

THE ROLE OF CONTEXT IN THE PERCEPTION  
OF EMOTION FROM FACIAL EXPRESSION

by

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### Abstract

In studies of emotion perception, an emphasis has been placed on the importance of facial information (Ekman, Friesen, and Ellsworth, 1972). One line of research suggests that facial information dominates contextual information in the perception of emotion (Frijda 1968; Watson, 1972; Walbott, 1988). The general procedure in this type of research has been to provide a scenario (context) in which a person may exhibit an emotion and then to show a picture of presumably their facial expression in that situation. According to previous research, when the face and context provide discrepant information, subjects' judgments tend to resemble the facial information more than the contextual information.

The goal of the present studies was to examine 1) whether contextual stimuli could be created to dominate facial expressions of basic emotions and 2) whether the linear model assumed in research in cue dominance is an appropriate description of how emotion is perceived from face and context. Three studies were conducted using a similar procedure to the one described above. Study 1 showed that context dominance could occur for contexts referring to basic emotions. Study showed that context dominance could occur for contexts referring to non-basic emotions. Study 3 showed that judgments of face and context combined are not necessarily linearly related to judgments of face and context alone.

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## Chapter 1

### What Happened to Context?

In studies of emotion perception, a noticeable shift has occurred. Early researchers focused on the judgment of another within a given situation, and some theorists insisted that the interpretation of personal cues (such as facial movement) was dependent on knowledge of the surrounding situational events (often referred to as the context; Fernberger, 1928; Landis, 1924). This contextually driven view has fallen to a belief in the hypothesis of Facial Dominance: emotion perception is dominated by facial information (Watson, 1972).

The ascendance of Facial Dominance is probably due to at least two factors. One factor is theory and evidence on the universality of the recognition of facial expressions (Ekman, 1972). Theories developed in the 1970's, such as Ekman's neurocultural theory (Ekman, 1972) and Izard's Differential emotions theory (DET, Izard, 1977), link facial expressions directly to emotional states. These theories consider facial expressions to be the "direct readout" of emotional experience (Buck, 1984). The cornerstone of these theories is evidence that certain facial expressions are universally recognized and therefore biologically basic (Ekman, 1972). This evidence has recently been criticized from theoretical, methodological, and ecological perspectives (Russell, 1994).

A second factor, the topic of this thesis, is a line of research that examines the relative weight of facial versus contextual information on a

person's overall judgment of another's emotion. In this line of research, here called studies in cue dominance, a distinction is made between concordant and discordant facial and contextual information. The two sources are concordant when each type alone suggests the same emotion, discordant when each type alone suggests a different emotion. Concordant pairs are of little interest: the emotion is predictable from both the face and the context, and therefore the information is redundant. Discordant pairs are interesting, and empirically -- or so it is assumed -- lead to the conclusion of facial dominance. That is, judgments of discordant pairs correspond more closely to judgments of the face alone than to judgments of the context alone. The upshot of this line of research is that contextual information, whether concordant or discordant, can safely be ignored. The study of emotion perception has thus become the study of the face alone.

In this thesis, I discuss the historical, empirical, and theoretical underpinnings of the hypothesis of Facial Dominance. I show that although facial dominance has been found in previous research, slight alterations in method can result in context dominance. More generally, research comparing the relative influence of facial and contextual cues has generated little progress towards an understanding of the perception of emotion from facial and contextual cues. There is therefore a need to shift the focus of attention to how individuals use these cues in emotion perception. The question of the relative influence of facial versus contextual information in the perception of emotion is

better thought of as an ecological question (which source of information is more important in naturally occurring situations) and therefore more ecologically valid methods must be sought.

Specifically, in the remainder of this chapter, I discuss the evolution of studies in cue dominance. In chapter two, I review all studies available in English that have examined the relative influence of facial and contextual information in the perception of emotion. In chapter three, the hypothesis of facial dominance is critically analyzed from both methodological and ecological perspectives. In chapter four, three studies are described which examine criticisms made in chapter three. In chapter five, the findings described in chapter four are discussed.

### The Evolution of Studies in Cue Dominance

#### Early Studies: Interpreting the Face in and out of context

The idea that one cue dominates another in emotion perception (here called cue dominance) is relatively new, but the relationship of contextual and facial information in the perception of emotion has been studied for over 75 years. Early researchers questioned the Darwinian view that "we have instinctive power of recognizing expressions" (Landis, 1929, p. 59), and some considered emotion perception dependent on knowledge of the context (Fernberger, 1928). There was also some skepticism as to whether subjects could accurately perceive emotion from both face and context, but most

considered the addition of context to at least improve accuracy. "Unless the situation is recognized, the [emotional] reaction cannot be properly labeled and when the situation is known there still remains a certain amount of difference of opinion as to the proper label for the behavior" (Landis, 1929, p. 60).

