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6

Primitive Emotional Contagion

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A woman talks casually with a friend. Suddenly she notices that she is beginning to feel awkward, uncomfortable, and ill at ease. She worries that she must be boring her friend and begins to try harder to be entertaining. The intensity of the discomfort intensifies, so she apologetically bids her friend farewell. As she walks away feeling somewhat anxious, she recalls that she was feeling fine prior to speaking with her friend. She wonders whether she possibly could have picked up her *friend's* emotion? She realizes that her chum is always ill at ease in company—brief expressions of anxiety cross his face, his voice rises, and he gets "twitchy." The next time they meet, the woman worries less about being witty and charming and more about reassuring her anxious friend. That succeeds in putting them both at ease.

Recently, we have begun to explore this process of emotional contagion. Of course, people's conscious analyses give them a great deal of information about their social encounters. People, however, can also focus their attention on their moment-to-moment emotional reactions to others, during their social encounters. This stream of reactions comes to them via their fleeting observations of others' faces, voices, postures, and instrumental behaviors. Further, as they nonconsciously and automatically mimic their companions' fleeting expressions of emotion, people also may come to *feel* as their partners feel. By attending to the stream of tiny moment-to-moment reactions, people can gain a great deal of information on their own and their partners' emotional landscapes. We begin by defining *emotion* and *emotional contagion* and discussing several mechanisms that we believe might account for this phenomenon. Next, we review the evidence from a variety of disciplines that "primitive emotional contagion" exists. Then we examine the role of individual differences in emotional contagion. Finally, we outline some of the broad research questions researchers might profitably investigate over the next decade.

OVERVIEW

Definitions

Fischer, Shaver, and Carnochan (1990) argue that emotions are

> organized, meaningful, generally adaptive action systems. . . . they are complex functional wholes including appraisals or appreciations, patterned physiological processes, action tendencies, subjective feelings, expressions, and instrumental behaviors. . . . none of these features is necessary for a particular instance of emotion. Emotions fit into families, within which all members share a family resemblance but no universal set of features. (pp. 84-85)

There is still disagreement about what precisely constitutes an emotion family (Ekman, in press; Izard, in press; Ortony & Turner, 1990; Panksepp, in press), but theorists have long argued that emotional "packages" comprise many components. These include conscious awareness; facial, vocal, and postural expression; neurophysiological and autonomic nervous system activity; and gross emotional behaviors. Different portions

of the brain process the various aspects of emotion (Gazzaniga, 1985; Lewicki, 1986; MacLean, 1975; Panksepp, 1986; Papez, 1937). Early theorists focused on the "sequence" question—which comes first, the cognitive, somatovisceral, or behavioral aspects of emotion? Recent theorists contend that "it depends." Emotional stimuli may well trigger the conscious, somatovisceral, and behavioral aspects of emotion almost simultaneously. Which appears first depends on the person and the situation. In any case, the brain integrates the emotional information it receives; thus each of the emotional components acts on and is acted upon by the others (Candland, 1977; Carlson & Hatfield, 1992). Our definition of emotion, then, stresses the importance of all the elements of the emotional "package" in shaping emotional experience/behavior.

How should *emotional contagion* be defined? A broad working definition might read something like this: "the tendency to 'catch' (experience/express) another person's emotions (his or her emotional appraisals, subjective feelings, expressions, patterned physiological processes, action tendencies, and instrumental behaviors)." Such emotional contagion, we believe, is best conceptualized as a multiply determined family of psychophysiological, behavioral, and social phenomena. Emotional contagion is *multiply determined*, because innate stimulus features (e.g., a mother's nurturing expressions and actions toward an infant), acquired stimulus significance, and mental simulations or emotional imagery are each capable of producing it. Emotional contagion represents a *family* of phenomena, because it can manifest as similar responses (e.g., as when smiles elicit smiles) or complementary responses (e.g., as when the sight of a stroke aimed leads to a drawing back of the site of the blow). Emotional contagion is a *multilevel phenomenon* because the precipitating stimuli arise from one individual, act upon (i.e., are perceived and interpreted by) one or more other individuals, and yield corresponding or complementary conscious awareness; facial, vocal, and postural expression; neurophysiological and autonomic nervous system activity; and gross emotional behavioral responses in these individuals. Thus an important consequence of emotional contagion is an attentional, emotional, and behavioral synchrony that has the same adaptive utility (and drawbacks) for social entities (dyads, groups) as has emotion for the individual. The focus in this chapter is on primitive emotional contagion—contagion that is relatively automatic, unintentional, uncontrollable, and largely unconscious. This form of *primitive emotional contagion* is defined as "the tendency to automatically mimic and synchronize

movements, expressions, postures, and vocalizations with those of another person and, consequently, to converge emotionally."

In this section, we will discuss the mechanisms that might account for emotional contagion (in general) and primitive emotional contagion (in particular). We will review evidence for the mechanisms said to underlie primitive emotional contagion, providing evidence that people do tend to (a) mimic the facial expressions, vocal expressions, and postures of those around them and (b) "catch" others' emotions as a consequence of such facial, vocal, and postural feedback. We will end by observing that primitive emotional contagion may well be critically important in personal relationships because it allows people to track others' feelings moment to moment.

Possible Mechanisms of Emotional Contagion

In characterizing emotional contagion as multiply determined, we suggested that individuals "catch" another's emotions in several ways. Early researchers focused on complex cognitive processes by which people might come to know and feel what those around them felt. Some theorists proposed that conscious reasoning and analysis accounted for the phenomenon. For example, as subjects listen to a target describe his or her emotional experiences, they might remember times they felt much the same way and shared much the same experiences. Such conscious reveries could spark a similar emotional response (Humphrey, 1922; Lang, 1985).

