1. What does a facial expression mean?

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> The human face – in repose and in movement, at the moment of death as in life, in silence and in speech, when seen or sensed from within, in actuality or as represented in art or recorded by the camera – is a commanding, complicated, and at times confusing source of information.
>
> P. Ekman, W. Friesen, and P. Ellsworth, 1972, p. 1

Tradition, common sense, and science converge in seeing the face as a window with a view opening onto our emotions. The Bible quotes God as saying, "My fury shall come up in my face" (Ezekiel 39:18). Aristotle (nd/1913, p. 808) wrote, "There are characteristic facial expressions which are observed to accompany anger, fear, erotic excitement, and all the other passions." When we turn our eyes to the face of another human being, we often seek and usually find a meaning in all that it does or fails to do. Grins, sneers, grimaces, and frowns, fleeting smiles and lingering stares, animated faces and poker faces are not merely utilitarian contractions and relaxations of the muscles, but glimpses into the heart of the other – or so it seems.

Do such ideas contain a truth in plain sight, or are they just another in a line of myths that will ultimately fall before scientific analysis? Common sense has been wrong before. And Aristotle believed that the coarseness of one's hair revealed one's courage.

By the 1980s, psychology's answer was nearly unanimous: The face is the key to understanding emotion, and emotion is the key to understanding the face. Over the past 30 years, psychologists as different as Maurice Merleau-Ponty and Carroll Izard have linked faces to emotions extremely closely: "Anger, shame, hate, and love are not psychic facts hidden at the bottom of another's consciousness: they . . . exist *on* this face or *in* those gestures, not hidden behind them" (Merleau-Ponty, 1961/

1964, pp. 52–53). Izard captured the idea with an aphorism, "Emotion at one level of analysis *is* neuromuscular activity of the face" (1971, p. 188).

Linking faces to emotions may be common sense, but it has turned out to be the single most important idea in the psychology of emotion. It is central to a research program that claims Darwin as its originator, Tomkins as its modern theorist, and Izard, Ekman, and dozens of other scientists as its practitioners. Facial expression is taken to be a universally understood signal, a visible outcropping of an otherwise hidden event, the triggering of a discrete categorical "basic" emotion. Through the face, the Facial Expression Program offered to make of emotion something measurable and understandable within an evolutionary framework and with implications for medicine, the criminal justice system, education, business, and psychotherapy (Ekman & Friesen, 1975).

The Facial Expression Program is presupposed in much work done on facial movements – although not all. Ethologists (e.g., Smith, 1977) have generally taken a different view of facial signals and communicative behavior more generally. Psychologists Mandler (1975) and Zajonc, Murphy, and Inglehart (1989) raised fundamental questions about the link between emotion and facial behavior. By the 1990s, empirical findings and theoretical considerations increasingly questioned the nature of facial expression, its precise link to emotion, and even whether "expression" is the right concept (Zajonc, 1994). Research on the face has recently introduced new conceptualizations, new findings, and new methods. Accepted assumptions are being questioned. Alternative accounts are being formulated, and older accounts are receiving renewed interest. Theorists within the Facial Expression Program are very actively revising some specific hypotheses and defending others.

The chapters of the book to which we now introduce you pursue this discussion. Our introduction is necessarily personal, rather than detached, and partial, rather than complete. Each chapter stands on its own but can perhaps be better appreciated after a discussion of our common historical context. We sketch that history here, outline in more detail one version of the Facial Expression Program, highlight the fundamental questions that have guided recent research, and suggest some guidelines for future research.

A brief history

A full history of the study of facial expressions has yet to be written. In writing this brief sketch, we noticed not only unsung heroes (e.g., Hjortsjö, 1969) but also ignored data (e.g., Kraut & Johnston, 1979) and forgotten ideas (e.g., Landis, 1934). Our view of the history of this area is thus somewhat different than that usually presented. It is also not clear where such a history should begin. Observations about emotions appearing on the face can be found in various ancient and medieval writers, West and East. (See Shweder, 1992, for a fascinating discussion of Indian literature on the facial expression of emotion.) We begin our story with Charles Darwin, the earliest writer whose work is still exerting an important influence on scientific work.

Darwin

Everyone knows that Darwin wrote about facial expressions, but not everyone agrees on what he meant. A frank assessment of Darwin's contribution to the study of facial expression is made difficult by his status as one of the greatest scientists of all time and by his indirect influence through what we *now* know of phylogenetic evolution. Vagueness in his conceptualization of emotion and of expression allows Darwin's 1872/1965 book to be read in different ways. His name has undoubtedly lent prestige to the study of the face, but the adjective *Darwinian* has been used for specific theories that are not exactly Darwin's, for ideas that Darwin did not originate, and occasionally for ideas that Darwin seemed to deny. Other equally legitimate theories have been branded *anti-Darwinian* – which might unintentionally seem to put them in a class with creation science and the flat-earth society.

We have yet to understand how to bring the great Darwinian principles – evolution, natural selection, and adaptation – to bear on human psychology, and so it is not surprising that Darwin's own attempt was not the final word. If you assumed that Darwin's (1872/1965) own account of faces centered on natural selection and adaptation, you would not be alone, but you would still be mistaken. Nor, as Darwin himself made clear, was he the first to think of facial expressions as universal – the thesis, he wrote, "has often been asserted" (p. 15). Nor did Darwin propose that expressions evolved in order to communicate – "there are no grounds, as far as I can discover, for believing that any muscle has been developed or even modified exclusively for the sake of expression" (p. 354).

Darwin's writings are best understood in terms of what Darwin meant to accomplish and against the background assumptions of his time, when facial expression was thought of as a universal, God-given language cre-

ated for the expression of emotion (Bell, 1806; Duchenne, 1862/1990). Darwin's goal was not to create a psychological theory but to undermine creationist views of humans in general and emotional expressions in particular (Fridlund, 1992). His specific mechanism of inheritance (Lamarckian transmission of acquired characteristics) and his first principle of facial expression (useless vestiges of ancestral habits) play no role in any current account of facial behavior.

Darwin's ideas of "expression" and "emotion" were also far removed from any current approach to these topics. For Darwin (1872/1965), the notion of "expression" was extremely general. Instead of a small set of facial "signals," expressions were "actions of all kinds, [which] if regularly accompanying any state of mind, are at once recognized as expressive. . . . Even insects express anger, terror, jealousy, and love by their stridulation" (p. 349). What did these actions of all kinds express? Instead of a short list of basic emotions, Darwin worked with a loose, unconstrained set of "states of mind." Darwin described these "states of mind" in terms not only of emotion (such as anger, terror, jealousy, and love) but also of motivational, behavioral, or personality traits (e.g., determination, defiance, ambition, helplessness, impotence, modesty, shyness, pp. 233, 247, 261, 263, 325, 333), sensations (e.g., bodily pain, hunger, p. 69), and cognitive processes (e.g., abstraction, meditation, p. 226).

According to Darwin, among the best recognized expressions are those of "low spirits" (p. 176) and those of "high spirits" (p. 196). Darwin's rather vague notions of "state of mind" and of "high" versus "low" spirits could be taken to prefigure a dimensional at least as much as a categorical approach to emotion. Indeed, both his second principle, "Antithesis" (opposite states of mind are expressed through behaviors opposite in appearance), and his third, Direct Action of the Nervous System (the effects of over- and under-activation of the nervous system), would seem to require a dimensional understanding of "states of mind."

