emotions are defined in terms of 'abnormal' physiological change!) However, the philosopher's somewhat tentative approach appears less unreasonable if we remember the tricks language can play on the unwary scientist.

First, our definition of a word may be ambiguous. It is clearly going to cause problems if, without warning, the same word can refer to two

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entirely separate entities, e.g. ‘vest’ – in America, this is worn over the shirt, and in Britain, under it.

Secondly, even a clear unambiguous word may refer to a non-existent entity, e.g. ‘Unicorn’.

Thirdly, a clear objective (even ostensive) distinction may have no counterpart in physical scientific analysis. Consider our ideas of colour: we talk as if there are many identifiable, perceivably different, colours and we can usually agree as to the colour of any particular object. But, from the point of view of a physicist, colour derives from an electromagnetic continuum in which there are no discrete boundaries and of which large portions cannot be seen with the naked eye. Equally, from the point of view of a psychologist, or the designer of a colour television set, our perception of the full range of colours requires the reception of only three different wavelengths of light and many colours may need only two (Land, 1959).

Fourthly, a clear, well-understood scientific concept may cut across discrete categories accepted by language. An electron can be thought of as a particle, a wave, both or neither. From the point of view of the English language, waves must travel in a medium while particles cannot have a wavelength. Neither of these restrictions bothers the physicists – who are quite happy to calculate the wavelength of an elephant.

Fifthly, it may take considerable effort to determine what is normally meant by a word such as emotion and there may be considerable variation in the answer to this question among different people (Davitz, 1969).

These linguistic problems suggest that we could gain by avoiding undue dependence on the specific content of our language. We would not, then, have to discover by experimental or philosophical analysis the exact meaning or meanings of ‘emotion’ as it is used in everyday speech. None the less, it is useful, by way of a starting point, to look briefly at the question ‘What is an emotion?’. This question has bedevilled psychologists since William James asked it in 1884. It appears to invite us to lift ourselves up by our own bootstraps. If we cannot agree on the meaning of the word, how can we use it objectively? But, if we do not use it, how can we refer to the phenomena which we wish to study? Taken in this narrow way ‘What is an emotion?’ is a pseudo-question or at least a diversion. It invites us to answer a scientific question before we have collected the data on which the answer should properly be based; or it invites us to confuse a semantic or metaphysical question with a scientific one. As Mandler (1975) points out ‘it seems useful not to fall into the trap of trying to explain what “emotion” is; ...

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instead [we should describe] a system that has as its product some of the observations that have been called “emotion” ... But the eventual aim is psychological theory not an analysis of human experience expressed in phenomenal, existential or ordinary language.’

One way to proceed, therefore, is as follows. We allow any and every meaning of the word emotion (without worrying about the exact nature of the meanings) to outline an approximate area of observation and experiment. We then attempt to account for as much of the data as possible with some small number of assumptions. Some part of the resultant theory may then be found to map back to our original conception of emotion, providing a scientific definition of the term. On the other hand, it may not, in which case our answer to the question ‘What is an emotion?’ is that scientifically speaking there is no such thing (Duffy, 1941; 1962). I would probably not have written this book if I believed this last to be likely. However, the book does not pretend to resolve the issue; it does not purvey a new wonder theory of emotion; rather, it attempts to provide a solid base for the further scientific analysis of emotional phenomena.

The list of emotions shows that phenomena related to them will be very numerous. It includes: love, pity, hate, rage, frustration, fear, grief, despair, joy and many others. In addition, the colloquial use of these concepts implies a number of different aspects, including at least:

1. communication – ‘he gave me a scared look’;
2. feeling – you ‘feel’ afraid, tremble with fear, go cold with fear;
3. physiological response – ‘I broke into a cold sweat’, ‘my heart was pounding’;
4. motivation – fear of the lion will be accompanied by a strong tendency to remove yourself from its vicinity;
5. cognition – we usually know what we are afraid of.