Other researchers argued that contagion had to be learned. Aronfreed (1970), for example, noted that, if an observer's and participant's pain or pleasure are habitually linked, soon the observer will come to share the participant's affective state. That is, emotional contagion can be a conditioned emotional response. Thus if, when a father is upset, he lashes out at his son, soon the sight of a distressed father will come to elicit distress in the son. Through stimulus generalization, emotional contagion could result from the sight of distress in anyone, not just the father.

A few researchers have suggested that some forms of emotional contagion are the result of even more primitive associative processes; specifically, that on occasion people may catch others' emotions because the others' responses generate an *unconditioned* emotional response. For example, Klinnert, Campos, Sorce, Emde, and Svelda (1983) observe that "abrupt, angular movements, shrill, high-pitched voices, loud or otherwise intense voculations and movements . . . probably elicit emotional reactions" (p. 79). Although individuals might be aware of the unconditioned emotional response, they can also be utterly ignorant of the eliciting stimulus and powerless against the emotional forces unleashed automatically following the perception of the stimulus.

Finally, and most important, considering our interest in primitive emotional contagion, we would add that, in conversation, people continuously mimic and synchronize their movements with the facial expressions, voices, postures, and instrumental behaviors of others (Bavelas, Black, Lemery, & Mullett, 1987; Bernieri, Reznick, & Rosenthal, 1988; Warner, 1988). Most of this mimicry occurs without deliberate or conscious processing (O'Toole & Dubin, 1968). People's emotional experience may be influenced by one of the following: (a) the central nervous system commands that direct such mimicry/synchrony in the first place; (b) the afferent feedback from such facial, postural, or verbal mimicry/synchrony; or (c) self-perception processes wherein individuals draw inferences about their own emotional state based on the emotional expressions and behaviors evoked in them by the emotional state of another (Adelmann & Zajonc, 1989; Izard, 1971; Laird, 1984; Tomkins, 1963).

In sum, various mechanisms for emotional contagion have been proposed, several of which are also capable of producing the automatic transmission of emotions between individuals. These latter mechanisms range from unconditioned and conditioned emotional responses to interactional mimicry and synchrony. The case for unconditioned and conditioned emotional responses subserving emotional contagion is relatively straightforward. Therefore we focus in the remainder of this chapter on the evidence consistent with the notion that primitive emotional contagion can derive from interactional mimicry and synchrony.

If we piece together several facts about the nature of emotion, we can gain some understanding of how and when each of these mechanisms might operate.

Emotional information may be processed consciously or nonconsciously. People often have powerful emotional reactions to others yet are at a loss to explain just why they responded as they did. Neuroscientists have found that people are consciously aware of only a small bit of the information that their brains process moment to moment (Wilson, 1985). Normally, people consciously attend only to the most important, unusual, or difficult information. As Lachman, Lachman, and Butterfield (1979) observe:

> Most of what we do goes on unconsciously. It is the exception, not the rule, when thinking is conscious; but by its very nature, conscious thought seems the only sort. It is not the only sort; it is the minority. (p. 207)

Similarly, probably most of the processing of emotional information goes on out of conscious awareness (Ohman, 1988; Posner & Snyder, 1975; Shiffrin & Schneider, 1977). We would argue that primitive contagion is produced by information that is processed outside of conscious awareness.

Despite the subjective experience that information is processed sequentially, the human brain clearly is capable of processing information in parallel (Gazzaniga, 1985). For example, while we are carrying on a rational conversation, we may also be continuously monitoring our partner's emotional reactions to what we have to say. We may unconsciously and automatically scan our partners' faces for second-by-second information as to their feelings. Are they feeling happiness, love, anger, sadness, or fear? We can use a variety of subtle indicators (such clues as facial muscle movements, "micro expressions," "crooked" expressions, or the timing of reactions to decide whether the other person is telling the truth or lying; Ekman, 1985). People may even be able to detect their partner's mood by observing facial muscle movements so minute that they *seem* detectable only in electromyographic (EMG) recordings (Cacioppo & Petty, 1983). People may also respond to other types of emotional information. They can listen to other people's words—to the volume, rhythm, pitch, and speed of their speech or to the length of their pauses. They can observe the way people gesture, move their hands, legs, and feet, and stand. They can observe others' instrumental behaviors.

Given this view of emotion, there is really not much mystery about the observations of therapists and others that—although they are not consciously aware that their clients and others are experiencing joy, sadness, fear, or anger—"somehow" they sense what others are feeling and react to it. Today, emotion researchers assume that the information of which we are consciously aware is only a small portion of the information we possess about ourselves and others.

Emotional packages comprise several components. As Fischer et al. (1990) noted, an emotional package typically includes conscious appraisals, subjective feelings, action tendencies, expressions, patterned physiological processes, and instrumental behaviors. No single feature,

not even conscious awareness, is a necessary feature of an emotional episode. Laird and Bresler (1992), for example, suggested that

> all components of the emotional episode are ordinarily generated, more or less independently, by some central mechanism, but activation of any one may increase activity of any other. Their interactive effects might arise because of the way the organism is built (Buck, 1985) or because of classical conditioning, produced by the long history of paired occurrence of emotional responses. (Kleck et al., 1976). (p. 49)

On occasion, of course, the various components may be desynchronized, because the various components may be controlled by very different perceptual and reinforcement contingencies and are processed in different portions of the brain. Such desynchrony may be quite disruptive to responsive social exchanges, however, and thereby foster miscommunication and conflict. One of the benefits of rudimentary emotional contagion therefore is the synchronizing of social exchanges. Let us examine more closely this "synchronization function" of emotional contagion.

