9

Emotion

- EMOTIONS or AFFECTS are not purely cognitive but also have visceral components.
- Emotions as represented in facial expressions seem to be universal, being found in similar forms in all cultures.
- William James' theory, that emotions are caused by bodily states rather than bodily states being caused by emotions, is supported by the action of beta-blockers and by the diminished emotions of patients with a spinal transection.
- Schacter's TWO-FACTOR THEORY OF EMOTION has extended James' theory of emotion and said that visceral arousal is interpreted by the cognitive system as an appropriate emotion according to the context.
- The frontal and temporal lobes, and Papez's circuit in the limbic system, are probably important for emotion.
- The right hemisphere seems to be more important than the left in producing emotional responses.

A recent dictionary of psychology says:

> '*Emotion*: historically this term has proved utterly refractory to definitional efforts; probably no other term in psychology shares its indefinability with its frequency of use. Most textbook writers wisely employ it as the title of a chapter and let the material presented substitute for a concise definition.'

This book will be no different. This chapter will therefore consider a number of aspects of emotion, and Chapters 11 and 13 will also discuss emotional development in the context of Freud's theories, and in relation to Personal Construct Theory.

We all experience EMOTIONS (or AFFECTS or MOODS), such as anger, love, jealousy, hatred, joy, ecstasy, misery, and disgust, and we recognize them in others. They do not seem purely intellectual but have strong visceral components, arising not only in our minds but in our heart, bowels, limbs, etc. Sometimes they seem dissociated from cognition ('I knew in my mind it didn't matter, but still I felt angry'), suggesting a separate process from pure thought.

Classification is difficult and although 'primary emotions' have been differentiated from mixtures of those primaries, there is little consensus.

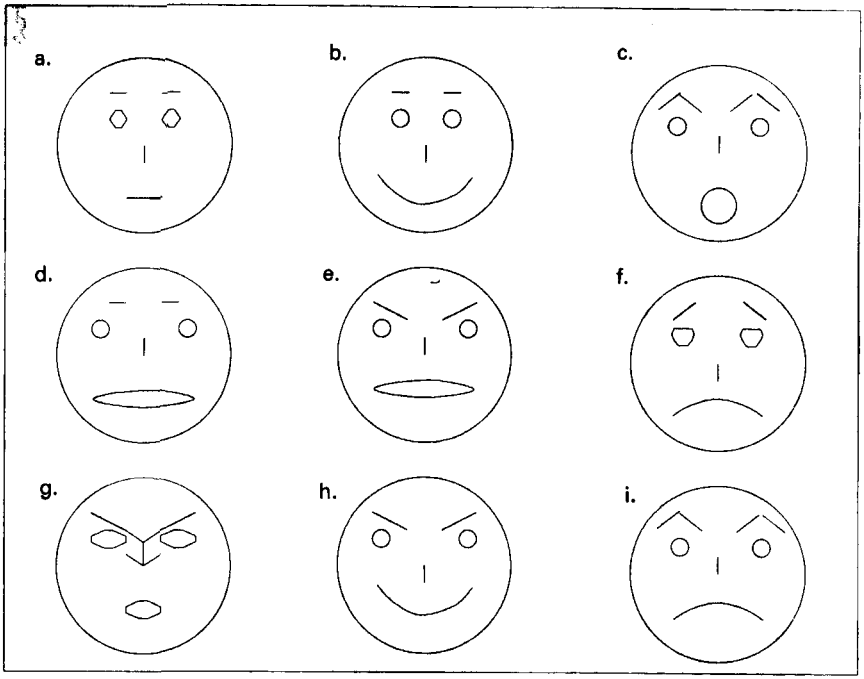

Fig. 9.1 Diagrammatic representations of six pure facial expressions of emotion (b–g), and two blended expressions (h–i). *a*) neutral, *b*) happy, *c*) surprise, *d*) afraid, *e*) angry, *f*) sad, *g*) disgusted, *h*) angry brow and eyes with happy mouth, *i*) surprised brow and eyes with sad mouth. Adapted from Lloyd P, Mayes A, Manstead A S R, Meudell P R and Wagner H L (1984), *Introduction to psychology: an integrated approach*, London, Fontana.

