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"I *Show* How You Feel": Motor Mimicry as a Communicative Act

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Elementary motor mimicry (e.g., wincing when another is injured) has been a classic problem in social psychology, with previous theories treating it as the overt manifestation of some intrapersonal process such as vicarious emotion. In a two-part experiment, we tested the hypothesis that motor mimicry is instead an interpersonal event, a nonverbal communication intended to be seen by the other. The first part examined the effect of a receiver on the observer's motor mimicry: The victim of an apparently painful injury was either increasingly or decreasingly available for eye contact with the observing subject. Microanalysis showed that the pattern and timing of the observer's motor mimicry were significantly affected by the visual availability of the victim. In the second part, naive decoders viewed and rated the reactions of these observers. Their ratings confirmed that motor mimicry was consistently decoded as "knowing" and "caring" and that these interpretations were significantly related to the experimental condition under which the reactions were elicited. These results cannot be explained by any alternative, intrapersonal theory, so a parallel process model is proposed: The eliciting stimulus may set off both internal reactions and communicative responses, but these function independently, and it is the communicative situation that determines the visible behavior.

As Allport (1968) noted, authors from Adam Smith (1759) to Spencer (1870) and MacDougall (1908) have been intrigued by one person's close motor mimicry of another, such as smiling at another's delight, showing pain at his injury, or straining with her effort. Such mimesis is, on reflection, curious: The individual's reaction is *not* appropriate to his or her actual situation as observer but to that of the other person. It is as if the observer, rather than remaining in his or her own situation, momentarily becomes the other person in that person's situation, to the point of showing the other's nonverbal behavior. Darwin (1872/1965) observed that emotions thus displayed may even exceed the expression of a personal emotion:

> It is not a little remarkable that sympathy with the distresses of others should excite tears more freely than our own distresses; and this is certainly the case. (p. 216)

The main issue to be addressed here is whether this is the result of heightened feeling (as Darwin implied) or the result of an intention to communicate that feeling clearly to another.

Our previous review (cf. Bavelas, Black, Lemery, MacInnis, & Mullett, 1985) showed that both research and theory on this phenomenon are scarce. With the exception of O'Toole and Dubin's (1968) studies, previous research on motor mimicry has been almost entirely anecdotal: for example, Köhler's (1927, Plate IV) photograph of Sultan holding one arm up as he watched another chimpanzee reaching for bananas, Allport's (1937, p. 531; 1961, p. 535) photographs of spectators at athletic events, and anthropologists' descriptions of ritual couvade (e.g., Kupferer, 1965).

Theory has been as insubstantial as empirical evidence, so that Allport's (1968, p. 29) comments regarding "the little understood tendency to elementary motor mimicry" are still a good summary of the theoretical state of affairs:

> Motor mimicry (empathy), basically a perceptual motor reaction, [is] at present not fully understood. (p. 32)
>
> This process of empathy remains a riddle in social psychology. (p. 30)

Motor mimicry has been conceptualized as primitive empathy, as a reflex based on cues previously conditioned to one's own direct experience, as an expression of vicarious emotion, and as a manifestation of a trait (e.g., empathic ability) or of a cognitive operation (e.g., taking the role of the other; Mead, 1934). Note that in all of these, the explanation is placed "inside" the individual, with the social environment secondary at most; that is, the overt reaction is seen as an incidental by-product of the primary intrapersonal event.

Yet, because facial and other nonverbal expressions are conspicuously visible to others, motor mimicry may have a social function.[1] As Kraut and Johnston (1979) noted, nonverbal expressions can be seen as social displays as well as emotional expressions. In their field studies Kraut and Johnston showed that smiling occurred principally in the presence of a receiver rather than in nonsocial but "happy" circumstances. Following

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[1] It is noteworthy that all of Darwin's (1872/1965, pp. 215–217) examples of nonverbal expressions of sympathy happen to be in social settings, never alone or in the abstract. (Of further interest is Darwin's implication that *blushing* is social; he offered surprising evidence [pp. 313–315] that it is usually displayed only on parts of the body visible to others.)

this line of thinking, motor mimicry would be seen as an interpersonal act conveying precisely and efficiently "I feel as you do." If so, it would not only be a nonverbal behavior but also a nonverbal communication (Wiener, Devoe, Rubinow, & Geller, 1972), which is expressive *to* another person rather than only expressive *of* the individual's feelings. In Ekman and Friesen's (1969) terms, this would be a shared communicative and interactive act, encoded by senders and decoded by receivers in such a way as to convey information. Specifically, it would be an iconically (analogically) coded illustrator or emblem, closely resembling the meaning it represents. We construe this meaning to be "It is as if I am feeling your pain" (or happiness, effort, etc.).