People Mimic/Synchronize the Movements of People Around Them

There is no particular need for people to be consciously aware that they are synchronizing their actions with those of others. Any action that is performed continuously is likely to become automatic. Nonetheless, the ability to be "in tune" with those around us is critically important. It allows us to coordinate emotionally and physically with them. The evidence that people synchronize their facial muscle movements, voices, and postural movements with one another, and thus they tend to be in emotional synchrony with one another, comes from several sources, including facial mimicry, vocal synchrony, and movement coordination. We will review this evidence in some detail, because we believe that this is a mechanism that underlies primitive emotional contagion.

Historical background. As early as 1759, Adam Smith observed: "When we see a stroke aimed, and just ready to fall upon, the leg or arm of another person, we naturally shrink and draw back on our leg or our own arm" (1759/1966, p. 4). Smith felt that such imitation was "almost a reflex." Lipps (1906) suggested that empathy is due to an unlearned "motor mimicry" response to another person's expression of affect.

According to Lipps, the observer automatically imitates the other person, with slight movements in posture and facial expression, thus creating in himself inner cues that contribute, through afferent feedback, to his understanding and experiencing of the other person's affect. Bavelas and her colleagues (Bavelas et al., 1987) translate Smith's and Lipps's observations to modern terms: "This is elementary motor mimicry, overt action by an observer that is appropriate to or mimetic of the situation of the other person, rather than one's own. The observer acts as if in the other's place to the point of wincing at his pain, smiling at her delight, or (as Smith described) trying to avoid that person's danger" (p. 317). Since the 1700s, researchers have collected considerable evidence that people do tend to imitate the facial expressions, postures, voices, and behaviors that they see and hear.

Facial mimicry. It has been observed that, when babies open their mouths, mothers tend to open theirs too. This is a nondeliberate reaction on their part, and one of which the mothers can be completely unaware (O'Toole & Dubin, 1968). As we observed earlier, Ekman (cited in Schmeck, 1983), Dimberg (1982), and Vaughan and Lanzetta (1980) have documented that people tend to mimic the expressions of those around them. Bavelas and her colleagues (1987) surveyed the research documenting the existence of motor mimicry. They found that people imitate others' expressions of pain, laughter, smiling, affection, embarrassment, discomfort, disgust, stuttering, reaching with effort, and the like, in a broad range of situations.[1] Ekman (cited in Schmeck, 1983) observes that people's emotions may be shaped by such mimicry. He points out that this may be one reason why smiling faces at parties or grief at a time of mourning are infectious. "The perception of another face is not just an information transfer," contends Ekman, "but a very literal means by which we *feel* the sensations that the other feels" (p. 1). Some researchers contend that we are especially likely to mimic the posture of those we care for (Scheflen, 1964).

Vocal synchrony. Chapple (1982) speculated that people's speech rhythms are related to their biological rhythms. Thus different people prefer different interaction tempos at different periods. When partners interact, if things are to go well, their speech cycles must become mutually entrained. Consistent with this reasoning, there is a good deal of evidence from controlled interview settings supporting interspeaker influence on utterance durations (Matarazzo, Weitman, Saslow, & Wiens, 1963), speech rate (Webb, 1972), and latencies of response (Matarazzo

& Wiens, 1972). Evidence is also available in more freewheeling settings. Capella and Planalp (1981), for example, studied twelve 20-minute dyadic conversations. They found clear evidence that, over time, partners came to match one another's conversational rhythms, even when they examined moment-to-moment reactions. In most dyads, couples talked the same amount. Partners also came to match one another's rhythms, as measured by length of vocalizations, mean pause duration, times between turns, length of talkovers, and the probability of breaking silences. Similar results were secured by Warner, Waggener, and Kronauer (1983) and Warner (1990).

Movement coordination. Finally, communication researchers have noted that people often synchronize their rhythms and movements with those of another person with whom they are interacting (Bernieri, 1988; Kendon, 1970). Condon and Ogston (1966) contend that a speaker's speech and movements are mirrored in the listeners' flow of movements: "Human expression appears to be a function of both speech and body motion inextricably locked together within the flow of behavior, reinforcing and counterpointing one another" (p. 345). To test some of these notions, Kendon (1970) videotaped the conversations of people in a London pub and carefully analyzed the tapes, word by word and frame by frame. He found that speakers' and listeners' streams of behavior were tightly coordinated. When the speaker was speaking and moving, the listener was moving as well. The speaker's movement waves coincide with those of the listener. A typical analysis is as follows:

> When B is moving, his movements are coordinated with T's movements and speech, and that in their form these movements amount in part to a "mirror image" of T's movements: As T leans back in his chair, B leans back and lifts his head; then B moves his right arm to the right, just as T moves his left arm to the left, and he follows this with a headcock to the right, just as T cocks his head to the left. We might say that here B dances T's dance. (Kendon, 1970, p. 110)

Davis (1985) points out that people are probably not able to consciously mimic others very effectively: The process is simply too complex and too fast. For example, it took even the lightening fast Muhammad Ali a minimum of 190 milliseconds to spot a light and 40 milliseconds more to throw a punch in response. Condon and Ogston (1966), however, found that college students could synchronize their movements within

21 milliseconds (the time of one picture frame). Davis (1985) argues that micro synchrony is mediated by basal brain structures and is either "something you got or something you don't; that there is no way that one can deliberately 'do' it" (p. 69). People who consciously try to mirror others, he speculates, are doomed to look phoney.

