

Chapter 15

Churning Emotions

fascination of emotions has kept generations of poets in gainful employment. One of the reasons is the lack of agreement about the significance of feelings we call 'emotions'. Consider as an intense emotion of love. To the poet Shelley it was a thirst for a communion not merely of the sense, but of the 'whole nature', but to George Bernard Shaw it was a generation of the difference between one person and another.

I do not attempt to arbitrate between them. How- ever, I consider the interesting matter of exactly what it is that makes people to have emotional experiences. In other words, what do emotions come from?

Experiment: interpreting arousal

A study on emotion was carried out some 30 years ago by Walter Dill Dill, a student of the late Professor Walter Dill Dill at Columbia University and Jerome S. Bruner at Pennsylvania State University. They started by asking themselves what ingredients were vital in order for a person to experience an emotional state, and decided that there were two. One ingredient is a state of physiological arousal which can include pounding of the heart, sweating, flushed cheeks, and a warm flushed face. The second ingredient is the way in which the person interprets this arousal; he must explain the arousal in emotional terms and then feel in an emotional state. If he accounts for the

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arousal in non-emotional terms, he will not experience emotion.

Normally, of course, arousal is interpreted as an emotional experience. A man who becomes aroused at the sight of an attractive woman normally attributes his arousal to feelings of sexual attraction. However, according to Schachter and Singer, it is entirely possible for us to feel aroused or 'stirred up' without experiencing any emotion at all. Some work done by a medical doctor named Maranon in the 1920s suggests the reason why. He injected 210 of his patients with adrenalin (epinephrine), a drug whose effects mimic almost perfectly a naturally occurring state of arousal. When he asked his aroused patients to say how they felt, 71 per cent simply reported their physical symptoms, attaching no emotional overtones to them whatsoever. But the remaining 29 per cent did respond in an apparently emotional fashion. The really interesting thing here was that the great majority of patients described their feelings in a way that Maranon described as 'cold' or 'as if' emotions.

Why did most of Maranon's patients fail to experience any true emotion in spite of their aroused state? Presumably because there was a clear and unequivocal reason for it, namely the drug they had been given. Because they could neatly account for their high level of arousal in non-emotional terms, they felt no emotional state.

Schachter and Singer argued that much the same state of physiological arousal was associated with all kinds of emotional experience: 'Precisely the same state of physiological arousal could be labelled "joy" or "fury" or "jealousy" or any of a great diversity of emotional labels depending on the cognitive aspects of the situation.' That is, the great variety of emotions we experience are the result of changes in the way we interpret our aroused state.

If it is true that there is very great flexibility in the way in which we apply emotional labels to aroused states, then we are likely to make mistakes, in other words apply them incorrectly,

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from time to time. For example, many women experience an increase in irritability and tension just before their periods. Often they attribute this to external causes, to other people being awkward or irritating, rather than to their monthly cycle.

The 'Romeo and Juliet effect' is another example of misattribution of emotions. The more parental interference young people in love are confronted with, the greater the amount of romantic love they tend to experience. It may be that the attitudes of the parents create a state of unpleasant arousal which is then re-labelled romantic attraction. Or, to put it another way, adrenalin makes the heart grow fonder.

Schachter and Singer carried out quite a complicated experiment to investigate some of these ideas. Their basic prediction was fairly simple and straightforward: for genuine emotion to be experienced, there must be a state of arousal, and it must be interpreted in emotional terms. If either ingredient is lacking, no emotion will be experienced.

They decided to test their prediction by varying both the amount of arousal that was experienced, and the way in which the arousal was interpreted. All the participants were told that the experiment was designed to find out how the vitamin compound Suproxin affects vision. Although they were told that they had been injected with this vitamin compound, they actually received either adrenalin (which increases physiological arousal) or a saline solution placebo (which has no effect on arousal).

The various groups of participants were told different stories about the side-effects of the drug. Those receiving adrenalin were either correctly informed about the effects of the drug, misinformed ('Your feet will feel numb, you will have an itching sensation over parts of your body, and you may get a slight headache'), or kept in ignorance, being told merely that the injection was mild and harmless and would have no side-effects. Those given the placebo were also told that the drug would have no side-effects.