Two broader theoretical frameworks are useful for identifying the more general message that such a reaction may convey. Watzlawick, Beavin, and Jackson (1967) proposed that communication inevitably carries not only content but also relationship information and that nonverbal, analogic communication (e.g., proximity, tone of voice) serves to define and reinforce the interpersonal relationship. Thus it may be more appropriate for me to *show* how you feel nonverbally than to say only verbally "I know how you feel." These two alternatives may define different relationships, the first warmer and more connected, the second more formal and distant. Similarly, in Heider's (1958) concept of *unit relation*, self and other are portrayed as close and similar; mirroring the other's reaction in motor mimicry would be characteristic and indicative of a unit relationship. (La France, 1982, has suggested this interpretation of postural mirroring.)

Our previous work (Bavelas et al., 1985) was devoted to developing experimental methods for studying motor mimicry and thus to establishing that there was indeed a class of such behaviors capable of being elicited and subjected to experimental manipulation in the lab as well as to quantitative analysis. These behaviors included mimetic expressions of pain, smiling and laughter, discomfort and disgust, verbal and physical effort, and avoidance of apparent danger. In the process, it became apparent to us that motor mimicry was not a simple reflex but, rather, was sensitive to social and, especially, communicative conditions.

The purpose of the present experiment was to test our theory that motor mimicry is communicative. The issue of how ultimately to establish whether a nonverbal behavior is also a nonverbal communication is not a settled one (Ekman & Friesen, 1969; MacKay, 1972; Patterson, 1983; Wiener et al., 1972). However, we propose that a strong prima facie case can be made by experiments focused on sender–receiver variables; that is, if motor mimicry is communicative, then (a) the probability of its being seen by a receiver should affect the sender's display of facial mimicry, and (b) receivers should make consistent interpretations of such displays. If, on the other hand, such mimesis reflects essentially a private experience that happens to result in overt nonverbal behavior, then it is not a nonverbal communication, and the presence or absence of a receiver should have no effect.

Therefore, we varied the probability that the "victim" of a painful injury would have eye contact with the observer and looked for coordinated differences in the display of motor mimicry. Then we sought to establish that differences resulting from this manipulation of visual availability were meaningful to others, in other words, that naive decoders would make consistent judgments about the meaning of facial mimesis of another's pain.

The experiment itself was a "microexperiment" in which the manipulation itself took only 4 s and the data were subjected to microanalysis of the synchrony between a subject's reactions and the experimenter's behavior. This reflects our corollary hypothesis that motor mimicry is not a global reaction indicating a single, undifferentiated psychological state but is instead quite finely tuned, analogous to verbal language as a skillful social act inserted quickly and precisely into the interactive sequence.

Part 1: The Effect of a Visually Available Receiver

Method

An apparently painful injury occurred directly in front of the observer in both experimental conditions. As noted earlier, the two conditions were made to differ in the probability (increasing versus decreasing) that eye contact would be made between victim and observer. In the eye-contact (EC) condition, the injured experimenter was initially oriented toward the observer, who could therefore expect and did indeed ultimately receive direct eye contact. In the no-eye-contact (no-EC) condition, the experimenter was initially at a right angle to the observer and then turned away after the injury to look at the other experimenter. A good deal of planning went into making the injury appear equally severe in both conditions; when the two procedures necessarily diverged, the no-EC injury was made to seem the more severe.

Every aspect of this 4-s sequence was precisely choreographed and enacted so that it could withstand frame-by-frame analysis. Two experimenters could play either the role of the victim (E1) or his helper (E2). These two experimenters and the two conditions were randomly permuted in sets of four for random assignment to observer.

Participants

Forty-two undergraduate women who had signed up for the University of Victoria Psychology Department's "subject pool" from their first- or second-year psychology courses participated voluntarily. Two were replaced because of equipment problems, leaving the planned N of 40, with 10 in each experimenter–condition combination.

Recording

The observer's responses along with the stimulus being watched were videotaped in split-screen. The stimulus (filmed from the observer's point of view) was recorded in the upper right quadrant, and the observer (filmed almost full-face) was recorded in the remaining three quarters, principally the left half. A time signal accurate to within 0.03 s was superimposed on the lower right quadrant. The experimenters' movements were planned so as not to block the camera that was filming the observer at the time of injury.

