Emotion in the human face
Second edition

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To M. A. & E.

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Preface to the second edition

This second, revised edition of *Emotion in the human face* is more than twice as long as the first edition, which was published in 1972. Totally new chapters, some by authors not involved in the first edition, cover new work currently at the forefront of research on the face and emotion.

In Chapter 8, Ekman and Oster critically review much of the research published since 1970. Their chapter, based on one in an *Annual Review of Psychology* published in 1979, has been considerably expanded and updated.

In Chapter 9, Ekman and Friesen discuss the development, use, reliability, and validity of their new technique for measuring facial movement – the Facial Action Coding System (FACS). Many of the data reported are published here for the first time.

In Chapter 10, Redican considers research since 1965 on facial expressions in nonhuman primates from the vantage point of what has been discovered about human expression and integrates the two bodies of literature.

In Chapter 11, O'Sullivan examines one of the most popular problems of the last decade, yet one in which there has been marked inconsistency in the results reported by different investigators. Studies of individual differences in the ability to recognize facial expression are evaluated in terms of how well they meet the requirements for test construction in terms of both reliability and validity.

In Chapter 12, Hager carefully and critically assesses studies of asymmetries in facial expression. Recently this topic has generated a number of controversial and contradictory studies.

In Chapter 13, Tomkins provides a concise, up-to-date overview of his theory of affect. Tomkins' was the first theory of emotion to place great emphasis on facial expression. His two volumes, published in the early 1960s, reawakened interest in the face but are now out of print. Chapter 13 makes his ideas accessible again.

The material retained from the first edition (Chapters 1–7), annotated and cross-referenced to the new chapters, bears reading today if investigators are to avoid repeating past methodological and conceptual errors (Chapters 1 and 2) and to stop the unwitting reiteration of findings already well established.

Preface to the first edition

Our aim in this book is to integrate knowledge about the face and emotion, describing what we know, indicating what we need to know, and providing some guidelines for study of this complicated but intriguing phenomenon. We have both students and researchers in mind as the readers – those interested not only in psychology but in anthropology, ethology, sociology, and biology. Although some may be engaged with questions other than those raised here, they nevertheless may profit from knowing the answers to many of the psychological questions that have been asked about the face and emotion; and some of the methods of study might well be appropriate to their own interests in the face. This book should also be useful to those who are not primarily interested in the face and emotion but who can gain through this book a better appreciation of how a field of behavioral science progresses – the problems, the mistakes – and how experiments conducted over five decades fit together. There will be excitement as answers emerge.

The second audience for whom this book is intended consists of those planning or already conducting research on the face. This book provides current information, integrating experiments conducted over a long period of time. Some of the conceptual ambiguities that have hindered research and the methodological decisions that must be made in planning research on the face and emotion are discussed. How past investigators handled these matters is presented critically, and a set of standards is offered, which should at least provoke thought and at best provide guidelines for research.

Our hope is that the reader will be better able to profit from the past and avoid asking questions that have actually already been answered, alerted to the methodological pitfalls into which others have fallen and sensitive to some of the new, challenging questions that can be asked. Most of the research analyzed in this book has already been published, but important new findings are reported for the first time and integrated with the past results.

Acknowledgments

My own interest in the face and emotion stems from a longer and broader interest in the whole range of nonverbal behavior – body movements, gesture, and posture, as well as facial behavior. In studying nonverbal behavior, I have found it crucial to understand how the information provided by the face may differ from that which can be derived from the body. Reluctantly at first, I was led to focus on the problem of the face and emotion. My reluctance stemmed from my trust of past reviews of that literature, which suggested it was a difficult area of research with only meager findings.

I am grateful to Carol Ammons, editor of the journal *Perceptual and Motor Skills*, who was kind enough to put me in touch with Silvan S. Tomkins, after noting the overlap in our interests from articles that each of us had submitted to that journal. Tomkins has taught me much about the face. Watching him interpret facial behavior dissipated my resistance, convincing me that this would be a rich and exciting area for study. In the last fifteen years, Tomkins has been a consultant on many of my experiments and a collaborative investigator on one.

As my own research on the face proceeded, I became perplexed as to why there had been so many failures in the past when I and other current investigators were obtaining positive results. This led me to read with care some of the earlier literature. When I discovered that many of the questions I had been asking had already been answered but that either the original investigator was not aware of the implications of his data or his findings had been misreported or ignored by reviewers, the idea for this book began.

I am extremely grateful for the generous support I have received from the National Institute of Mental Health, both from the Research Fellowships Branch and the Clinical Research Branch. After finishing my master's thesis on body movement in 1955, I received a predoctoral research

fellowship to continue studies of nonverbal behavior. Since that time, my research on nonverbal behavior has been supported by a postdoctoral research fellowship, a Career Scientist Development Award, a Research Scientist Award, and research grants from the Clinical Research Branch of NIMH. Some of the studies reported and the time for writing both the first and this second, revised edition were supported by NIMH grant 5 RO1 MH11976-15 and NIMH Research Scientist Award 5 KO2 MH06092.

Wally Friesen, one of the co-authors of this book, has been my close friend and collaborator for more than twenty years. We have worked together so intimately at every stage of research that it would be difficult to distinguish his ideas from mine.