Ekman's work on facial expressions of emotion followed Charles Darwin's (1809–1882) *The expression of the emotions in man and animals* of 1872 in arguing for several basic emotions. Figure 9.1 shows facial expressions with six different emotions (happy, surprised, afraid, angry, sad and disgusted), and two of many possible combinations, ('happy anger' and 'sad surprise'). As well as showing how a cartoon can express complex states, similar figures and photographs have been used cross-culturally to assess Darwin's hypothesis of the UNIVERSALITY OF EMOTIONAL EXPRESSION. The emotions are recognized by people in all cultures tested, implying a biological coding of facial emotions rather than the simple cultural learning found with other non-verbal communications, such as head shaking, which has different meanings in different societies. Darwin also suggested that similar expressions were found in animals, particularly primates, presumably being the basis for attribution of emotions to pet cats or dogs (and perhaps why animals like fish are said to be unemotional because they cannot produce facial expressions; and hence the phrase 'They are a cold fish').

Figure 9.1 also shows another aspect of emotion. Look at Figure 9.1c, raise your eyebrows, and open your mouth in an 'o' shape; you *feel* something like surprise; and replicating Figure 9.1e produces a feeling like anger. Such observations on the role of FACIAL EFFERENCE raise an important question of causality: do we have emotions and our body then responds to them or are emotions the perceptions of bodily actions? The second theory was proposed by William James (1842–1910), when he said 'we are afraid because we run, we do not run because we are afraid'. The first, more commonsense hypothesis, ascribed to Walter Cannon (1871–1945), says emotions are states of mind resulting from cognitive analysis that firstly provides reasons for emotions such as fear (we might just have seen a tiger) and then activates the autonomic system (increased heart-rate, etc). Although counter-intuitive, the second theory has evidence to support it. It predicts that a lack of visceral sensations should reduce emotions, and that false visceral feedback should result in inappropriate emotions.

Anxiety, amounting almost to fear, occurs in young musicians taking examinations, the 'stage fright' ruining their performance, particularly due to hand tremor. Beta-blockers, which act by slowing the heart, diminish the fear and reduce the tremor; reducing the visceral sensation reduces the emotion, as James' theory predicts. Beta-blockers have become popular amongst junior doctors taking examinations, despite no evidence for improved performance and the possibility of impairment because some intermediate level of arousal is usually necessary for optimum performance.

Patients with a spinal cord transection lose a large proportion of their visceral afferents, higher lesions producing greater loss. The patients report reduced emotions of fear, anger and sexuality, as James' theory predicts. However the precise comments ('Seems like I get thinking mad, not shaking mad', 'It's a mental kind of anger', and 'I don't really feel afraid, not all tense and shaky, with that hollow feeling in my stomach like I used to') suggest central emotions are still present, but lack the visceral effects which make emotions so powerful.

BIOFEEDBACK can be used to make subjects aware of visceral processes, such as heart rate, by connecting ECG electrodes so that each heart beat produces an audible click. If such feedback is artificially speeded up or slowed down then the FALSE FEEDBACK modifies emotional interpretations of events. I remember once seeing the film *Earthquake* and during an exciting episode was impressed by my tachycardia of about 120 beats per minute; but a finger on the pulse showed my true heart rate was 70 beats per minute. The film's soundtrack contained false low frequency auditory feedback, which enhanced the excitement (a device exploited many times in film soundtrack music).

A different approach to emotion is Schacter's influential TWO FACTOR

THEORY OF EMOTION, bridging the gap between James and Cannon. Schacter says that visceral stimuli are like other sensory stimuli, requiring interpretation by the cognitive system, which tries to make sense of events. Schacter also says AROUSAL or ACTIVATION is the only activity that can be recognized in the visceral inputs. Consider the fear felt when running away from a tiger. Schacter says we see the tiger and start to run, which produces arousal, and the cognitive system then detects increased visceral arousal, which it explains by saying the emotion must be fear. The visceral activity is LABELLED as fear, the most reasonable explanation for all the phenomena. Identical visceral activity at some other time, as during vigorous exercise, would not be labelled as fear, but instead would be ascribed to the exercise and labelled as tiredness coupled with physical well-being. Emotion therefore requires *both* appropriate physiological arousal *and* an appropriate emotional context for the arousal.