The concept of "state of mind" is vague enough to fit any model of emotion, including those approaches that deny the scientific value of the concept itself, translating it into cognitive (Mandler, 1975) or behavioral terms (Duffy, 1957; Fridlund, 1994). William James (1890/1950) drew an entirely different lesson from Darwin than did Tomkins, Izard, or Ekman. For biology in general, one of Darwin's great achievements was to view species not as fixed immutable categories

but as groups within which is great diversity. Looking backward in geological time, we see not eternal species but streams that merge. As we discuss shortly, James suggested a view of emotions as similarly flexible.

One of Darwin's less fortunate influences was methodological. Darwin's methods were merely exploratory. For example, when Darwin wrote that a smiling person (or a dog with a wagging tail) is happy, he offered no systematic way to verify that happiness. At best, he relied on an informal and common-sense judgment that the person's (or dog's) situation was a happy one, and occasionally he provided no evidence other than the expression (smile or wagging tail) itself. For example, Darwin showed photographs of posed facial expressions to observers "without a word of explanation," asking them what emotion could be "agitating" the model. Those expressions on which people agreed were considered to be "true." Darwin's methods of cross-cultural research contained the same problem. His method became the method of choice in the Facial Expression Program, in which consensual attribution of a specific "basic" emotion to a particular facial expression was taken to establish that that emotion did indeed cause the facial expression. However, unfortunately, even when human observers agree with one another, they are not necessarily correct – as when everyone once agreed that the earth is flat, and most laypeople still agree that the singing bird is expressing joy or the howling wolf melancholy.

Darwin's legacy

Darwin's influence took two different courses, one in ethology and another in psychology. Ethologists moved from Darwin's specific analysis described in his 1872 book on expression to the implications of the modern synthesis of evolutionary theory with genetics. Early ethologists conceptualized facial "displays" in ways similar to Darwin's (Tinbergen, 1939, 1952; see Lorenz, 1970). Later ethologists, however, moved steadily away from explanations of behavior in terms of internal states and focused instead on the consequences of facial displays for interaction (Hinde, 1985a, b; Smith, 1977, 1985). They assembled evidence on how communicative behavior in general is dramatically shaped by the interactive context in which it occurs. For example, Marler and Evans (chapter 6, this volume) showed that bird calls vary as a function of the audience. Eibl-Eibesfeldt (e.g., 1972) explored the universality and regional/cul-

tural variation of facial behavior (rather than "states of mind"). Andrew (1963) and van Hooff (1976) attempted to apply modern evolutionary theory to human facial displays, asking about what the original behaviors might have been, the selection pressures that fashioned facial displays, their genetic and epigenetic control, their relations to language, how they serve inclusive fitness, and the like. Kraut and Johnston (1979) and Provine (chapter 7, this volume) applied ethological methods to the study of human facial behavior, with startling results.

Psychologists were less influenced by Darwin's book initially but embraced it with fervor around the time of its centennial (Ekman, 1973). Ethological and psychological streams of thought continued their separate development until meeting head-on in Fridlund's (1994; chapter 5, this volume) critique of the Facial Expression Program. Here we trace only the psychological stream.

Experimental psychology, 1900–1930

Early experimental psychologists did not always cite Darwin but attributed to common knowledge the idea that faces express emotions. Like Darwin, researchers were conceptually open-minded and methodologically innovative. Recognition of emotion meant the recognition of the states of mind or particular circumstances accompanying facial actions (Buzby, 1924; Landis, 1929). One of their goals was to discover precisely what observers could infer from faces. They therefore tried to bring facial expression into the laboratory. Some tried to elicit genuine emotions or other states under controlled conditions (Landis, 1924; Sherman, 1927) and to record the ensuing facial movements. Others examined films of naturally occurring facial expressions (Lewin, 1927).

Although the methods of the early experimentalists were primitive, they accumulated evidence that collectively challenged traditional notions about facial expressions. When actual rather than simulated emotions were studied, faces did not seem to reveal that emotion (Landis, 1924). Observers not only failed to agree on precisely what emotion was conveyed even by simulated faces but were subject to the experimenter's suggestion (Fernberger, 1928) and to training (Allport, 1924). Researchers took up an issue ignored by Darwin: When an observer sees a facial expression, what is the role of the context in which the face is embedded? Overall, this era raised questions and challenged preconceptions – questions and challenges that remain relevant today.

Experimental psychology, 1930–1960

Just as relevant today is the very active conceptual and empirical work of the period broadly surrounding World War II (see reviews by Woodworth & Schlosberg, 1954; Bruner & Tagiuri, 1954; Taguiri, 1969). In addition to interesting individual studies (Coleman, 1949; Munn, 1940; Turhan, 1960; Landis & Hunt, 1939), three related schools of thought arose that sought to reconcile the traditional views of a face–emotion link with the doubts raised by experimental evidence gathered earlier. Woodworth (1938) and his students were especially active. Woodworth (1938) reanalyzed judgment data and found them not so damning after all. He proposed that although faces do not convey specific emotions, they do convey families of emotion. Schlosberg (1941, 1952, 1954) proposed that what holds these families together are underlying components, such as pleasantness or unpleasantness, arousal or relaxation, attention or rejection. Schlosberg's model was later upheld cross-culturally (Triandis & Lambert, 1958). Woodworth's students, Klineberg (1938, 1940) and Vinacke (1949; Vinacke & Fong, 1955) also observed both a universal aspect to facial expression and a role for culture as well; Klineberg (1938, 1940) proposed what later came to be called *display rules*. Culture's influence was reinforced by anthropological reports (LaBarre, 1947; and later Birdwhistell, 1963, 1970).

A second school began with Osgood (1955, 1966), who emphasized the meaning of a facial display as the observer's response to it. Osgood's dimensions of meaning (evaluation, potency, and activity) and his semantic differential technique were taken up in later studies of nonverbal communication (Mehrabian, 1972). Osgood (1955, 1966) also provided evidence on the cross-cultural generality of facial meaning.

A third school consisted of Frijda (1953, 1958, 1969) and his colleagues. Frijda proposed an information-processing model of the perception of emotion in the face and a multicomponent model of emotion that provided a link between facial expressions and emotion and that stressed action preparation in both emotion and the face. Frijda and Tcherkassof (chapter 4, this volume) describe the current version of this theory.

Psychology, 1960–today

The modern era of psychology's study of facial expression began in 1962 with the publication of books on emotion by Tomkins and by Plutchik. Stimulated by these books, the pace of research on facial expression ac-

celerated through the 1970s. By 1980, research on the face was dominated by the Facial Expression Program, centered on a list of specific "basic" emotions as the cause of and the signal received from facial expressions. In this program, Darwin's (1872/1965) book was rediscovered, the issue of universality was made central, the history of the study of facial expression was reinterpreted (as if it were a clash between those who accepted Darwin and those who rejected him), previous research was severely criticized on theoretical (Izard, 1971) and technical (Ekman et al., 1972) grounds, new conceptual and methodological guidelines were offered, and much new research was undertaken. Indeed, this program has generated more research than any other in the psychology of emotion.

