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# What Do Facial Expressions Convey: Feeling States, Behavioral Intentions, or Action Requests?

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Emotion theorists assume certain facial displays to convey information about the expresser's emotional state. In contrast, behavioral ecologists assume them to indicate behavioral intentions or action requests. To test these contrasting positions, over 2,000 online participants were presented with facial expressions and asked what they revealed—feeling states, behavioral intentions, or action requests. The majority of the observers chose feeling states as the message of facial expressions of disgust, fear, sadness, happiness, and surprise, supporting the emotions view. Only the anger display tended to elicit more choices of behavioral intention or action request, partially supporting the behavioral ecology view. The results support the view that facial expressions communicate emotions, with emotions being multicomponential phenomena that comprise feelings, intentions, and wishes.

The traditional view of facial expressions is that certain configurations of facial muscle contractions convey information about the emotional state of a person (e.g., Darwin, 1872; Ekman, 1972; Izard, 1997). For example, Ekman's (1972) neurocultural theory assumes that emotional stimuli trigger facial-affect programs that coordinate emotions and motor commands to facial muscles. Ekman proposed that at least six basic emotions—anger, disgust, fear, happiness, sadness, and surprise—are associated with distinct facial expressions. When, for example, surprise is elicited, motor commands to widen the eyes, raise the eyebrows, and open the mouth are sent automatically to the facial muscles. This automatic release of motor commands, however, need not necessarily result in visible facial action, because people often follow *display rules*. That is, they mask, intensify, de-

intensify, or neutralize expressions with those they think are appropriate to the social situation. Facial-affect programs are assumed to have a phylogenetic origin, developed through the evolutionary forces of random variation of inherited features and natural selection (i.e., differential reproduction) to enable the nonverbal communication of emotion.

The hypothesized phylogenetic origin of facial expressions of emotions was the basis of a research program that examined (and found) cross-cultural consensus in the assignment of emotion terms to the six prototype facial expressions (e.g., Ekman et al., 1987; but see Fridlund, 1994; Russell, 1994). To summarize the traditional view, as expressed in Ekman's (1972) neurocultural theory, certain facial expressions and certain emotions are intimately tied together. Emotional expressions are produced automatically (given no attempt to control them) on the occurrence of the corresponding emotion by means of evolved, hardwired, facial-affect programs, and they are universally understood as expressions of emotion.

This traditional view was vigorously attacked by researchers who conceived of human facial displays as signals that regulate social interactions (e.g., Fridlund, 1994, 1997; Kraut & Johnston, 1979). In his 1994 book *Human Facial Expression: An Evolutionary View*, Fridlund criticized the theoretical rationale of what he dubbed the "emotions view" of facial displays and proposed his "behavioral ecology view" as an alternative. He agreed with the emotions view that facial displays are produced by evolved mechanisms.

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However, he argued that facial displays—as evolved communication tools for social interactions—must serve the social motives of the displayer. He proposed that in order to serve these social motives, displays must signify what the displayer wants the interactant to do in the social interaction, or signal the displayers' intended future course of action. He argued that only communicated action requests and behavioral intentions, but not emotional feelings, change the course of the social interaction in a way that is beneficial to the displayer. A benefit for the displayer, however, is crucial because some benefit is necessary to provide the selection pressure for the evolution of a signaling ecology (i.e., the proclivity to signal on the side of the displayer together with attention to the signal and an understanding of its meaning on the side of the receiver). From this Fridlund concluded that facial displays must be driven by social intentions, rather than being automatic readouts of feelings or other mental states. For example, when engaged in an aggressive encounter, an interactant would display "Back off or I'll attack" to deter the opponent. If the opponent would retract in response to this display rather than in response to a real assault, the displayer would have achieved his or her goal without expenditure of energy and the risk of being injured—possibly a substantial benefit. The content of the signal is thus not the displayer's feeling state, rather it is a social message about the displayer's intention or constitutes a request for a specific action by the person to whom the display is directed (see also Fridlund, 1997).

According to Fridlund (1994), only behavioral intentions and action requests, but not emotional feelings, fulfill another necessary condition for a signaling ecology, that is, attending to signals must also pay for the receiver, and it is obviously useful to know what the interactant in a social situation intends to do or requests the receiver to do. To summarize, Fridlund (1994) sought to eliminate the concept of emotion in explanations of nonverbal behavior with the proposal that social motives would suffice. On this basis, signaling behavior is exhibited in social interactions to regulate (i.e., to maintain or change) the course of interaction. Fridlund argued that for logical and evolutionary theoretical reasons, the contents of the messages exchanged in the interaction comprise behavioral intentions and action requests, but not emotional feelings.

It may seem that the traditional view and the behavioral ecology view of facial expressions are quite easy to reconcile, a position that has been adopted by several researchers, including Ekman (1997; see also

Frijda, 1995; Hess, Banse, & Kappas, 1995). All that has to be done is some definitional work. To begin with, few contemporary researchers equate emotion with feeling. Rather, emotions can be viewed as syndromes of correlated components, with feelings being one of these components, whereas motives that underlay behavioral intentions and wishes that may underlay action requests are other components. Some researchers even propose that feelings are nothing more than the conscious reflections of the other components of emotion, such as action tendencies (e.g., Frijda, 1995; Frijda & Tcherkassof, 1997), which would render any distinction of emotional feelings and emotional intentions obsolete. However, although proponents of a multicomponential view of emotions may accept that emotions are highly indicative of behavioral intentions that typically arise during emotional episodes, the complementary position is not possible for Fridlund's (1994) behavioral ecology view. As previously mentioned, Fridlund's aim was to eliminate the concept of emotion from explanations of facial-signaling behavior, and his provocative thesis was that behavioral intentions or action requests, but not emotional feelings, are signaled by facial displays.

Most of the studies conducted to test the behavioral ecology view were not concerned directly with the content of the message that is communicated through facial displays. Rather, they sought to provide experimental support for the hypothesis that displaying behavior is under the control of social motives. In particular, the behavioral ecology view, but not the emotions view, emphasizes that displays are social tools, which suggests that displaying should occur most often in social interactions and least often when the displayer is alone or not facing an audience. This was found by Fridlund and others for smiling and has become known as the *audience effect*; that is, facial signals are more frequently displayed in front of a social audience (e.g., Kraut & Johnston, 1979), even if the audience is present only in the imagination of the displayer (e.g., Fridlund, 1991). Moreover, expression frequency varied more consistently with the presence of a social audience than with ratings of felt emotions.

For example, Fridlund (1991) measured the intensity of smiles in response to funny movies in four experimental conditions. In three conditions, participants came with the friend to the experiments. They saw the film either (a) with the friend in the same room; (b) alone, with the friend in another room watching the same films; or (c) alone, with the friend in another room occupied with a different task. A fourth group

(d) did not bring another person to the experiment and saw the film alone. According to Fridlund, these four conditions vary in the degree of sociality, with sociality highest in the group that saw the film with a friend, lower in the two groups in which participants saw the film alone but participated with a friend ("implicit sociality"; cf. Fridlund, 1991), and lowest in the group that viewed the film alone. Fridlund found that the intensity of smiling was linearly related to the degree of sociality. In contrast, self-ratings of experienced emotion did not correlate with intensity of smiling. Later studies replicated this audience effect of an enhancement of signaling behavior in the presence of others but also found covariation of expression intensity and the emotion intensity (e.g., Hess et al., 1995). Hess et al. (1995) manipulated both the degree of sociality and emotion intensity and found that both factors had an effect on expression intensity. Indeed, manipulated emotion intensity accounted for even more variance than did the degree of sociality. An important extension of this work was reported by Jakobs, Manstead, and Fischer (2001), who examined audience effects on facial responses to sad films. Contrary to the behavioral ecology view, expressions of sadness were less often displayed in the company of a friend than when alone. Furthermore, sadder films elicited more expressions of sadness than did less sad films, consistent with the emotions view. To conclude, there is considerable evidence that smiles are nearly as much under social control as they are under emotional control, but for displays of sadness, experimentation failed to find evidence supporting the behavioral ecology view.