Procedure

There were three experimenters, E1 and E2 (both male) and E3 (female). The main experimenter (E1) was in charge and interacted with the participant, who was told that her part was simply to be an observer of some tasks and video clips, that she would be interviewed afterward, and that the experiment was being videotaped. The injury sequence was embedded in a four-part procedure: First (in order to let the observer settle in and to set the stage for the injury), the observer watched E3 work at a timed construction task. Then, while E1 was setting up equipment for the next task, he accidentally dropped a large television monitor on his apparently already injured finger. Next the observer watched several short film clips and then was interviewed by E1 and asked to describe all the events that occurred during the experiment.

The injury. So that the observer would perceive the accident to be a painful one, E1 was wearing a full, taped finger splint throughout the experiment, as if his finger were injured. After the construction task, E3 left to get E2 to help bring in the video equipment. E1 then addressed the observer while putting away the blocks of the construction task, during which activity his splinted finger was quite conspicuous:

> Okay, for the next part of the experiment we have a film clip we'd like you to see. First, let me pick these up, then [E2's name] and I'll set up the Betamax and the TV, so you can watch it right here [on the table directly in front of the observer].

E2 brought in the Betamax, cable, and cassette, put them on the table, and set them up. E1 then said, "Okay, let's get the TV," whereupon E1 and E2 left the room and came back carrying a 20-in color monitor, which was obviously both heavy and awkward.

E2 was leading, carrying the right side of the set, while E1 was holding up the left side with his left hand (the one with the splinted finger). When they were a few steps away from the table and directly in front of the observer, E1 said, "Wait a minute, let's put it over here," and they placed the monitor on the table, perpendicular to the observer, with E1's splinted finger underneath the end directly in front of her. The two injury sequences then proceeded as follows:

EC	no-EC
Injury and intake of breath; face begins to show pain.	Injury and intake of breath; face begins to show pain.
Brings head up and glances at observer with defocused eyes as head rolls back.	Hunches down over TV, with face visible to observer in profile.
Two seconds after the start of the injury:	
E2 lifts TV off E1's hand.	E2 lifts TV off E1's hand.
E1 pivots fully toward observer, in semi-crouch, holding his hand. Looks at hand, then directly at observer for 1 s with "blank" face.	E1 pivots fully toward E2, in semi-crouch, holding his hand. Looks at hand, then directly at E2 for 1 s.

Four seconds after the start of the injury in both conditons E2 asked, "Are you okay?" E1 looked at E2, then said, "Yeah, I think so," examined his hand again, and concluded, "It just hurt for a minute."

Both experimenters then went on to hook up the TV and Betamax, without looking at the observer. E2 left, and E1 started the video-watching part of the experiment. After this and the interview, the observer was taken to the control room, where the experiment was explained while she viewed the videotape of it. Permission to keep and analyze the tape was requested and obtained in all cases.

Scoring

Motor mimicry was defined as any nonverbal response similar to one made by E1, or one that a person might make in E1's situation, but *not* what an observer might do remaining as observer—in brief, motor mimicry was any expression of pain. This is consistent with the historical definition (e.g., "When we see a person struck we cringe; when we watch a tightrope walker we grow tense"; Allport, 1968, p. 24), which is broader than literal mimicry in including reactions appropriate to the other's situation.

The typical expression is best described as a big wince. However, our observers' faces were often kaleidoscopic and typically included a rapid succession of expressions and components of expressions. The following behaviors were counted as indicative of pain:

Mouth—rounded, open; pursed or puckered; drawn and held back in grimace (including teeth bared); corners of lips down; lips tightened or bitten. (*Not* mouth ajar; or smiles that were not grimaces, i.e., open with no tension.)

Eye area—eyebrows move up, down, or asymmetrically; knitted or wrinkled; eyes widened or narrowed. (*Not* blinks or looking away.)

The following other mimetic behaviors occurred less often:

Vocalizations—ew, ouch, ooch, ow, oh (with congruent tone); audible, sharp intake of breath. (*Not* laugh, giggle, or any verbalization, e.g., "Are you okay?")

Head—back and up, but only near beginning of sequence. (*Not* left or right, or back later in sequence.)

These labels were matched to expressions on pilot tapes so that the scorers' usage would be standard.

Because we were interested in more than simply whether expressions of pain occurred within the 4-s interval, our main analysis was microanalysis of synchrony (cf. Bavelas et al., 1985)—that is, of the coordination of the observer's expression with the victim's visual availability.