This is not to suggest that higher-order psychological processes are unimportant in rudimentary forms of emotional contagion. Researchers have speculated that people are most likely to coordinate their movements tightly with those they like and love. Tickle-Degnen and Rosenthal (1987) argue that rapport and coordinated movement are linked. Kendon (1970) argues that synchrony communicates interest and approval. Bernieri (1988) observes that

> high states of rapport are often associated with descriptive terms such as harmonious, smooth, "in tune with," or "on the same wavelength." Likewise states of low rapport are often associated with terms such as awkward, "out of sync," or "not getting it together." (p. 121)

Tronick, Als, and Brazelton (1977) speculate that synchrony may be a way for a child to signal "continue"; dissynchrony may communicate "stop" interaction.

If love and attention facilitate the synchronization of the movements of two people, then it seems reasonable that mothers would show evidence of greater synchrony when interacting with their own children than with the children of others. Bernieri et al. (1988) measured three kinds of synchrony in parent-child interactions: (a) simultaneous movement (does, for example, a mother begin to turn her head at the precise moment her child lifts an arm off the table?); (b) tempo similarity; and (c) coordination and smoothness (does the interactants' flow of behavior mesh evenly and smoothly?). They found that mothers showed more synchrony when they were interacting with their own children than when they were interacting with strangers. Presumably, mothers were more loving and attentive to their own children than to the children of strangers.

Emotional Experience and Facial, Vocal, and Postural Feedback

Researchers have also found evidence that people's emotional experience and somatic expression are tightly linked. In this section, we

consider briefly some of the evidence indicating that emotional experience is affected by changes in the skeletal musculature.

The facial feedback hypothesis. Darwin (1872/1965), Izard (1977), and Tomkins (1982) predicted that emotional experience is profoundly affected by feedback from the facial muscles. Several emotions (e.g., fear, anger, sadness, disgust, joy) are associated with different patterns of facial muscle activity. Joy feels different from sadness in part, suggested these theorists, because smiling feels different from frowning. The sight of a face that is happy, loving, angry, sad, or fearful, we suggest, can cause the viewer to mimic elements of that face and, consequently, to catch the other's emotions. We considered evidence for the first part of this mechanism in the preceding section. Let us now consider the evidence for the second part of this mechanism.

Although contemporary theorists do not agree on exactly how facial feedback affects emotional experience, most agree that the two are somehow coupled (Adelmann & Zajonc, 1989; Lanzetta & McHugo, 1986). Two types of experiments have led to this conclusion. In one type, subjects are asked to exaggerate or play down their naturally occurring emotional facial expressions. For example, in some experiments, subjects are told to try to deceive an observer about what they are really feeling. Then they are shown an amusing movie or given painful electric shocks. Later, subjects are asked what they really felt during the funny movie or the electric shock. Subjects report that the movie was funnier or the shocks more painful when they exaggerated their amusement or pain than when they muted their facial reactions (see Kleck et al., 1976; Kopel & Arkowitz, 1974; Kraut, 1982; Lanzetta, Biernat, & Kleck, 1982; McCaul, Holmes, & Solomon, 1982; Zuckerman, Klorman, Larrance, & Speigel, 1981).

In the second type of experiment, careful steps are taken to avoid alerting subjects to the fact that the experimenters are studying emotions or manipulating subjects' emotional expressions. Typically, subjects are told that the experimenters are interested in studying the action of the subjects' facial muscles. Then the experimenters unobtrusively arrange the subjects' faces into happy or angry expressions. For example, subjects might be asked to "contract the muscles between your eyebrows by drawing them down and together, and clench your teeth" thus producing a scowl. With such procedures, researchers find that subjects' emotional feelings and/or behaviors are affected by feedback from their facial expressions. Subjects feel emotions consistent with those poses

and have trouble experiencing emotions inconsistent with those poses (Duclos et al., 1989; Kellerman, Lewis, & Laird, 1989; Larsen, Kasimatis, & Frey, 1990; Rutledge & Hupka, 1985; Strack, Martin, & Stepper, 1988). Exceptions to this principle can be found when the facial efference is very weak (Cacioppo, Bush, & Tassinary, 1991) and when the emotional stimulus evokes extensive cognitive appraisals of strong affect (e.g., conditioned emotional responses) independent of the posed emotion (Matsumoto, 1987; Tourangeau & Ellsworth, 1979).

We were able to find only one article that investigated the link between love and feedback from expressions of love. In two experiments, Kellerman et al. (1989) asked opposite-sex pairs of subjects to gaze into one another's eyes continuously for two minutes. Compared with control subjects, who gazed at each other's hands, the mutual gaze subjects reported greater feelings of romantic love for each other.

Finally, researchers find that a happy face (Bush, Barr, McHugo, & Lanzetta, 1989; Hsee, Hatfield, Carlson, & Chemtob, 1991a, 1991b; Hsee, Hatfield, & Chemtob, 1992; Uchino, Hatfield, Carlson, & Chemtob, 1991), sad face (Hsee, Hatfield, & Chemtob, 1992; Hsee et al., 1991a, 1991b; Uchino et al., 1991), loving face, angry face (Lanzetta & Orr, 1986), or fearful face (Lanzetta & Orr, 1981) can provoke the corresponding emotion and facial display in viewers.

In a variety of studies, then, we find that people tend to feel the emotions consistent with the facial expressions they adopt and have trouble feeling emotions inconsistent with those poses. Further, the link between emotion and facial expression appears to be quite specific. When people produced facial expressions of fear, anger, sadness, or disgust, they were more likely to feel the emotion associated with those specific expressions rather than just any unpleasant emotion (i.e., people who make a sad expression feel sad, not angry; Duclos et al., 1989). Of course, emotions are not solely or perhaps even primarily shaped by facial feedback. Nevertheless, to the extent that emotions are influenced by facial feedback, spontaneous facial mimicry should contribute to emotional contagion.

