

# The psychology of facial expression

*Edited by*

James A. Russell

*University of British Columbia*

José Miguel Fernández-Dols

*Universidad Autónoma de Madrid*



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# 1. What does a facial expression mean?

JAMES A. RUSSELL AND  
JOSÉ MIGUEL FERNÁNDEZ-DOLS

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; Tagiuri, 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 dis-

- gust. 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 in-



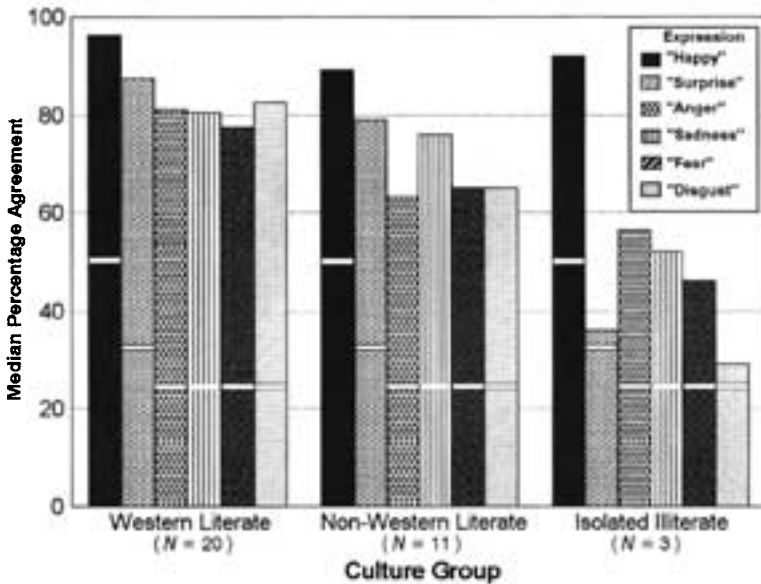


Figure 1.1. Recognition scores for six facial expressions of emotion. Values taken from Russell (1994). White horizontal bars represent level expected by chance alone. *N* is number of groups.

credulous 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.)

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.