The first measure captured the *pattern* of mimetic facial expressions, starting at the onset of injury and continuing either to the most communicative point (full eye contact) in the EC condition or to the least communicative point (when E1 looked directly at E2 and E2 started to say, "Are you okay?") in the no-EC condition. Observers should follow one of two patterns in the EC condition, in which eye contact was increasingly probable given the orientation and behavior of E1: Their mimicry should either begin immediately and continue at the same level or begin and increase over the interval. In the no-EC condition, in which eye contact was decreasingly probable from E1's initial orientation until he finally turned to interact with E2, the mimicry should either not begin at all or begin but decrease over the interval. These patterns were scored by pairs working together, and reliability was established across three pairs of scorers. Two pairs were experienced in microanalysis; one pair was new to scoring nonverbal behaviors. Agreement across pairs was 80%, 84%, and 90%. Disagreements were later resolved by the most experienced pair.

Besides demonstrating that the display of motor mimicry follows this general pattern of increase or decrease, it is necessary to show that it was actually present when the victim could see it. For this, a *point* measure was taken as follows: The tapes were stopped at the moment of maximum or minimum interaction (the ends of the two above sequences), and the facial expressions were grouped into clear, unambiguous mimicry and unclear or no mimicry (cf. Bavelas et al., 1985). Interpair agreement was 83%, 83%, and 94% across the three pairs.

We also recorded any smiles that occurred during the injury and, finally, the occurrence of mimetic expressions in the postexperimental interview, when the observer was describing that part of the experiment (e.g., "and then you dropped that TV on your finger" accompanied by a wince).

Results

Procedural Checks

Eight participants' responses to the injury sequence could not be used: 3 because of experimenter errors (improper delivery of initial gaze or full eye contact, or varying the verbal script slightly), and 5 because of the participant's unexpected actions (1 was not looking at the experimenters at the time of the injury, 3 interrupted with questions just before or during the injury sequence, thereby throwing it off, and 1 leaped out of her chair to help at the onset of the injury). Thus the N usable for analysis was 32, 15 in the EC and 17 in the no-EC condition.

Before any scoring, the videotapes were analyzed to determine how closely the procedure was followed during the injury sequence, which had been practiced for several weeks to ensure that it was consistently enacted. The EC and no-EC conditions were quite similar in both the mean time to the midpoint (when the TV was lifted off the finger: EC, M = 1.49 s, SD = 0.58; no-EC, M = 1.32 s, SD = 0.25) and the mean total duration of the injury sequence (EC, M = 3.82 s, SD = 0.34; no-EC, M = 3.59 s, SD = 0.22). In the EC condition, the mean duration of the initial glance was 0.56 s (SD = 0.16), and the mean duration of the second, full eye contact was 0.74 s (SD = 0.19). The two experimenters were found not to differ in their performance of the key aspects of the injury, for example, in the initial glance, body orientation, and delivery of eye contact. All of the above differences (between conditions and between experimenters) were nonsignificant.

Occurrence of Motor Mimicry

The injury was very effective, in that 26 out of 32 observers displayed some expression of pain at some time during the injury (14 of 15 in the EC condition, 12 of 17 in the no-EC condition). The reaction time was surprisingly short, which is consistent with results from earlier studies; the mean from onset of stimulus to first mimetic reaction was 1.27 s (EC, M = 1.04; no-EC, M = 1.32; the difference was not significant).

Effects of Eye Contact

As shown in Table 1, the temporal patterning of mimesis corresponded to EC and no-EC conditions as predicted: In the EC condition, these expressions either (1) began and continued over the entire interval or (2) began and increased in intensity over the interval. In the no-EC condition, either (3) the expression began but decreased in intensity over the interval or (4) did not occur at all. Similarly, the expressions at the maximally and minimally interactive points differed significantly as predicted.

In addition, mimetic expressions occurred frequently in the postexperimental interview, when the eliciting conditions were no longer present. When asked to describe everything they saw in the experiment, 20 of 38 subjects spontaneously produced mimetic expressions when recounting the injury to E1. As our theory would predict, because there was now a receiver available, there was no residual difference between EC and no-EC conditions, $\chi^2(1, N = 38) = .42$, *ns*.

Finally, an interesting unexpected finding was the frequency of smiling (usually mixed with other expressions) in reaction to the injury. Such smiles occurred significantly more often in the EC condition, $\chi^2(1, N = 32) = 4.79$, $p < .05$. We suspect that these smiles, which were paired with or sandwiched between mimetic expressions, were not sadistic or happy smiles but were instead reassuring, face-saving, or perhaps miserable smiles (Ekman & Friesen, 1982), aimed at E1 and intended to be seen by him.