Two methods were developed that examined subject's interpretation of another's emotion with and without context. In one method, subjects were asked to infer either the emotion or the eliciting condition of an emotion of another from their spontaneous facial reactions to emotion-eliciting events. In a second method, subjects were asked to evaluate photographs of people in real life situations with and without contextual information. Although the focus of these early studies was on whether emotion could be perceived from the face alone, these studies provided the impetus for an argument over cue dominance.

Emotion Judgments of spontaneous facial reactions. Although many studies have examined the perception of emotion from spontaneous and posed facial expressions (see Ekman, Friesen and Ellsworth for a review; 1972, 1982), only Landis (1928) and Coleman (1949) have done so by placing subjects in specific emotion-eliciting situations. In addition, Landis had subjects report the emotion they were feeling in the situations. Systematic control of the emotion-eliciting situations and an assessment of what the person in the situation was feeling allowed Landis to examine the correspondence between facial movement, the emotion, and the emotion-eliciting events.

Landis (1928) placed one group of subjects in 17 emotion-eliciting conditions ( few of which would pass an ethical review today). For example, in one condition, subjects blindly put their hand into a bucket of water with frogs in it and were simultaneously given an electric shock. In another condition, subjects were required to cut the head off a live rat with a blunt butchers knife. Subjects' facial expressions were photographed while in these situations. A group of judges were asked to judge what emotion subjects were feeling based on the photograph alone. There was little similarity between the emotions reported by subjects and the emotions perceived by the judges. Landis concluded that the face alone does not provide sufficient information for an accurate judgment of emotion to be made.

Landis (1928) admits that there were some flaws in his study. For example, the subjects who were put into the strange situations were friends or graduate students of the researcher. Landis also suggested that even if the subject did not know the experimenter, their facial expressions may have been different or subdued because they were participating in a study and were expecting to be put in a variety of situations. The Landis study was conducted in 1929 when visual recording techniques were far from advanced. It is impossible to tell if the photographer was able to photograph subjects at the moment when their facial reactions were most clear.

Coleman (1949), using a similar method to that of Landis (1928), found that subjects were able to judge, at better than chance levels, the eliciting

situation of an emotional reaction from film clips of the target person's facial reaction. Coleman's more encouraging results could be attributable to a number of factors. First, the judgment tasks used by Coleman and by Landis differed. Whereas Landis asked judges what emotional state the target person was feeling, Coleman had judges choose, from a list, the situation that elicited the facial reaction of the target person. It is possible that the results of the two studies would have been more similar if they had used similar response measures. The multiple choice response method used by Coleman may have been easier for subjects than the free labeling response method used by Landis, especially when the eliciting situations were so different (i.e. target person reading book versus target person receiving electric shock). Second, Coleman filmed subjects whereas Landis photographed subjects. Not only facial muscle movements, but also head movements would be seen in film. These head movements could have provided clues as to what was happening to the subject. If their head suddenly moved up it is likely that the stimuli produced some sort of surprise. Third, the films in the Coleman study may have been of better quality. The Coleman study was conducted 20 years after the Landis study and advances in photographic techniques would have occurred.

Although the Coleman study suggests that subjects are able to perceive some sort of information, at least some of the time, from a target person's spontaneous head and facial movements, which enables them to make some sort of judgment concerning the target person's emotional state, the study did

not slow a growing questioning of whether the face alone conveys specific information which enables the accurate labeling of a target's emotional state. Both studies suggest that spontaneous facial reactions do not convey all there is to know about another's emotional state. Because of the ethical problems involved in placing subjects in uncomfortable emotional eliciting situations, this type of study has ceased to be conducted.

Emotion Judgments of spontaneous facial expressions with and without context. In both the Landis (1928) and Coleman (1949) studies, facial information was judged apart from any contextual information. In as such, these studies did not examine what is perceived when both facial and contextual information are present. Munn (1940) and Vinacke (1949) presented subjects with pictures cut from magazines such as Time and Life, which contained either facial or both facial and contextual information. The pictures were of live scenes where at least one person's face was visible. Neither study explains how the stimuli were chosen. In both studies there were two conditions of stimulus presentation. In one condition the entire picture was presented to subjects. In a second condition, the "facial" condition, only the face of the person in the picture was presented to subjects. In both studies, subjects were asked to decide what emotion the person in the picture was feeling and were provided with a list of emotion words to choose from. Both lists were developed from preliminary studies that had used free choice.