The influence of this program is very great. Its assumptions appear in important theories of emotion (Damasio, 1994; Oatley, 1992). Its language is implicit in psychologists' discourse. Facial expressions are named by the specific "basic" emotion allegedly expressed (a "surprise face" or the "facial expression of anger"). When experimental participants select the predicted name, they are said to have "recognized" the facial expression; they are "accurate" or "correct"; those who select a qualitatively different term are said to have made an "error." In studies on the important question of autonomic differentiation of the emotions, Levenson (1992) used the directed facial action task in which discrete emotions were claimed to be induced by the creation of the corresponding facial expression. When Cacioppo, Berntson, and Klein (1992) proposed the Somatovisceral Afference Model of Emotion – which combines the tradition of James (1890/1950) and Schachter and Singer (1962) with that of Tomkins, Ekman, and Izard – they relied on the Facial Expression Program. To test their model, they needed unambiguous bodily manifestations of single discrete emotions; they turned to facial expressions: "Research spearheaded by Tomkins (1962), Ekman (1972), and Izard (1971, 1977) . . . [identified] the prototypical facial configurations associated with discrete emotions" (p. 88). The Facial Expression Program has been equally important in inspiring and guiding research on the development of facial expression and its recognition (Camras, Malatesta, & Izard, 1991; see Izard and Nelson & de Haan, chapters 3 and 8, respectively, this volume).

Although alternative conceptualizations of the link between emotion and faces exist, by the 1980s, it was the work and conclusions of the Facial Expression Program that were presented to undergraduates in their textbooks. Advocates found that psychologists had accepted their

conclusions: "Ekman and other psychologists have uncovered compelling evidence that six basic emotions are expressed in much the same way in all cultures" (Carlson & Hatfield (1992, p. 221). Even critics of the kind of emotion theory offered by Tomkins, Izard, and Ekman stated: "We do not (and did not) dispute the fact that there are universal facial expressions associated with certain emotions" (Turner & Ortony, 1992, p. 566). We next elaborate on that program.

The Facial Expression Program

The Facial Expression Program consists of a network of assumptions, theories, and methods, but it is surprisingly difficult to find a complete statement of that set. Each investigator (indeed, each article) presents a somewhat different version of the program, and the program is evolving rapidly. Rather than a history of who said what when, it may be more useful to make explicit a prototypical version, capturing the program in its clearest, most heuristic, interesting, and stimulating form. Some of that prototype's key assumptions, premises, and implications would be these:

1. There are a small number (seven plus or minus two) of basic emotions.
2. Each basic emotion is genetically determined, universal, and discrete. Each is a highly coherent pattern consisting of characteristic facial behavior, distinctive conscious experience (a feeling), physiological underpinnings, and other characteristic expressive and instrumental actions. (Note that in this definition, cognition is not *part* of an emotion, although cognition might be one of the possible *causes* of an emotion.)
3. The production (encoding) and recognition (decoding) of distinct facial expressions constitute a signaling system, which is an evolutionary adaptation to some of life's major problems. This premise predicts and relies upon similarity in facial configurations across species.
4. Any state lacking its own facial signal is not a basic emotion. Therefore, discovering which facial expressions signal the same emotion universally provides a list of candidate basic emotions. The seven candidates found so far are happiness, surprise, fear, anger, contempt, disgust, and sadness. There is some uncertainty over contempt and over the distinction between surprise and fear. Interest

and shame might be added to the list. Candidates could then be tested against the criteria outlined in premise number 2.

5. All emotions other than the basic ones are subcategories or mixtures (patterns, blends, combinations) of the basic emotions. For example, anger includes fury and annoyance as subcategories (which should therefore share anger's facial signal). Anxiety is a mixture of fear, sadness, anger, shame, and interest (and should therefore result in a facial blend).
6. Voluntary facial expressions can simulate spontaneous ones. Voluntary expressions are deceptive in nature and culturally conditioned. Different cultures establish different display rules, which dictate when an expression can be displayed freely, and when it must be inhibited, exaggerated, or masked with a different expression. The true emotion "leaks" through the camouflage and can be detected through facial measurement.
7. Any facial expression that deviates from the universal signals – either in an individual or in a cultural group – is a mixture of the basic signals or stems from the operations of culture-specific display rules.
8. Emotional state is revealed by facial measurement. Thus, the emotions of newborns and of others unable or unwilling to speak truthfully become accessible. Verbal report can be bypassed. Great effort has gone into the development of scoring systems for facial movements. These systems objectively describe and quantify all visually discriminable units of facial action seen in adults or in babies. Scoring keys are available to translate the observed facial action units into emotion categories. Subtle or inhibited emotions can be revealed through facial electromyography. Expressions too brief to be seen by the unaided eye can be detected through high-speed photography.
9. The subjective feelings associated with an emotion are due, at least in part, to proprioceptive feedback from facial movements. This "facial feedback hypothesis" has been offered as one means by which an individual "knows" which emotion he or she is feeling (and thus answers a question that has been central in the psychology of emotion since William James). The existence of these highly differentiated internal "cues" to an ongoing emotion would refute Schachter and Singer's theory that emotion consists of cognition plus undifferentiated arousal.
10. Deliberately manipulating the face into the appropriate configuration creates the neurological pattern of the corresponding emotion. For instance, wrinkling the nose creates the neurological pattern of disgust. Facial manipulation can then be used in the laboratory to reveal the physiological signature of each emotion.

11. The seven (plus or minus two) facial signals are easily recognized by all human beings regardless of their culture.
12. The ability to recognize the emotion in a facial expression is innate rather than culturally determined. The ability is present very early, possibly at birth. In "social referencing," for example, young children use the emotion in their caregiver's face to decide how to handle ambiguous and potentially dangerous situations. The information obtained is more specific than simply whether the caregiver feels positively or negatively about the situation. For instance, anger and fear expressions send very different messages to the child.
13. The mental categories by means of which recognition occurs (in the self as facial feedback or in others through facial signaling) are genetically rather than culturally determined. The words *happiness, surprise, fear, anger, disgust, contempt,* and *sadness* thus designate innate and universal categories. Other languages may use other names, but the categories named are the same. These categories are natural kinds and semantic primitives. Like the emotions themselves, additional emotion labels designate mixtures or subcategories of the basic categories.
14. Like encoding and decoding, the meaning ("signal value") of a facial expression is fixed by nature and invariant across changes in the context in which it occurs. Observers can thus recognize the emotion in another's facial expression, even when the other's context and behavior provide conflicting information. Observers can recognize the same emotion in the same facial expression across a range of modes of presenting the facial expression.

No one now suggests that all of these corollaries are supported unequivocally, especially when stated so starkly. Still, textbooks (Carlson & Hatfield, 1992), popular science books (Ingram, 1994), and other secondary sources (Behavioral Science Task Force of the National Advisory Mental Health Council, 1995) present similarly stark and unconditional versions of the Facial Expression Program. In contrast, both Ekman and Izard have cautioned against some of the corollaries. There are also arguments about details, such as whether children actually engage in social referencing and about whether newborns can recognize emotions from facial expressions. Five rather than seven emotion words might be the semantic primitives. The ability to recognize facial expressions might not

be innate. Conceivably, they might be so common and so obviously associated with the corresponding emotion that they are easily learned. Such arguments are within the program. Current theories and summaries of the evidence from this perspective are readily available (Izard, chapter 3, this volume; see also Ekman, 1992, 1994; Izard, 1992, 1994).

Evidence supporting any of these corollaries would be taken as strong support for the program, but no one pillar of support is necessary for the program to survive. Of course, if enough difficulties surface in enough domains, they may constitute the kind of anomalies that stimulate the questioning of the program itself. And this kind of questioning has begun. We consider here two questions that recently resulted in lively debate: first, the universality of facial expressions and, second, the nature of emotion and its link to faces.

Universality

For many, the most convincing and exciting accomplishment of the Facial Expression Program was dramatic evidence for the universality of the facial expression of emotion. To establish this conclusion would require the establishment of three related propositions:

1. The same patterns of facial movement occur in all human groups.
2. Observers in different societies attribute the same specific emotions to those universal facial patterns.
3. Those same facial patterns are, indeed, manifestations of those very emotions in all human societies.