The first edition of this book was dedicated to four psychologists who at different times and places each gave me encouragement and opportunity during my education. Margaret Tresselt, my teacher in an undergraduate research course, encouraged me to pursue a career in psychology. Robert Berryman was my mentor in graduate school at Adelphi University; he taught me the excitement of research. Gordon Derner, the director of the clinical psychology training program at Adelphi, supported my work in too numerous ways to describe. The late Robert E. Harris, when he was chief psychologist at Langley Porter Institute, made it possible for me to go there for postdoctoral research training; I have never left.

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PART I
Research foundations

PAUL EKMAN, WALLACE V. FRIESEN,
AND PHOEBE ELLSWORTH

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. The face is *commanding* because of its very visibility and omnipresence. While sounds and speech are intermittent, the face even in repose can be informative. And, except by veils or masks, the face cannot be hidden from view. There is no facial maneuver equivalent to putting one's hands in one's pockets. Further, the face is the location for sensory inputs, life-necessary intake, and communicative output. The face is the site for the sense receptors of taste, smell, sight, and hearing; the intake organs for food, water, and air. It is the output location for speech. The face is also commanding because of its role in early development; it is prior to language in the communication between parent and child.

The complexity of the face is apparent when we consider its sending capacity, the information it may convey, and its role in social life. Although there are only a few words to describe different facial behaviors (*smile, frown, furrow, squint,* etc.) human facial muscles are sufficiently complex to allow more than a thousand different facial appearances; and the action of these muscles is so rapid that these appearances *could* all be shown in less than a few hours' time. (Current work shows that there are tens of thousands of expressions; see Chapter 11.) The face is also a complex information source. We can learn different things from looking at a person's face. The face can send messages about such transient and sometimes fleeting events as a feeling or emotion or the moment-to-moment fluctuations of a conversation. The face can show more enduring moods, perhaps even stable personality characteristics and traits, and such slow progressive changes as age or state of health and such immutables as sex. The complication occurs because the opportunity to

glean such a wide variety of information from this single source is combined with the possibility of drawing inferences that may not be correct.

Certainly physiognomic or environmental factors can result in misinformation from the face – for example, the prematurely wrinkled face in a young person. But the face can also misinform by intention or habit. Although smiles may be a reliable index of pleasure or happiness, a person may also smile to mask a feeling he wishes to conceal or to present a feeling when he has no emotion at all. Is the face like an involuntary system or is it subject to voluntary activation and thus capable of purposeful control and disguise? Clearly, it is both.

The very richness of the face, the number of different facial behaviors, the number of different kinds of information we may derive from observing the face, and the uncertainty about whether we are obtaining correct, incorrect, or even purposely misleading information can give rise to *confusion*. How can the movements of the face be described when there is no vocabulary to label them, when there are so many different facial appearances, and when they can change so rapidly? Which of these facial appearances are relevant to learning about a person's emotions, which to learning about his personality? Which will tell us whether he is listening or wants to interrupt us and speak himself? And how can we know when the face is purposely misleading us?

Our purpose is to clarify such confusion about the face by critically evaluating a body of research to provide answers to these questions. It will be necessary to restrict our focus to the consideration of only one type of information that can be obtained from the face (information about emotion), from only one type of organism (human adults), using only one type of evidence (empirical research). The vastness of the research literature, the variety of problems encountered in the study of the face, and the difficult conceptual issues that must be considered in order to integrate the multitude of studies require these restrictions.

We chose to focus on questions concerning how the face provides information about *emotion* because these have been the most frequently asked questions, certainly by investigators, and perhaps also in life when people see each other's faces.[1] The face of the human *adult* was selected because some of the methodological problems involved in work with children and nonhuman primates are quite different and because there has been much less work on these now rapidly developing areas. (A review of recent research on infants and children is given in Chapter 8;

[1]The reader is referred to Vine (1969) for a review of the face excluding emotion and to Ekman (1978) for a review of 17 types of facial signals other than those relevant to emotion.

research on facial expression in nonhuman primates is discussed in Chapter 10.) Finally, we will consider only evidence that is based on scientific research (largely in psychology) because our aim is to aid further research by providing a discussion of the obstacles that have impeded it and, most importantly, to provide answers, not speculations, about what we now know about the face and emotion.

Of the many intriguing questions that can be and have been asked about the human face and emotion, we shall discuss the evidence from seven major lines of research. (1) What words can be used to describe the emotional information that we observe in the face? How many different emotions can be seen? Can we discover not only whether someone feels good or bad but also whether he or she is interested, happy, angry, disgusted, sad, or afraid? (2) Are there types of emotional information that are fundamental to understanding the face, such as how pleasant a person feels, how active, how intense? When people are left to their own devices, how do they usually handle the information about emotion they glean from the face? The research on these questions will be discussed in Chapters 3 and 8.

(3) Is the information about emotion that can be derived from the face always an accurate measure of how a person feels? How often does the face provide *no* basis for accurate judgment of emotion? How often does the face provide incorrect information? Some people may be poker faced or may habitually mask their true feelings; does the face provide accurate information about emotion for only some people and not for others? Does one require some special tutoring in order to know how to judge emotion accurately from the face? The research on these questions will be surveyed in Chapters 4 and 8.

(4) Which of the movements and wrinkles in the face provide accurate information about a particular emotion? Is there one wrinkle that means sadness and another that means anger? Does one area of the face, such as the eyes, provide more information, or more accurate information, than other parts of the face? (5) Can we link particular facial movements and wrinkles to particular impressions about emotion? The research on these questions will be analyzed in Chapters 5 and 9.