In both the Munn and Vinacke studies, rater agreement for each condition was compared. In both studies, rater agreement was predominantly found to be greater when both contextual and facial information was present, suggesting that contextual information is influential in judgments of emotion. In Munn's study, where only descriptive statistics were computed, for 11 of the 14 photographs agreement was greater when both the face and the context were presented, whereas agreement was greater for only one of the photographs when the face alone was present. For two of the photographs, agreement was the same under both conditions. Vinacke compared the proportions of the most frequently rated terms for the entire photograph with those of the face alone. For 12 of the 20 photographs agreement was significantly greater when both the face and context were presented, whereas agreement was significantly greater for only five photographs when the face alone was present. In both studies a large proportion of the photographs were interpreted differently under the two stimulus presentation conditions, suggesting that the addition of contextual information may not simply increase agreement, but actually alter subjects' perceptions. For 50% of Vinacke's stimuli, the target person was judged as feeling a different emotion when the face was presented alone compared to when both the face and context were present. This was the case for 36% of the stimuli used in the Munn study.

The Munn and Vinacke studies demonstrate two things. First, for pictures of people in various emotional situations cut from magazines, increases



in interater agreement occur, more often than not, when contextual information is presented in addition to facial information. Second, that various other results can occur when judgments of face and face and context are compared.

Sometimes agreement is greater when the face is presented alone, sometimes agreement is equal whether the face is presented alone or in context, and sometimes the emotion perceived from the face alone and the face and context together are different. Regardless of the variety of possible results, historically, the Munn and Vinacke studies have been interpreted as demonstrating the importance of contextual information in the perception of emotion.

#### Early comparison of the influence of face and context on emotion judgments

In the studies of Landis (1928) and Coleman (1949) the absence of context was examined, but not its presence. In the Munn (1940) and Vinacke (1949) studies the presence of context was partially examined. That is, the effects of adding a context to a facial expression was examined. A study that fully examined the presence of context was that of Goodenough and Tinker (1931); judgments of face alone, context alone, and face and context together were assessed. Goodenough and Tinker's (1931) study was later to be considered the first study of cue dominance (Ekman, Friesen, and Ellsworth, 1972). The study is only briefly discussed here because the details of the study will be discussed later when studies of cue dominance are reviewed.

Goodenough and Tinker (1931) had subjects rate facial and contextual information alone and combined. Judgments of the combinations were

sometimes more similar to the face judged alone, and in other cases more similar to the context judged alone. In addition, for some combinations the combined cues were judged differently than either the face or context. They therefore concluded that "neither the situation alone or the picture [face] alone determine the judgment of emotion" (p. 369). They listed a number of possible explanations to account for the fact that sometimes the face and sometimes the context was more influential in subjects' judgments of emotion; 1) the face or verbal description may not be equally good examples of the emotion in question, 2) the facial and contextual information may vary in their generalizability across individuals, 3) facial expression may not be an important component of certain emotions. These possibilities remain unstudied.

#### Emergence of the Facial Dominance Hypothesis

Early reviews. The studies described so far were the subject of reviews by Bruner and Tagiuri (1954), Woodworth and Schlosberg (1954) and Tagiuri, (1968), who interpreted the available evidence as a clear indication that context plays an important role in emotion perception. These reviews also considered emotion perception from spontaneous facial information alone unreliable, but emotion perception from posed facial expressions quite accurate. In addition, Bruner and Tagiuri argued that the context in which facial behavior appears, seems to effect how the facial information is interpreted. This argument reflects the findings of Munn (1940) and Vinacke (1949) which show that facial information alone is often judged differently from the same facial information with

contextual information. Bruner and Tagiuri also questioned the validity of studying the perception of facial expressions without knowledge of context.

Frijda's studies of dominance. Frijda (1969) was the first to examine cue dominance. In his earlier work, Frijda hypothesized that certain aspects of the perception of emotion were attributable to the face and others to the context. Specifically, he suggested that "expressive cues give rise to a general attitude or activity, the nature of which in terms of emotion can only be specified with the help of situational cues" (Frijda, 1958, p. 153). In other words, both the face and context are influential in the perception of emotion but that each has a separate role. The face provides information about the general activity of the target person (i.e. attention, approach, withdrawal) and the context allows the perceiver to make more specific judgments about the target persons emotional state. Frijda (1969) hypothesized that facial information would dominate contextual information for judgments of two specific dimensions (pleasure and attention), and found that, indeed, the facial information did dominate. Although Frijda was examining the dominance of facial information for two specific dimensions, his results were later overgeneralized and interpreted by supporters of facial dominance as evidence for facial dominance (Ekman, Friesen, and Ellsworth, 1972).

