Emotion

***Keith Oatley** on Emotion as the Measure of Humankind — the first of an occasional series of 'State of the Art' guides to major topics in psychology.*

IN James Cameron's film *Terminator 2* a humanoid robot played by Arnold Schwarzenegger explains that he (it) is equipped with a micro-chip based on connectionist neural-net architecture. Already knowledgeable, he learns more about human beings by associating with them. He comes to understand the patterning of human emotional behaviour but, of course, he does not feel emotions.

Cognitive psychologists recognize in the film a version of Turing's (1950) question: How might we distinguish artificially intelligent computers from humans? In the tradition of the West, Turing defined human mentality in terms of thought, knowledge and intelligence, and said it would become increasingly difficult to distinguish the thinking power of computers from that of humans. Some 50 years after Turing's famous paper, computers can beat even expert humans at chess. Might we, now, like the makers of *Terminator 2*, wonder whether reasoning and learning are keys to our humanity? Might not emotion be the measure of our species? Should we not define ourselves as those beings that can love and make commitments, that suffer grief at losing someone irreplaceable, and that feel shame at having behaved badly?

The epidemiology of human emotions

If emotions are the measure of human beings, what do we know of them and their daily patterns?

To answer this question a number of researchers, including my collaborators and I, have used diaries structured like questionnaires, and asked people to record incidents of emotion and their accompaniments. In our first studies we asked people to look out for instances of happiness/joy, sadness/grief, anger/irritation, fear/anxiety, and disgust/hatred. These are regarded by many emotion researchers as basic emotions, from which more complex emotions can be derived.

We asked participants to complete a diary page when any of these emotions happened, that included one or more of the following:
- bodily sensations such as heart beating fast, feeling unnecessarily hot, feeling tense, etc.,
- thoughts that are hard to stop, such as worrying, wanting to get even, etc.,
- emotional actions, or urges to act, such as hugging, storming from the room, etc.

We subsequently modified the procedures, for instance by asking people to look out for any emotion, and then asking if it was a version of any basic emotion — with this modification results remained similar. Altogether we have asked people to make diary records in four ways, either (a) when an incident of emotion occurred that was salient to them, (b) when they were signalled by an electronic beeper, (c) at specific times of day, and (d) when a certain kind of incident occurred — we used the event of something going wrong in a plan made with another person.

Figure 1 shows a result from Oatley and Duncan (1994) using the first method with a sample of adults employed as librarians or technicians — more emotions were negative than positive. The intensity of every emotion was rated on a 0–10 scale, and intense emotions were reported; 11 per cent of the emotions were rated 10, meaning 'as intense as I have ever felt.'

In a study in which people were prompted at random times with a beeper, and asked: 'What was your most recent emotion when the beeper sounded?' the pattern changed. Happiness became more than twice as frequent as anger or fear. Oatley and Ann Russell (in preparation) found from this study that much of the time people were engaged in what they were doing — enjoying being with friends, having a meal, watching a movie, and so forth — accompanied by happy emotions. Using this method (in contrast to the first method in which participants were responsible for selecting emotions that were salient to them) more emotions were of low intensity; without prompting they would be forgotten within a few hours.

James Averill (1982), perhaps the most influential social psychologist working on emotions, asked 80 community participants and 80 students to keep a diary of their next episode of anger, and asked a further 80 students to keep a diary of being the target of someone else's expressed anger. Averill's participants found that the object of their anger was typically someone they knew and liked, and that the usual motive of the anger was to assert authority or independence. Despite most people rating anger as a negative experience, they also felt it ben-

eficial to the relationship.

When, using the fourth method indicated above, Oatley and Laurette Larocque (1995) asked people to record emotions after something had gone wrong in a joint plan, anger was the most common emotion and, rather than concentrating on recovering from the error, the majority of participants concentrated on its implications for the relationship. Averill explains: anger is not just a feeling, it is a temporary role, within which some aspect of a relationship is renegotiated with someone who has fallen short of our expectation.