Schacter has supported his theory with an ingenious experiment. Four groups of subjects in a laboratory supposedly received injections of 'suproxine', a hypothetical vitamin. One group (P) actually received a saline placebo, and the other groups (T, F & N) received adrenaline. Group T was told they might experience tachycardia, tremor, etc, the true side effects of adrenaline. Group F was told they might experience numbness of the feet, itching, etc, false side-effects of adrenaline. Group N and P were given no information about possible side-effects. After the injection subjects waited in a room, which they shared with another 'subject', actually a confederate of the experimenter. This stooge was conspicuously euphoric. Subjects later recorded their emotional state, and their pulse rate was measured to confirm the adrenaline had produced similar degrees of tachycardia in groups T, F and N. The amount of euphoria was greatest in group F, followed by N and P, and finally T. Schacter interpreted the result as follows: group T were aroused and had a cogent reason for the arousal, which they attributed to the injection and therefore felt no euphoria. Group F were similarly aroused but since they could not attribute it to the injection (it not being one of the possible side-effects), they attributed their arousal to euphoria induced by the confederate (and indeed acted appropriately). Group P felt little arousal, having received the placebo. Group N felt arousal but did not know if it might be the effect of the drug and hence were intermediate between groups F and T. Such experiments suggest emotions are not feelings independent of thought (like the coloured wash used to tint a monochrome engraving), but instead both influence and are influenced by thought itself (and hence are an integral part of the picture itself). The mind actively tries to understand the world in which it finds itself, and the body, with its physiology, is also a part of that world, a part in some ways as foreign as the world outside it.

Emotion, like all other behaviours, depends upon the brain, and

attempts have been made to locate sites of importance in emotion. A popular image has the cortex as the seat of thought, and sub-cortical nuclei producing emotions, the 'higher' cortex inhibiting the 'lower', primitive, sub-cortical nuclei. (The model was most popular when Freudian theories were in the ascendant, and provided correlates of ego and id.) In the 1930s, Papez, an American anatomist, hypothesized that the LIMBIC SYSTEM (in particular the hippocampus, septum, hypothalamus, anterior thalamus, cingulate gyrus, and entorrhinal cortex) were a circuit (known now as PAPEZ'S CIRCUIT), responsible for emotional behaviour. The AMYGDALA is now also thought to be important, although there is still no coherent theory of the neuropsychology of emotion. Brain lesions in animals can nonetheless produce abnormal emotions, as in the KLUVER-BUCY SYNDROME, in which bilateral temporal lobectomy causes intense, labile emotions as also does bilateral frontal lobectomy. Patients with frontal or temporal tumours, or with TEMPORAL LOBE EPILEPSY, can present symptoms of emotional instability. Because of such observations, some neurosurgeons have attempted to control disturbed emotional behaviour in psychiatric patients by FRONTAL LOBOTOMY or FRONTAL LEUCOTOMY, or lesions to limbic system or sub-cortical nuclei. Because most such lesions have been made without adequate theoretical justification, and without controlled trials of efficacy, the pejorative epithet 'cerebral topiary' is not entirely without justification.

Recent work suggests emotions may depend more upon the right than the left hemisphere (see also Chapter 23). Patients with left hemisphere lesions (which 'release' the right hemisphere), often display CATASTROPHIC REACTIONS to illness, being fearful and depressed, whereas right-hemisphere lesions produce INDIFFERENCE REACTIONS or EUPHORIC REACTIONS, with denial of disease. Similar symptoms can be produced by unilateral intracarotid sodium amytal. Such effects are partly explained by aphasia after left-hemisphere lesions, and neglect after right-hemisphere lesions, although these are not entirely the explanation. Right-hemisphere lesions also impair judgements of emotion in others, and of humour in cartoons, whereas left-hemisphere lesions only produce defects secondary to language difficulties in describing emotions.

Emotion is the salt that gives savour to cognition; it is always present and should never be forgotten. But it is still far from well understood.