The postural feedback hypothesis. Bull (1951) reports that, when hypnotized subjects are told to experience certain emotions, they consistently adopt appropriate postures. Conversely, when subjects are told only to adopt certain postures, they consistently experience the appropriate emotion as well. They also have unusual difficulty experiencing emotion opposite to that of the locked-in posture. Duclos et al. (1989) manipulated subjects into sad, angry, and fearful postures and found that subjects' feelings came to match their postures precisely. For example, when subjects were placed in sad postures, they felt sad but not angry or fearful.

In a variation on the facial feedback and postural studies, Cacioppo et al. (in press) hypothesized that a static flexion of the arms and torso that implies approach, in contrast to a static extension that implies withdrawal, results in positive attitudes toward unrelated, novel stimuli in focal attention. In their first experiment, subjects categorized Chinese ideographs as liked or disliked while pressing upward (flexion) or downward (extension) on a table. Afterward, subjects distributed the ideographs equally across six bins, whose labels ranged from "extremely unpleasant" to "extremely pleasant." Results revealed that the ideographs that had been shown during flexor contraction were subsequently rated as being more pleasant than the ideographs that had been shown during extensor contraction. Experiment 2 replicated the results of Experiment 1. Experiment 3 provided evidence that flexion led to more positive attitudes, and extension led to more negative attitudes, when compared with a no-contraction control condition. Thus affective reactions toward neutral, nonassociative stimuli can be influenced by somatic factors as rudimentary as arm flexor or extensor contraction.

The vocal feedback hypothesis. There is also evidence that feedback from the facial muscles and/or the production of emotional sounds can influence emotional experience. For example, Hatfield, Costello, Schalenkamp, Hsee, and Denney (1991) asked subjects to read, as realistically as possible, short tape scripts of joyous, loving, sad, or angry telephone conversations. The authors assessed subjects' emotions in two ways: (a) subjects described their own emotional states (via a series of self-report measures) and (b) judges' rated the subjects' faces as they read the emotional tape scripts. Subjects' self-reports of emotion and facial expressions of emotion were affected by feedback from the emotional messages they delivered. In a second experiment, the scientists made every effort to hide the fact that they were interested in the subjects' emotions. They asked subjects to reproduce a series of supposedly random *sounds*. These sounds had been carefully designed to mimic sounds associated with joy, love, anger, fear, and sadness. As before, subjects were asked to rate their own emotions after reproducing one of the sounds. Again, the authors found evidence that people's emotions were affected by feedback from their vocal productions.

Finally, in a series of studies, Zajonc, Murphy, and Inglehart (1989) asked subjects to make sounds like the long "e" sound in "cheese" (which required them to make a smilelike expression) and the "ü" sound in German (which required subjects to pucker their lips, as if mimicking a negative emotional expression). Here, too, the subjects' experiences matched their vocal expressions. People tended to feel the emotions their voices and faces were induced to express.

Thus far, we have focused on primitive emotional contagion. Researchers from a range of disciplines have been interested in the process of emotional contagion, *broadly defined*. It will be evident to readers that many factors, including primitive contagion, may account for these data. They are, however, included in the interest of completeness.

ADDITIONAL EVIDENCE THAT EMOTIONAL CONTAGION EXISTS

Developmental Research

Child psychologists have long been interested in emotional contagion and the related concepts of empathy and sympathy. Titchener (1909) argued that people could never *know* what another felt by reasoning. They could only know by *feeling themselves into* the other's feelings: "Not only do I see gravity and modesty and pride and courtesy and stateliness, but I feel or act them in the mind's muscle" (p. 21). Later researchers speculated about how this process might work. Allport (1961) thought that it involved "the imaginative transposing of oneself into the thinking, feeling, and acting of another" (p. 536). This involved "the imitative assumption of the postures and facial expressions of other people" (p. 530). Murphy (1947) speculated that people came to feel as others felt because of *motor mimicry*—"his muscles tighten as he watches the tug of war; his larynx tires and his heels rise as the soprano strains upward" (p. 414). Today, theorists make clear distinctions between the process in which we are interested, primitive emotional contagion, and "empathy" or "sympathy" (Eisenberg & Miller, 1987).

Child psychologists have collected some evidence that, from the start, both parents and children are powerfully "enmeshed"; both parents and children show evidence of emotional contagion (Thompson, 1987). In one experiment, for example, Simner (1971) found that 2- to 4-day-old newborns began crying when they heard the cry of another

newborn. These newborns seemed to be responding specifically to the other infant's emotional distress rather than to noise per se because the newborns did not cry when they heard a synthetic cry.

Hoffman (1973) has also suggested that caretakers teach their infants to feel what they feel via physical handling. For example, if, when a mother is distressed, her body stiffens, the infant will also experience distress. Subsequently, he speculates, the facial and verbal expressions that initially accompanied the mother's distress will serve as conditioned stimuli that evoke distress in the child. Stimulus generalization ensures that other distressed people also become able to evoke distress in the child. In summarizing such research, Hoffman (1987) observes:

> Infants may experience empathetic distress through the simplest arousal models . . . long before they acquire a sense of others as distinct from the self. Distress cues from the dimly perceived other are confounded with unpleasant feelings empathetically aroused in the self. Consequently, infants may at times act as though what happened to the other happened to themselves. Infants also seem to catch their parents' fears and anxiety. (p. 51)

Hoffman cites as examples the case of a child who buries its face in its mother's lap upon seeing another child fall and cry, or who strikes his doctor in anger when another child is seen receiving an injection. Researchers have found that infants begin to mimic the experimenter's facial gestures shortly after birth. Infants stick out their tongues, purse their lips, open their mouths, and the like shortly after the model does (Meltzoff, 1988; Reissland, 1988). In an interesting extension of this line of research, Haviland and Lelwica (1987) found that 10-week-old infants could and would imitate their mother's facial expressions of happiness, sadness, and anger.