In our diary studies we have found that most emotions are associated with other people. Anger is typical. Something unexpected happens: the emotion monopolizes our attention, makes ready a certain repertoire of responses, and urges us towards a certain kind of action in relation to the person who caused the emotion.

Modern theories of emotions

Current psychological ideas about emotions emerged quite recently. Perhaps most importantly, from 1951 onwards, John Bowlby developed attachment theory (Bowlby, 1971). From its first emotional relationships the infant constructs mental models of self-with-other that guide emotional development. If a caregiver is reliable then the model is of love and interpersonal trust. Should the caregiver be neglectful, then corre-spondingly untrusting models of self-with-other form foundations for subsequent relationships.

In my view, the most important generalization from Bowlby's research is that emotional development is social development. We humans are the most social of all vertebrate creatures. We belong to that species whose members accomplish together what we cannot do alone. Look around you: every manufactured object, almost every building, every word that has been written, is a product of human co-operation. Of course humans come into conflict too, but we succeed by co-operation, which develops — or so the hypothesis goes — from species–specific patterns of interpersonal emotion and action that are first expressed between caregiver and infant to maintain mutual proximity, and anxiously to protect the vulnerable infant from threat.

Not only did Bowlby's work provide the essential stimulus to empirical child psychiatry as explored, for instance by Michael Rutter (Rutter *et al.*, 1994), but in psychology, emotional development has become as important as cognitive development. This was helped by the research of Bowlby's collaborator, Mary Ainsworth, who perceived three different styles of emotional attachment in one-year-old children: secure, anxiously avoidant, and ambivalent (oscillating between anger and solicitation) (Ainsworth *et al.*, 1978). These styles affect relationships at school, and sexual relationships in adulthood.

The second development in modern theories of emotion was launched by Magda Arnold and J.A. Gasson (1954), who stated the essential role of emotions in human life: to relate outer and inner worlds. So if, in psychology, perception is about the outer world and personality traits are about what inheres within the person, emotions are those processes that relate outer events to the inner states that are called goals, or that Nico Frijda (1988) calls 'concerns'. Although we can choose among concerns — money, relationships, status — once they are established we cannot exert much control over our emotions in relation to them. Instead the function of emotions can seen as guiding our attention, and prompting action, in relation to events that have implications for our concerns.

Arnold and Gasson followed Aristotle in proposing that emotions are based on judgements — now called appraisals. From the diary studies mentioned earlier, 69 per cent of participants' emotions could be predicted just from appraisals of the event they said had started the emotion. If the participant mentioned achievements, being engaged in what they were doing or being with friends, the emotion was likely to be happiness. From losses came sadness, from frustrations came anger, from different kinds of threats came fear and anxiety. Klaus Scherer (1997) has shown in a study of appraisals of remembered recent emotion incidents that occurred to 2921 people in 37 countries, that as well as some cross-cultural differences in patterns of appraisal in relation to specific kinds of emotion, there is substantial universality.

A third development of modern theories came also in 1954, when Sylvan Tomkins (e.g. 1995) extended William James's idea of emotions as perceptions of bodily states, and proposed that it was via sensations of the body that emotions give the oomph to life. He argued that although we have motivations of hunger, sex, exploration and so forth, these do not determine what we do at any moment. That determinant is an emotion. Its function is to amplify a motivational state by sensations of the body. This amplification provides the urgency. Tomkins proposed that humans have the motivational system for sex all the time, but it is when the sexual organs are aroused that sexual motivation becomes urgent.

Despite this example, Tomkins argued that for most emotions the face provides the essential sensory feedback. So when we smile, and even when we are induced unknowingly to make the facial action of smiling, happiness is amplified. When tears are secreted and our mouth sags, we feel sad. According to Tomkins an emotion is a neural programme with three components: a motor expressive part, a somatic sensory part, and an experiential part. Each part entrains the others, so the programme tends to be set off as a whole. The idea fits easily with the ethological idea of species-specific action patterns, on which Bowlby also drew.