The foundation of research in cue dominance. The conclusions made by the early reviewers, and the research on which they were based was disputed in a review by Ekman, Friesen, and Ellsworth (1972, chapter 8). Their review

provided the foundation and guidelines for renewed research in the perception of emotion from face and context. The review was one chapter of a book devoted to promoting facial expressions as fundamental elements in emotional experience and communication. Chapter eight focused on whether facial or contextual information, in general, has a greater influence on subjects' judgments of emotion. Indeed, as would be expected by the nature of the book, Ekman et al. (1972) suggested that the influence of facial information in the perception of emotion had been unduly downplayed and that context had been over emphasized by previous researchers and reviewers.

Ekman et al. (1972) stated that their interpretation of the literature conflicted with that of previous reviewers in at least two ways; 1) contextual information does not dominate facial information in the perception of emotion, 2) having more information about the situation in which an emotion is expressed does not always lead to more accurate and reliable judgments. To their argument against context dominance they added that "what data there are suggest just the reverse of what has been concluded" (p. 140). Although they never stated what the reverse was, presumably they were suggesting that facial information dominates contextual information. I do not interpret previous reviewers as having made such strong conclusions. Admittedly, Fernberger (1928) had suggested that contextual information was more influential than facial information, but this conclusion was an interpretation of his own data, not a conclusion made after reviewing other studies. Bruner and Tagiuri (1954)

disagreed with Fernberger's position. In terms of the relative influence of face and context in emotion perception, Bruner and Tagiuri's (1954) position was ambivalent: "Just how the information is utilized by the judge, and what weight he may give to each component, if it is the components that he attends to, rather than some higher order variable derivable from their interaction, is still a wide open question" (p. 402). Ekman et al.'s (1972) interpretation of Bruner and Tagiuri's (1954) general claim that "the more contextual information available the more reliable the judgment" (Bruner and Tagiuri, 1954, p. 402) as an actual hypothesis may also be inaccurate. Bruner and Tagiuri had no hypothesis, they were simply describing the general trends found in the studies of Munn (1940) and Vinacke (1949). Indeed, on some occasions agreement was greater when facial information was presented alone.

Some of the disagreement Ekman et al. (1972) attribute to a conflict between their interpretation and that of previous reviewers' is possibly due to the different questions that they and previous reviewers were addressing. Bruner and Tagiuri (1954) focused on the general question of how another's emotion is perceived, whereas Ekman et al. (1972) focused on the relative dominance of facial and contextual information in emotion perception. This new focus generated a new way of looking at emotion perception, a way that pits contextual information against facial information. This competition between face and context has altered how researchers have approached emotion perception from face and context.

Ekman et al. (1972) also offered guidelines for how this new question should be researched. They suggested that previous researchers had neglected to adopt adequate criteria for choosing facial and contextual stimuli. The most important requirement was called source clarity. Both sources of information must be equally clear as to emotional information, for otherwise the clearer source would have an unjust advantage. "It would be possible to obtain results showing that the face was more important than the context or vice versa, depending upon whether the investigator had combined an informative face with an ambiguous context, or an ambiguous face with an informative context" (Ekman et al. 1972; p. 136).

Ekman et al. (1972) use the phrase 'source clarity' to refer to "differences in the amount or type of information about emotion available to observers when they are exposed to a single source, either context or face" (p. 138). Ekman et al. (1972) discuss three components to source clarity; ambiguity, message complexity, and strength. Ambiguity refers the amount of agreement between judges concerning the emotion interpreted from the source. Message complexity refers to whether the source is interpretable as a single clear emotion or whether it is interpretable as a blend or complex of emotions. Strength refers to the intensity of the emotion interpreted from the source.

Ekman et al. (1972) reanalyzed previous studies, by correcting for what they consider a lack of equal source clarity, to find out if the face or context was a more dominant cue. They justifiably interpreted previous findings as failing to

support context dominance and, although they did not explicitly state that facial information dominates contextual information, they did reinterpret previous findings as more compatible with such an hypothesis. Of the studies reviewed by Ekman et al. (1972), only one, that of Frijda (1969), specifically examined cue dominance, and he examined cue dominance for only two general dimensions. Ekman et al.'s interpretation of research in emotion perception from face and context redefined the field so that the face could be studied without consideration of the context.

Eleven studies have examined cue dominance since Ekman et al.'s review. Watson (1972), less than a year after Ekman et al.'s review, examined the question of cue dominance following the guidelines laid out by Ekman et al. (1972), and supported all their arguments. The question of cue dominance then lay dormant until the 1980's. Since 1980, ten studies have examined cue dominance (Questions raised by earlier reviewers such, as Bruner and Tagiuri (1954), have gone unexamined). Some researchers have favored Ekman et al.'s (1972) position (Nakamura, Buck, and Kenny, 1990), some have remained neutral (Walbott, 1988a), and still others have explicitly questioned it (Fernandez-Dols, Sierra, and Ruiz-Belda, 1993). Although the findings have been less than consistent, in the most part they are in agreement with Ekman et al.'s (1972) position that contextual information does not dominate facial information and also with their implicit suggestion of Facial Dominance.