Parents seem to "catch" the emotions of newborns as well. Frodi and her colleagues (1978) found that parents who were asked to observe a sad-angry newborn reported feeling more "annoyed, irritated, distressed, disturbed, indifferent and less attentive and less happy" than those who viewed a smiling infant. When parents viewed a sad-angry child, their diastolic blood pressure rose and their skin conductance increased as well. Although mothers were most likely to "catch" and mimic their infants' positive emotions (interest, enjoyment, and surprise), they also mimicked the infants' negative emotions (pain, sadness, and anger) to some extent (Malatesta & Haviland, 1982).

and have trouble experiencing emotions inconsistent with those poses (Duclos et al., 1989; Kellerman, Lewis, & Laird, 1989; Larsen, Kasimatis, & Frey, 1990; Rutledge & Hupka, 1985; Strack, Martin, & Stepper, 1988). Exceptions to this principle can be found when the facial efference is very weak (Cacioppo, Bush, & Tassinary, 1991) and when the emotional stimulus evokes extensive cognitive appraisals of strong affect (e.g., conditioned emotional responses) independent of the posed emotion (Matsumoto, 1987; Tourangeau & Ellsworth, 1979).

We were able to find only one article that investigated the link between love and feedback from expressions of love. In two experiments, Kellerman et al. (1989) asked opposite-sex pairs of subjects to gaze into one another's eyes continuously for two minutes. Compared with control subjects, who gazed at each other's hands, the mutual gaze subjects reported greater feelings of romantic love for each other.

Finally, researchers find that a happy face (Bush, Barr, McHugo, & Lanzetta, 1989; Hsee, Hatfield, Carlson, & Chemtob, 1991a, 1991b; Hsee, Hatfield, & Chemtob, 1992; Uchino, Hatfield, Carlson, & Chemtob, 1991), sad face (Hsee, Hatfield, & Chemtob, 1992; Hsee et al., 1991a, 1991b; Uchino et al., 1991), loving face, angry face (Lanzetta & Orr, 1986), or fearful face (Lanzetta & Orr, 1981) can provoke the corresponding emotion and facial display in viewers.

In a variety of studies, then, we find that people tend to feel the emotions consistent with the facial expressions they adopt and have trouble feeling emotions inconsistent with those poses. Further, the link between emotion and facial expression appears to be quite specific. When people produced facial expressions of fear, anger, sadness, or disgust, they were more likely to feel the emotion associated with those specific expressions rather than just any unpleasant emotion (i.e., people who make a sad expression feel sad, not angry; Duclos et al., 1989). Of course, emotions are not solely or perhaps even primarily shaped by facial feedback. Nevertheless, to the extent that emotions are influenced by facial feedback, spontaneous facial mimicry should contribute to emotional contagion.

The postural feedback hypothesis. Bull (1951) reports that, when hypnotized subjects are told to experience certain emotions, they consistently adopt appropriate postures. Conversely, when subjects are told only to adopt certain postures, they consistently experience the appropriate emotion as well. They also have unusual difficulty experiencing emotion opposite to that of the locked-in posture. Duclos et al. (1989) manipulated subjects into sad, angry, and fearful postures and found that subjects' feelings came to match their postures precisely. For example, when subjects were placed in sad postures, they felt sad but not angry or fearful.

In a variation on the facial feedback and postural studies, Cacioppo et al. (in press) hypothesized that a static flexion of the arms and torso that implies approach, in contrast to a static extension that implies withdrawal, results in positive attitudes toward unrelated, novel stimuli in focal attention. In their first experiment, subjects categorized Chinese ideographs as liked or disliked while pressing upward (flexion) or downward (extension) on a table. Afterward, subjects distributed the ideographs equally across six bins, whose labels ranged from "extremely unpleasant" to "extremely pleasant." Results revealed that the ideographs that had been shown during flexor contraction were subsequently rated as being more pleasant than the ideographs that had been shown during extensor contraction. Experiment 2 replicated the results of Experiment 1. Experiment 3 provided evidence that flexion led to more positive attitudes, and extension led to more negative attitudes, when compared with a no-contraction control condition. Thus affective reactions toward neutral, nonassociative stimuli can be influenced by somatic factors as rudimentary as arm flexor or extensor contraction.

The vocal feedback hypothesis. There is also evidence that feedback from the facial muscles and/or the production of emotional sounds can influence emotional experience. For example, Hatfield, Costello, Schalenkamp, Hsee, and Denney (1991) asked subjects to read, as realistically as possible, short tape scripts of joyous, loving, sad, or angry telephone conversations. The authors assessed subjects' emotions in two ways: (a) subjects described their own emotional states (via a series of self-report measures) and (b) judges' rated the subjects' faces as they read the emotional tape scripts. Subjects' self-reports of emotion and facial expressions of emotion were affected by feedback from the emotional messages they delivered. In a second experiment, the scientists made every effort to hide the fact that they were interested in the subjects' emotions. They asked subjects to reproduce a series of supposedly random *sounds*. These sounds had been carefully designed to mimic sounds associated with joy, love, anger, fear, and sadness. As before, subjects were asked to rate their own emotions after reproducing one of the sounds. Again, the authors found evidence that people's emotions were affected by feedback from their vocal productions.