Although Darwin (1872), in the book that started ethology, was the first to propose a taxonomy of emotional expressions, it was Tomkins who
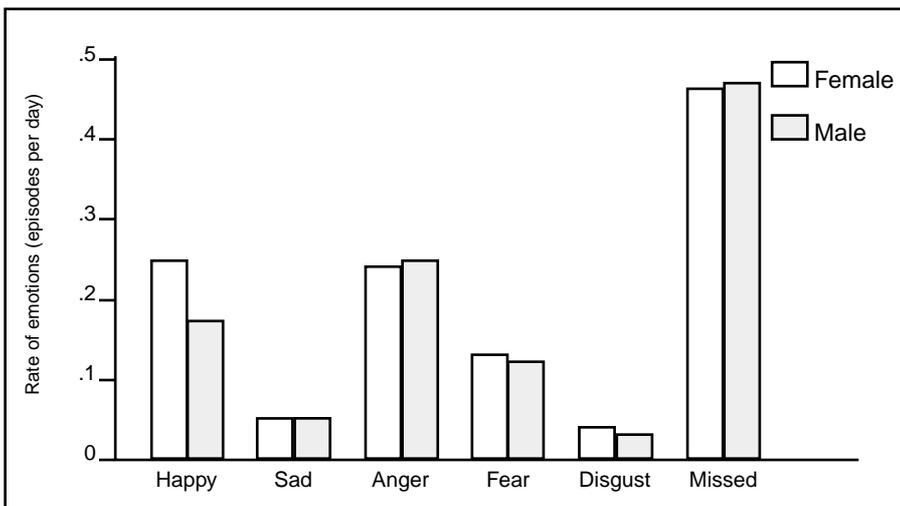

Figure 1: Mean rates of occurrence of different basic emotions as recorded (or were missed from recording) in emotion diaries by a sample of employed adults (24 males and 23 females).

inspired the programmes of research on such expressions that were established by Carroll Izard and Paul Ekman. They have presented evidence of a small number of basic emotions (such as happiness, sadness, anger, fear and disgust) which can be seen in children before the age of one, while adult emotional expressions can be recognized cross-culturally (Izard, 1991). There is also evidence that each basic expression is accompanied by distinctive bodily changes recorded by polygraph (Ekman *et al.*, 1983). Work on facial expression was instrumental in establishing the empirical study of emotions, but its interpretation has recently become controversial; see Russell and Fernandez-Dols (1997), whose analysis is in terms of dimensions of arousal and pleasantness, rather than of distinct basic emotions.

Tomkins also proposed the idea of emotion scripts: configurations of habitual emotional response that form foundations of personality, for instance scripts of emotional commitment — to a marriage, to a career, to a system of belief. By such means a person narrows the bewildering choices of life. Tomkins also defined affect-management scripts. The affect that is managed is negative emotion; such scripts include ways of avoiding it, by alcohol, by watching too much television, by addictive relationships, by compulsive travel, and so forth.

Certain scripts can be constricting. We see extreme forms in people who in childhood, prompted at first by genetically influenced temperament and/or by early family experience, are painfully shy or chronically angry. Instead of appraising different events differently, such people tend to bias their appraisals of a wide range of events towards only one kind of emotion: so shy people fearfully avoid all novelty, chronically angry people see frustration and disrespect in events that do not cause anger in others. Caspi *et al.* (1987) have shown that such traits have high continuity from childhood to adulthood, and profoundly affect life chances. For instance, boys who were chronically angry at eight years of age were in adulthood downwardly socially mobile, had worse employment records, and more problematic marital relationships.

Current theories and directions

Although even 30 years ago the field of emotions looked too amorphous for most psychologists to take seriously, there are now handbooks of emotions (Lewis & Haviland, 1993) and textbooks (Oatley & Jenkins, 1996). There has also been convergence, so theories are marked more by similarities than differences. The theory with which I have been involved (Oatley & Johnson-Laird, 1996),

for instance, shares features with other appraisal theories, such as those of Frijda (1988) and Scherer (1997).