Table 1
Synchrony Analyses of Motor Mimicry as a Function of Increasing or Decreasing Probability of Eye Contact

Measure	Frequency: Eye contact	Frequency: No eye contact
Pattern measure (intensity as a function of time)[a]		
(1) Began and continued	2	1
(2) Began and increased	11	4
(3) Began and decreased	1	7
(4) Did not occur	1	5
Point measure (motor mimicry at moment of maximum or minimum interaction)[b]		
Clearly present	10	3
Absent or ambiguous	5	14

[a] For (1) + (2) versus (3) + (4), $\chi^2(1, N = 32) = 8.72$, $p < .005$.
[b] $\chi^2(1, N = 32) = 7.94$, $p < .005$.

Discussion

The presence and availability of a receiver affected both the pattern and timing of motor mimicry. As the probability of eye contact with the receiver increased, motor mimicry not only increased generally but was available at the best "delivery point." When, on the other hand, it became less and less probable that the victim could see the expression, motor mimicry either faded away quickly or did not occur at all. These observers' faces seemed to go on hold, apparently waiting for eye contact that never happened.

A plausible alternative explanation of these results would be that information was not constant in the two conditions. That is, it could be that, solely because the experimenter's face was visible longer in the EC condition, his injury appeared more serious or painful (e.g., because E1's face signaled more pain or conveyed more clearly that the injury was a serious one.) Because this would be a strong alternative explanation, considerable planning had gone into making this possibility less likely: Most aspects of the two conditions were identical, including the injury itself, the full view of the injury, the sharp intake of breath, a pronounced bodily reaction, holding and looking at the injured hand, and all of E2's reactions. Other aspects of the two conditions were as comparable as possible. The stimulus configurations at the time of the injury were almost identical, with half of E1's face, showing pain, visible in the no-EC condition; recall that mimetic reactions appeared very quickly, so this was the initial stimulus. Moreover, in the EC condition, the pain was gone from E1's face by the time he made eye contact. When, in the no-EC condition, E1 began to turn away, he also crouched over, holding his hand—a reaction that was chosen because a pilot study had shown that turning away and bending over raised the possibility of a very severe injury. E2's concern was also salient at this point. In brief, everything was scripted to make the injury in the no-EC condition appear at least as painful, if not more, than the injury in the EC condition.

There is also the evidence of collateral results. If the EC injury had appeared more severe, observers should have been *less* likely to smile, even reassuringly. There might also have been a greater likelihood of motor mimicry of pain in the interview. (The incidence of smiles also rules out another not entirely implausible alternative: that the human face per se is inherently a stronger stimulus or, more precisely, an intensifier of other stimuli.)

Finally, there is an alternative explanation that may be noticeable by its absence thus far: namely, that the observers' responses were the result of experimenter demand or compliance.

Surprisingly, we agree with one version of this interpretation, although not with another. If what is meant by this explanation is that the experimenter somehow covertly conveyed the hypothesis to the participant, who, upon witnessing an entirely unexpected event in the midst of a series of diverse events, conformed to this particular hypothesis within 1.27 s, then the explanation seems implausible. However, if what is meant is that the participant knew what a person should convey when someone else is injured, then we agree; that is our hypothesis, and it should hold in experimenter–subject interaction as in any other. It is not an artifact but the very topic of interest.

If these alternative explanations can be set aside as less probable than our communicative hypothesis, this same hypothesis must then deal with the occurrence of motor mimicry in the no-EC condition. Five of the six blank faces were in this condition, but the other 12 observers did display some mimetic expressions. It is tempting to think of these as a noncommunicative base rate. However, the no-EC condition was not a noncommunicative one: Our independent variable was the probability of eye contact. Seen in this light, it is noteworthy that the most common no-EC pattern was an early display that decreased. The motor mimicry therefore occurred at a time when the experimenter (in profile) was visually available and when there was still some probability that he might turn toward the observer. Thus it is not accurate to interpret these as instances of motor mimicry in the absence of a receiver. (The more general issue of why motor mimicry might occur without a receiver, as it undoubtedly does in other circumstances, is discussed at the end of this article.)

The appearance of expressions mimetic of the injury during the interview is worth elaborating on. It might be seen as caused by a memory of the recent experience. However, it seems more parsimonious to treat all mimetic expressions as operating by the same principle, whether they happened while the injury was taking place or later when it was being described. We are proposing that, at either time, they were illustrators (Ekman & Friesen, 1969). The observer was not injured and was not expressing her pain (as the experimenter appeared to be expressing his). Rather, she was representing her reaction and conveying this representation, in both instances. (This leads to the interesting prediction that the expression should be made to receivers other than the victim, not only to another interviewer but even to other observers who are in a position to see the expression—for example, to a companion in a movie theatre.)