(6) How does the face compare with other sources of information about emotion? A face is usually seen in context, that is, with words, voice, body, social setting, etc. Can we really read any information from the face alone, or is most of the information about emotion inferred from its context? If we can read information about emotion in the face and it differs from that contained in the context (i.e, a sad face shown when a

person says, "I feel great"), which is correct? Which will most people believe – face or context? Or will they combine both bits of information when forming a judgment? The research on these questions will be discussed in Chapter 6.

(7) How does the facial behavior[2] associated with emotion differ across cultures? Are there any universal associations between a facial behavior and a given emotion, or is the distinctive facial behavior for anger in one culture not relevant for anger in another culture? Do cultures differ in what makes someone angry or sad or happy? Do they differ in whether members of the culture show or conceal any clues to such feelings in their face? Do they differ in the particular facial movements that will occur when someone is angry or afraid or sad? The research on these questions will be examined in Chapters 7 and 8.

More than five decades of empirical research have addressed these questions. Reading this literature from its early beginnings, we have found that the results were not as negative, contradictory, or chaotic as past reviewers have maintained.[3] Our more optimistic picture, that there are answers to many of these questions, is based in part on a reanalysis of key experiments and an emphasis upon studies that have been ignored. In addition, by examining systematically and in detail the research design and results of certain experiments, we have been able both to correct past misinterpretations of results and to furnish the basis for discrediting some experiments that have managed to survive past criticism.

This fundamental reevaluation of the literature required that we develop a conceptual and methodological framework in terms of which each experiment could be considered, for much of the confusion, both in the experiments themselves and in past reviews, occurred because of the absence of any such framework. It is no wonder that such confusion has persisted; the conceptual issues are hazy and complex and the methodological decisions that must be made in designing research on the face and emotion are difficult and intricate.

In Chapter 1 some of the conceptual issues that need clarification will be discussed. The first difficult conceptual problem is deciding what we

[2]We have avoided the phrase *facial expressions of emotion* because it implies that some inner state is being manifested or shown externally or that the behavior is intended to transmit information. Instead we have used the phrases *face and emotion* or *facial behavior*. Note that in the later chapters we shall give up this purity of terminology and revert to the less-awkward term *expression*.

[3]Most notable, see the comments by Landis (1924, 1929) and Sherman (1927a) in their own research reports and Hunt (1941) in his review of the literature; also see Bruner and Tagiuri (1954) and Tagiuri (1969).

mean by *emotion*. The lack of a clear definition of emotion has caused much difficulty for those trying to study the face and emotion. How does emotion differ from other facets of human experience? For example, is anger an emotion? If so, how does anger relate to hostile or aggressive behavior? How can we tell when an emotion is experienced?

Another difficult conceptual problem is specifying just what we mean by the term *accurate*. How do we know whether information provided by the face is accurate? Is there some one criterion to determine what emotion has actually been experienced? We shall examine this problem by analyzing the ways past investigators have dealt with it.

A third conceptual problem is the various applications of the term *generality*. If evidence is obtained that observers can distinguish fear from anger, how are the limits of these findings determined? A number of different kinds of generality must be considered. Are the findings general to settings other than the ones studied? Can they be generalized to people other than those studied? Do they have generality in time, in the sense of showing that the face *often* permits this distinction? Do the findings have generality in the sense that most people could make the same distinction?

Another conceptual problem is to determine the extent and effect of people's ability to disguise and *control* their facial behavior. Does control entail both omitting the sign of a felt emotion and simulating the sign of an unfelt emotion? Does such control occur only in some settings or only with some people? If people can disguise and control their facial behavior, then how does the investigator determine when facial behavior is genuine and when it is simulated?

The final problem discussed in Chapter 1 is whether to conceive of the face as a single message system, which, at a given moment, can show information relevant to only one emotion, or as a multimessage system, which can simultaneously show the *blend* of two or more emotions.

In Chapter 2 each of the decisions that a researcher of face and emotion must make will be presented, along with a review of past decisions and their ramifications. The choice between two alternative research approaches and the relationship between the findings of each will be discussed. The types of circumstances that may elicit facial behavior relevant to emotion will also be evaluated. In addition, a number of questions about sampling will be considered: How many people need to be studied in order to learn about the face and emotion? How much of the facial behavior of each person should be included and how should it be selected from the total facial behavior? How many different emotions

should be studied to answer questions about accuracy, cross-cultural similarities, etc? If the research utilizes observers who are to record their impressions of emotion, how many words, categories, or scales should they be given? The last methodological decision considered will be the selection of a recording technique from a number of alternatives.

In separate chapters discussions will be presented on the research that has been done and the answers that have emerged to the fundamental questions about the face and emotion, which were the focus of research from 1914 to 1970 and which continue to be studied today.