With this historical overview, we can now turn to the evidence. Chapter two reviews studies that have examined, or can be interpreted in terms of cue dominance.



## Chapter Two

### Review of studies that examine cue dominance

At least 16 studies have compared the relative influence of facial and contextual information in the perception of emotion. Table 1 lists these 16 studies in chronological order, the question posed, the comparisons made, and the conclusions drawn.

These 16 studies can be conveniently divided into three groups. One group used a method similar to Goodenough and Tinker (1931). A second group used a method similar to that of Munn (1940). A third group of studies do not share a specific method, but all used more dynamic stimulus presentations than the others.

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Insert Table 1 about here

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#### Group I: Goodenough and Tinker Paradigm.

A method first used by Goodenough and Tinker (1931) has become the single most frequently used method for examining cue dominance. Eleven of the studies listed in Table 1 have used the Goodenough-Tinker paradigm. In this paradigm, the facial stimuli are posed facial expressions and the contextual stimuli are verbal descriptions of emotional situations (e.g. this person's dog has just died). Subjects are presented either the facial information alone, the

contextual information alone, or the facial and contextual information combined.

Subjects are then asked to judge the emotional state of the target person.

Comparisons are made between judgments of the face alone, judgments of the context alone, and judgments of both face and context.

The Goodenough-Tinker paradigm has been used to answer a number of questions. One, are both facial and contextual information influential in the perception of emotion? Two, is one source of information more influential than the other in the perception of emotion? Three, what is it about the contextual stimuli that leads to facial dominance?

Are both facial and contextual information influential in the perception of emotion

Two studies have used the Goodenough and Tinker paradigm, and a third has used a quite similar method, to examine whether verbal statements of context can influence the interpretation of emotion from facial information (Goodenough and Tinker, 1931; Frijda, 1958; Knudsen and Mezekari, 1983). Although cue dominance was not the primary focus of these studies, that is, none examined which cue was more dominant, they all examined the influence of both facial and contextual information in the perception of emotion.

Both Goodenough and Tinker (1931) and Knudsen and Muzekari (1983) used the Goodenough tinker paradigm. Frijda (1958) used a slightly different method in that subjects were presented one of two series of facial and contextual cue pairs. The order of the facial expressions was the same for both series, but the context that went with each face was different for each series.

Stimuli. Both the facial stimuli (all posed facial expressions) and the contextual stimuli (all verbal descriptions) were different for each of the three studies. For facial stimuli, Goodenough and Tinker (1931) used four of the Felekey (1914) posed photographs of facial expressions representing emotions of fear, righteous anger, sympathy, and disgust. Knudsen and Muzekari (1983) used photographs of four facial expressions (happiness, sadness, anger, and fear) of basic emotions selected from Ekman and Friesen (1976). Frijda (1958) selected four facial stimuli "with the desire for everyday, not exaggerated expressions" (p. 149). Frijda did not label the facial stimuli as representing any particular emotion. For contextual stimuli, all three studies used one-sentence descriptions. Both Goodenough and Tinker (1931) and Knudsen and Muzekari (1983) used descriptions which were congruent with each of the four facial expressions. Frijda (1958) does not provide any rationale for his choice of contextual stimuli. Some of the descriptions described emotional situations (i.e. she receives a serious reproach) and some were rather ambiguous in terms of emotional connotation (i.e. she looks at an animal in the corner of the room).

Design. In the Goodenough and Tinker study, each facial expression was presented with each of the contextual cues for a total of 16 stimulus conditions. In four of the stimulus conditions the context and facial expression were concordant, in 12 conditions they were discordant. Knudsen and Muzekari (1983) presented subjects with random pairings of concordant and discordant pairings of facial and contextual information. Frijda (1958), as mentioned above,

presented subjects with one of two series of facial and contextual information where for both series the facial information was identical and the contextual information was different. Both Goodenough and Tinker (1931) and Knudsen and Muzekari (1983) collected ratings of the facial and contextual stimuli alone, Frijda (1958) did not.

Judgment Task. Subjects in the Goodenough and Tinker (1931) study responded to each stimulus presentation by choosing one of four emotion terms from a list (righteous anger, fear, sympathy, and disgust), with the options to choose their own word. Knudsen and Mezekari (1983) had subjects respond by choosing among six emotion terms (happiness, anger, fear, sadness, surprise, and disgust) or by writing in their own response. Frijda simply asked subjects to describe in writing what the target person was feeling.