Research concerning the audience effect is certainly of great importance to our understanding of the conditions that determine whether facial displays are shown or not. Furthermore, audience effects provide tests of Fridlund's (1991) hypothesis that social motives induced by the presence of others are important determinants of facial-displaying behavior. However, one may argue that audience effects are somewhat peripheral to the main controversy between the emotions view and the behavioral ecology view, which is whether emotional expressions signify emotions, or behavioral intentions, or action requests. Although this controversy has received considerable attention in the field, it instigated surprisingly little empirical research that directly compared the central predictions of both views. One reason for this lack of empirical work may be that Fridlund (1994) did not precisely specify the meaning of facial expressions in terms of the behavioral ecology view. In contrast, he deliber-

ately refused to describe prototype facial expressions for social messages like "I give in!", "Back off or I'll attack!", or "Let's play!" and stated that "there may be one dozen or one hundred 'about to aggress' displays," depending on the social and nonsocial context of the display; for example, "whether the interactant is dominant or nondominant, conspecific or extraspecific, and whether one is defending territory or young, contesting for access to a female, or retrieving stolen food or property" (pp. 128–129). Furthermore, Fridlund (1994) proposed behavioral intentions or action requests as messages of facial displays, although these two types of messages are not the same. He also proposed that there are messages such as "I can't even bother with you" that neither communicate behavioral intentions nor are action requests. Thus, Fridlund's treatment of the specific messages signaled by facial displays did not goad other researchers to conduct empirical tests of his thesis about the meaning of facial expressions.

This difficulty concerning the exact messages of facial expressions is also apparent in the only study to date that tested Fridlund's (1994) proposal that facial expressions convey social messages. Yik and Russell (1999) examined the ability of members of three cultures to assign social messages or emotion labels to the prototype facial expressions of emotion. The authors presented pictures of facial expressions of seven emotions (anger, contempt, disgust, fear, happiness, sadness, and surprise). Depending on the condition, participants had to choose from either 10 emotion labels or 10 social messages to determine what the person was trying to communicate. Of these 10 different options, 7 were intended to represent either the predictions of the emotions view or the behavioral ecology view, respectively, and three were distractor items. The results showed that, on the average, recognition performance in the two conditions was comparably high within each culture.

Yik and Russell's (1999) study thus demonstrated that people are able to assign social messages (without an obvious emotional content) with nearly equal consensus as emotion labels to facial expressions of emotion. That is, the behavioral ecology view and the emotions view fared equally well in predicting behavior. However, as Yik and Russell admitted, the social messages in their study were not optimal. In particular, four of the seven social messages that were generated to match the presented pictures were neither behavioral intentions nor action requests (e.g., "Hi, how are you doing?" or "I can't even bother with you"), and two were not even social messages (i.e., "I

didn't expect this at all" and "That stinks!"). Of course, some of the messages Fridlund (1994) suggested sound odd when given as a response option (e.g., "Let's play!" as the message of a happy face), whereas for the surprise and the disgust face, Fridlund did not offer any response suggestion. However, without knowing whether the messages are indeed those predicted by Fridlund's theory, it is difficult to assess the relevance of Yik and Russell's (1999) results with respect to that theory. Furthermore, it is possible that the ability to match social messages to facial expressions does not indicate that people receive social messages of behavioral intentions or action requests from facial expressions. Rather, the results may primarily reflect the participant's ability to use their cognitive schemas on the causes, concomitants, and consequences of emotions to infer what message pertains to what facial expression. For example, it is commonly believed that surprise is elicited by unexpected events (cf. Meyer & Niepel, 1994), thus participants might have used this knowledge to connect the facial expression of surprise with the statement "I didn't expect this at all." Similarly, broader schemas about social conduct may be used to recall that smiles are often used as social greetings and that the message that best fits a happy face is "Hi, how are you doing."

The aim of the research presented here was to extend Yik and Russell's (1999) investigations in one important respect: instead of testing whether participants are able to match social messages to faces, it sought to examine whether participants prefer to do so. Participants were presented with pictures, each depicting a prototypical facial expression of emotion, as did Yik and Russell (1999). However, in contrast to Yik and Russell's study in which participants had to choose a label within the categories "emotion labels" or "social messages", respectively, participants had to choose between the different categories of messages. That is, participants decided for each facial expression whether it conveyed emotional feelings, behavioral intentions, or action requests.

As previously noted, an obstacle to testing the behavioral ecology view is the difficulty to determine the exact social message of specific facial displays. To circumvent this problem, participants did not choose between emotion labels and specific statements of social intentions or action requests. Rather, they were asked whether a given expression reveals to an observer (a) what feeling state the person is experiencing, (b) what the person is going to do, or (c) what the person wants the observer to do. The first option (a) was intended to represent the view that

emotional feelings are conveyed by facial displays. This view was the target of Fridlund's (1994) critique, and although few contemporary emotion researchers would equate emotion with feeling, feelings are certainly central components of the concept of emotion. The second option (b) was intended to represent the view that behavioral intentions are signaled by facial displays, and it followed Fridlund's description of what recipients are interested in when they attend to facial displays (i.e., "predictions about the future behavior of the displayer"; Fridlund, 1994, p. 132). It might be noted that the present investigation does not differentiate between behavioral intentions and related concepts like action tendencies (Frijda & Tcherkassof, 1997), although the wordings in the studies were chosen to correspond primarily to Fridlund's theory. The third option (c) was intended to represent the action request view of facial displays, as presented by Fridlund (1994). Using general message categories has several practical advantages compared with specific messages. First, the same response format could be used for all facial expressions, thus allowing direct comparisons between different facial expressions. Second, this procedure minimizes the hazard of providing a wrong list of labels, which would clearly bias the results (see Russell, 1994). Third, emotion labels may sometimes imply action tendencies (e.g., Frijda, 1995), which are conceptually similar to behavioral intentions, thus making the results difficult to interpret.

The theoretical rationale of the procedure was as follows: Both views at hand imply that the faculty to produce facial expressions is a product of evolution—and as Fridlund (1994) convincingly argues, the same must be true for the faculty to understand (decode) them, if they truly evolved for means of communication. However, both views make diverging predictions about the specific content of this communication. The emotions view suggests that the human brain is tuned by natural selection to signal emotional feelings and to understand certain facial expressions as indicators of feeling states. If this view is correct, people should prefer to say that facial expressions convey emotional feelings. In contrast, the behavioral ecology view suggests that the brain is tuned to signal behavioral intentions (or action requests) via facial displays and to understand them in that way.

Three studies were conducted, with participants being visitors of Internet sites that offered interested persons the opportunity to take part in a selection of psychological experiments. Two of the Web sites were American, one German, and one Swiss. Thus,

there was an English and a German language version of Experiments 1 and 2. Experiment 3 was conducted with an English language version only. Using the Internet for empirical research has both advantages and disadvantages (Reips, 2000, 2002). Advantages comprise the access to large numbers of participants while implementing the capabilities of computerized presentation in experimental research, such as randomized assignments to conditions or randomized stimulus presentation. In addition, possible experimenter effects are reduced because there is no direct social interaction between experimenter and participant and the procedure is highly standardized. Disadvantages comprise less experimental control because of differences in hardware, software, and environment (e.g., Krantz, 2001; W.C. Schmidt, 2001), and the absence of social control may encourage some participants to provide false information. However, because the requirements concerning precise stimulus presentation are very low in the present judgment study (cf. Krantz, 2001), biases and enhanced variances caused by hardware and software differences are expected to be negligible. Moreover, Voracek, Stieger, and Gindl (2001) presented evidence that the risk of obtaining false information (in their case participants' gender) is low in Web-based research. Another possible problem with Web experiments is multiple submissions. These, however, have proved to rarely occur (Reips, 2000) and are easy to control. Self-selection is often considered a more important factor in Web experiments than in laboratory experiments. Reips (2002) suggested using multiple site entry (comparing participants from different Web sites) as a means to control for self-selection effects. This was done in the present study.

### Experiment 1

#### Method

**Participants.** Data for the English language version were collected from 547 participants, 402 women and 135 men (10 missing data concerning gender). The mean reported age of the 538 participants was 21.9 ( $SD = 8.1$ ) years (9 missing data on age). The participants were visitors of two Web sites that provided access to online studies: About two thirds of the participants came from the Web site of the American Psychological Society (APS)<sup>1</sup> and about one third came from the Web site of the Social Psychology Network (SPN).<sup>2</sup> On both Web sites, the study was given the heading "Meaning of Facial Expression." The study appeared in the category "Cognition" in the APS list and in the category "Interpersonal Relations"

in the SPN list. No reference was made to emotion in the announcement.