Writers have not always distinguished among these three. For instance, Ekman (1980) published photographs of aboriginal people in New Guinea smiling, frowning, weeping, and so on. Ekman then concluded in favor of universality – "Ultimately, however, the best argument for universality is made by the faces of the New Guineans" (p. 12) – without specifying which aspect of universality was actually established. Of course, the existence of facial patterns per se addresses only Proposition 1.

Proposition 1 has been largely assumed true, although its empirical examination might be highly revealing. Proposition 2 has received great attention. Proposition 3 has been curiously ignored; independent evidence on 3 is much needed, since 3 would not necessarily be true even if 1 and 2 were established. (This last point might be dismissed by incredulous readers, and so let us be clear: There is now no evidence showing that, in a number of different societies, happy people smile, angry people frown, disgusted people wrinkle their noses, and so on. See Fernández-Dols & Ruiz-Belda and Frijda & Tcherkassof, chapters 11 and 4, respectively, this volume, for discussions of this topic.)

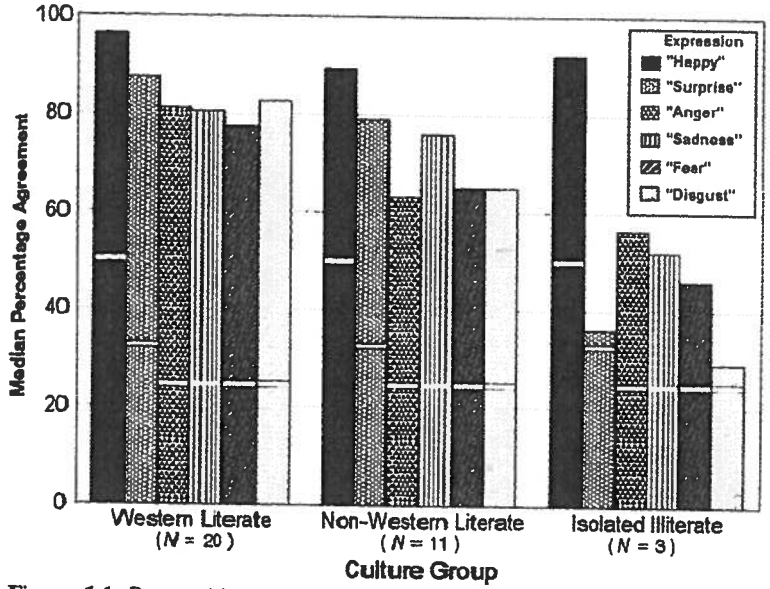

Figure 1.1. Recognition scores for six facial expressions of emotion. Values taken from Russell (1994). White horizontal bars represent level expected by chance alone. *N* is number of groups.

Now consider the evidence on Proposition 2. Figure 1.1 provides a summary of relevant results from cross-cultural judgment studies using a standard method. The figures given are "recognition scores" (the percentage of observers who pick the predicted label). The first set of bars comes from Western literate societies (largely college students). The numbers are impressive (far above chance, represented in Figure 1.1 by white horizontal lines). The second set of bars comes from non-Western societies (although still largely college students). This second set of scores is reliably lower than the first but still high. Now turn to the third set, which comes from more isolated samples of non-Western observers (uneducated, indeed illiterate). These observers agreed on attributing happiness to the smiles but yielded noticeably lower recognition scores with all other photographs.

Clearly, both Western and non-Western observers conform to prediction to a greater degree than would be expected by chance. At the same time, the recognition scores are proportional to the amount of Western influence and may have been inflated by a series of method factors: exaggerated posed expressions, within-subject design, and a forced-choice response format (not to mention experimenter influence, Sorenson, 1975, 1976). (For example, in Russell's 1994 data, the within-subject design resulted in an 11-percentage-point increase in average recognition score over that achieved in a between-subjects design.)

So, return to the third set of bars, and picture each bar falling even a small amount each time an inflationary method factor is removed. It remains to be seen which if any of the bars would remain above chance. Whatever the answer to that question, there also remains the matter of their interpretation.

Suppose that all recognition scores remain above chance even when technical problems are overcome. There would still be various alternative explanations for the nonrandom associations, including that of the Facial Expression Program (Izard, chapter 3, this volume) but also including alternatives to it (e.g., Fernández-Dols & Carroll, Frijda & Tcherkassof, Russell, Smith & Scott, chapters 12, 4, 13, and 10, respectively, this volume).

The most parsimonious account of all evidence we now have on how facial expressions are produced and interpreted is something called *Minimal Universality*. It is outlined in Table 1.1. The phrase may sound like an oxymoron, but the paradox may stem from the presupposition that we face an either–or choice: either randomness (the null hypothesis used in the statistical tests carried out in the cross-cultural studies) or full universality. Like the nature–nurture dichotomy, this choice is simplistic. Minimal Universality predicts a certain amount of cross-cultural similarity in interpreting facial expressions without postulating an innate emotion signaling system. Calling this position *minimal* is meant to emphasize that at least this much universality appears to exist. The question for the future, then, is: What can be established beyond Minimal Universality?

Needless to say, the topic of universality remains controversial. See Russell (1994, 1995) for an elaboration of the analysis just presented. See Izard (1994) and Ekman (1944) for an alternative analysis. See van Brakel (1994), Cornelius (1996), Oatley and Jenkins (1996), and Parkinson (1995) for independent reviews.

Table 1.1. *Minimal universality*

Assumptions

1. Certain patterns of facial muscle movement occur in all human beings.
2. Facial movements are coordinated with psychological states (actions, preparation for actions, physical states, emotional states, cognitive states, and other psychological conditions).
3. Most people everywhere can infer something of another's psychological state from facial movement, just as they can from anything else that other person does.
4. People in Western cultures have a set of beliefs in which specific types of facial actions are expressions of specific types of emotion.

Some caveats

1. Facial actions are not necessarily signals.
2. Facial action is not necessary or sufficient for emotion. Facial action is not necessarily more associated with emotions than with other psychological states.
3. What inferences are made in one culture, or by one individual, need not coincide exactly with inferences made in another culture or by another individual.
4. People in all cultures need not share Western beliefs about the specific associations of emotions and facial actions.
5. Western beliefs about the association between facial expressions and emotions are not necessarily valid.

Predictions

1. Photographs of facial movements will be associated with psychological state with agreement that is greater than chance.
2. People are sometimes accurate in the inferences that they make on the basis of facial movements.
3. There will be similarities across cultures in what is inferred from facial movements.

Emotion and its link to the face

A second set of still deeper questions faces any theory explaining facial behavior in terms of emotion. How exactly is facial behavior linked to emotion? If facial behavior is linked to basic emotions, what are they, and how would their "basicness" be established? And what is an emotion, anyway?

How exactly is emotion linked to faces? That certain "facial expressions" actually "express" emotions presupposes that they are caused by emotion. This assumption remains untested. Casual observation suggests

a link between faces and emotions (just as casual observation suggests that flu symptoms are linked to cold weather, wet feet, bad luck, and being around others with the flu). It remains for scientific analysis to establish which links are intrinsic and which merely correlational. So, just as influenza is intrinsically linked to the spread of germs and only accidentally linked to cold weather (in cold weather, people congregate closer together more often and therefore spread germs more effectively), facial behavior might be intrinsically linked to something correlated with emotion.