Results. Goodenough and Tinker (1931) examined responses to concordant and discordant pairings separately. When the facial expression and context were concordant, subjects' responses were congruent with the stimulus 88.8 percent of the time. When the facial expression and context were discordant, subjects' responses were congruent with the facial stimuli 31.6 percent of the time and were congruent with the contextual stimuli 55.7 percent of the time.

Knudsen and Muzekari reported the responses to discrepant pairings for each facial expression, but unfortunately did not do the same for each context. Responses to discordant pairs were significantly different from ratings of

the face alone for all emotional expressions. Knudsen and Muzekari did not examine how similar judgments to the discordant pairs were to judgments of context alone, nor whether judgments of discordant pairs were more similar to judgments of the facial stimuli or the contextual stimuli. Rater agreement was significantly greater for the congruent combinations than for the face alone for the emotional expressions of fear, anger, and sadness, but not for that of happiness. Thus in general, the addition of the context increased the agreement of the judges. Agreement for congruent combinations was never less than agreement for both its cue components, and for both the fear and happy facial expressions, the agreement was higher in the congruent combination than for either of its cue components.

Frijda (1958) coded subjects' written responses and placed them into predetermined categories. In order to examine the effect of context and facial expression on the perception of emotion, the responses of the subjects to the two series, after being coded, were compared. For 19 of the predetermined categories, the two series differed. For several of other categories there was no significant difference between the two series.

All three studies demonstrate that both contextual and facial information influence subjects' judgments of another's emotion. In the Goodenough and Tinker (1931) study, discordant pairings are judged sometimes as more congruent with the face and other times more congruent with the context. In the Knudsen and Mezekari (1983) study, judgments of facial

expressions of basic emotions was effected by discordant contextual information. In the Frijda (1958) study, changes in context, altered subjects responses. That is, the categorization of some responses were different with different contexts.

The general finding that both facial and contextual information influence, to some extent, judgments of emotion, has gone undisputed. Not only studies that have used the Goodenough and Tinker paradigm, but all studies listed in table one have found both face and context to influence judgments of emotion. Is one source of information more influential than the other in the perception of emotion

Given that both facial and contextual information seem to influence judgments of emotion, researchers have sought to measure whether either facial or contextual information has a greater influence. Four studies have used the Goodenough and Tinker paradigm for the specific purpose of measuring the relative weight of facial and contextual information in the perception of emotion (Frijda, 1969; Watson, 1972; Walbott, 1988a, study 1). Frijda (1969) reports two studies that examine the relative influence of contextual and facial information on the perception of two "dimensions of emotion." The two studies were masters theses conducted by two of his students. Frijda (1969) refers to the two studies as the Warries study and the Jaanus study. The Warries study examined judgments of the dimension of pleasantness and the Jaanus study examined judgments of the dimension of attentional activity. Both Watson

(1972) and Walbott (1988a, study 1) examined judgments of discrete emotions.

Watson examined judgments of happy, sad, and angry emotions. Walbott examined judgments of joy, sadness, anger, and fear

Stimuli. In both the Warries and Jaanus study, the facial stimuli were photographs of three facial expressions. In the Warries study, the facial expressions depicted pleasant, unpleasant, and neutral (perceived slightly negative) emotional states. In the Jaanus study, the facial expressions depicted active, passive, and neutral emotional states. In both studies, contextual information was provided by nine different one sentence situational descriptors. Three descriptors corresponded to the emotional states depicted by each facial expression.

Watson used photographs of facial expressions created by Boucher under Ekman's supervision (1971), and one sentence verbal descriptions of context generated by Watson and her colleagues. The stimuli used in the actual experiment were selected from those of a pilot study. Eight facial expressions, four of each of two people, were used. The facial expressions were of happiness, anger, sadness, and neutrality. Two one line situations were generated to describe each of the four emotions depicted by the facial expressions. Subjects in the pilot study had rated the facial and contextual stimuli on two measures. One of the measures, the dimensional measure, required subjects to rate the expressions on five bipolar seven-point scales of emotional expression; pleasantness, activation, dynamism, control, and interest.

The second measure was a force choice between seven emotion labels; happy, sad, anger, disgust, fear, surprise, and neutral.

Walbott (1988a, study 1) used eleven photographs, from Ekman and Friesen's (1976) collection of posed photographs of basic facial expressions of emotion which were preselected in a pilot study and rated to be high in source clarity (i.e. neither ambiguous nor complex). The situations in Walbott's study were attained in a previous study which had subjects write down a situation in which they had experienced either joy, sadness, anger, or fear (see Scherer, Walbott, and Summerfield, 1986). Eleven of these situations were selected for the study. All the situations were rated as low in ambiguity and complexity.