Data for the German language version were collected from 110 participants, of which 69 were women, 37 were men, and 4 reported no gender. Their mean age was 28.3 ( $SD = 8.9$ ) years (1 missing datum). They were visitors of the psytab, an online laboratory site<sup>3</sup> located at the University of Bielefeld. The heading of the study was "Welche Botschaft vermittelt der mimische Ausdruck?" (What message is transmitted by facial expression?).

**Stimuli.** Six pictures of facial expressions from the Ekman and Friesen (1976) series served as stimuli. All expressions were posed by the same person. The facial expressions were prototypes for the six emotions of anger, disgust, fear, happiness, sadness, and surprise.

**Procedure.** The experiment comprised eight separate screen pages that were displayed via the Internet browser as HTML documents. The first page contained a short introduction informing the participant that the aim of the study was to examine facial expressions and providing a short overview of the procedure. The participants were informed that a list of statements would be presented with a picture of a facial expression. Their task was to select a statement with the mouse and press the "send" button subsequently. They were informed that the page would reappear if the "send" button was pressed without prior selection of a statement. Otherwise, the next page would be displayed. They were further asked four demographic questions before entering the experiment.

In the next four lines, there were four input fields for age, gender, continent of residence, and mother tongue, respectively. At the end of the page, there was a button labeled *Start the experiment*. The input field for age accepted a number that had to be entered via the keyboard. The remaining input fields could be accessed with the mouse to select one of the given options. The next six pages were all the same, except for the specific facial expression that was displayed. Each page was headed by the name of the study, *Meaning of Facial Expressions*. (Only the wording of

<sup>1</sup> Interested readers may visit <http://psych.hanover.edu/Research/exponnet.html>

<sup>2</sup> Interested readers may visit <http://www.socialpsychology.org/expts.htm>

<sup>3</sup> Interested readers may visit <http://www.whomes.uni-bielefeld.de/psytab/index.html>

the English version is given. The German version corresponded closely to the English version.) Below the heading there was a picture, and to its right was the following instruction: "Please imagine that a person shows you this facial expression. What would this facial expression reveal about the person?" Below this instruction there was a select list with three options: *What feeling state the person is experiencing*, *What the person is going to do next*, and *What the person would like you to do*. Then the instruction continued: "Please use the mouse to select the statement that best fits the answer you have in mind. Then press the send button." After the participant selected one of the options, the selected option was highlighted by contrast inversion (white font on a black rectangle). Only one option could be selected. Once a selection had been made, a subsequent mouse click on a different option resulted in the selection of that option, thus allowing corrections to be made.

On the last page, the participants were thanked for their participation, and they were given the opportunity to receive some written debriefing information about the purpose of the experiment on a separate page.

The display of the materials and the registration of the responses were controlled by a server-side common gateway interface script written in PERL. At the beginning of the experiment, the script determined a new random sequence in which the different pictures would be displayed. Furthermore, on submission of each of the six experimental pages, the script checked whether the participant had selected one of the options. If he or she did, then the next page was displayed; if not, then the current page was displayed again. The data were saved after the completion of the sixth page. In the English language version, the order of the options on the experimental pages was rotated such that each participant received one of the three orders (1-2-3 [emotion, intention, request], 2-3-1, or

3-1-2). In the German language version, all participants received the 1-2-3 order.

Because participants might have occasionally used their browser to revisit a previously displayed page, multiple submissions of data from the same participant were a possible result. To control for this possibility, the script assigned each participant a random number (between 0 and 100,000,000) on the first call, and the results file was searched for consecutive entries with the same random number to eliminate recurrent submissions.

## Results

Table 1 shows the percentages of choices of emotional feeling, behavioral intention, and action request, respectively, for both the English and German language versions. (Here and in the following experiment, emotional feeling, behavioral intention, and action request are used as shorthand for the response options *What feeling state the person is experiencing*, *What the person is going to do next*, and *What the person would like you to do*.) The most frequently selected option was emotional feeling, except for anger in the German language version, in which behavioral intention was selected most frequently. In general, the choice of the emotional feeling option was lowest for anger and highest for surprise. The second most frequently selected option was behavioral intention, except for happiness in both language versions and for sadness in the English language version. The distribution of choices deviated from an equal distribution within each facial expression category in the English language version,  $\chi^2(2, N = 547) > 36.1$ ,  $ps < .01$ , and in the German language version,  $\chi^2(2, N = 110) > 11.1$ ,  $ps < .01$ , indicating that participants did not respond at random.

To test whether the emotions view or the behavioral ecology view provided better predictions, the two messages assumed by the behavioral ecology view

Table 1  
Percentages of Participants Who Selected Action Request, Behavioral Intention, or Emotional Feeling for Each of the Six Facial Expressions in English and German Versions of Experiment 1

Choice	Facial expression											
	Surprise		Fear		Happiness		Sadness		Disgust		Anger	
	Eng.	Ger.	Eng.	Ger.	Eng.	Ger.	Eng.	Ger.	Eng.	Ger.	Eng.	Ger.
Action request	6	4	7	10	16	12	17	8	16	14	24	19
Behavioral intention	12	10	17	20	9	9	11	12	22	16	32	45
Emotional feeling	83	86	76	70	75	79	73	80	62	70	44	36

Note. Eng. = English language version; Ger. = German language version.

were combined and a chi-square test was performed for each emotion. The results were consistent with the prediction of the emotions view for disgust, fear, sadness, happiness, and surprise in both the English language version,  $\chi^2(1, N = 547) > 29.5, ps < .01$ , and the German language version,  $\chi^2(1, N = 110) > 17.6, ps < .01$ . In contrast, for anger, the results were consistent with the behavioral ecology view in both the English language version,  $\chi^2(1, N = 547) = 6.8, p < .01$ , and the German language version,  $\chi^2(1, N = 110) = 8.2, p < .01$ .

A number of methodological tests were conducted concerning the robustness of the data pattern. The German and English language versions were combined and analyses were conducted using 657 participants. A first test concerned possible differences between the two language versions. There was a significant difference with respect to anger, and a marginally significant difference with respect to sadness only. With the angry face as a stimulus, participants of the German language version more frequently chose behavioral intention and less frequently chose action request and emotional feeling than the participants of the English language version,  $\chi^2(2, N = 657) = 6.4, p < .05$ . In addition, with the sad face as a stimulus, participants of the German language version tended to more often choose emotional feeling and less often choose action request than the participants of the English language version,  $\chi^2(2, N = 657) = 5.1, p < .1$ . There were no significant differences with respect to disgust, fear, happiness, and surprise, all  $\chi^2s(2, N = 657) < 2.8, ps > .1$ . Furthermore, there were no reliable gender differences for any of the six faces,  $\chi^2(2, N = 643) < 4.3, ps > .1$ .

Two further tests were performed with only the English language version. Participants originating from the APS and SPN lists did not differ on any of the six faces,  $\chi^2(2, N = 518) < 2.7, ps > .1$  (referrer information was missing for 29 participants). Furthermore, the order of the select options had no reliable effect on results for anger, disgust, fear, sadness, and surprise, all  $\chi^2s(4, N = 547) < 4.8, ps > .1$ ; the only significant difference emerged for happiness,  $\chi^2(4, N = 547) = 9.9, p < .05$ .

## Discussion

The aim of this study was to compare the predictions concerning the meaning of facial expressions from the emotions view with the behavioral ecology view. For five of six emotions, the results were consistent with the predictions of the emotions view. The prevailing majority of the participants responded that

feelings are inferred from facial expressions of disgust, fear, sadness, happiness, and surprise. Only for the anger face did a small but reliable majority of participants infer either a behavioral intention or an action request more often than an emotional feeling. There were only minor differences between the German and the English language versions, and these differences revealed no consistent pattern that lent itself to a plausible interpretation. The overall high concordance between the diverse subdivisions of the sample suggests considerable robustness of the data.