This question arises in an interesting form for those who think of emotion as consisting of components, no one of which is necessary. Is it the full emotion that is necessary and sufficient for facial action, or is it perhaps one of emotion's components: preparation for action (Frijda & Tcherkassof, chapter 4, this volume) or cognitive appraisal (Smith & Scott, chapter 10, this volume)? This same question arises in a more extreme form when Fridlund (chapter 5, this volume) argues that facial behavior can be accounted for in terms of social motives, which are only modestly correlated with emotion.

Are some emotions basic? Any account of emotion needs a description of the different categories of emotion. Izard (chapter 3, this volume) and most other proponents of the Facial Expression Program assume a fixed number of "basic" categories. Indeed, Tomkins and Izard saw the face as a tool in their more general aim, which was the understanding of basic emotions. Others, however, question the evidentiary and conceptual basis of the claim that some categories of emotion are basic (Ortony & Turner, 1990). Some writers emphasize the plasticity of emotion over fixed categories. Drawing on Darwin, William James inspired this perspective:

> So long as [categories of emotion] are set down as so many eternal and sacred psychic entities, like the old immutable species in natural history, all that *can* be done with them is reverently to catalogue their separate characters, points, and effects. But if we regard them as products of more general causes (as "species" are now regarded as products of heredity and variation), the mere distinguishing and cataloguing becomes of subsidiary importance. (James, 1890/1950, p. 449)

Following in James's footsteps are theories such as those of Averill (1980), Harré (1985), Hochschild (1983), Lutz (1982), Schachter and Singer (1962), and Wierzbicka (1992), who see social forces as influencing the particular categories of emotion found in each society.

What is an emotion? To account for facial behavior through emotions, basic or not, we would need a scientifically acceptable definition of emotion. After all, to test such an account requires that we know what counts as an emotion and what does not. Izard (1977, 1991) suggested defining emotion as consisting of neurophysiological, behavioral, and subjective components. Fehr and Russell (1984), however, pointed out that such a definition fails to distinguish emotion from wishes, intentions, motives, and, indeed, many psychological concepts. (Consider squinting on a sunny day or moving a pawn in a game of chess. These events have neurological, behavioral, and subjective components. Therefore, it is not clear why these would not count as emotions on Izard's definition. If squinting and chess moves express emotions, then it is hard to imagine what would not.)

Definitions of emotion proposed so far face a dilemma: Either they fail to capture what the word *emotion* means, or they fail to be precise enough to serve as a scientific concept. This dilemma should not surprise us. "Emotion" is an ordinary, everyday word understood by all rather than a precise concept honed through scientific analysis. Perhaps "emotion" is a concept that could be dispensed with in scientific discourse (except as a folk concept requiring rather than providing explanation), and therefore it would have no role to play in the analysis of facial behavior. Doubts about the scientific viability of the concept of "emotion" have been expressed by Duffy (1957), Kagan (1978), and Mandler (1975). Some everyday concepts survive scientific scrutiny (e.g., water), but others do not (witches). Many survive in name only (force, weight). In any case, we have probably reached the point where further usefulness of thinking of facial expressions in terms of emotion requires a clarification of the concept of emotion itself.

Some broad guidelines for future research

Everyone produces facial expressions, and everyone reacts to the facial expressions of others. Whatever one's answer to the foregoing perplexing theoretical questions, such happenings raise their own, more general questions:

1. [Description of The Face] Which facial movements and patterns occur? (e.g., How can facial behavior be described and assessed?)
2. [Production] What causes facial movement? (e.g., Of what state or

process or the like, if any, in the expresser is the facial movement a sign?)

3. [Reaction] How do others react to a facial movement? (e.g., What meaning does an observer find in the facial movements of the expresser? What is the process – direct perception, inference, attribution – whereby meaning is found or constructed?)

Further questions must also be raised about the neural mechanisms, the ontogeny, and the phylogeny of facial behavior and others' reactions to it. In the view of the field we have just outlined, there are many questions, few answers, many theories, few facts. There are few greater clichés in psychology than calling for more research, but what else can we do? One surprising fact about the psychology of facial expression is how little basic information on the topic we have. There's no question about the need. But how to conduct the research – that's the question.

Ekman et al. (1972) provided researchers with guidelines that have been of historic importance. Much of what they advocated was standard: objectivity, generality, and so on. We certainly don't quibble with such points, but their guidelines – as any guidelines would – also mix such consensual concerns with their own particular conceptual framework. As a consequence, each researcher might want to think carefully before accepting their advice in detail, and it is probably time to reconsider their guidelines in general. In chapter 2, Wagner reviews methodological issues in facial research. Here we provide general guidelines – similarly guided by our own assumptions – on conceptual issues that the researcher might want to consider.

Production of versus reaction to faces

"What does a facial expression mean?" – this question has two distinct meanings. It could be translated as "what about the expresser causes facial behavior?" But it could also be translated as "what does an observer see in the face?" This ambiguity is potentially dangerous, as when an answer to one question is taken to be an answer to the other. Past confusion urges us to emphasize our distinction between studies on the production of facial behavior versus studies on reactions to (including perception of) facial behavior.

Production of faces. Here the face is the *dependent* variable. The questions asked center on the conditions that influence facial behavior – conditions internal or external to the expresser (his or her emotion, social motives, intention, internalized display rules, current situation, developmental trajectory, evolutionary history, etc.). Such studies include what have been called *component* or *encoding studies.* Wagner calls them *measurement studies.* (See Ekman & Rosenberg, in press, for a compendium of such studies.)

Reaction to faces. Here the face is the *independent* variable. The questions asked concern an observer's reaction to the face. What influences the observer? Through what process does the observer "see" an emotion in a face – labeling? perceiving? Is it direct or mediated? More generally, what are the observers' emotional and behavioral reactions to the facial behavior of others? (For example, reactions to others' yawns, smiles, and laughs include yawning, smiling, and laughing, respectively; Provine, chapter 7, this volume.) Such studies include "judgment" or decoding studies, but the topic is really any reaction by an observer (including self-observation), not just judgments, and that reaction could be assessed in a variety of ways. For example, clever studies of babies examine how often the baby looks at a given face, or whether the baby habituates to kinds of faces, in order to explore the baby's processing of facial information (see Nelson & de Haan, chapter 8, this volume). These babies might not be making judgments at all, but they are processing information from the face they observe.

Maintenance of this distinction is needed in sorting what is known from what is not. For example, just because a face is caused by the expresser's anger would not necessarily imply that observers will know this. After all, human beings – even collectively – are not infallible. Scientists might detect information in the face previously misunderstood or never before exploited – just as geologists can extract from rocks information previously ignored or misunderstood. Conversely, just because lay observers infer anger from a face does not necessarily imply that the expresser is truly angry. Folk judgments of faces are not necessarily true – any more than owls are wise or camels proud just because they seem that way to observers. This distinction remains relevant even in the study of the full process of communication or of facial feedback. The relation between what causes the face to move and what an observer thinks causes the face to move should be an empirical question rather than an implicit assumption.

Faces are associated with more than emotion

The relation of the face to emotion will remain an important topic. But whatever the resolution of that question, the relation of facial behavior to other psychological events merits more study. States other than emotion (pain, fatigue, boredom, interest, sleepiness, alertness) can entail facial movements, and observers infer more than emotion from the face of others (again pain, fatigue, boredom etc.). Smith and Scott (chapter 10, this volume) discuss how the face might be used as an index of cognitive processes (attention, pre– or post–problem solving). Frijda and Tcherkassof (chapter 4, this volume) show that observers infer a full range of action tendencies from faces. Fridlund (chapter 5, this volume) considers the social intentions of the expresser as the message expressed by the face and received by the observer.