1. Conceptual ambiguities

PAUL EKMAN, WALLACE V. FRIESEN,
AND PHOEBE ELLSWORTH

1.1. Historical review

The lack of a broad methodological or conceptual framework for reviewing research on the the face and emotion and the pessimistic attitude that has characterized past reviews have had serious consequences: Errors in experimental design have been repeated, recent experimenters have been uninformed or misinformed by relevant past work, and interest has at times lagged because of the seemingly discouraging state of the field. These problems are traceable in part to the nebulous nature of the concept of emotion itself and in part to the disjointed history of research characterized by major, disjunctive shifts of interest, which we shall consider in three successive time periods. An unjustified pessimism culminated the first period (about 1914 to 1940) and was followed by a shift of interest to other issues in the second period (about 1940 to 1960). When in the third period (about 1960 to 1970) many of the issues addressed in the first period came again into vogue, the investigations did not sufficiently profit from either the mistakes or the progress made earlier.

During the first period, the face and emotion was a popular topic in the field of psychology. There were many studies, some by investigators well known today, although not primarily for their work on this topic: F. Allport, Goodenough, Guilford, Landis, Munn, Woodworth. Despite differences in both variables studied and research designs, most experiments addressed one of two issues: (1) Does the face provide accurate information about emotion? (2) Are the facial behaviors related to emotion innate or learned? For a time, there was considerable argument in the literature, but a pessimistic view became dominant. At the least, the results appeared contradictory, and certain advocates, most notably Hunt, Landis, and Sherman, argued that the face was a poor source of infor-

mation about emotion; there was no accuracy, either as judged by observers or through direct measurement of the face. What little agreement about emotion could be achieved depended more on knowledge of the eliciting circumstance than on observation of the face. And no evidence for innate elements could be found. Commenting in disbelief on this period of research, Hebb (1946) wrote, "These studies have led to the conclusion that an emotion cannot be accurately identified by another observer" (p. 90).

The second period of research on the face and emotions saw less research by fewer people concerned with different aspects of the phenomenon. The field became largely defined and known by the work and interest of one man, Harold Schlosberg, the only person to publish consistently. A student of Woodworth's Schlosberg continued Woodworth's (1938) interest in the vocabulary of observers' judgments of emotion from the face, but Schlosberg did not pursue Woodworth's finding that judgments made in terms of emotion categories agreed with actors' intended poses. Instead, Schlosberg (1941, 1952, 1954) developed verbal dimensions, which he considered to underlie Woodworth's emotion categories. He later proposed a geometric model of how those dimensions interrelate, which he considered relevant not only to facial behavior but also to developments in the psychophysiology of emotion. Although a few others (Fulcher, Coleman, and Thompson) published articles during this time challenging, at least in part Landis's and Sherman's earlier negative findings, each published only once and received little attention. Accuracy and the question of innate versus learned components of facial behavior became dormant issues.

In the third period of research on the face and emotion, covering 1960 to 1970, there has been a resurgence of interest, sparked by clinical investigators looking for behavioral measures applicable to studies of psychotherapy, by the publication of two theories of emotion that emphasized the face (Plutchik's and Tomkins's), and by the development of the field of semiotics (see Sebeok, Hayes, & Bateson, 1964). Some investigators have continued the line of study initiated by Schlosberg on the dimensions of emotion relevant or useful in observers' judgments of the face. However, many of the current investigations have revived issues that had been dormant since the first period: issues of accuracy, early development, and cross-cultural similarities. Rather than avoiding the methodological pitfalls of that first period and building upon some of its promising positive findings, much current work has seemed either uninformed about the early work or, conversely, directed toward refut-

ing the legacy of pessimism about the face and emotion. (A somewhat different historical review is contained in the beginning of Chapter 8.)

Because of the lack of an orderly progression in development of research issues, concepts, methods, and findings over these three time periods, no framework has emerged within which a survey of findings might have meaning. We shall attempt to supply such a framework. In this chapter we shall examine some of the conceptual ambiguities and oversimplifications that have hindered research and in Chapter 2 we shall then discuss the methodological problems that have impeded research in the area throughout its history.

1.2. What do we mean by "emotion"?

Most writers have disagreed in their definitions of emotion, often describing different phenomena. Izard (1969), in reviewing the literature, wrote, "The area of emotional experience and behavior is one of the most confused and ill-defined in psychology."[1] Another volume would be needed to review all the various definitions and underlying theoretical positions, but a brief outline of the different phenomena considered by those defining emotion will be relevant to issues discussed later.

Some authors have considered central to their definition of emotion a special class of *stimuli* that usually elicit emotional behavior, but there has been little agreement about what might characterize such stimuli or distinguish them from stimuli that rarely elicit emotion. No one has provided a description of either the social variables (e.g., the nature of the setting, the roles of the persons, the tasks underway) or the individual differences that might clarify why and when certain classes of stimuli evoke emotional behavior. A further problem is the inability to verify that a stimulus frequently kindles emotion except from the occurrence of consequent emotional behavior; unfortunately, it is equally difficult to verify whether the consequent behavior *is* emotional. There is some agreement, however, that there may be stimuli that elicit emotional behavior because of innate factors as well as stimuli to which the emotional response is learned, and that, in addition to internal events of the organism, such emotional reactions would also be induced by external or environmental stimuli.

The lack of agreement about what stimuli bring on emotion and the circularity in the verification of such stimuli leave the investigator with-

[1]For recent attempts to define emotion, see Izard (1971), Ekman & Friesen (1975), and, for a quite different view, Mandler (1975).

out guidance in choosing the particular setting or eliciting circumstance that may be likely to inspire emotional facial behavior for study. Thus, when an investigator finds no relationship between some aspect of the face and emotion, there is always the possibility that he failed to utilize stimuli that draw out "emotional" facial behavior.