## Experiment 2

The aim of Experiment 2 was to replicate Experiment 1 and to explore whether the addition of situational context information would alter the pattern of results. From the behavioral ecology point of view, a possible limitation of many judgment studies on facial expression is the poverty of context (Fridlund, 1994; see also Russell, 1994, 1997). In these studies, participants were presented with reproductions of facial expressions without further information about the display or the situation in which the expression is shown. Although this is a sensible procedure with respect to the aim of examining what inferences are possible on the basis of the facial expression alone (see also Ekman, 1997), critiques have questioned the ecological validity of such studies. In partial response to this concern, participants of Experiment 1 were instructed to imagine that the facial expression is shown to them, which provides at least minimal context information. Experiment 2 provided more context information and additionally examined whether context information alters the results. In particular, Experiment 2 included a second contextual feature: whether the observer assumed that the facial expression was a response to him or his actions or to something unrelated to him. This factor was chosen because it appeared to represent a fairly general and basic distinction that could be applied to all or most actions (Heider, 1958). Furthermore, the possibility that the expression is a response to the observer dovetails with Fridlund's (1994) conception of communicative displays within social interactions. Thus, the messages predicted from the behavioral ecology view should be chosen especially often when the display is presented as a response to the observer.

## Method

*Participants.* Data for the English language version were collected from 828 participants, 579 of



Table 2

*Percentages of Participants in the Other-Cause and the Self-Cause Conditions Who Selected Action Request, Behavioral Intention, or Emotional Feeling for Each of the Six Faces in Experiment 2*

Choice	Facial expression											
	Surprise		Fear		Happiness		Sadness		Disgust		Anger	
	Eng.	Ger.	Eng.	Ger.	Eng.	Ger.	Eng.	Ger.	Eng.	Ger.	Eng.	Ger.
<b>Other-cause</b>												
Action request	5	5	7	11	16	9	14	13	15	12	21	19
Behavioral intention	11	9	12	21	12	12	10	10	25	21	39	40
Emotional feeling	84	85	80	68	72	79	76	77	61	68	41	41
<b>Self-cause</b>												
Action request	5	14	9	15	17	12	16	16	20	12	20	20
Behavioral intention	15	13	18	20	12	8	11	10	23	22	39	42
Emotional feeling	80	73	73	65	72	80	73	74	58	66	40	38

*Note.* Eng. = English language version; Ger. = German language version.

which were women and 225 were men (24 missing data). The mean age of the 805 participants who gave this information was 23.8 ( $SD = 9.2$ ) years. They were visitors of the APS list, the SPN Web site, and the English language pages of the Experimental Psychology Lab (EPL).<sup>4</sup> Data for the German language version were collected from a total of 472 participants, 290 of which were women and 165 were men (17 missing values). The mean age of 465 participants who gave this information was 27.5 ( $SD = 8.8$ ) years and were visitors of the German language pages of the EPL. The data were screened for multiple entries, as in Experiment 1. In 30 cases, the same random number occurred in consecutive entries, including double or triple (in one case) submissions from the same participant.<sup>5</sup> In each case, the second (or third) entry was discarded.

**Stimuli and procedure.** The stimuli and procedure were similar to Experiment 1, except for the only important deviation in which the instruction was changed so that half the participants were told the following: "Please imagine that a person shows you this facial expression. Assume that the expression is not a reaction to you but to something else. What would this facial expression reveal about the person?" For the other half of the participants, the second sentence was "Assume that the expression is a reaction to you or your action."

**Design.** Participants were randomly assigned to one of the two context conditions. In the English language version, 404 participants were assigned to the other-cause condition, and 424 were assigned to the self-course condition. In the German language version, 244 participants were assigned to the other-

cause condition, and 228 were assigned to the self-cause condition.

## Results

Table 2 shows the choice percentages, separately for the six emotions, for the two context conditions and for both language versions. Overall, the results replicated those from Experiment 1. For all but one face, the majority of the participants selected the feeling option. The exception again concerned the angry face for which emotional feelings and behavioral intentions were selected, on average, equally frequently.

Consistent with Experiment 1, it was tested whether the results conformed more to the predictions from the traditional or the behavioral ecology view. As in Experiment 1, the results (collapsed over the context factor) for disgust, fear, sadness, happiness, and surprise supported the emotions view in both the English language version,  $\chi^2(1, N = 828) > 27.9, ps < .01$ , and the German language version,  $\chi^2(1, N = 472) > 51.2, ps < .01$ ; whereas the results for anger supported the behavioral ecology view in both the English language version,  $\chi^2(1, N = 828) = 30.2, p < .01$ , and the German language version,  $\chi^2(1, N = 472) = 21.2, p < .01$ .

Situational context had little impact on responses. Only for the fear face in the English language version and the surprise face in the German language version

<sup>4</sup> Interested readers may visit <http://www.psychologie.unizh.ch/genpsy/Ulf/Lab/WebExpPsyLab.html>

<sup>5</sup> The number of multiple submissions had not been documented for Experiment 1.

was a significant difference in the pattern of choices observed. The fear face was judged significantly more often an indicator of emotional feelings when the assumed cause was something else versus the observer,  $\chi^2(2, N = 828) = 7.1, p < .05$ , for the English language version, as was the surprise face in the German language version,  $\chi^2(2, N = 472) = 12.7, p < .01$ . The other differences between the two context conditions apparent in Table 2 were not reliable,  $\chi^2(2, N = 828) < 3.7, ps > .1$ , for the English language version, and  $\chi^2(2, N = 472) < 2.4, ps > .1$ , for the German language version.

The results from the two language versions (collapsed over the context factor) significantly differed for four faces. The fear face,  $\chi^2(2, N = 1,300) = 15.4, p < .01$ , and the surprise face,  $\chi^2(2, N = 1,300) = 10.8, p < .01$ , were judged more often an indicator of emotional feelings in the English language version; whereas the disgust face,  $\chi^2(2, N = 1,300) = 9.3, p < .01$ , and the happiness face,  $\chi^2(2, N = 1,300) = 10.4, p < .01$ , were judged more often an indicator of emotional feelings in the German language version. Because the differences are very small and the pattern of results does not readily lend itself to a plausible explanation, these cultural differences are not discussed further. An analysis of gender did not reveal any significant effects,  $\chi^2(1, N = 1,259) < 4.6, p = .10$ .

## Discussion

Experiment 2 generally replicated the results of Experiment 1. Except for the anger face, emotional feeling was selected most often as the message conveyed by facial expressions of emotion. For the anger face, action requests and behavioral intentions together were chosen more often than emotional feelings. There is no indication that the behavioral ecology view fares better with the enhanced situational context in Experiment 2. Concerning the experimentally manipulated context factor, an effect was observed for only one face in each subsample. This effect was in the direction predicted by the behavioral ecology view in that more choices of behavioral intentions and action requests occurred when the context information suggested more social interaction between the display and the observer (i.e., when the face was a response to the observer).

## Experiment 3

Experiment 3 addresses several concerns that may be raised regarding Experiments 1 and 2. First, it may

be argued that the stimulus material (i.e., the traditional photos of facial expressions published by Ekman & Friesen, 1976) are currently well-known by most psychologists as depicting expressions of emotion. Because the visitors of the three Web sites may have all been well-versed in psychology, their answers might have reflected their academic knowledge of what the facial expressions are supposed to convey. If the latter concern were true, there would have been a bias in favor of the emotions view. Experiment 3 examined this possibility by asking the participants whether they were psychologists and used this information to compare the answers of psychologists and nonpsychologists.

Second, Fridlund (1994) repeatedly criticized the use of "expression" as an ill-founded concept presupposing a hidden entity that is involuntarily and therefore truthfully made public by the act of expressing. No attempt was made to avoid the term *expression* in Experiments 1 and 2. Rather, it was assumed that emotional feelings, behavioral intentions, and wishes underlying action requests reflect inner states that can in principle be expressed, involuntarily or voluntarily. However, it may be argued that the term *expression* is semantically associated more with emotional feelings than with behavioral intentions or action requests and that this association biased the results in favor of the emotions view. To address this argument, the word *expression* was not used within Experiment 3; rather, the neutral term *face* was used instead. A related concern may be that asking what the expression conveys about the person primes answers involving concepts associated with emotions because descriptors of persons' states and traits are often emotionally laden. Therefore, the term *convey* was eliminated, and the more neutral term *indicated* was used in the present study.

Third, participants' dominant choice of emotional feeling might have been partially influenced by a lack of understanding of what is meant by the response options, especially with respect to the short sentences describing behavioral intentions and action requests. This concern was redressed by considerably extending the introductory instruction to include a more extensive explanation of the three options.