This conceptual richness creates a problem. If we use colloquial terms solely to delineate the area of study, and if we exclude them from our initial analysis of the data, how are we to organise the data so that we are not overwhelmed with detail? Existing theories of emotion, just as much as everyday language, are laden with assumptions and different meanings of the critical terms. To use them runs the risk of undervaluing data which, while peripheral to the theories, can provide a bridging link between the areas of data from which the different theories are derived. What is required is some pretheoretical means of organising the data so that analysis can be restricted to coherent subsets of the available facts.

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### **1.2. A biological approach to emotion?**

Some concept such as emotion is explicit or implicit in a wide variety of areas of psychological research. While 'emotion' may be taken to imply a complex internal or mental state, it has proved more parsimonious to treat emotions within psychology as potential intervening variables or theoretical constructs (Brown & Farber, 1951; Goldstein, 1968). We can take a more complicated position when the data force us to it. Brown & Farber make the point that 'emotion may be retained as a separate construct if, and only if, it is empirically useful to posit a state or process that is related to antecedent events, to other constructs, or to behaviour by a different set of functions from those that characterise other constructs within a theory'. A major question in what follows will be how far such intervening variables (states/processes) in one area of research, whether labelled as emotions or not, can be identified with similar intervening variables in other areas.

This question is particularly appropriate at the present time. Many of the areas which touch on emotion are moving together: learning theorists are employing theoretical constructs which border on the cognitive (Dickinson, 1980); physiological psychologists are attempting to relate their work to both learning theory (Gray, 1982) and cognitive psychology (O'Keefe & Nadel, 1978); and the boundaries between ethology, neurophysiology, and the experimental analysis of behaviour are becoming blurred (Masterson & Crawford, 1982; Konishi, 1971; Shettleworth & Juergensen, 1980; McFarland, 1971). Similarly, recent anthologies of work on emotion have covered a wide range of research areas (Rorty, 1980; Arnold, 1970; Izard, 1979) as have recent textbooks (e.g. Buck, 1976). It is clear that areas such as ethology, physiological psychology, psychophysiology, neuropsychology, learning theory, social psychology and cognitive psychology can all shed light on the nature of emotion. I hope this book will also convince you that the study of emotion requires an integration of these areas which, in turn, sheds light on them.

A brief glance at these areas of research suggests a way out of the impasse generated by the slippery nature of the word emotion. Analysis of the expression of the emotions, physiological changes during emotion, the development of emotional behaviour and the incursion of terms related to emotion into theories of learning all imply that emotions, in humans and other animals, are dependent to a considerable extent on aspects of mind/behaviour which are both functionally fundamental and phylogenetically old. A biological approach is likely, therefore, to provide a good starting point for the analysis of emotions.

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There are two immediate consequences of such an approach. First, it necessitates a concentration on reliable observation and experimental data which can bypass much of the linguistic confusion which arises when dealing with emotion. Second, it provides a means of compartmentalising the data, and hence dealing with it piecemeal. Functionally discrete systems can be separately analysed, and the different potential components of emotional responses (physiological, expressive, etc.) can be compared to equivalent non-emotional responses.

Note that I am suggesting only that biology (viewed here as the incursion of evolutionary, physiological, and similar considerations into psychology) provides a good starting point. While this book is largely biological in its approach to emotional concepts, the study of emotion properly extends to other disciplines (for example, clinical, cognitive and social psychology). It is my contention that the framework developed in this book provides a sound foundation on which such disciplines can build. It is also my view that the more complex human emotions will only be properly analysed when we have a good understanding of more basic emotions – it is even possible that much of what is viewed as complex and uniquely human may be explicable solely in terms of such simpler emotions.

Not only may ‘complex’ emotions be constructed from the same, or similar, elements as ‘simple’ ones, but any individual emotion can be investigated at a number of levels. Suppose we have been asked a question such as ‘Why do we cry?’. The answer to this will depend on the context of the question. We could be concerned with social/historical reasons for crying; individual/developmental reasons; psychological processes; physiological mechanisms; or evolution. In my view these different types of analysis can be viewed as hierarchically ordered – and that answers to the more biological types of ‘why’ for any particular emotion will often help in answering the other types. (As an example, a possible evolutionary/functional answer to ‘why do we cry?’ is given in Section 11.2.)