Judgment task. All four studies used full factorial designs. That is, every facial expression was paired with every situational description. For all four studies, ratings were also made for each stimulus individually. In both the Warries and Jaanus studies, subjects rated cue combinations on seven-point bipolar scales, with end points of happy and sad for the Warries study and endpoints of active and passive for the Jaanus study. In the Watson study, for each combination, subjects were required to complete the same measures as in the pilot study. One additional seven-point bipolar scale was used which required subjects to rate the likelihood of the cue combination occurring in everyday life. Subjects in the Walbott (1988a, study 1) study responded to each stimulus combination by rating the target person on seven nine-point bipolar



scales, one for each of seven basic emotions (Happy, anger, sad, surprise, fear, disgust, and contempt).

Results. Each study used different measures to examine cue dominance. Because of this discrepancy in measure, the results of each study will be described separately. The results of all four studies support the facial dominance hypothesis.

In the Jaanus and Warries studies, a measure of relative shift was developed to examine the dominance of one cue over the other. The relative shift measure is attained by dividing the difference between the combination rating and the photograph alone rating by the difference between the combination rating and the context alone rating (This can be written in the form  $[(C - E) / C - S]$  where C refers to the combination rating, E refers to the rating of the expression, and S refers to the rating of the situation or context). If the result is greater than one, situational cues dominate, if the result is less than one then the facial cues dominate.

For the Warries study, for the discordant combinations, the average relative shift  $[(C - E) / C - S]$  was significantly less than one, meaning the face was the dominant source of information. In seven of the fourteen discordant combinations, the combination ratings were even more extreme than the ratings of the cues separately. Frijda suggested that discordance may sometimes enhance the suggestion of emotion. Frijda also interprets the results to suggest that for concordant combinations, the situational information was dominant. He

suggests the finding may have occurred because the situations were rated more extremely than the facial information and that the interpretations were closer to the more extreme cue, whether facial or contextual.

For the Jaanus study, the relative shift of the discordant combinations was significantly less than one, and for six of the discordant combinations the combination ratings were more extreme than the ratings of the cues separately. The correlation between the combinations and the photograph was ( $r = .86$ ,  $p < .01$ ) and between the combination and the context was ( $r = -.36$ ,  $p > .05$ ). Frijda (1969) interpreted the two studies as showing that facial information dominates in the perception of dimensions of pleasure and attention.

Watson examined both subject's categorical and dimensional responses for cue dominance. To examine dominance in the dimensional data, the relative shift quotient  $[(C - E) / C - S]$  was calculated for each of the 72 combinations for each of the five emotional expression dimensions. The average relative shift away from the context alone ratings was 2.73 times greater than the relative shift away from the facial expression alone ratings. To examine dominance in the categorical data, frequencies of responses were examined for each of the emotion labels for the combinations which were judged as improbable on the likelihood scale (a combination was considered improbable if the mean rating on the likelihood scale was greater than 4.5). Of the 29 combinations judged to be improbable, subjects chose the emotion label consistent with the facial

expression significantly more often than they chose the emotion label consistent with the context ( $\chi^2$  (df = 1) = 1926,  $p < .001$ ).

Watson performed a three way analysis of variance to examine the relation between the contextual cues, facial cues, and face-context combinations. The factors were the eight faces, the nine contexts, and the categorical responses. Both a face x response and a context x response interaction were significant. Watson interpreted this as showing that both the face and the context affected how subjects responded. There was also a face x context x response interaction suggesting that responses differed due to the face and context combinations. Watson suggested that the later two of these effects was due to the 22 combinations which were judged as likely to occur together. The analysis of variance was not done with the likelihood of occurrence considered as a factor so it is hard to determine whether Watson's contentions are accurate.

Walbott examined cue dominance for what he refers to as concordant, discordant, and ambiguous types of combinations. This division is somewhat different from other studies. Like other studies, he defined concordant pairs as those which on their own are interpreted the same. Unlike previous research, Walbott defines discordant combinations to be those in which the valence of the emotion is different for the two cues. Walbott defines combinations where interpretation of the two cues are different but the valence

of the two interpretations is similar as ambiguous (i.e. happy and anger are discordant but sad and anger are ambiguous).

Walbott investigated the influences of both context and facial expression on the perception of the concordant, discordant, and ambiguous combinations by examining the correlations of the responses on the seven scales between face alone and context alone conditions, face alone and combination conditions, and context alone and combination conditions. The correlation between subjects' judgments of the face alone and their judgments of the context alone was greatest for concordant combinations, much lower for ambiguous pairs, and negative for discordant pairs.