Fourth, it may be argued from the behavioral ecology point of view that the expressions, being embedded in only little social context, might have been quite meaningless to the participants, making it difficult for them to follow the instructions. To address this possibility, participants had to describe in their own words what the faces indicate in addition to complet-

ing the forced-choice task. Although analyzing these responses is notoriously difficult, these descriptions should at least clarify whether the participants have ideas about the expressions. Requesting these descriptions has the additional advantage of collecting data about the specific contents of facial displays with respect to behavioral intentions and action requests.

Fifth, the phrasing that was used to describe the behavioral intention, "What the person is going to do next," may be considered too narrow an interpretation of what Fridlund (1994) meant. In particular, it may be argued that "going to do next" is too definite in that it does not allow for a change in the intended behavior. In addition to a more detailed explanation of what is meant by the three options, the phrase "what the person is moved to do" was chosen to appear in the select list. This phrasing was considered to be less specific with respect to the specific behavior and the specific point in time indicated by the facial signal. In addition, "what the person is moved to do" appears to comprise not only (specific) behavioral intentions but also more diffuse action tendencies as the messages of facial expressions (see Frijda & Tcherkassof, 1997).

Finally, Experiments 1 and 2 both used facial expressions presented by only one display and are thus open to the objection that the results may pertain only to this particular individual. Two different displays, one male and one female, were used in the present study.

To summarize, Experiment 3 sought to replicate Experiments 1 and 2 while addressing some possible concerns. In contrast to Experiment 2, no variation of the instructions to manipulate context was done. However, gender of display was introduced as a possible contextual feature that may moderate the meaning of facial expressions.

## Method

**Participants.** The initial data file contained 276 records. A first data-screening procedure checked whether there were multiple submissions. In contrast to the previous studies, this was done by searching the file for consecutive submissions coming from the same Internet protocol (IP) address (IP addresses were not collected with the data in Experiments 1 and 2), and checking whether both submissions had the same order of expressions, age, and gender. A record was considered as a second (or third, fourth, etc.) submission if (a) the same IP address occurred with the same stimulus order, (b) the same IP address occurred with the same age and gender, or (c) if age and gender were omitted with the second submission. Fifteen records

(5%) were eliminated according to these criteria, leaving 261 records in the analysis, which were assumed to correspond to unique participants composed of 172 women and 87 men (2 missing data). The mean age of the 258 participants who gave a specification was 26.9 ( $SD = 10.3$ ) years. The question concerning psychological education was answered in the affirmative by 156 participants and in the negative by 81 participants (24 missing data; the high incidence of missing data was due to the fact that the question was functional only after the first 23 participants had been run). Participants were recruited among visitors of the APS list in which the study was placed in "Social Psychology" under the title "What do Faces Indicate?" (no reference to facial expressions or emotions was made in the announcement).

**Stimuli and procedure.** New stimuli were used. One male and one female display were selected from the Ekman and Friesen (1976) series. The procedure was very similar to that of the previous experiments. Each page showed the title of the study ("What do Faces Indicate"). The first page provided the general instructions and some definitions of the used phrases. It read:

Dear Participant!

On each of the following six pages you are requested to judge a photo of a person concerning the question what the person's face indicates. To answer the question, please select with the mouse one of the three statements that best fits the answer you have in mind. The statements are:

*What the person is moved to do.* Indications of what the person wants or intends to do; would like to do; or would tend to do.

*What the person wants you to do.* Indications of what the person wants you to do; wishes you to do; requests from you; or demands you to do.

*What feeling state the person is experiencing.* Indications of what the person feels at the moment.

After completing your choice, please report briefly in your own words what you think the person's face indicates. After you have finished, please click on the send button. (You may also press return in the text field.) In case an answer is missing, the page will reappear. As soon as your answer has been registered, you will be presented with the next page. Before you start the experiment, please answer the following questions.

As in the previous experiments, these questions pertained to age, gender, continent, and mother tongue. In addition, participants were asked "Are you (or have you been) a student of psychology?" which could be answered either "yes" or "no." The next six pages were analogous to the corresponding pages in the previous experiments. However, the instruction

was phrased "Please assume that the person in the photo is looking at you. What does the person's face indicate? (Select the statement that best fits the answer you have in mind)." The options in the select list were *What feeling state the person is experiencing*, *What the person is moved to do*, and *What the person wants you to do*. Three orders were used in which emotional feeling, behavioral intention, and action request appeared once at each position in the list. Next, the instruction for the free responses was given, "Please describe in a few words what it is that the person is moved to do, wants you to do, or feels." Below this instruction there was a text field in which the description could be typed (up to a maximum of 200 characters). Participants sent the data by clicking on the "send" button or by using the return key within the text field. If no option from the list had been selected, or nothing had been entered in the text field, the page reappeared. When both responses were given, the next page was presented.

*Design.* Each participant was randomly assigned to either the male ( $n = 120$ ) or the female ( $n = 141$ ) displayer. One of the three orders for the response options was determined randomly for each participant.

## Results

Table 3 shows the percentages of choices separately for the six emotions and for both displayers. The basic results pattern of Experiments 1 and 2 was clearly replicated, with the feeling option being the one most often selected for surprise, fear, happiness, sadness, and disgust. In contrast to the preceding experiments, however, the feeling option was selected most often even for anger face. Moreover, the emotional feeling was selected more often than the other two options taken together for all emotions,  $\chi^2(1, N = 261) > 7.8, p < .01$  (data were collapsed over displayers).

Inspection of the data in Table 3 suggests that gender of the displayer did not play an important role in the findings. Displayer did not have significant effects on choice, although the test approached significance for disgust,  $\chi^2(2, N = 261) = 5.4, p < .1$ , and fear,  $\chi^2(2, N = 261) = 4.7, p < .1$ . Gender of participant had no effect on the pattern of choices,  $\chi^2(2, N = 259) < 3.2, ps > .1$ .

Next, it was determined whether psychological education had an impact on the pattern of choices. Only one test was significant: For anger, psychologists chose action requests more often than nonpsychologists (30% vs. 20%) but chose behavioral intention less often (12% vs. 24%), whereas there was virtually no difference in the frequency in which emotional feeling was selected (58% vs. 57%),  $\chi^2(2, N = 237) = 6.2, p < .05$ . For the other faces, nonsignificant differences were obtained,  $\chi^2s < 2.5, ps > .1$ .

An inspection of the free responses revealed that any concern that the participants might not have known what the faces indicated was unfounded. When participants selected emotional feeling as the type of information indicated by the face, they most often provided an emotion term that corresponded to the facial expression, based on Ekman and Friesen (1976), except for sadness for which most responses referred to other emotions (e.g., sympathy) or non-emotional feelings (e.g., pain). Similarly, when behavioral intention was selected, most of the free descriptions named a behavioral intention. In particular, an anger face was assumed to indicate that the displayer was about to attack (physically or verbally), as Fridlund (1994) predicted. This was also true for the disgust face, which was additionally assumed to indicate a tendency to separate from or reject something. Fridlund predicted "readiness to submit" as the message of fear faces. This was, however, virtually never mentioned; rather, for most participants, the fear face

Table 3  
*Percentages of Participants Who Selected Action Request, Behavioral Intention, or Emotional Feeling for Each of the Six Facial Expressions in Experiment 3*

Choice	Facial expression											
	Surprise		Fear		Happiness		Sadness		Disgust		Anger	
	F	M	F	M	F	M	F	M	F	M	F	M
Action request	3	7	6	14	11	18	18	16	14	14	23	29
Behavioral intention	10	8	17	13	16	13	14	15	12	23	18	13
Emotional feeling	87	85	77	73	74	70	67	69	75	63	59	58

Note. F = female displayer; M = male displayer.

indicated the intention to flee, aggress, or scream. The dominant action tendency associated with the sad face was to cry, and the happy face was understood as indicating being moved to be friendly and affiliate, as predicted by Fridlund (1994), and to laugh. Finally, the surprise display indicated that the person was moved to run away, dodge, or freeze.