Physiological responses have been viewed as relevant to some definitions of emotion, including visceral activity, other signs of autonomic activation, and hypothalamic activity. It is generally accepted that the occurrence of such physiological responses is not a sufficient indication of the presence of emotion, and there is little evidence indicating that different emotions are associated with the different patterns of autonomic activity investigated to date.[2]

Some motor responses have been considered central to the definition of emotional behavior. Involuntary motor attitudes, voluntary action tendencies, presumed basic patterns of aggression, flight, or immobility, and such phenomena as tics and restlessness have been considered. And, of course, the movements of the facial muscles have been regarded by many authors as relevant to or a primary element of emotional behavior. The nature of the relationship between facial behavior and other presumably emotion-related phenomena is the topic of this book.

Certain kinds of verbal responses have been part of some definitions of emotion. These include what Mandler (1962) called *referential verbal behaviors*, which are descriptions referring to internal somatic states, presumably reflecting awareness of physiological activation. They include, too, the vocabulary of emotion names, categories, dimensions, attributes, or qualities that could be used to describe felt or observed emotional experiences.

The interactive consequence of certain behavior has been considered by some to be the necessary criterion for defining emotional behavior. Those investigators of nonhuman primates who speak of emotion define it in terms of a sequence of events between two or more organisms in which a behavior on the part of one is immediately followed by a particular kind of response by another. Although some investigators of human nonverbal behavior have begun to study interactive sequences, the only studies of the face that utilized this approach were not concerned with emotion and isolated only the one aspect of facial behavior for study,

[2]There has been little study of the relationship between facial responses and physiological indices. The few studies compared only one physiological index, the galvanic skin response (GSP), and only a gross measure of the face (Buck, Savin, Miller, & Caul, 1969; Jones, 1950; Lanzetta & Kleck, 1970), but they found evidence of a negative correlation. (See a review of current studies in Chapter 8.)

looking or not looking at the face of the other person. (This remains so in the work from 1970 to the present.)

The lack of a clear definition of emotion presents problems for investigators, some of whom have simply sidestepped the problem of specifying why the behavior they studied may be presumed to have anything to do with emotion, and also for the editor of this volume. How should we determine just which studies are relevant, and how should we utilize this ambiguous concept? Our selection procedure was to take into account, with a few exceptions, any article that the author *said* was about emotion and where the face was studied in relation to one of the other phenomena listed above. The most common experiment has been to study the face in relation to emotion vocabulary, usually that of the observer, although there have been some studies that have analyzed facial responses under different natural or experimentally arranged environmental conditions. We found no studies of the relationship between referential verbal behavior and facial behavior, although these would have qualified for inclusion, and only a few that included physiological measures.

Studies of the face in which the investigator reported focusing on traits, attitudes, or personality, not emotion, have not been incorporated. Also excluded were experiments in which drawings of the face rather than photographs, film, videotape, or live facial behavior were employed; the rationale for this exclusion will be given in Chapter 2, Section 2.7.

When we use the word *emotion*, in many cases the discussion will apply equally to the various aspects of the term, and therefore there will be no need to specify one. In scrutinizing the results of particular experiments, we will attempt to specify what notion of emotion the investigator had in mind or at least why the investigator felt the behavior studied was relevant to emotion. In most studies, the behavior investigated was thought to be emotional because observers were able to reach some agreement in utilizing the lay vocabulary of emotion terms to describe the behavior. When interpretations of results are challenged primarily on grounds of relevance of the behavior studied to emotion, the different sources of evidence (stimuli, motor responses, verbal responses, physiological responses, interactive consequences) will be discussed.

1.3. How do we determine whether judgments of emotion are accurate?

Can the face provide accurate information about emotion? This simple question, the answer to which may seem patently obvious on an intu-

itive basis, has baffled investigators. Past reviewers have claimed that the findings from equally reputable investigations are contradictory and that therefore no answer can be proposed. We shall challenge this reading of the literature and, in establishing that the face can provide accurate information, shall criticize in detail and then dismiss as worthless certain experiments; we shall reanalyze and reinterpret others. We shall have to consider how investigators solved many of the methodological problems examined in Chapter 2, and shall need to take careful stock of how they established their criteria of accuracy, for this has been one of the main sources of error and confusion.

If we are to show that the face provides accurate information, we must do two things. We must use some measurement procedure to decipher the information shown in a face, and we must establish some other index of what occurred, which we will call an accuracy *criterion*, so that the information from the face can be compared with this index. If they coincide, we conclude that the face provided accurate information. The accuracy criterion is the index of what occurred; this is compared with the facial information. Part of the confusion in interpreting the past literature has arisen because investigators used different methods to derive their information from the face. Some simply asked observers of the face what emotion was shown, and others measured some aspect of the face (for example, the lowering or raising of the brows). With either kind of measurement, the investigator had the same problem – to find some independent criterion of what occurred to compare with the measurement of information from the face. If, for example, he could ask the person whose face was being measured how he felt at that time, and if he could trust the adequacy and veracity of the person's self-report as his accuracy criterion, he would employ this criterion regardless of which measurement procedure he had used for determining the information shown in the face. If he had asked observers about what the face showed, he could compare their judgment with the person's self-report; or, if he had measured some facial behavior, such as brow lowering, he could determine whether it varied when the person reported different emotions. Thus, a definition of accuracy criteria must allow for the use of either measurement procedure.