More to faces than seven prototypes

Every psychologist is familiar with the seven prototypical "facial expressions of emotion." The sets of photographs developed by Ekman and Friesen (1976) and by Matsumoto and Ekman (1988) have played a large role in the accumulated body of data about faces. But facial patterns and movements are not restricted to this small set, and very much work remains to be done in exploring other facial movements. Izard (chapter 3, this volume) emphasizes that even the basic emotions can be expressed through a range of facial patterns, not just the prototypes. Again, we mean this advice to apply both to the study of the production of faces and to the study of reactions to faces.

Spontaneous and posed faces

Common sense and scientific writing sharply distinguish spontaneous facial expressions from posed ones. This distinction is clearly important, with sometimes dramatic differences between the two (Fernández-Dols & Ruiz-Belda, chapter 11, this volume). It is also troubling that so very much of the research on facial expression employs posed faces. And yet the distinction as usually formulated is unclear and probably too simple. Spontaneous expressions are assumed to be natural, involuntary, undirected outbursts. Poses, in contrast, are assumed to be artificial, symbolic, produced on demand, deceptive in nature, and aimed at an audience.

And yet we spontaneously pretend, we naturally strike poses. As part of our dialogues, we spontaneously mime in comment on the stories told us or to illustrate our own stories (Bavelas & Chovil, chapter 15, this volume). Spontaneous, involuntary, undirected facial expressions, on the one hand, and artificial, posed behavior produced on demand, on the other hand, may each be extreme and rarely occurring end points on a continuum. Much naturally occurring facial behavior may be spontaneous and symbolic and communicative in nature and directed toward a specific audience.

Ecological questions

At least since Bell (1806), scientists have tried to bring the study of the face into the laboratory. Obviously, much is to be gained by doing so, and much more laboratory work remains to be done. At the same time, ecological questions have been terribly neglected. We do not know when or in what circumstances various types of facial behavior occur or in what frequency. For example, return to the seven highly researched prototype facial expressions published by Matsumoto and Ekman (1988). In what natural situations do such configurations occur? How frequently? When they occur, how often are they part of the emotion they are said to express? More importantly, we must ask the same set of questions about facial behavior other than the seven prototypes.

Ecological questions are relevant both to the study of the production of facial behavior and to the study of reactions to faces. Studying production, Provine (chapter 7, this volume) found that smiling and laughing occur much more frequently in social than in nonsocial situations. Similarly, when the topic is another's reaction to a face, such reactions may vary with how common or unusual that facial expression is, especially given the context. Reactions to commonly encountered expressions might differ from reactions to unusual ones. We also need to ask much more about observers' naturally occurring, spontaneous reactions to faces. Are they well represented by the kinds of judgment scales often used in studies of facial expressions?

Taking culture seriously

Some of the most widely cited cross-cultural studies ever carried out have concerned facial expressions. Available evidence arises from a rather narrow perspective on cultural studies. Typically, a hypothesis is

formulated in our "Western" culture, and then its generality across cultural settings is tested. The information obtained from the resulting studies is thus restrained to a single quantitative dimension of degree of generality.

Much more interesting cultural studies are possible. We have very little information on what facial behavior is seen in a given society, on what influences that behavior, and how that behavior is interpreted by its members. Those who propose that observers infer emotions from faces might want to ask what observers understand by emotion. Culture includes a theory of human nature and of emotion (Shweder, 1992). A real understanding of how people of different cultures understand the link between faces and emotion (and anything else) has barely begun.

Testing among rival hypotheses

Much research on the face has pitted the experimenter's plausible hypothesis against an implausible null hypothesis. The null hypothesis might, for example, be that observers choose an emotion label completely at random for every facial stimulus shown. When human beings are given a task such as figuring out which emotion label goes with which face, completely random behavior is highly unlikely. Rejecting this null hypothesis (finding that the results are "statistically significant"), the experimenter then concludes – and here's the problematic step – that the experiment has established his or her hypothesis (or even has strongly supported his or her entire theory). The experimenter's hypothesis can be accepted as *the* explanation of the data only if no alternative rival explanation exists. Ruling out the null hypothesis in any particular study lends support not only to the experimenter's favorite account but to every possible account of the data other than sheer chance. The experimenter's own favorite enjoys no privileged position in the logic of experimental design.

Testing a null hypothesis such as random choice has its uses, but more useful and interesting research and analysis of the data will come from comparisons among more plausible rival hypotheses. Often a simple account (such as Minimal Universality, Table 1.1) could be constructed to serve as a more plausible rival to the experimenter's. In this book, nearly every question about the face has generated rival accounts. Nearly every hypothesis offered by one author can be contrasted with an alternative offered by another. We have deliberately sought a range of perspectives,

on the belief that our field is ready for research that seeks to test among these rival hypotheses.

The remaining chapters

A second half of the introductory section of this book is a chapter by Wagner on methods. Wagner provides guidelines on how methods can be tailored more closely to the specific question being investigated.

Part Two presents three broad theoretical perspectives on the face. Izard writes from the perspective of his Differential Emotions Theory, Frijda from his multicomponent theory of emotion, and Fridlund from his Behavioral Ecology perspective.

Part Three pursues more specific topics, all from a broadly biological perspective. Marler and Evans reexamine the implications of work on animal signaling, once thought to be paradigm cases of eruptions of emotion. They find that emotions are not enough to account for signaling. Provine applies an ethological approach to human laughing, smiling, and tickling. Such an approach has been so neglected in the past that naturalistic observation can still yield surprising findings. (An ethological approach also yields a perspective on facial behavior that nicely complements the conclusions reached in later chapters by Bavelas and Chovil from a social-communications perspective.) The last two chapters in this part take up important developmental issues. Nelson and de Haan examine the recognition of facial expressions in infants from a neurobehavioral perspective. And Messinger, Fogel, and Dickson interpret smiling in infants from a dynamic systems perspective.

Part Four similarly examines specific topics but now from a broadly psychological and social perspective. Smith and Scott break emotion into specific psychological steps, which they call *components*, and discuss their separate links to facial behavior. Fernández-Dols and Ruiz-Belda focus on spontaneous facial behavior and the naturally occurring conditions under which it occurs. They illustrate how spontaneous behavior may be dramatically different from its posed and simulated counterpart and report evidence supportive of Fridlund's emphasis on the sociality of facial expression. Fernández-Dols and Carroll reexamine a traditional but lately dormant question of the relative roles of facial and situational information in the perception of emotion from facial expression. They challenge the traditional assumption that specific facial expressions have a specific meaning independent of the context in which they occur (that

the frown is a "facial expression of anger" whatever the context). Russell similarly focuses exclusively on the observer in the process of facial communication. The final two chapters in this part illustrate a social communicative perspective on facial behavior. In the first, Chovil reviews research and writing emerging from this perspective. In the second, Bavelas and Chovil describe their own research on facial behavior during dialogue.

Finally, Part Five is an epilogue by Ginsburg summarizing and integrating themes that emerge from the previous chapters and offering his own reconceptualization. Readers who like to begin with a more detailed summary of each chapter might want to turn now to Ginsburg's chapter.

References

Allport, F. M. (1924). *Social psychology*. Boston: Houghton-Mifflin.

Andrew, R. J. (1963). Evolution of facial expression. *Science, 141*, 1034–1041.

Aristotle. (1913). Physiognominica. In W. D. Ross (Ed.) & T. Loveday & E. S. Forster (Trans.), *The works of Aristotle* (pp. 805–813). Oxford: Clarendon.

Averill, J. R. (1980). A constructivist view of emotions. In R. Plutchik & H. Kellerman (Eds.), *Emotion: Theory, research, and experience*. New York: Academic Press.