In a similar vein, the free responses that were made when action request was selected mostly named action requests. The action requests associated with the anger face included, as Fridlund (1994) predicted, to back off or move away. To a substantial degree, it also indicated that the displayer wanted the observer to obey and to do something against one's wishes. The disgust face was similarly assumed to indicate the request to go away and additionally as a request to do something different. The fear face was also assumed to reveal a request to stop acting or to act differently, help, go away, or notice something. The sad face was most often understood as a request for help or comfort, as predicted by Fridlund, or as an attempt to get manipulated into something. The happy face was conceived of as a request to reciprocate smiles, friendliness, or happiness, or to engage in some cooperative activity. Finally, the surprise face was understood as a request for more information or help.

### *Discussion*

The aim of Experiment 3 was to respond to concerns that could be raised with Experiments 1 and 2 and that would have, if valid, biased the results in favor of the traditional view of facial expressions. The changes made in Experiment 3, however, only weakly altered the results. Indeed, the only major difference concerns the anger face, for which the majority of participants chose emotional feelings. It is not clear though which of the changes incorporated in Experiment 3 caused this effect.

Participants were asked to provide their own verbal descriptions of what the faces indicated. When participants chose behavioral intention or action request as the message, their free responses were in fair agreement with the suggestions Fridlund (1994) made. That is, smiles were often understood as signals to play or affiliate, and the request to reciprocate smiles and signs of happiness can be interpreted in this way as well. Anger faces indicated the intention to aggress and the request to back off, whereas sadness was a request for help or comfort. Fridlund suggested the fear face to signal a tendency to submit, which did not appear in the free responses. However, one may argue

that the frequently mentioned indication of an intention to back off is part of a submission (Fridlund phrased the message "If you continue, I'll back off [slink away]"). Some of the responses, however, do not appear to fit the behavioral ecology view very well. For example, it may be questioned whether being moved to scream, or cry, or laugh is a behavioral intention rather than another expression of emotion.

### *General Discussion*

Three experiments examined whether facial expressions are perceived as signals of emotional feelings, as predicted by the emotions view, or as signals of behavioral intentions or action requests, as predicted by the behavioral ecology view. The results supported the emotions view, because the vast majority of participants chose emotional feelings as the messages signaled by facial expressions of disgust, fear, sadness, happiness, and surprise. For the facial expression of anger, the behavioral ecology view was supported in Experiments 1 and 2 but not in Experiment 3. Thus, the implications of the present experiments are different from those of Yik and Russell (1999), who found both views equally good in predicting performance when people had to choose either different emotion labels or different social messages. In contrast, in the present experiments, the emotions view fares better in predicting the choices than the behavioral ecology view. However, the results of Yik and Russell and of the present study are not necessarily in conflict. Yik and Russell sought to examine whether people are able to assort social messages to faces with similar precision as they assort emotion labels to faces. Therefore, they had their participants choose within the category of social messages or within the category of emotion labels. In contrast, the present study examined whether participants preferred to describe the content they received from the face as emotional feeling, behavioral intentions, or action requests. This required allowing the three categories of possible messages to concur for the observer's choice.

The present results have implications for both the emotions view and the behavioral ecology view of facial expressions. Both positions would have to concede that there are other messages in facial expressions than those preferred by their theories. However, the implications for the behavioral ecology view seem to be more negative than for the emotions view. Fridlund (1994) did not merely suggest that some facial displays signal information about behavioral intentions or action requests. Rather, he explicitly asserted

that the facial expressions traditionally seen as displays of emotions actually signal behavioral intentions or action requests and not emotional feelings. The results of the present study are at odds with this position. The expressions traditionally seen as facial expressions of disgust, fear, happiness, sadness, and surprise are most often interpreted as signals of feelings and not as signals of behavioral intentions or action requests. However, although the present evidence did not give broad support for the behavioral ecology view, it does not preclude the possibility that facial expressions other than those used in this study have no emotional meaning but rather communicate intentions and requests exclusively.

For the emotions view, the present results suggest that emotional feeling is not the only message conveyed by facial expressions. Between 13% and 64% of the participants did not choose emotional feelings as the category that best fits what they see in facial expressions. However, the emotions view might accommodate the present results. Ekman (1972), for example, explicitly assumed that one evolutionary cause of the association of facial expressions with emotions might have been the signaling of intention, with, for example, the exposure of teeth (intent to bite) being a part of the anger expression. Moreover, the emotions view was represented in the present study in quite an extreme version: that the message of facial expressions is solely emotional feeling. This is not exactly the position that emotion theorists typically hold (although it was the position criticized by Fridlund, 1994). Rather, it is often assumed that facial expressions of emotion convey information about emotional state, with emotions conceived of as multicomponential states that comprise behavioral, physiological, phenomenal, and sometimes other components (e.g., Ekman 1972, 1997; Frijda, 1995; Scherer, 1984). There were two reasons for asking for feelings rather than for emotions. First, a multicomponential view of emotions suggests that the components are correlated. Therefore, facial expressions of emotion would be expected to convey information about all or some components, including behaviors and their precursors such as motives, action tendencies, and intentions. That is, emotion is a concept that is at least one level higher in a class inclusion hierarchy than feelings and intentions and includes the more elementary concepts. Thus, presenting emotion with behavioral intention and action request as a select option risked that participants chose emotion because it is the most inclusive term. The second reason for testing the feeling

variant of the emotions view was that it was Fridlund's (1994) main target of his criticism.

Even the decision to let participants choose between emotional feelings and other possible messages could be criticized. For example, Frijda and Tcherkassof (1997) suggested that not only emotions but also feelings are multicomponential phenomena that comprise the conscious experience of the various components of emotion. If this were true, emotional feelings would again be the most inclusive response option, probably also including motives or action tendencies that precede behavior. This line of argumentation, however, is based on a particular solution to a controversial issue in emotion research: the nature of emotional feelings (e.g., Cannon, 1927; James, 1884; Schachter & Singer, 1962). Although it is possible that emotional feelings include conscious reflections of behavioral intentions or action requests, or are even nothing more than their conscious registration, it appears premature to adhere oneself to one or the other position.

The emotional feeling and the behavioral ecology views do not exhaust the conceivable messages of facial expressions of emotions (e.g., Ekman, 1997; Frijda & Tcherkassof, 1997; Hess et al., 1995; Scherer, 1992). As an example for a very different approach, Scherer's (1992) component process theory proposes that the brows are raised and the eyes opened (components of the surprise face) when some stimulus is evaluated as novel, or that corrugator supercilii activity (a component of the anger face) occurs when the stimulus is evaluated as discrepant to current goals or needs. The crucial difference to Ekman's (1972) basic emotions approach is that there is no fear, anger, surprise "node," or program that, if activated, triggers the several components of the respective expression in sync but rather a sequence of stimulus evaluation checks that each triggers some of the several components in succession. Analogously, the basic emotions view assumes that all other components of emotions are triggered simultaneously, whereas Scherer's component process theory asserts that these other components are triggered individually as the stimulus evaluation check sequence unfolds. Because the present study was concerned with Fridlund's (1994) critique of the emotions view, these other possible referents of facial expressions of emotion were not considered. To obtain a full picture of the information being conveyed by facial expressions of emotion, the relative importance of these other referents must be explored as well.

From a broader perspective of emotions as multi-

componential states (e.g., Ekman, 1972, 1997; Frijda, 1995; Scherer, 1984), the results indicate that different facial expressions convey different message categories to different degrees (see also Hess et al., 1995; Jakobs et al., 2001). Some instances of expressions (e.g., the surprise face) are taken to predominantly indicate an emotional feeling, whereas other instances (e.g., the anger face) are understood more often as action requests or the indication of a future course of action. One reason for the differences between emotions could be the relative salience and importance of the different emotion components. In particular, a facial expression of anger is probably seen as being action relevant to the observer because anger is a state that may subject the observer to an assault. In contrast, surprise is assumed to result in an initial action interruption that produces some temporary state of immobility (e.g., Darwin, 1872; Horstmann, 2001; Meyer, Niepel, Rudolph, & Schützwohl, 1991), such that surprise is associated with nonaction rather than with action. Thus, messages other than action tendencies or behavioral intentions should be more salient. The possibility that different faces convey messages from different message categories is not alien to the behavioral ecology view, as it already entails different types of messages. Although it is possible to specify both a plausible behavioral intention and action request message for some displays (e.g., anger: "Back off or I'll attack"), for other displays it is easier to find an action request message than a behavioral intention message (e.g., sadness: "Take care of me").