Although these interesting lines of research do not speak definitively to the hypothesis that parents and children are genetically predisposed to take on one another's emotional reactions, the potential adaptive significance for a species of synchronizing the attention, emotions, and behaviors of caretaker and newborn is undeniable. Of course, this line of reasoning also predicts that newborns or children characterized by sickly or unpleasant (e.g., colicky) temperaments are placed at risk for abuse or neglect. The limited data that do exist are, unfortunately, consistent with this hypothesis (Bugental, Blue, & Lewis, 1990).

Clinical Research

Therapists have long observed that clinicians tend to catch their clients' feelings. Clinicians point out that it is difficult to work with depressed clients; one keeps nodding off. Something about the clients' slow voices, sad facial expressions, or the endless, hopeless details they recite keep putting one to sleep. It is hard to concentrate and attend long enough to be helpful. For example, Jung (1968) observed:

> Emotions are contagious. . . . In psychotherapy, even if the doctor is entirely detached from the emotional contents of the patient, the very fact that the patient has emotions has an effect upon him. And it is a great mistake if the doctor thinks he can lift himself out of it. He cannot do more than become conscious of the fact that he is affected. If he does not see that, he is too aloof and then he talks beside the point. It is even his duty to accept the emotions of the patient and to mirror them. (p. 155)

Reik (1948) described the process by which clinicians move in close enough to glimpse their clients' emotions and then move back far enough to deal with them. Clinicians have speculated about how the process of "countertransference" may operate and how such emotional information might be used therapeutically. Tansey and Burke (1989), for instance, suggest that therapists may respond to clients' emotions in two different ways. They may feel exactly what the client feels (*concordant identification*) or they may feel emotions that are *complementary* to the clients' own emotions (for example, feeling hurt at a client's angry attack). The authors assume that therapists are generally provoked to feel what clients *wish* them to feel.[2]

Clinical researchers have also collected considerable evidence as to the impact manic, depressed, anxious, and angry people make on those around them. In some of these research reports, we find clear evidence of contagion (Coyne, 1976; Howes, Hokanson, & Lowenstein, 1985).

Social-Psychological Research

Early sociologists such as Le Bon (1896) were interested in the "group mind" and the "madness" of crowds. Since then, researchers have explored the process of "mass hysteria" in a variety of societies.[3] In the Middle Ages, in the wake of the Black Plague, dancing manias swept through Europe (Hecker, 1970). In Malaysia, entire communities have fallen prey to contagious depression (Teoh, Soewondo, & Sidhartha, 1975); in East Africa, to hysterical laughter and crying (Ebrahim, 1968); in the New Guinea Highlands, to anger, giddiness, and sexual acting out (Reay, 1960); and, in Singapore, to hysterical fear (Chew, Phoon, & Mae-Lim, 1976).

Wheeler (1966) and other social psychologists have found that Western group members seem particularly susceptible to catching the laughter (Leventhal & Mace, 1970), fear, and panicky behavior of other group members (Kerckhoff & Back, 1968; Schachter & Singer, 1962). Wheeler attempted to distinguish "true" contagion (the rapid transfer of emotion from one person to others in the group) from other types of social influence, such as conformity, conscious imitation, responsiveness to social pressure, and social facilitation.

Psychophysiological Research

Haggard and Issacs (1966) observed that people's emotional experiences and accompanying facial expressions may change with incredible speed. They found that unique facial expressions could appear and disappear within a span of 125 to 200 milliseconds: "Occasionally the expression on the patient's face would change dramatically within three to five frames of film (as from smile to grimace to smile), which is equivalent to a period of from one-eighth to one-fifth of a second."

Psychophysiological investigations have further found that people's emotional experiences and facial expressions, as measured by electromyographic (EMG) procedures, tend to mimic the changes in emotional expression of those they observe, and that this motor mimicry can occur at levels so subtle that people produce no observable facial expressions (Cacioppo, Tassinary, & Fridlund, 1990). For example, Dimberg (1982)

measured subjects' facial EMG activity as they looked at pictures of happy and angry facial expressions. He found that happy and angry faces evoked different facial EMG response patterns. Specifically, minute muscular actions were found to increase over the *zygomaticus major* (cheek) muscle region when subjects observed happy facial expressions, whereas minute muscular actions decreased over the *corrugator supercilli* (brow) muscle region (the muscle that pulls the forehead into a frown) when they observed angry facial stimuli. Similar results were secured by Vaughan and Lanzetta (1980) and Voglmaier and Hakeren (1989).

How powerful are these contagion effects? Some research suggests that the process of contagion is relatively fragile (Cacioppo et al., 1991). For instance, if people are caught up in emotions of their own that are very different from those others are feeling, the contagion process can be totally disrupted. In an illustrative study, subjects competed with an experimental confederate in a stock market game (Englis, Vaughan, & Lanzetta, 1982). Subjects quickly learned that, when their partner winced in pain, it was a telltale sign that their own guess was correct and they had won money. When the confederate smiled, they figured they had guessed wrong and that they would soon be receiving an electric shock. Under those conditions, subjects' faces (and facial muscle activity) reflected *their own* pleasure or pain (which was directly opposite to that expressed by the confederate) rather than mimicking the confederate's facial displays of emotion. Thus the usual process of contagion completely disappeared when the context of the social interaction led subjects to focus on and think about the personal consequences implied by another's emotional expressions.

We see then that developmental, clinical, and social psychologists are among the scientists who have observed phenomena that appear to meet the criteria of "emotional contagion." In the next section, we consider the role of individual differences in emotional contagion—individual differences in people's potency as "carriers" of emotional contagion and in people's vulnerability to emotional contagion.