Behavioral Science Task Force of the National Advisory Mental Health Council (1995). Basic behavioral science research for mental health: A national investment: Motivation and emotion. *American Psychologist, 50*, 838–845.

Bell, C. (1806). *Essays on the anatomy of expression in painting*. London: Longman, Hurst, Rees, & Orme.

Birdwhistell, R. L. (1963). The kinesic level in the investigation of the emotions. In P. H. Knapp (Ed.), *Expression of the emotions in man* (p. 123–139). New York: International Universities Press.

Birdwhistell, R. L. (1970). *Kinesics and context*. Philadelphia, PA: University of Pennsylvania Press.

Brakel, J. van (1994). Emotions: A cross-cultural perspecitive on forms of life. In W. M. Wentworth & J. Ryan (Eds.), *Social perspectives on emotion* (Vol. 2). Greenwich: JAI Press.

Bruner, J. S., & Tagiuri, R. (1954). The perception of people. In G. Lindzey (Ed.), *Handbook of social psychology* (Vol. 2). Cambridge: Addison-Wesley.

Buzby, D. E. (1924). The interpretation of facial expressions. *American Journal of Psychology, 35*, 602–604.

Cacioppo, J. T., Berntson, G. G., & Klein, D. J. (1992). What is an emotion? The role of somatovisceral afference, with special emphasis on somatovisceral "illusions." *Review of Personality and Social Psychology, 14*, 63–98.

Camras, L. A., Malatesta, C., & Izard, C. E. (1991). The development of facial expression in infancy. In R. Feldman & B. Rime (Eds.), *Fundamentals of nonverbal behavior*. New York: Cambridge University Press.

Carlson, J. G., & Hatfield, E. (1992). *Psychology of emotion*. New York: Holt, Rinehart, & Winston.

Coleman, J. C. (1949). Facial expressions of emotion. *Psychological Monographs, 63* (1, Whole No. 296).

Cornelius, R. R. (1996). *The science of emotion*. Upper Saddle River, NJ: Prentice-Hall.

Damasio, A. R. (1994). *Descartes' error*. New York: G. P. Putnam's Sons.

Darwin, C. (1965). *The expression of the emotions in man and animals*. Chicago: University of Chicago Press. (Original work published 1872)

Duchenne de Boulogne, G. B. (1990). *The mechanism of human facial expression*. R. A. Cuthbertson (Ed. and Trans). Cambridge: Cambridge University Press. (Original work published 1862)

Duffy, E. (1957). The psychological significance of the concept of arousal on activation. *Psychological Review, 64*, 265–275.

Eibl-Eibesfeldt, I. (1972). Similarities and differences between cultures in expressive movements. In R. A. Hinde (Ed.), *Nonverbal communication*. Cambridge University Press.

Ekman, P. (1972). Universals and cultural differences in facial expressions of emotion. In J. Cole (Ed.), *Nebraska symposium on motivation, 1971* (pp. 207–283). Lincoln: University of Nebraska Press.

Ekman, P. (1973). *Darwin and facial expression: A century of research in review*. New York: Academic Press.

Ekman, P. (1980). *The face of man: Expressions of universal emotions in a New Guinea village*. New York: Garland STPM Press.

Ekman, P. (1992). Are there basic emotions? *Psychological Review, 99*. 550–553.

Ekman, P. (1994). Strong evidence for universals in facial expression: A reply to Russell's mistaken critique. *Psychological Bulletin, 115*. 268–287.

Ekman, P., & Friesen, W. V. (1975). *Unmasking the face*. Englewood Cliffs, NJ: Prentice-Hall.

Ekman, P., & Friesen, W. V. (1976). *Pictures of facial affect*. Palo Alto, CA: Consulting Psychologists Press.

Ekman, P., Friesen, W. V., & Ellsworth, P. (1972). *Emotion in the human face*. New York: Pergamon.

Ekman, P., & Rosenberg, E. (in press). *What the face reveals: Basic and applied studies of spontaneous expression using the Facial Action Coding System (FACS)*. New York: Oxford University Press.

Fehr, B., & Russell, J. A. (1984). Concept of emotion viewed from a prototype perspective. *Journal of Experimental Psychology: General, 113*. 464–486.

Fernberger, S. W. (1928). False suggestion and the Piderit model. *American Journal of Psychology, 40*. 562–568.

Fridlund, A. J. (1992). Darwin's anti-Darwinism in *The expression of the emotions in man and animals*. In K. Strongman (Ed.), *International review of emotion* (Vol. 2, pp. 117–137). Chichester: Wiley.

Fridlund, A. J. (1994). *Human facial expression: An evolutionary view*. San Diego: Academic.

Frijda, N. H. (1953). The understanding of facial expression of emotion. *Acta Psychologica, 9*, 294–362.

Frijda, N. H. (1958). Facial expression and situational cues. *Journal of Abnormal and Social Psychology, 57*, 149–154.

Frijda, N. H. (1969). Recognition of emotion. In L. Berkowitz (Ed.), *Advances in experimental social psychology IV*. New York: Academic Press.

Harré, R. (Ed.). (1985). *The social construction of emotions*. Oxford: Blackwell.

Hinde, R. A. (1985a). Expression and negotiation. In G. Zivin (Ed.), *The development of expressive behavior* (pp. 103–116). Orlando, FL: Academic Press.

Hinde, R. A. (1985b). Was "The Expression of the Emotions" a misleading phrase? *Animal Behaviour, 33*, 985–992.

Hjortsjö, C. H. (1969). *Man's face and mimic language.* Lund, Sweden: Studentlitteratur.
Hochschild, A. R. (1983). *The managed heart.* Berkeley: University of California Press.
Hooff, J. A. R. A. M. van (1976). The comparison of facial expression in man and higher primates. In M. von Cranach (Ed.), *Methods of inference from animal to human behavior* (pp. 165–196). Chicago: Aldine.
Ingram, J. (1994). *The burning house: Unlocking the mysteries of the brain.* London: Penguin.
Izard, C. E. (1971). *The face of emotion.* New York: Appleton Century Crofts.
Izard, C. E. (1977). *Human emotions.* New York: Plenum.
Izard, C. E. (1991). *The psychology of emotions.* New York: Plenum.
Izard, C. E. (1992). Basic emotions, relations among emotions, and emotion-cognition relations. *Psychological Review, 99,* 561–565.
Izard, C. (1994). Innate and universal facial expressions: Evidence from developmental cross-cultural research. *Psychological Bulletin, 115,* 288–299.
James, W. (1950) *The principles of psychology.* New York: Dover. (Original work published 1890)
Kagan, J. (1978). On emotion and its development: A working paper. In M. Lewis & L. A. Rosenblum (Eds.), *The development of affect.* New York: Plenum.
Klineberg, O. (1938). Emotional expression in Chinese literature. *Journal of Abnormal and Social Psychology, 33,* 517–520.
Klineberg, O. (1940). *Social psychology.* New York: Holt.
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.
LaBarre, W. (1947). The cultural basis of emotions and gestures. *Journal of Personality, 16,* 49–68.
Landis, C. (1924). Studies of emotional reactions: II. General behavior and facial expression. *Journal of Comparative Psychology, 4,* 447–509.
Landis, C. (1929). The interpretation of facial expression in emotion. *Journal of Genetic Psychology, 2,* 59–72.
Landis, C. (1934). Emotion: II. The expressions of emotion. In C. Murchinson (Ed.), *Handbook of general experimental psychology* (pp. 312–351). Worcester: Clark University Press.
Landis, C., & Hunt, W. A. (1939). *The startle pattern.* New York: Farrar, Straus, & Giroux.
Levenson, R. W. (1992). Autonomic nervous system differences among emotions. *Psychological Science, 3,* 23–27.
Lewin, K. (1927). Kindlicher ausdruck. *Zeitschrift fur Paedagogie und Psychologie, 28,* 510–526.
Lorenz, K. Z. (1970). *Studies on animal and human behavior* (Vols. 1 & 2). Cambridge, MA: Harvard University Press.
Lutz, C. (1982). The domain of emotion words in Ifaluk. *American Ethnologist, 9,* 113–128.
Mandler, G. (1975). *Mind and emotion.* New York: Wiley.
Matsumoto, D., & Ekman, P. (1988). *Japanese and Caucasian facial expressions of emotion (JACFEE).* Slide set and brochure available from first author, San Francisco State University.
Mehrabian, A. (1972). *Nonverbal communication.* Chicago: Aldine-Atherton.
Merleau-Ponty, M. (1964). *Sense and non-sense.* (H. L. Dreyfus & P. A. Dreyfus, trans.). Chicago: Northwestern University Press. (Original work published 1961)