The results can therefore be interpreted as being consistent with a multicomponential view of emotions in which different facial displays convey messages about emotional feelings, behavioral intentions and their precursors such as action tendencies that are the precursors of intentions, and desires or wishes underlying action requests, and possibly other internal states to different degrees. However, some researchers may object that the emotions view has been depicted by Fridlund (1994) as conflicting with evolution theory in several central assumptions, most importantly that (a) automatic displays could not possibly have evolved, (b) social motives must underlie displaying behavior, and (c) signaled content of facial expressions must involve the indication of the future course of action. Thus, some researchers may argue that the emotions view, which is, according to Fridlund (1994), impossible on evolutionary theoretic grounds, cannot explain the results. However, a critical examination reveals that Fridlund's evolutionary arguments against the emotions view are not as strin-

gent as they may appear at first sight and that an emotion theoretic view is in fact consistent with an evolutionary perspective.

Concerning Proposition a, which suggests that automatic displays could not have possibly evolved, Fridlund (1994) started from the axiom that the process of natural selection favors only those inheritable features that are beneficial to their owners or their kin. He concluded:

Displayers must not signal automatically, but only when it is beneficial to do so, that is, when such signaling serves its motives. Automatic readouts or spillovers of drive states (i.e., "facial expressions of emotions") would be extinguished early in phylogeny in the service of deception, economy, and privacy. (S. 132)

This argument, however, is not quite conclusive for two reasons. First, the argument focuses exclusively on the costs of automatic displays. However, what actually counts in evolutionary currency is the *average net benefit*, that is, the average benefit minus the average cost, sampled over those situations that members of a species recurrently encountered on an evolutionary timescale. It is, therefore, not sufficient to point out that the automatic display of, for example, anger, can be detrimental in one type of situation in which it would be more beneficial to deceive the interactant (it might be noted that deceiving is also not without costs; e.g., Maynard Smith, 1994). To argue against the evolutionary probability of facial expressions of emotion, it would be necessary to substantiate that the costs of automatic displays exceed the benefits, or that automatic signaling is more frequently detrimental than beneficial to its owner. Fridlund (1994) did not present such an analysis, which requires, for example, consideration of different socioecological contexts relevant in human phylogeny and discussion of the fitness consequences of facial expressions of emotions in each of them. K. L. Schmidt and Cohn (2001) conducted such an analysis for smiles. They argued that reflexive displays have positive fitness consequences within long-term cooperative social interactions, in which the costs of deception are furthermore remarkably high, and that deception is an adaptive problem primarily in interactions with strangers (K. L. Schmidt & Cohn, 2001). If it is further assumed that the socioecological context of within-group interaction was more frequent in phylogeny than was interaction with strangers, which appears to be defensible, it follows that Fridlund's conclusion is invalid for smiles.

Second, Proposition a implies that signaling is beneficial only when it is controlled nonautomatically.

This is, however, a questionable position, given that behavioral ecologists (including Fridlund, 1994) and evolutionary psychologists regard features other than voluntary behaviors as evolved signals (e.g., for age, gender, health, and power). Thus, the invocation of intentions is not necessary to explain signaling in general. Facial expressions (of emotion or of other inner states) in particular are not necessarily more intentional than, for example, smooth skin and glossy hair are as morphological signals of youth in humans. Moreover, recent work in ethology and evolutionary psychology dealt with *honest signaling*, which means that signaling ecologies evolve around signals that convey valid information. For example, Zahavi and Zahavi (1997) argued that during threat displays, information about the strength and the motivation of the displayer is honestly (i.e., "automatically") conveyed<sup>6</sup> and that the validity of the signal is of crucial importance for an understanding of threat and other displays. The conclusion that automatic displays of emotion would have necessarily extinguished in phylogeny in the service of deception and privacy is thus disputable. In addition, Zahavi and Zahavi (1997) argued that costs associated with signaling immunize signals from deception, suggesting that the efficiency of signals is of little relevance for the evolution of signals.

The Proposition b that social motives must drive displays seems to confound two lines of reasoning that should be kept separate—one concerned with what selective pressures formed an adaptive behavioral mechanism, and the other with what exactly happens when that mechanism is activated in a concrete situation. If facial expressions had been selected for their social effects in phylogeny, this does not imply that social motives mediate them when they are produced, that is, one can accept the former assumption without being committed to the latter. Both the emotions view and the behavioral ecology view embrace the assumption that the biological function of facial expressions (or displays) is communicative, thus both assume that facial expressions had been selected for their social effects. By what means these effects are achieved is entirely open. Facial expressions may be driven by social motives. Alternatively, they may be displayed in a completely mechanistic manner that could be implemented to the functioning of mindless automata, or they may be driven by emotional feelings, or by corresponding brain processes. Neither of these possibilities is a priori more consistent with the assumption that facial expressions had been selected for their social effects than its alternatives.

Concerning Proposition c, Fridlund (1994) proposed that facial expressions had to indicate the displayer's future course of action to the observer: "Recipients of displays should only attend to cues that provide predictions about the future behavior of the displayer, regardless of how the displayer 'feels'" (p. 132). This proposal relates to the observers' coevolutionary role in the development of a signaling ecology; only if observers attend to a feature can that feature be selected for the function of communication as a display, and observers will attend only to features that provide useful information. It is certainly correct that information about behavior is highly useful. It is, however, questionable to claim that the observer must by necessity be interested in behavior. For example, red fruits signal ripeness to birds looking for carbohydrates, male deer howl to compare their strength and motivation, human males display power, and human females display youth (Fridlund, 1994, also reviews many of these and other examples). In these instances of signaling within signaling ecologies, observers are not interested in the displayer's future behavior but in other traits relevant to their survival. To consider a behavioral example, male deer contesting for dominance are ultimately interested not in behavior but in the outcome of a possible combat. When male deer howl, they signal honestly their physical strength and motivation—qualities that are causally related to the outcome of the combat (Zahavi & Zahavi, 1997).

A categorical denial of the possibility that among the traits and states an observer may be interested in is the feeling state of the displayer seems to be consistent only with an epiphenomenalist position in the mind-body problem. If conscious states are indeed causally inert, no one could have an evolved interest in the feelings of other people. But whatever function consciousness may have, people seem to have a profound interest in the feelings of others. This observation indicates that signals of other peoples' feelings would be worth attending to, thus fulfilling an important condition for the establishment of signaling ecologies. To conclude, Fridlund's (1994) critique that the emotions view is implausible in evolutionary terms is not quite convincing. However, Fridlund is to be credited for having renewed the interest in adaptive explanations of facial expressions. He rightfully

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<sup>6</sup> Fridlund (1994) mentioned this hypothesis shortly but did not elaborate on it.



pointed out that an evolutionary analysis must consider state-of-the-art theories of evolution theory. Such an analysis has just begun (e.g., K. L. Schmidt & Cohn, 2001).

As a last point, I ask whether there really is no place for emotion in a behavioral ecology view. As Fridlund (1994) observed, emotions are more distal and less determinant to actions than intentions, and observers may ultimately be more interested in how other people act than in how they feel. For Fridlund, this was an argument to strengthen his view that intentions, rather than emotions, are signified by facial expressions. However, the separation of emotional states and concrete actions is not necessarily a weakness of the concept of emotion but rather a strength. Scherer (1984) hypothesized that emotions function as stimulus-response decouplers. Rather than just allowing a stereotyped action pattern to unfold as a response to significant stimuli, emotions support a greater variety of concrete action, thus allowing the organism to respond more flexibly. This does not mean that emotions give no direction to action. To the contrary, conceived as operation modes of the mind (Tooby & Cosmides, 1990), emotions focus attention on significant stimuli, initiate vegetative and hormonal adjustments, activate certain motives and deactivate others, and thereby restrict the range of probable behaviors, although they may not exactly specify a concrete action. In a similar way, Panksepp (1998) argued that emotional feelings might not primarily motivate immediate emotional behavior but rather emotional behavior in a medium-term timescale. Concerning the function of emotional feelings, it might be added that without the conscious representation of the emotional state, voluntary (self-) control of emotional behavior would be difficult or even impossible because voluntary control requires conscious representations (e.g., Bargh, 1994; McDougall, 1928; Posner & Snyder, 1975). Ironically, emotions appear to meet exactly the functional properties that Fridlund (1994) argued to be important in the evolution of a signaling ecology: that the signal should be informative about the further course of action of the signaler (otherwise the recipient of the signal would not be interested in attending to the signal), but must leave room for the signaler to depart from the signaled course of action (otherwise it would often be more advantageous to act immediately, i.e., without prior signaling, at least in antagonistic interactions). Because emotions, in contrast to intentions, are distal to concrete action, they appear well-suited to support the evolution of a signaling ecology.