Part 2: Decoding of the Expressions

Having shown that our observers' expressions varied as a function of decoder availability and were therefore probably communicative acts, we next sought to establish that the differences in facial expression resulting from the manipulation of visual availability in Part 1 were meaningful to others.

In open-ended pilot work, we gave naive and expert decoders essentially the same information as below and asked them (a) whether the facial expressions from Part 1 meant anything at all to them; (b) if so, what; (c) how certain they were of this; and (d) how difficult it was for them to arrive at their answers. Decoders had little difficulty in judging the meaning of these expressions, and they were certain about their judgments. There was a remarkable consistency in the labels decoders chose to describe the faces: The expressions of observers in the EC condition were described as caring or empathic, whereas those of observers in the no-EC condition were described as uncaring or unknowing. This strongly suggests systematic decoding by receivers, which was the hypothesis tested in Part 2.

Method

All 32 observers' facial reactions to the injury in Part 1 were presented to naive decoders in the form of videotaped excerpts, without information about experimental condition. Each excerpt was approximately 10 s in length and included the 6-s period before the injury when the two experimenters carried the TV past the observer over to a table where the 4-s injury sequence occurred. The preinjury material was included so that decoders had a more complete view of the context of the injury and had 6 s to prepare themselves before viewing the material to be rated (i.e., observers' facial reactions during the 4-s injury sequence). The 32 reactions were divided into four unequal blocks for presentation to decoders. All decoders saw the same block of 6 expressions first, then they were randomly assigned to view the next two blocks (each containing 12 expressions) in one of two possible orders. Finally, each decoder saw the remaining block of 2 expressions last.[2]

Participants

Five male and 5 female University of Victoria summer session students (aged 17 to 36 years) participated voluntarily. Each was paid $10.00 for participating in the study, which took about 1½ hr.

Equipment

The facial expressions were presented by a Betamax SLO-323 videocassette recorder (VCR) on a Sony black and white monitor with a good quality picture. The upper right-hand quadrant, which contained the split-screen view of the injured experimenter, was covered to ensure that decoders were blind to experimental condition.

Procedure

The experimenter told each decoder that he or she was about to participate in a study of nonverbal communication and that he or she would see the facial reactions of 32 people to an experimenter's injury, which was then described. If the nature of the injury was not clear from the verbal description, it was simulated. The decoder was then seated directly facing the TV monitor and told that the task was to imagine that he or she was the injured experimenter looking up at the observer's face just after the injury occurred. Both the rating scales and the kinds of expressions they might see were explained. The experimenter then presented three enacted examples, intended to represent the range of faces the decoder would see during the study. Finally, the experimenter described the operation of the VCR, told the decoder to view each of the 32 excerpts only once, and left him or her alone to make the ratings.

After viewing each facial expression, the decoder made his or her ratings on three continuous 12-cm lines. These ratings were expressed as physical length, using a magnitude estimation procedure suggested by Stevens

[2] The first block contained the six excerpts used in pilot research and could therefore be used as an index of reliability between the ratings of pilot decoders and those in the present study (these reliabilities all approached unity). The second and third blocks of 12 excerpts each were used for counterbalancing. The third block became necessary because of delays in contacting the original observers for confirmation of their permission to show their tapes to decoders.

(1966) and shown to be a highly reliable technique for obtaining quantitative judgments (e.g., Bavelas & Smith, 1982). Two of the three rating scales, namely, the "knows" and "cares" scales (see below), were derived empirically from the labels used by pilot decoders. The third scale, "appropriateness," was added to test the prediction that failing to show that one knows or cares about another's injury would be seen by others as inappropriate behavior in the situation.

On the first scale, the decoder rated the extent to which the face expressed that the person *knew* how the experimenter felt. One endpoint of the scale was labeled *not at all* (0 cm), and the other was labeled *completely* (12 cm). There were vertical lines at 4 and 8 cm denoting *a little* and *quite a bit*, respectively. On the second scale, which was similarly formated and labeled, the decoder rated the extent to which the face expressed that the person *cared* about what had happened to the experimenter. The third scale was for rating the extent to which the facial expression was *appropriate* to the situation. One endpoint of the scale was labeled, *completely inappropriate* and the other, *completely appropriate*, with the 4-cm and 8-cm points labeled *a little inappropriate* and *quite appropriate*. On all three scales, the decoder was free to mark anywhere on the line.