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After they had received the injection, all the participants were told that the vision tests would begin in 20 minutes, so as to allow time for the Suproxin to get into the bloodstream. During that time, each individual was placed in a situation designed to produce either euphoria or anger.

In the euphoria situation, the participant and a confederate of the experimenter waited together. The confederate doodled on a notepad, threw crumpled pieces of paper at the waste-paper basket in a mock 'basketball game', made and flew a paper plane, made a catapult out of a rubber band and used it to shoot bits of paper at a tower of manila folders, and played with a hula hoop. The general idea was that the participant would respond to the boisterous enthusiasm of the confederate by becoming happy or euphoric (it has since been pointed out that other emotions might be aroused by such behaviour, including curiosity, disgust and extreme annoyance).

In the anger condition, the participant and the confederate spent the 20 minutes filling in questionnaires which became increasingly personal and insulting, finishing up with the question: 'With how many men (other than your father) has your mother had extra-marital relationships?' The confederate became progressively more annoyed and agitated, and eventually tore up his questionnaire, screwed up the pieces and flung them on the floor, saying, 'I'm not wasting any more time on this. I'm getting my books and leaving.'

How much emotion should the various groups have shown in both these conditions? According to Schachter and Singer, those given adrenalin and told about its arousing effects should not have experienced much emotion; they would interpret the arousal they felt as stemming from the drug rather than from their reaction to the behaviour of the confederate ('I feel this way because I have just received an injection of adrenalin').

Those given the innocuous placebo should also have experienced relatively little emotion: they would not be in an

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aroused state because they had not received an arousing drug. In contrast, those given adrenalin and misinformed about its effects should be highly aroused, and would be unlikely to interpret their arousal as due to the drug; they would presumably tend to attribute their aroused state (anger or euphoria) to the behaviour of the confederate. A similar prediction followed for those given adrenalin and told it would have no side-effects; they should be aroused and would account for their arousal in emotional terms.

In view of the fact that Schachter and Singer's experiment constitutes one of the most celebrated investigations of emotion, the striking thing about their findings was that some of them did not accord too well with their predictions. The basic problem was that those who had been given the placebo, and were therefore supposed to be relatively unaroused and unemotional, actually experienced quite a lot of emotion. A further experiment designed to probe this particular problem will be considered in a moment. However, there was reasonable evidence that states of high arousal are labelled in different ways in different circumstances. Of the people injected with adrenalin, it was only those who were told precisely what they would feel, and why, who remained relatively unmoved by the anger- and euphoria-provoking situations, presumably because they believed that the drug rather than the situation was producing the arousal.

It is possible that those given the placebo rather than adrenalin did, in fact, become aroused as a result of being exposed to the confederate, in which case, of course, the assumption that they were relatively unaroused was false. Schachter and Singer argued that the way to prevent people becoming aroused was to give them a drug that actually *reduces* arousal rather than a placebo. The drug they chose for this purpose was the depressant chlorpromazine. Everyone was told that they would receive Suproxin, a highly concentrated vitamin C derivative with no side-effects, but they were actually injected

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either with chlorpromazine, the placebo or the arousing drug adrenalin. They then watched a 15-minute excerpt from a Jack Carson film called *The Good Humour Man* involving a slapstick chase scene.

Since everyone was expected to attribute any feelings of arousal to the same source, namely the film, the prediction was that the amount of emotion experienced would depend mainly on the amount of arousal caused by the injections given. Thus, the adrenalin-injected people should have been most aroused and most amused, and the chlorpromazine-injected people least aroused and amused.

Reactions to the film were assessed by asking the participants how enjoyable and funny they had found the film and by observing the number of smiles, grins, laughs and belly laughs during the showing of the film. Exactly as predicted, those injected with adrenalin found the film funniest and showed most signs of overt amusement, and those injected with chlorpromazine were the least amused by the film. The placebo-injected participants tended to react to the film with quiet amusement, whereas several of the adrenalin-injected participants reacted with belly laughs. Interestingly, some of those injected with adrenalin were aware of a discrepancy between their actual behaviour and their impressions of the film. For example, one participant said: 'I just couldn't understand why I was laughing during the movie. Usually, I hate Jack Carson and this kind of nonsense.'