We have mentioned one source of information about emotion, the person's self-report, which could be used as an accuracy criterion. Our previous discussion of definitions of emotion showed that there were various events that have been taken to be relevant to emotion (certain stimuli, motor responses, verbal responses, physiological responses, in-

teractive consequences). We shall consider these various sources of information as possible accuracy criteria. Further, we shall argue for the need to use multiple sources of information.

We shall use the term *accuracy* to refer to "correct" information of some nature being obtained by some means from facial behavior. The criterion for determining what actually did happen, in terms of which to check whether information derived from the face was correct, might be based on one or more of the following phenomena: (1) antecedent events (e.g., the behavior of another interactant or experimentally introduced or naturally occurring environmental events); (2) concomitant behavior (e.g., physiological measures, simultaneous verbal behavior, body movements); (3) consequent events (e.g., self-report, motor responses of the person being studied, the other interactant's behavior); or (4) consensus by a panel of experts about the individual's experience or behavior.

Few investigators have employed information from more than one such source as their accuracy criterion, yet variability across subjects, in their interpretation of similar events or instructions and in their attempts to control rather than show emotion, suggests the wisdom of obtaining multiple indexes and combining or comparing them in order to establish accuracy. Each of the possible criteria we have suggested may be incomplete; each may be subject to some sort of error; each may be more useful for one emotion than for another, for one setting than another, for one type of person than another. If these criteria have at least partial independence, in that they are subject to different kinds of error, then, as more criteria are employed, alternative explanations based on associated error become less plausible (see D. T. Campbell & Fiske, 1959).

Our definition of accuracy refers to *correct* information but does not require that the information be relevant to emotions. Establishing that the information derived from the face is correct does not guarantee that this information concerns emotion, in any of its various definitions. For example, it may be possible to show that observers are able to distinguish accurately between facial behaviors emitted during the stressful and nonstressful portions of a standardized interview. However, this correct judgment need not necessarily be based on information about emotion; if, in the stressful phase, the subjects become exhausted, facial cues associated with tiredness could provide the basis for accuracy. The investigator would need other means to show that the accurate judgment is relevant to emotional phenomena. For example, the verbal behavior of the subjects during the stress interviews could be examined, other observers who knew nothing about the interview procedure could

be tested to see if they agreed about judgments, utilizing an emotion vocabulary, and whether such judgments would differentiate facial behavior emitted during the nonstressful from that during the stressful parts of the interviews. Or, the correctly judged facial behaviors could be compared with facial behaviors emitted in situations where emotional behavior is presumed to have occurred.

There is no reason to derogate findings that show accuracy. Correct information from the face is important evidence of the face's ability to provide information about personality, state of exhaustion, etc., but it may or may not be related to the construct of emotion. Maintaining the distinction between accurate information from the face and accurate information about emotion is fundamental to resolving some of the confusions in the relationship between the two general research methods for studying the face, to elucidating problems inherent in the choice of eliciting circumstances, and to interpreting substantive findings on accuracy (all discussed in Chapter 2).

Today the construct of emotion is still far from validated. Some authors even question the utility of such a construct, suggesting that its only use is as a chapter heading in survey textbooks. Multiple methods and multiple criteria for obtaining accurate information relevant to emotion are, therefore, essential to the pursuit of research in this field. Accuracy obtained with different criteria, all relevant to the different aspects of the phenomena labeled *emotional* and relevant to the distinctions among emotions (made either in terms of such categories as anger, fear, sadness, etc., or such dimensions as pleasantness, intensity, control, etc.) is crucial to increasing confidence in the utility of the emotion construct.

One further part of our definition of accuracy requiring comment is the phrase, "by some means," referring to how correct information is obtained from the face. Shortly, we shall discuss two interrelated methods of research, judgment studies and components studies (Section 2.1), one requiring observers to describe the information they derive from facial behavior and the other requiring measurement of some component of facial behavior. Accuracy can be a question in each of these methods, and an accurate finding with one can indicate the probable outcome of the other.

Let us now consider accuracy criteria that have been employed in studies of the face. The most popular accuracy criterion has been the emotion intended by an actor posing facial behavior. If observers can tell what emotion was posed or if measurement of the face can show that

different facial muscles were involved in different poses, then one type of accuracy is established. The *generality* of such results may be open to question, without diminishing the finding that correct information about the actor's intended emotion can be obtained from the face. Four types of questions about the generality of findings from studies of posing can be raised: Are the findings relevant to spontaneous facial behavior (generality across settings and eliciting circumstances)? Do the results depend on the few specially gifted actors (generality across persons)? Are the findings attributable to those rare moments when someone emits a decipherable pose (generality across time)? Is exact judgment the privilege of only those who are specially trained as observers (generality across observers)? We shall weigh these questions further in the next section of this chapter when we distinguish among these types of generality.