To ensure attentiveness, the decoder was given the option of taking breaks during the experiment or stopping and finishing at another time. Only 2 of the 10 decoders did not finish in one session, and neither required more than a short second session to finish. After the ratings were completed, the experimenter discussed the study with the decoder in as much detail as he or she wished. Each was then thanked and received $10.00 for participation.

Results

Reliability of Ratings

The intraclass reliability coefficients (Winer, 1962, pp. 124-128) were .88 for the knowing scale, .87 for caring, and .89 for appropriateness. Thus there was substantial consensus among naive decoders on their ratings of the 32 facial expressions on all three dimensions.

Experimental Effects

To test the hypotheses that the facial expressions of observers in the EC condition of Part 1 would be rated as more knowing, caring, and appropriate than those of observers in the no-EC condition, a 2 (condition) × 2 (experimenter) multivariate analysis of variance was conducted on decoders' three ratings of each expression. As predicted, there was neither an effect of experimenter nor an interaction of condition with experimenter, and the multivariate main effect of condition was significant, $F(3, 26) = 3.88$, $p < .02$. This was followed by one-tailed univariate tests of our directional hypotheses, two of which were significant. As shown in Table 2, the decoders rated the facial expressions of observers in the EC condition as more knowing and caring than the expressions of those in the no-EC condition. However, what should at best be cautiously called a trend was obtained for the overall appropriateness of the expressions. (We think that this is because the decoders felt that direct action, i.e., getting up to help, would have been most appropriate.)

Table 2
Mean Ratings of Observers' Expressions as a Function of Their Probability of Eye Contact With the Victim

	Experimental condition		
Rating scale	Eye contact	No eye contact	$t(30)$
Knowing	7.11	5.55	2.12*
Caring	6.16	4.67	2.03*
Appropriate	6.54	5.45	1.36

Note. Scale range was from 0 to 12 cm, with 12 the maximum positive score. The three scales correlated as follows: knowing–caring = .96, knowing–appropriate = .91, caring–appropriate = .91.
* $p < .03$ (one-tailed).

Discussion

As in Part 1, the results could easily have falsified the communicative hypothesis. Here, decoders might have responded virtually randomly if the expressions had no message value to them. Instead, we obtained consistent evidence that what observers in Part 1 did in the presence of a visually available victim produced a more knowing and caring message than did the behaviors of observers in the other condition. Thus the presence of a visually available decoder elicited reactions that were interpretable by decoders in general.

General Discussion

Taken together, these two studies support the thesis that motor mimicry is not only an informative act but a communicative one; it is iconically encoded, inserted skillfully into the interactive sequence, and consistently decoded by receivers.

We do not believe it is possible to explain these findings with an intrapersonal theory, such as classical conditioning (Berger, 1962; Craig & Weinstein, 1965), vicarious emotion (Stotland, 1969), taking the role of the other (Mead, 1934; O'Toole & Dubin, 1968), or a trait of empathy that is either verbal/cognitive (Bender & Hastorf, 1953; Davis, 1983; Dymond, 1949; Kerr & Speroff, 1951) or nonverbal/expressive (Argyle, 1972; Haase & Tepper, 1972; Miller & Steinberg, 1975; Rogers, 1975; Wiemann, 1977). To justify this conclusion, it is necessary to identify the phenomenon precisely: Motor mimicry is no more and no less than the overt behavior visible to others. The question is, then, to what other behaviors, processes, or constructs is the phenomenon related most directly? The intrapersonal theories propose that this overt reaction is the observable manifestation of an unseen psychological process. But we doubt that any such theory can account for (a) the differential effect of visual availability of a decoder, (b) the microsynchrony of the motor mimicry to this visual availability, and (c) the agreement among decoders on its meaning.

If alternative, intrapersonal theories cannot be offered, then communicative variables must be able to affect the display of motor mimicry. This modest success immediately raises an interesting new conceptual problem: Why would motor mimicry ever occur when the observer is alone? Most readers will have had this experience, and our studies with video stimuli confirm that these elicit motor mimicry, albeit less than do live stimuli (Bavelas et al., 1985). In formal terms, is it the case that some motor mimicry is communicative (as has been shown by these studies) or that all motor mimicry is communicative? The answer depends in part on what explanations can be offered for motor mimicry when an individual is alone. The possibilities to be considered raise issues central to our conception of "social behavior."

First, it is possible to maintain the traditional position—that motor mimicry is primarily the manifestation of an intrapersonal process—by an amendment stipulating that the probability or amount of reaction can be enhanced and shaped by secondary, social factors. In other words, the stimulus leads to an internal reaction (such as vicarious emotion), which may lead to the nonverbal reaction; but this reaction does not occur, at full strength, in every instance. Communicative factors, such as the presence of a receiver, may enhance the response significantly. Thus keeping in mind some difficulties discussed earlier, it is still possible to interpret the incidence of motor mimicry in the no-EC condition as being the base rate caused by purely intrapersonal factors and thus to maintain the position that it would not occur without some intrapersonal process.