More questions

In the 30 years or so since this seminal work, much has been said both for and against Schachter and Singer's viewpoint. Some of the most critical points were made by Gary Marshall and Philip Zimbardo² of Stanford University, who did a follow-up study in 1979. They noted that, despite the obvious importance of the Schachter and Singer study and the unclear

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nature of some of their results, no one had attempted to replicate it in the intervening 20 years. In their study, Marshall and Zimbardo used only the euphoria situation, because the Stanford University Medical School Human Subjects Committee argued that it was unethical to induce anger in unsuspecting people.

In essence, Marshall and Zimbardo found that the injection of adrenalin failed to make the participants more happy or euphoric than those receiving the placebo. They were disappointed by these results, and tried larger doses of adrenalin. People injected with these larger doses and then exposed to the euphoric confederate actually reported that they were unhappier than the other groups, which is precisely the opposite of what Schachter and Singer would have predicted.

Why didn't the high level of arousal produced by adrenalin make the participants more receptive to a pleasant state of emotion? It may be that unexplained arousal is normally regarded as unpleasant. After all, substantial levels of physiological arousal are far more often associated with negative emotional experiences than with positive ones, the universal exception being sexual excitement.

Even when the adrenalin-injected participants behaved in a mildly euphoric way, it was still something of a pretence. As one participant said: 'It's like being at a party when everyone is clearly having a good time and you have a headache or feel depressed for some unknown reason. You don't want to rain on their parade. You might even laugh and try to join in, but you don't really feel happy.'

Schachter and Singer hypothesized that all emotional states involve the same churned-up physiological state. Other psychologists, however, have wondered whether things are really that simple. For example, Daniel Funkenstein found some support for the idea that anxiety is associated with the production of adrenalin within the body, with noradrenaline (norepinephrine) release being associated with anger or

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aggression. Some fairly fanciful support for this notion comes in the finding that predatory species of animals such as lions and tigers produce more noradrenaline than non-predatory species such as deer and sheep. But how does this relate to human emotional states?

Lennart Levi tested Funkenstein's idea in a study in which he asked people to watch four films designed to elicit different emotional reactions: *Paths of Glory* (an early Stanley Kubrick film about a First World War episode in which several French enlisted men were accused of cowardice, court-martialled and shot, in order to cover up the bungling of an incompetent general); *Charley's Aunt* (a comedy in which the main male character capers about in woman's clothing to avoid the consequences of some supposed breach of family propriety); *Mask of Satan* (a horror film in which there are several gruesome killings); and a neutral film of nature scenes.

Those watching the films experienced anger while watching *Paths of Glory*, amusement during *Charley's Aunt*, and fear during *Mask of Satan*—different emotional reactions in each case. It was found that adrenalin flow increased to a similar extent during all three of these films, but not during the neutral film. This of course agrees with Schachter and Singer's notion that all emotional experiences have a common underlying physiological basis. (Unfortunately for Funkenstein's own theory, noradrenaline flow did not significantly increase during *Paths of Glory*, but it did increase during *Mask of Satan*.)

A final important way of assessing the value of Schachter and Singer's contribution to the study of emotion is to consider the emotional life of paraplegics and quadriplegics, whose spinal cord injuries are so severe that they have little or no direct experience of physiological arousal. If Schachter and Singer's theory is right, they should lead relatively unemotional lives, and this does indeed seem to be the case. Although they sometimes behave in an apparently emotional way, they tend not to feel very emotional: 'Sometimes I act angry when

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I see some injustice. I yell and cuss and raise hell . . . but it just doesn't have the heat to it that it used to. It's a mental kind of anger'.

Excitement makes the heart grow fonder

On the face of it, romantic love is an odd topic to try to study within the walls of the psychology laboratory. However, some bold researchers have done just that. The usual idea has been that romantic love, or at least sexual attraction, can be produced in the laboratory, provided those taking part in the experiment are aroused and the situation enables them to interpret their state in sexual terms.

Stuart Valins took this argument one step further. He wondered whether it was really necessary for people to be physiologically aroused; perhaps if they mistakenly believed themselves to be aroused, that would prove sufficient for them to experience pleasant feelings of a sexual nature.