It could be argued that, in concentrating on biology, we are throwing the baby out with the bath water; that we are in the position of the physicist whose explanation of the occurrence of a rainbow does not touch on the fact that it is beautiful. There are certainly those who would say that a rat cannot possibly have feelings like those of a human being and that to study the former will not enlighten us about the latter. This is a semantic red herring. The rat is not identical to the human. It may in some respects be totally unlike the human. But where there are similarities these may explain human behaviour to us,

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without forcing us to the conclusion that rats are small furry people. The detection of such similarities and the discovery of the extent to which they are meaningful can result only from our investigating the possibility as opposed to ignoring it. Where changes in the emotional behaviour of a rat (Wynne & Solomon, 1955) are paralleled by changes in self-report of emotions in people (Hohman, 1966) it can suggest a similar organisation of behavioural control (Chapter 11). Equally, where there are differences between species, appropriate (e.g. ecological) analysis of the differences can illuminate the reasons for the idiosyncratic behaviour of each.

It could also be argued that the study of animals cannot provide us with the kind of data which are provided by introspection – and introspection provides our best *a priori* reasons for treating emotion as an important topic. However, self-report, and presumably therefore introspection, often fails to reveal the true underlying causes of human behaviour (Schachter, 1980). The rat may therefore give us a clearer picture of humanity than does humankind especially if we are not distracted by the question of asking whether animals have emotions 'exactly like' those of humans.

#### 1.3. Darwin and 'the expression of the emotions in animals and man'

Darwin in his studies of emotion preferred to observe animals rather than humans for this very reason – that they are 'less likely to deceive us'. He is often touted as the father of modern biology. Certainly, modern biology has a strong evolutionary flavour. However, in advocating a comparative approach, Darwin has an even better claim to being the father of the modern psychology of emotion. His book *The Expression of the Emotions in Man and Animals* (reprinted in facsimile, 1965) not only presents a good case for the genetic basis of emotional behaviour but also presents a variety of observations and opinions which can be seen as forerunners of contemporary research on emotion.

The bulk of his work analyses facial and bodily expressions. The important point for him was in each case to determine whether an expression was largely innate or largely the result of experience. Darwin suggested that 'whenever the same movements of the features or body express the same emotions in several distinct races of man, we may infer with much probability, that such expressions are innate'. He therefore posted a questionnaire to various parts of the world soliciting descriptions of expressions and the contexts in which they were pro-



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duced to provide the data for such an analysis. He was of course mindful of the unifying effects of culture and, for example, specifically excluded a comparison of American negroes with Europeans on the grounds that their expressions might be similar for cultural rather than genetic reasons. Similarly, he studied the expressions of young children on the grounds that they would have had little time to learn complex expressions.

In this way he provided an essentially positive answer to the question of whether at least some expressions are common to particular emotion-provoking situations throughout the world. A corollary of this was his finding that the emotions portrayed in photographs of emotional expressions could often be accurately identified. Both for humans and animals, Darwin believed that this communicative aspect of emotional expressions was a major force shaping their evolution.

It should be noted that the expression of the emotions extended, for Darwin, well beyond facial expression, simple bodily attitude, or 'instinctive tendency to performance of an action' (op. cit., p. 30). For example, he pointed out that in 'almost all animals ... terror causes the body to tremble. The skin becomes pale, sweat breaks out, and the hair bristles. ... [Urine and faeces] are involuntarily voided ... the breathing is hurried, the heart beats quickly, wildly and violently' (op. cit., p.77). Thus, for Darwin, emotion generally resulted in quite widespread skeletal and systemic changes.

A strong genetic control of complex components of emotion of the type discerned by Darwin implies an extensive evolutionary history. This brings us to an apparent paradox in the analysis of emotion: the contrast which is often drawn between emotional and rational behaviour. If emotion is irrational, in the sense of counterproductive, why has it not been eliminated by selection pressure? The answer to this lies in the functional value which can be discerned in virtually all emotional reactions under at least some conditions.