The second basis for an accuracy criterion, employed much less often than actor's intent, is the circumstance in which the facial behavior occurred. If observers can tell what was happening or if measurements of the face show systematic variations with changing eliciting circumstances, then accuracy is established. One of the problems with this criterion is that it presupposes without substantiation (although there are empirical tests that have rarely been employed) that the same eliciting circumstance evokes the same reaction (emotion?) across persons and, further, if observers are utilized, that the observers know what reaction is likely to occur in each eliciting circumstance. For if the same eliciting circumstance evoked different reactions across persons or if the circumstance was not thought by observers to elicit a particular reaction, there would be no possibility of achieving accurate results. Even if the situation did elicit the same reaction across subjects, it is necessary to determine whether the subjects were similar in regard to attempts to control or disguise their facial behavior. These problems will be further examined when we review the control of emotion and later in the report of Landis and Coleman's experiments (Chapter 4).

Sometimes observers have been asked to judge the emotion shown in the face rather than the eliciting circumstance, typically with the investigator assuming, but not verifying, that a particular emotion was associated with a particular eliciting circumstance for stimulus persons. This problem will be further elaborated in Chapter 4 also.

Even when the accuracy criterion is based on a spontaneous eliciting circumstance, there are still questions about the generality of the findings. Although spontaneous eliciting circumstances better approximate real life than does posing, the question still remains as to how general

the findings are to real-life settings. Further, one must consider whether the stimulus persons and/or the observers are representative or in some way special or unique. In addition, there is a need to establish how often, within the situation studied, facial behavior provides accurate information.

1.4. What does establishing generality entail?

There are four types of questions to be raised about the generality of the findings from any accuracy study. To establish generality across *eliciting circumstances and settings,* we must determine whether the findings in one eliciting circumstance or setting would be valid for another such circumstance or setting. This determination is relevant to studies that employ either posed or spontaneous eliciting circumstances.

This type of generality has been a major source of doubt about accuracy studies involving posed behavior, which some writers have claimed has little generality to spontaneous facial behavior. Even if observers can tell what emotion the poser intended, posing may involve the use of special facial conventions that are irrelevant to the facial behavior occurring when people are engaged in spontaneous behavior. We shall scrutinize this argument further when we weigh the choice of eliciting circumstances (Chapter 2), when we report findings on accuracy (Chapter 4), and when we examine cross-cultural studies of posing (Chapter 7). We shall argue that posed facial behavior, while special, is not unique and does have generality to spontaneous facial behavior.

Regarding the use of spontaneous behavior, if a laboratory event such as a stress interview is devised, the investigator must provide some assessment of the types of real-life events to which the laboratory eliciting circumstance is relevant. The stress interview might elicit facial behavior that is accurately judged, but that situation might be unique as to the extent of stress induced or the constraints against retaliation and have generality only to a limited set of circumstances when people are severely put-upon and cannot fight back. Even if a naturally occurring eliciting circumstance is employed, rather than a laboratory event, questions can be raised about generality across settings. For example, it might be possible to derive accurate information from the facial behavior shown during childbirth labor, but there might be few other events in life that evoke such prolonged pain and where the setting permits or encourages uncontrolled facial behavior.

Generality *across persons* refers to whether the findings are general to most people, just to specially trained persons, such as actors, or just to people with certain personality characteristics, such as extroverts. Generality is severely limited when the posers have been actors but not when untrained persons pose the emotions. Generality across persons is in doubt in studies of spontaneous behavior if some special group of persons is recruited as subjects, e.g., mental patients.

The third type of generality is *across time* within an eliciting circumstance. How frequently does the face provide true information? In posing, how often does the poser emit facial behavior that is accurately judged; does he give eight poses inaccurately judged for every one judged accurately? In studies of spontaneous facial behavior, has the investigator chosen for his sample the infrequent moment when the face showed something, or does the facial behavior shown in the situation provide precise information at many points in time? The answer to this question about generality depends upon how the investigator sampled facial behaviors from his record, whether of posing or of spontaneous behavior, and will be discussed in Chapter 2. The problem of achieving generality across time will be explored in relation to the spontaneous facial behavior studies that used photographs from magazines as their stimuli (Chapter 4).

The last question on the generality of accuracy findings applies only if observers judge the information shown in the face. Generality of *decoding* asks how readily other observers could make those judgments. Were specially trained or gifted observers used, or was enlargement or slowed motion required for their making exact judgments?

1.5. Can facial behavior be controlled or disguised?

Many writers (Hebb, 1946; Honkavaara, 1961; Klineberg, 1938; Murphy, Murphy, & Newcomb, 1937; Plutchik, 1962) have commented that a subject's control over his facial behavior and the social pressures that dictate such control can conceal the very behavior that experiment was arranged to draw out. Ekman and Friesen (1969a, 1969b, 1975) described four management techniques for the control of facial behavior: (1) intensifying, (2) deintensifying, (3) neutralizing, and (4) masking a felt emotion with the facial behavior usually associated with a different emotion. They hypothesized that these control techniques for managing facial behaviors associated with emotion are operative in most social

situations and that *display rules* learned, usually early in life, for each facial behavior specify what management technique should be applied by whom in what circumstances. The display rule dictates the occasion for the applicability of a particular management technique in terms of (1) static characteristics of the persons within the situation (e.g., age, sex, physical body size), (2) static characteristics of the setting (e.g., ecological factors, social definition of the situation, such as funeral, wedding, job interview, waiting for a bus), (3) transient characteristics of the persons (e.g., role, attitude), and (4) transient regularities during the course of the social interaction (e.g., entrances, exits, transition points, periods in conversation, listening). Display rules govern facial behavior on an habitual basis such that they are more noticeable when violated than when followed. The face appears to be the most skilled nonverbal communicator and, perhaps for that reason, the best "nonverbal liar," capable not only of withholding information but of simulating the facial behavior associated with a feeling that the person in no way is experiencing.