Munn, N. L. (1940). The effect of knowledge of the situation upon judgment of emotion from facial expressions. *Journal of Abnormal and Social Psychology, 35,* 324–338.
Oatley, K. (1992). *Best laid schemes: The psychology of emotions.* Cambridge: Cambridge University Press.
Oatley, K., & Jenkins, J. M. (1996). *Understanding emotion.* Cambridge, MA: Blackwell.
Ortony, A., & Turner, T. J. (1990). What's basic about basic emotions? *Psychological Review, 97,* 315–331.
Osgood, C. E. (1955). Fidelity and reliability. In H. Quastler (Ed.), *Information theory in psychology* (pp. 374–384). Glencoe: Free Press.
Osgood, C. E. (1966). Dimensionality of the semantic space for communication via facial expressions. *Scandinavian Journal of Psychology, 7,* 1–30.
Parkinson, B. (1995). *Ideas and realities of emotion.* London: Routledge.
Plutchik, R. (1962). *The emotions: Facts, theories, and a new model.* New York: Random House.
Russell, J. A. (1994). Is there universal recognition of emotion from facial expression? *Psychological Bulletin, 115,* 102–141.
Russell, J. A. (1995). Facial expressions of emotion: What lies beyond minimal universality? *Psychological Bulletin, 118,* 379–391.
Schachter, S., & Singer, J. E. (1962). Cognitive, social, and physiological determinants of emotional state. *Psychological Review, 69,* 379–399.
Schlosberg, H. (1941). A scale for judgment of facial expressions. *Journal of Experimental Psychology, 29,* 497–510.
Schlosberg, H. (1952). The description of facial expressions in terms of two dimensions. *Journal of Experimental Psychology, 44,* 229–237.
Schlosberg, H. (1954). Three dimensions of emotion. *Psychological Review, 61,* 81–88.
Sherman, M. (1927). The differentiation of emotional responses in infants: II. The ability of observers to judge the emotional characteristics of the crying of infants and of the voice of an adult. *Journal of Comparative Psychology, 7,* 335–351.
Shweder, R. A. (1992). The cultural psychology of the emotions. In M. Lewis & J. Haviland (Eds.), *Handbook of emotions.* New York: Guilford.
Smith, W. J. (1977). *The behaviour of communicating.* Cambridge, MA: Harvard University Press
Smith, W. J. (1985). Consistency and change in communication. In G. Zivin (Ed.), *The development of expressive behavior* (pp. 51–75). Orlando, FL: Academic Press.
Sorenson, E. R. (1975). Culture and the expression of emotion. In T. R. Williams (Ed.), *Psychological anthropology* (pp. 361–372). Chicago: Aldine.
Sorenson, E. R. (1976). *The edge of the forest: Land, childhood and change in a New Guinea protoagricultural society.* Washington, DC: Smithsonian Institution Press.
Tagiuri, R. (1969). Person perception. In G. Lindzey & E. Aronson (Eds.), *Handbook of social psychology* (Vol. 3, pp. 395–449). Reading, MA: Addison-Wesley.
Tinbergen, N. (1939). On the analysis of social organization among vertebrates, with special reference to birds. *American Midland Naturalist, 21,* 210–234.
Tinbergen, N. (1952). "Derived" activities: Their causation, biological signifi-

cance, origin and emancipation during evolution. *Quarterly Review of Biology, 27,* 1–32.
Tomkins, S. S. (1962). *Affect, imagery, consciousness* (Vol. 1: The positive affects). New York: Springer.
Triandis, H. C., & Lambert, W. W. (1958). A restatement and test of Schlosberg's Theory of Emotion with two kinds of subjects from Greece. *Journal of Abnormal and Social Psychology, 56,* 321–328.
Turhan, M. (1960). Ueber die Deutung des Gesichtsausdrucks. *Psychologigische Beitraege, 5,* 495–497.
Turner, T. J., & Ortony, A. (1992). Basic emotions: Can conflicting criteria converge? *Psychological Review, 99,* 566–571.
Vinacke, W. E. (1949). The judgment of facial expressions by three national-racial groups in Hawaii: I. Caucasian faces. *Journal of Personality, 17,* 407–429.
Vinacke, W. E., & Fong, R. W. (1955). The judgment of facial expressions by three national-racial groups in Hawaii: II. Oriental faces. *Journal of Social Psychology, 41,* 184–195.
Wierzbicka, A. (1992). *Semantics, culture, and cognition.* New York: Oxford.
Woodworth, R. S. (1938). *Experimental psychology.* New York: Holt.
Woodworth, R. S., & Schlosberg, H. (1954). *Experimental psychology.* New York: Holt, Rinehart, & Winston.
Zajonc, R. B. (1994). Emotional expression and temperature modulation. In S. H. M. van Goozen, N. E. van de Poll, & J. A. Sergeant (Eds.), *Emotions: Essays on emotion theory.* Hillsdale, NJ: Erlbaum.
Zajonc, R. B., Murphy, S. T., & Inglehart, M. (1989). Feeling and facial efference: Implications of the vascular theory of emotion. *Psychological Review, 96,* 396–416.

2. Methods for the study of facial behavior

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In the present chapter, I first survey the main methods that have been applied to the study of faces and indicate how different methods relate to different types of research questions. I make no claim that this survey is complete; space would not permit this. In particular, I do not consider ethological approaches (see Eibl-Eibesfeldt, 1989, especially chapters 2 and 6). Following this brief survey, I focus on judgment studies and examine the components of such studies in some detail, reexamining the assumptions underlying the usual practices in the application of judgment methods and their analysis. It will become apparent that these usual practices, while mostly appropriate for addressing certain questions about facial behavior, lack generalizability to many other important questions.

Ways of studying facial behavior

The range of questions that may be asked about facial behavior is apparent from the other chapters of this volume. A consideration of these questions suggests that they may be differentiated from one another on the basis of which of two general aims the study of the face has. An examination of the methods available indicates that they are not equally applicable to questions with different general aims. Many questions involve describing or measuring facial behavior. Such questions include: What can facial behavior tell us about the number and nature of distinct emotions? (That is, are there "basic," or "fundamental," emotions?) How is facial behavior involved in the experience of emotions? Does facial behavior directly reflect emotional experience? Are there individual differences (and gender differences) in facial behavior? Essentially, these questions do not involve any consideration of what is communicated by facial behavior or how it is interpreted by others. Ekman, Friesen, and