Our theory also has distinguishing features. We call it the communicative theory: its central idea is that emotions are based on signals to ourselves and others. We propose two types of brain signals. One type is diffuse and perhaps based on peptides; it controls brain organization to make ready certain species-typical action patterns. There is a small number of these signals corresponding to the basic emotions: one prompts continuation with current activity when things are going well (happiness), another prompts giving up and backtracking when there has been a loss (sadness), another prompts aggression when a goal is blocked (anger), another prompts freezing and paying attention to dangers in the environment when a threat occurs (fear). The second type of signal is informational, about the cause and object of the emotion.

According to Oatley and Johnson-Laird, happiness, sadness, anger and fear, based on separate signals of the diffuse kind, are distinct, but can be dissociated from meanings or known causes — they can be free-floating. Mood altering drugs such as antidepressants and tranquillizers work by modulating these states. Emotions such as love, disgust and contempt are also based on species–typical patterns, but always need an object.

People also transmit emotional states between each other by signals that are the interpersonal equivalents of the diffuse control signals within the brain, by non-verbal warmth or coldness, and by emotional expressions such as those of the face and voice.

Intra-psychically, the communicative theory suggests, a basic emotion sets the brain into a specific mode that has been evolutionarily adapted to recurring kinds of goal-related circumstance. It also tends to structure the current interpersonal encounter. For instance, as well as happiness being (intrapsychically) the emotion of expansiveness and confident continuation in what we are doing, it sets self-and-other (interpersonally) into a mode of cooperation.

Recently, research has turned to effects of emotions. Sadness, for instance, is the emotion of disengagement; in bereavement it is the emotion of disengagement from the lost relationship. Intrapsychically it has effects predominantly on memory. Tim Smith (1996) has found that during episodes of sadness and other negative emotions depressed people, as compared with never-depressed or previously depressed people, tend to experience memories of former losses and adversities — not predominantly of the events that caused the current depression but of events from earlier in life. The function of this emo-

tion-dependent memory process seems to be to allow backtracking to these earlier times to reconsider, and perhaps reconstitute oneself, after the current loss. Interpersonally, sadness elicits empathy and support from others. Fear and anxiety have the predominant intrapsychic effect of directing attention to threats and safety in the current environment (Mathews, 1993). Interpersonally anxiety is often the emotion of deference to another or, in a group, of attention to shared danger.

Emotions of reading and watching

Using emotion diaries we have found that some 20 per cent of emotional incidents are not about immediate events. They are elicited at one remove, by memories, by imagination, or by symbolic means such as reading or movies. We have been studying such effects by having people read short stories by famous writers. Seema Nundy and I (Oatley, 1996) have found that when sadness is elicited by a story, people enter a mode of processing and interpretation of what they read, that in studies of reasoning is called backward chaining — looking for causes. But when anger is elicited, people enter a mode called forward chaining, planning and searching for effects. In another study of reading short stories, Mitra Gholamain and I (submitted) have found that people classified from questionnaire responses that yielded adult versions of Ainsworth's three attachment styles — (a) secure, (b) avoidant, and (c) ambivalent/preoccupied — gave summaries of the story which were categorized respectively as (a) combining emotional and critical judgement, (b) being distanced or over-intellectual, and (c) reacting in terms of strong emotions without much critical judgement.

So, in ordinary life the function of emotions is to guide us among our many concerns. But we do not just experience emotions, we actively seek them out: we buy novels, we pay to watch movies and sports events. All these have as primary effects the experience of emotions: Steckley and Larocque (1996) found that people's enjoyment of videos that they rented depended on whether the movie made them feel what they expected.

The people in our research team like to think that the integration of emotion

with personal understanding that can come from emotionally moving fiction may imply that people read and watch films to become more attuned to their own and others' emotional lives. But we may be too optimistic. Fiction is now part of a growing entertainment industry which, along with a growing pharmaceutical industry, enables us to feel some emotions but not others. Emotions may be so much the measure of human beings that people prefer being in emotional states to being in non-emotional ones. But perhaps it is only proper in a consumer society that people should be able to choose what states to be in, and should be able to keep them somewhat under control.

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