Valins asked a number of young men to look at slides of semi-nude women taken from the pages of *Playboy* magazine. While they were performing this arduous task, they listened to what they were told was an amplified version of their heartbeat. In fact the heartbeat was completely faked; it remained steady for some of the slides, but speeded up or slowed down for others at random. The semi-nudes associated with the apparent increase in heart rate were rated as the most attractive and appealing, followed by those associated with the decreased heart rate, and then those for whom the heart rate had remained steady. When the men were looking at a slide that apparently caused their heartbeat to speed up, they tended to look at the slide more closely, obviously in an attempt to justify their fast heartbeat by magnifying the girl's positive characteristics.

Valins apparently demonstrated that sexual attraction can be enhanced by an imaginary increase or change in arousal.

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However, it has subsequently been found that fake changes in heart rate when watching female nudes trigger off genuine changes in heart rate, so that actual changes in arousal may be necessary to increase sexual attraction. It has also been found that men watching slides of male nudes were not affected emotionally by fake heart rate increases. They merely found the whole experiment distasteful and offensive.

Joanne Cantor showed excerpts from an erotic film called *Naked Under Leather* to young men either immediately after or five minutes after they had performed vigorous physical exercise (bicycle pedalling). She found that those who viewed the film five minutes after exercise, rather than immediately afterwards, were more sexually aroused by it. Immediately after exercise, people are physically aroused but attribute arousal to the aftereffects of exercise. A few minutes later, however, people are still aroused but do not realize that they are. In Cantor's experiment this residual arousal combined with the arousal produced by watching the film led to an augmented erotic response to the film. Thus, if you take up jogging, you may find yourself giving your partner the glad eye after your daily run!

This research showed that arousal produced by one aspect of the environment (in this case exercise) can sometimes be attributed to a completely different aspect of the environment (in this case an erotic film). The notion that sexual attraction can be increased by arousal from an irrelevant source has a long history. In classical times, a Roman expert on love recommended that would-be lovers should take their ladies to gladiatorial contests, presumably on the principle that the ladies would misattribute the arousal and excitement generated by the events in the arena to their male companions and fall in love with them.

Many authorities have even suggested that the arousal produced by unpleasant emotions such as fear, anger and frustration can often fuel the flames of desire. In the words of

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Sigmund Freud: 'Some obstacle is necessary to swell the tide of libido (sexual energy) to its height.' The same thought was expressed less bluntly by the Greek writer Vassilikos: 'Once upon a time there was a little fish who was a bird from the waist up and who was madly in love with a little bird who was a fish from the waist up. So the Fish-Bird kept saying to the Bird-Fish: "Oh, why were we created so that we can never live together? You in the wind and I in the wave. What a pity for both of us." And the Bird-Fish would answer: "No, what luck for both of us. This way we'll always be in love because we'll always be separated".'

Donald Dutton and Arthur Aron of the University of British Columbia wondered whether the emotion of fear could be used to enhance sexual responsiveness. Men on their own were approached either by an attractive female interviewer or by a male interviewer. The interviewer took place either on a sturdy bridge overlooking a 10-ft drop, or on a 5-ft wide, 450-ft long suspension bridge which tilted, swayed and wobbled rather alarmingly, creating the impression that one might easily fall 230 ft to the rocks and shallow rapids below. It was assumed, with some justification, that the suspension bridge would create more fear than the other bridge. The interviewer asked each man to invent a story based on a picture, and found the greatest number of sexually toned responses when the interviewer was female and the interview took place on the fear-provoking suspension bridge. The female interviewer also gave each participant her phone number and the men on the suspension bridge showed more sexual interest in her than the men on the sturdy bridge, because more of them telephoned her afterwards.

Dutton and Aron may have succeeded in showing that arousal associated with fear can be misperceived as sexual attraction, but it seems a little far-fetched to suggest that the men on the swaying bridge really interpreted their sweaty palms and trembling legs as due to the irresistible charms of the

female interviewer. It is more likely that she helped to reduce their fear by distracting them from their dangerous situation, and that this is why they responded to her so positively. Alternatively, she may have been perceived as more daring or thrill-seeking in the more fear-inducing situation, and the male participants assumed or hoped that this would also be true of her sexual behaviour.