## References

- Bargh, J. A. (1994). The four horsemen of automaticity: Awareness, intention, efficiency, and control in social cognition. In R. S. Wyer & T. K. Srull (Eds.), *Handbook of social cognition* (2nd ed., pp. 1–40). Hillsdale, NJ: Erlbaum.
- Cannon, W. B. (1927). The James–Lange theory of emotions: A critical examination and an alternative theory. *American Journal of Psychology*, 39, 106–124.
- Darwin, C. (1872). *The expressions of the emotions in man and animals*. London: John Murray.
- Ekman, P. (1972). Universals and cultural differences in facial expressions of emotion. In J. Cole (Ed.), *Nebraska symposium on motivation* (Vol. 19, pp. 207–283). Lincoln: University of Nebraska Press.
- Ekman, P. (1997). Should we call it expression or communication? *Innovations in Social Science Research*, 10, 333–344.
- Ekman, P., & Friesen, W. V. (1976). *Pictures of facial affect*. Palo Alto, CA: Consulting Psychologists Press.
- Ekman, P., Friesen, W. V., O'Sullivan, M., Chan, A., Diacoyanni-Tarlatzis, I., Heider, K., et al. (1987). Universals and cultural differences in the judgments of facial expressions of emotion. *Journal of Personality and Social Psychology*, 53, 712–717.
- Fridlund, A. J. (1991). Sociality of solitary smiling: Potentiation by an implicit audience. *Journal of Personality and Social Psychology*, 60, 229–240.
- Fridlund, A. J. (1994). *Human facial expression: An evolutionary view*. San Diego, CA: Academic Press.
- Fridlund, A. J. (1997). The new ethology of human expressions. In J. A. Russell & J. M. Fernández-Dols (Eds.), *The psychology of facial expression* (pp. 103–129). Cambridge, England and Paris: Cambridge University Press & Editions de la Maison des Sciences de l'Homme.
- Frijda, N. H. (1995). Expression, emotion, neither, or both? *Cognition and Emotion*, 9, 617–635.
- Frijda, N. H., & Tcherkassof, A. (1997). Facial expressions as modes of action readiness. In J. A. Russell & J. M. Fernández-Dols (Eds.), *The psychology of facial expression* (pp. 78–103). Cambridge, England and Paris: Cambridge University Press & Editions de la Maison des Sciences de l'Homme.
- Heider, F. (1958). *The psychology of interpersonal relations*. Oxford, England: Wiley.
- Hess, U., Banse, R., & Kappas, A. (1995). The intensity of facial expression is determined by underlying affective state and social situation. *Journal of Personality and Social Psychology*, 69, 280–288.
- Horstmann, G. (2001). *Die Unterbrechungsfunktion der Überraschung: Ein neues experimentelles Paradigma*

- und ein Test der Automatizitätshypothese [*The interrupt function of surprise: A new experimental paradigm, and a test of the automaticity hypothesis*]. Unveröffentlichte Dissertation. Universität Bielefeld.
- Izard, C. E. (1997). Emotions and facial expressions: A perspective from differential emotions theory. In J. A. Russell & J. M. Fernández-Dols (Eds.), *The psychology of facial expression* (pp. 57–77). Paris: Cambridge University Press & Editions de la Maison des Sciences de l'Homme.
- Jakobs, E., Manstead, A. S. R., & Fischer, A. H. (2001). Social context effects on facial activity in a negative emotional setting. *Emotion*, 1, 51–69.
- James, W. (1884). What is an emotion? *Mind*, 9, 188–205.
- Krantz, J. H. (2001). Stimulus delivery on the Web: What can be presented when calibration isn't possible. In U.-D. Reips & M. Bosnjak (Eds.), *Dimensions of Internet science* (pp. 113–130). Lengerich, Germany: Pabst Science Publishers.
- Kraut, R. E., & Johnston, R. E. (1979). Social and emotional messages of smiling: An ethological approach. *Journal of Personality and Social Psychology*, 37, 1539–1553.
- Maynard Smith, J. (1994). Must reliable signals always be costly? *Animal Behaviour*, 47, 1115–1120.
- McDougall, W. (1928). *An outline of psychology* (4th ed.). London: Methuen.
- Meyer, W.-U., & Niepel, M. (1994). Surprise. In V. S. Ramachandran (Ed.), *Encyclopedia of human behavior* (Vol. 4, pp. 353–358). Orlando, FL: Academic Press.
- Meyer, W.-U., Niepel, M., Rudolph, U., & Schützwohl, A. (1991). An experimental analysis of surprise. *Cognition and Emotion*, 5, 295–311.
- Panksepp, J. (1998). *Affective neuroscience*. New York: Oxford University Press.
- Posner, M. I., & Snyder, C. R. R. (1975). Attention and cognitive control. In R. L. Solso (Ed.), *Information processing and cognition: The Loyola symposium* (pp. 55–85). Hillsdale, NJ: Erlbaum.
- Reips, E.-D. (2000). The Web experiment method: Advantages, disadvantages, and solutions. In M. H. Birnbaum (Ed.), *Psychological experiments on the Internet* (pp. 89–117). San Diego, CA: Academic Press.
- Reips, U.-D. (2002). Internet-based psychological experimenting: Five dos and five don'ts. *Social Science Computer Review*, 20, 241–249.
- Reips, U.-D. (2002). Theory and techniques of conducting Web experiments. In B. Batinic, U.-D. Reips, & M. Bosnjak (Eds.), *Online social sciences* (pp. 229–250). Seattle, WA: Hogrefe.
- Russell, J. A. (1994). Is there universal recognition of emotion from facial expression? A review of the cross-cultural studies. *Psychological Bulletin*, 115, 102–141.
- Russell, J. A. (1997). Reading emotions from and into faces: Resurrecting a dimensional-contextual perspective. In J. A. Russell & J. M. Fernández-Dols (Eds.), *The psychology of facial expression* (pp. 295–320). Paris: Cambridge University Press & Editions de la Maison des Sciences de l'Homme.
- Schachter, S., & Singer, J. E. (1962). Cognitive, social and physiological determinants of emotional states. *Psychological Review*, 69, 379–399.
- Scherer, K. R. (1984). On the nature and function of emotion: A component process approach. In K. R. Scherer & P. Ekman (Eds.), *Approaches to emotion* (pp. 293–317). Hillsdale, NJ: Erlbaum.
- Scherer, K. R. (1992). What does facial expression express? In K. T. Strongman (Ed.), *International review of studies on emotion* (Vol. 2, pp. 139–165). Chichester, England: Wiley.
- Schmidt, K. L., & Cohn, J. F. (2001). Human facial expressions as adaptations: Evolutionary questions in facial expression research. *Yearbook of Physical Anthropology*, 44, 3–24.
- Schmidt, W. C. (2001). Presentation accuracy of Web animation methods. *Behavior Research Methods, Instruments & Computers*, 33, 187–200.
- Tooby, J., & Cosmides, L. (1990). The past explains the present: Emotional adaptations and the structure of ancestral environments. *Ethology and Sociobiology*, 11, 375–424.
- Voracek, M., Stieger, S., & Gindl, A. (2001). Online replication of evolutionary psychological evidence: Sex differences in sexual jealousy in imagined scenarios of mate's sexual versus emotional infidelity. In U.-D. Reips & M. Bosnjak (Eds.), *Dimensions of Internet science* (pp. 91–112). Lengerich, Germany: Pabst Science Publishers.
- Yik, M. S. M., & Russell, J. A. (1999). Interpretation of faces: A cross-cultural study of a prediction from Fridlund's theory. *Cognition & Emotion*, 13, 93–104.
- Zahavi, A., & Zahavi, A. (1997). *The handicap principle: A missing piece of Darwin's puzzle*. New York: Oxford University Press.

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