In the choice of an eliciting circumstance for sampling nonverbal behavior (Chapter 2), the question of which display rules may be operative for which persons should be considered, otherwise the investigator may unintentionally obtain samples of deintensified or masked facial behavior. The investigator can utilize questionnaires as well as observations to determine the display rules or the social norms about the probable visible facial behavior for the particular eliciting situations employed. Individual differences in knowledge of display rules or in skill in the management techniques for controlling facial behavior, which might affect the behavior during an experiment, could be explored through self-reports by the subjects about just those questions.

It is difficult for the investigator to determine the effect of display rules, but in the past, investigators have rarely even raised the question of whether their findings might be influenced by and their negative results attributed to display rules. Conceivably, there may be circumstances where the display rule specifies that no management technique need be applied to control the facial behavior, and unmodulated facial behavior would occur. Most investigators have assumed, with little evidence for that assumption and much reason to question it, that their eliciting situations were those kinds of circumstances. How the failure to consider display rules obscured cross-cultural comparison of facial expression is described by Ekman (1973, pp. 176–179).

It is possible, of course, to make the operation of display rules itself the focus of research on the face and emotion. For example, differences

in facial behavior could be compared between the subject in isolation and in interaction or aware of being observed. Some such studies are reported by Ekman (1973, pp. 214–218).

1.6. Can two or more emotions be shown simultaneously?

Several authors (Ekman & Friesen, 1967a, 1969a; Nummenmaa, 1964; Plutchik, 1962; Tomkins & McCarter, 1964) have commented on the capacity of the face to show more than one emotion at a given instant. These writers claimed that the facial muscles are sufficiently complex and independent for discrete muscle patterns in different parts of the face to combine so as to present the elements of two or more emotions, observable even in a still photograph. *Blends* may also occur through the very rapid succession in time of two different emotions. Affect blends are thought to occur when (a) the emotion-eliciting circumstance by its very nature elicits more than one feeling or (b) habits (common to a group, or idiosyncratic) link the elicited emotion to another as, for example, when a second emotion is generated in response to the initially inspired one.

Nummenmaa (1964) directly studied this phenomenon by having an actor attempt to show blends in his face. Nummenmaa confirmed that blends could be posed by finding that observers tend to select a blend judgment (e.g., happy and angry) more often than a single affect judgment for the stimuli intended to portray blends but not for the stimuli intended as single-emotion portrayals. In unpublished research, Ekman and Friesen found that some of the photographs that past investigators found to yield a bimodal distribution of judgments when observers were allowed only one judgment choice yielded agreement about the presence of both emotions when observers were allowed to indicate the presence of more than one emotion in the face.

Most investigators have failed to take into account the occurrence of blends in their stimuli. The frequent finding that observers disagree about which of two emotions is present can no longer be interpreted only as evidence of low information in the face but, alternatively, as the consequence of presenting a multiple-message stimulus and allowing the observer only a single-message judgment. In other words, low agreement may be a result of the insensitivity of the dependent-variable measure to complex forms of facial behavior.

The phenomenon of blends complicates not only the judgment procedure to be utilized but also the measures of facial behavior that need to

be taken in studies where such measures are related to eliciting circumstances.

1.7. Review

We discussed five conceptual problems that need to be reviewed in planning or evaluating research on the face and emotion. Although no clear agreement about the meaning of the concept emotion has yet merged, consensus suggests that there are some stimuli that typically elicit emotion, that certain physiological, motor, and verbal responses are relevant to emotion, and that there may be specific interactive consequences of emotion. The ambiguity about the meaning of emotion causes problems for the investigator in determining what to study and how to establish that the facial behavior observed is relevant to emotion.

The term *accuracy* was defined as referring to correct information of some nature being obtained by some means from facial behavior. Four sources of information were described for determining what actually did happen. We argued that multiple sources of information should be used in establishing the criterion of accuracy. We hypothesized that the control and disguise of facial behavior are dictated by socially learned display rules, which specify how facial behavior is to be managed in particular social settings, by deintensifying, intensifying, neutralizing, or masking the facial behavior associated with an emotion. Investigators must determine whether the eliciting circumstance they chose for obtaining facial behavior is subject to display rules that might inhibit or diminish the display of the elicited emotion.

Four kinds of generality were considered, all of which are relevant to findings obtained with posed or spontaneous, artificial or natural eliciting circumstances. Is the finding general to eliciting circumstances and settings other than those studied, and if so, to which? Is the finding relevant to the facial behavior of people in general or only to some special class of persons? Is the finding general to most moments in time within the eliciting circumstance studied, or does the face provide information only occasionally? Finally, in judgment studies, is the finding general to most persons who might observe facial behavior or does it require some special skills in the observer?

We suggested that the face can probably provide information about blends of two or more emotions at a given instant. The existence of blends requires that in judgment studies observers be given the option of reporting an impression about more than one emotion. In studies

where measurement is made of facial components, it is necessary to examine various areas of the face in order to determine whether a particular facial behavior is relevant to one or more than one emotion.

In Chapter 2 we shall discuss how these conceptual issues translate into specific methodological decisions to be made in planning research on the face and emotion.