**1.4. Cannon and the 'utility of the bodily changes in pain and great emotions'**

Cannon is most frequently cited in the literature on emotion for his attack on James's theory of emotion (Section 1.5). However, an equally important contribution to an understanding of emotions is his analysis of the function of the physiological changes which accompany many emotional states. Peripheral autonomic and hormonal responses in emotion are often discussed largely in terms of their psychological consequences. Such discussion can result in the impression that



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peripheral reactions are present simply to confuse the psychologist, or to provide employment for psychophysicists. However, as Cannon (1936) pointed out, such peripheral reactions are of great importance in readying particular organ systems for particular types of action and in returning such systems to a basal state when such readiness is no longer required.

Cannon itemises the ‘increased blood sugar as a source of muscular energy ... increased (adrenaline) in the blood as an antidote to the effects of fatigue ... the vascular changes produced by the sympathico-adrenal system favourable to supreme muscular exertion ... the value of increased number of red blood corpuscles ... the changes in respiratory function (as) favourable to great effort ... the utility of rapid coagulation in preventing loss of blood’ (op. cit., p. xiv).

Cannon’s discussion of these issues centres on the physiological advantages of the bodily changes observed. The changes he considers can all be viewed as placing the animal into a state of readiness for events which are likely to accompany or follow particular emotional states.

For example, in many cases a situation which results in an animal becoming fearful is very likely to be one in which the alternatives are to run away or to get damaged, e.g. bitten. The release of adrenaline, according to Cannon would not only ready muscles for flight but also speed coagulation of blood released by a bite, hence reducing blood loss.

It could be argued that most if not all of the physiological changes which accompany emotion have such physiological utility. Certainly, some of the changes (in e.g. red blood corpuscles) discussed by Cannon are not ones of which psychologists normally take great account. What appears to a psychologist, then, as a particularly mysterious aspect of emotion may be so because it fulfils a largely physiological rather than psychological function. However, some psychologists have viewed physiological changes as more than epiphenomena of emotion.

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Darwin (cited in Mandler, 1984, p. 47) viewed internal physiological changes as necessary, integral parts of an emotional state – without such changes you would not have true emotion.

However, his approach seems to have been that some external stimulus, or a specific interpretation of an external stimulus, gives rise to a state of the central nervous system (the emotion) which then can have linked to it (by selection pressure) directed, communicative and

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internal responses. The emotion, on this view, precedes the responses both in evolutionary and functional terms. The opposite suggestion was made by James (1884) and phrased in a provocative way implying that bodily change necessarily precedes the occurrence of emotion proper (see Chapters 5 and 6).

There are two points worth noting about James's original statement of his position which can be lost sight of when considering the attacks on it. First, James was not talking about all emotions but only 'those which have a distinct bodily expression'. If we start from a Darwinian analysis of the evolution of complex behavioural patterns, we have every reason to suppose that some emotions could occur with little bodily change – since such change would not serve any function in the situations for which the emotion had evolved. Secondly, even for those emotions which have distinct bodily expression, James says 'without the bodily states following on the perception ... we might see the bear, and judge it best to run, ... but we could not actually *feel* afraid.' Normally, if we say that someone *is* afraid of the bear we imply both that they *feel* afraid and also that they will *act* afraid. James's theory purports to be about the feeling components of emotion in specific contrast to directed skeletal responses, and possibly also communicative expressions.

Viewed like this James could merely be making the trivial proposal that bodily changes result in feelings. His subsequent statement that these feelings *are* the emotion would then be a tautology based on a particular (fairly unusual) linguistic definition of emotion. The tone of James's writing implies a stronger position than this – and subsequent attacks on James have usually been addressed to the position that aspects of emotion such as expression are dependent on feelings. It is this view which Cannon (1927) specifically rejects since 'total separation of the viscera from the central nervous system does not alter emotional behaviour .. organic changes could not occur soon enough to be the occasion for the appearance of affective states' and a number of other similar reasons (Cannon, 1927; Chapter 5).

It can be seen that, to some extent, it is a matter of purely verbal definition whether, like James, we wish to say that feeling is essential to emotion. If we do so, we will then need some other word for states which are otherwise similar to emotion, so defined, but which are not accompanied by feelings. However, it is clear that however one chooses to define emotion, Cannon's arguments place severe constraints on the relationships which are postulated between feelings and emotions. These constraints could even be sufficient to persuade us to modify our definition of the word if the chosen definition forced us into