INDIVIDUAL DIFFERENCES

Are there individual differences in susceptibility to emotional contagion? Does everyone experience and display other people's joy, sadness, love, anger, and fear or do people differ markedly in their ability to mirror others' emotions? We assume that people's genetic heritage,

gender, personality, and early experiences should make them more or less likely to "catch" versus resist experiencing others' emotions. Orimoto and Hatfield (1992) developed a measure of people's vulnerability to contagion. The Emotional Contagion Scale consists of 15 items designed to assess people's susceptibility to catching fear/anxiety, anger, sadness/depression, joy/happiness, love, and emotions in general. With the development of the Emotional Contagion Scale, investigators can begin to examine individual differences in emotional contagion. Some of the possibilities in which emotional contagion may be more likely are these:

- Mothers may be especially prone to display and experience their infant's emotions. (In fact, the mother-infant relationship may be a prototype of the "loss of boundaries" between emotional displays of two individuals.)
- Women may have been taught to be more "sensitive" to other people's feelings and thus are more likely to experience and display other people's emotions than are men.
- Couples who are passionately in love (and other intimates) may be especially likely to display and experience their mates' emotions.
- Certain social roles may promote emotional contagion. For instance, social roles that require one to make a psychological investment in another may promotion contagion. Thus psychotherapists may be prone to emotional contagion with their clients; teachers, with their students; and caretakers, with their dependents.
- People who are particularly good at decoding emotions should be more susceptible to emotional contagion.
- Individuals who are sympathetically reactive by disposition may be more likely to "catch" the emotions of those around them.
- Some people are generally unaware of their own feelings. Such people may be less likely to display and experience the feelings of others.

Logically, it would seem that several characteristics should make individuals especially susceptible to (or resistant to) emotional contagion: (a) People should be more likely to catch others' emotions if their attention is riveted on the others than if they are oblivious to others' emotions. (b) People should be more likely to catch others' emotions if they construe themselves in terms of their interrelatedness to the others than if they construe themselves in terms of their independence and uniqueness. (c) Those able to read others' emotional expressions, voices, gestures, and postures should be especially vulnerable to contagion. (d)

Those who tend to mimic facial, vocal, and postural expressions should be especially vulnerable to contagion. (e) Those who are aware of their own emotional responses (people whose subjective emotional experience is tempered by facial, vocal, postural, and movement feedback) should be more vulnerable to contagion. (f) Emotionally reactive people should be more vulnerable to contagion.

Recently, Hatfield and her colleagues (Hsee, Hatfield, & Chemtob, 1992; Hsee et al., 1991a, 1991b; Uchino et al., 1991) proposed that it is when people are paying careful attention to, loving, identifying with, or taking responsibility for others that they are most likely to catch others' emotions. Illustrative situations in which people are especially attuned to others include when they love or like others (as opposed to being disinterested in them), when they identify with or feel responsible for others, and when they believe the others have power over them.

Are some people especially likely to shape others' emotions? Some people may be especially able to shape emotional encounters. Some individuals, for instance, have such contagious laughs that no one can resist; other people get lost in the crowd. Friedman and Riggio (1981) argue that "expressive" people (as measured by the Affective Communication Test) are more likely to provoke contagion than are their "inexpressive" peers. Sullins (1991) provides evidence that "strongly expressive" people are more likely to be carriers of emotional contagion than are "weakly expressive" people.

We would argue that powerful senders should probably possess at least three characteristics. (a) They must feel, or at least appear to feel, strong emotion. (b) They must be able to express these emotions (c) They should be relatively insensitive to the feelings of those who are experiencing emotions incompatible with their own.

CONCLUSIONS

In this chapter, we have reviewed evidence that people often catch the emotions of those around them. They sense, moment to moment, what others are feeling. First, we reviewed some of the processes that may underlie such primitive emotional contagion. We found that people are capable of processing a great deal of information outside of conscious awareness. We found that people tend to mimic/synchronize their movements with the movements of those around them. They mimic the facial, vocal, and postural expressions of others. Emotional

experience is often shaped by feedback from the facial musculature as well as by vocal and postural feedback. We ended by reviewing evidence from a variety of disciplines that both primitive emotional contagion and broader ranging emotional contagion exist.

What are the implications of such findings? Of course, people's conscious analytic skills can help them figure out what makes other people "tick." But, if people pay careful attention to the emotions they experience in the company of others, they may well gain some extra information as to others' emotional states. In fact, researchers (Hsee, Hatfield, & Chemtob, 1992) provide some evidence that what people think may be very different from what they feel emotionally. Both provide invaluable information as to others' emotional states.

Of course, emotional contagion research is still in its infancy. Much more research is needed to tease apart the factors that shape the tangled skein of primitive emotional contagion. We believe that the importance of emotional contagion for synchronizing and maintaining adaptive social interactions and the potential richness of this area of research will make a program of research into the antecedents and consequences of primitive emotional contagion worthwhile.

NOTES

1. Bavelas et al. (1987) argue, of course, that such mimicry is a communicative act, conveying a rapid and precise nonverbal message to another person.

2. Presumably, in concordance, the client wishes the therapist to share his or her experiences; in complementarity, to fill a very different, but facilitative, role—playing, say, stern disciplinarian to the client's child.

3. Tseng and Hsu (1980) define mass hysteria as a "sociocultural psychological phenomenon in which a group of people, through social contagion, collectively manifest disturbances for a brief period of time" (p. 77). We wish to thank Lois Yamuchi for sharing her research on this topic with us.

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