Clinical implications

Most, if not all, forms of mental illness involve a considerable amount of emotional disturbance. If there is any validity to the theoretical approach to emotion pioneered by Schachter and Singer, then it ought to have some implications for clinical treatment. Some work has already been carried out, and some intriguing results have been obtained.

Imagine that you are faced with the problem of treating people suffering from chronic insomnia, who report taking almost an hour to get to sleep every night. You have in your possession some sugar pill placebos, which are entirely innocuous. Should you tell the insomniacs that these pills will increase their level of arousal or that they will decrease arousal and help to relax them? One's initial reaction would be to tell the insomniacs that the 'drug' will relax them.

However, let us assume that the insomniac's problem is that he tends to go to bed in a state of arousal, and that he associates that arousal with emotionally-toned thoughts. If he then takes a 'drug' that allegedly reduces arousal but is actually a placebo, he is likely to start thinking: 'If I feel as I do now, when a drug is operating to lower my arousal, then I must be very aroused indeed.' In contrast, if he takes a placebo which he believes to be capable of producing arousal symptoms, he may very well attribute most of his arousal to the drug and only a small proportion of his arousal to his worries and problems.

Paradoxically, then, insomniacs might worry more and

take longer to get to sleep when given a 'relaxing' drug than when given an 'arousing' drug, and this is what researchers found. Insomniacs given the 'arousing' placebo got to sleep at least 20 per cent faster than previously, whereas those taking the 'relaxing' placebo took over 40 per cent longer than usual to get to sleep.

Why were the results exactly the opposite of those usually achieved with placebos? Part of the answer may be that insomniacs are all too familiar with their own symptoms and therefore know that their overall state of arousal at bedtime is neither much greater nor much less than usual. If they believe that the 'drug' lowers or raises arousal level, as the case may be, they can only suppose that the amount of emotion-generated arousal must be more, or less, than usual in order to achieve the same result.

The same technique has been applied to pain tolerance. People who were led to believe that their experience of pain was due to a placebo (because they were told it would cause heart pounding, increased rate of breathing, and hand tremors) were able on average to tolerate 1,450 microamperes of electric shock, whereas those who had no reason to attribute pain to the placebo could tolerate only 350 microamperes. The former group also reported less experience of pain. Strange though it may sound, a visit to the dentist might be less unpleasant if the dentist gave you a 'drug' which you thought would cause sweating, hand clenching and a feeling of blind panic! You would blame the 'drug', not his treatment.

Rather than allowing people to become aroused and then trying to persuade them to give a non-emotional label to their arousal, it might be easier to prevent the arousal occurring in the first place. Richard Lazarus of the University of California adopted the latter approach. The stimuli he used were anxiety-provoking films. In one film, adolescent boys had their penises deeply cut in a Stone Age ritual. In another, a board is caught in a circular saw and rammed with tremendous force through

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the body of a worker, who dies writhing on the floor.

Most people responded to these films with considerable arousal and anxiety. However, if they are asked to consider the Stone Age ritual from the perspective of an anthropologist watching strange customs, and to remember that the people shown in the factory accident are actors, there is a marked reduction in arousal and anxiety. Similarly, one might be frightened by strange noises in the night, until one discovers that the neighbour's cat is the culprit. Whenever possible, it seems, we try to cope with unpleasant situations by giving them a non-emotional interpretation.

Conclusions

In broad terms, Schachter and Singer were correct in assuming that the most important ingredients in producing an emotional experience are a state of physiological arousal and an emotional interpretation of the reasons why the arousal has occurred. They were also right in saying that a similar state of physiological arousal seems to be involved in several quite different subjective states.

The theory implies that people frequently mis-perceive the cause of their stirred-up physical state, and this may help in the treatment of some clinical patients. The theory also suggests explanations for some of the puzzling aspects of romantic love, particularly the way in which unpleasant emotions such as fear and anger can amplify romantic ardour.

However, it would be fair to say that Schachter and Singer adopted an over-simplified view, a view which requires certain modifications and extensions. They focused on the notion that a state of arousal triggers off an interpretation of that state. But it is equally true to say, as Lazarus does, that the way in which a situation is interpreted affects the level of arousal.