Note, however, that we now have a time bracket for this hypothesized process, namely, the reaction time of the overt display. The reaction time we obtained is revealing for two reasons. First, the overall mean of 1.27 s sets an upper limit on the complexity that can be proposed for the intervening process. Second, and more important, there should have been a difference in reaction time between conditions, because in this model the communicative overlay would have to be added to the basic reaction. But there was no significant difference; as it happened, the means were in the opposite direction, with the no-EC reactions occurring on average over a quarter of a second later.

If the traditional view is now less plausible or appealing, we are left only with communicative explanations, and these require a new view of social behavior. For example, if we believe communication to be ubiquitous in the presence of others (e.g., Watzlawick et al., 1967), then we should point out that participants watching a video in an experiment are not alone but in the presence of both an experimenter and a camera. Indeed, our participants watching an unpleasant medical procedure on video often turned toward the experimenter while displaying the classic "disgust" face. Similarly, even nonverbal expressions in a darkened theater may be addressed to one's companions.

To avoid this explanation, we can put our hypothetical observer alone at home in front of a television set. But why not say that the person (or personification) on the screen is psychologically real for the moment, or at least becomes sufficiently an "other person" to elicit a misplaced display? We accept easily that the plot or situation portrayed can become real enough to evoke our emotions, so by the same liberty, the characters themselves can be seen as "real" enough to evoke our communication.

However, it is not necessary to consider symbolic events at all, because there is another, simpler possibility: The occurrence of motor mimicry or any nonverbal illustrator when alone is the nonverbal equivalent of talking to oneself. Just as we represent our thoughts in words that sometimes spill over into muttering to ourselves, we might represent some thoughts in nonverbal actions that are not always suppressed.

Having examined these alternative theories logically and in the light of our data, we conclude that overt motor mimicry is best explained as a communicative act, controlled by interpersonal variables and independent of any intrapersonal processes that may accompany it. It is important to emphasize that we do not reject the existence of the latter. Instead, we propose a *parallel process* theory: Both communicative and internal psychological processes can be elicited by the same stimuli but thereafter proceed independently. Any interdependencies would have be to demonstrated, and both the present data and Kraut and Johnston's (1979) earlier data on smiles suggest that this may be a difficult isomorphism to establish. Moreover, we are inclined to think that such interdependencies are irrelevant or at least secondary to the main interests of investigators of either process.

In verbal interaction, what we say is seldom exactly what we think or feel. We may sometimes speak without thinking and at other times (fortunately) think without speaking. Similarly, witnessing another's injury (or effort or grief or success) may give rise both to personal feelings and to motor mimicry, but we cannot, on the basis of the evidence, conclude from this that the internal reaction causes the overt display. The event witnessed may lead to one, both, or neither: The observer may have an internal reaction but show no motor mimicry; for example, a nurse may suppress her own grimace. Or the observer may show motor mimicry prior to or even without feeling any emotion. For example, some of our participants in earlier studies have reacted even though they were unsure what had happened; they seem to wince or grimace just in case this display were appropriate.

It will take considerably more evidence to support our model, evidence we are now seeking both in the topography of the mimetic response (hoping that in form we may find function) and in its developmental parameters. But we should not underestimate the implications for any theory, from learning theory to social psychology, that currently treats intrapersonal processes as primary and social behavior as secondary. Our goal is not the negative one of denying intrapersonal processes in favor of interpersonal ones. We have, rather, the positive aim of separating the two so that social behaviors can be seen as interesting in their own right. As proposed in detail elsewhere (Bavelas, Black, Lemery, & Mullett, in press), nature is not slipshod or wasteful; if an expressive behavior is visible to others, then we should approach that behavior as communicative.

To summarize our position, all of our actions in the presence of others are probably shaped in part by the reactions they elicit from others. Expressive behaviors in particular are not an inadvertent by-product of a private experience but are primarily and precisely interactive; they are constant evidence that in our social behavior we are intricately and visibly connected to others. For these reasons we propose that the overt behavior of motor mimicry is primarily communicative and that, moreover, it conveys a message fundamental to our relationships with others: I am like you, I feel as you do. Thus the centuries-old puzzle of motor mimicry—and perhaps many other behaviors—may be solved by looking beyond the individual to the immediate interpersonal context in which the behavior occurs.

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