The correlations between face alone and the combinations were equally high for all combination types. The correlations between context alone and the combinations were zero for discordant combinations, moderate for ambiguous combinations, and very high for concordant combinations. The relative shift quotient  $[(C - E) / C - S]$  was less than one for both discrepant and ambiguous combination, but slightly above one for concordant combinations. Walbott interpreted these results as suggesting facial dominance when ambiguous and discordant pairs are presented and neither facial nor contextual dominance when concordant pairings are presented. This is similar to the conclusion made by Frijda (1969), when describing both the Jaanus and Warries studies.

In addition to examining dominance, Walbott also examined three possible models for the integration of the two cues; the averaging model, the

summation model, and the weighted regression model. These models all assume that 1) integration occurs between the two sources of stimuli and that 2) the integration is the result of some linear combination based on how the two sources are interpreted separately. Both the weighted regression model and the averaging model appeared to fit quite well. Walbott proposed that in the perception of emotion from facial and contextual cues, subjects examine each cue separately and create a list of the possible emotions that can be interpreted from each cue source. They then choose the emotion label that best fits both cues.

Each of the four studies described above provide evidence for Facial dominance. In all four studies, subjects' responses to discordant pairings of face and context tended to be more consistent with their judgment of the face alone than their judgment of the context alone.

#### What is it about the contextual stimuli that leads to facial dominance

Fernandez-Dols and his colleagues have remained skeptical of facial dominance (Fernandez-Dols, Walbott, & Sanchez, 1991; Fernandez-Dols, Sierra, and Ruiz-Belda, 1993). They have conducted studies to examine three possible explanations, other than that of facial dominance, to explain previous findings of facial dominance. One, findings of facial dominance may be due to subjects' unfamiliarity with the contextual information (Fernandez-Dol, Walbott, and Sanchez, 1991). Subjects may have more knowledge about the emotion depicted by various prototypical facial expressions than they do for situational

descriptions which they may or may not have experienced. Two, findings of facial dominance may be due to subjects' inability to categorize contextual information in terms of emotion labels used to categorize facial expressions (Fernandez-Dol et al., 1991). It may be that subjects are quite capable at labeling prototypical facial expressions according to single emotion terms, but not so capable with contextual information. Three, the selection criteria, developed by Ekman et al. (1972) for research in cue dominance, may influence findings of facial dominance (Fernandez-Dols, Sierra, and Ruiz-Belda, 1993). Perhaps there is a criterion which is more appropriate for contextual stimuli.

Fernandez-Dol et al. (1991), in a series of three studies, examined both whether subjects' unfamiliarity with contextual stimuli and their ability to label contextual information could account for previous findings of facial dominance. The procedure in the three studies is similar the that of Walbott (1988a, study one), described above. Eleven facial expressions from Ekman and Friesen's (1976) "Pictures of facial affect" and 11 situations from Scherer, Walbott, and Summerfield (1986) were used as stimuli. Subjects responded to each condition by rating the target person on nine nine-point bipolar scales; joy, anger, disgust, fear, surprise, sadness, shame, skepticism, and despair. In all three studies, subjects were presented with only discordant pairs.

Unfamiliarity with contextual information. The first study was to examine whether a subject's previous experience in the type of situation (used as stimuli) influences emotion perception from discordant pairings of facial expression and

contextual cues. One week before the main study, subjects were given a questionnaire asking them if they had ever experienced any of the eleven situation that were to be used in the study. For six of the situations, there was no distinction between individuals (i.e. they had all been in the situation or they had all never been in the situation). For the other five situations the distribution between having experienced the situation and not having experienced the situation was relatively even.

Forty- nine subjects who had experienced fewer than three of the five situations (inexperienced group) and 48 subjects who had experienced three or more of the five situations (experienced group) returned the next week for the main study. Subjects in the inexperienced group were presented the situations, with which they were unfamiliar, paired with discordant facial expressions. Subjects in the experienced group were presented the situations with which they were familiar paired with discordant facial expressions. In both these conditions the facial cue dominated the contextual cues, but there was no significant difference between the two conditions.

Ability to label contextual information. The second study examined whether previous experience in the emotion categorization of situations (used as stimuli), by means of verbal labels that are usually attributed to facial expressions, influences the use of contextual and facial cues in the perception of emotion. The experimental group filled out a five page questionnaire which had one of the five situations from the first study written on the top of each page.

Subjects rated the situations on the same scales used in the first study. They were also provided nine facial expression at the bottom of each page and were asked to choose the one that fit with the situation. The next day, both the experimental and a control group were presented discordant pairings of contextual and facial stimuli and again filled out the rating scales.

Results showed that for the control group, the facial expression dominated the context. However, neither cue source dominated in the experimental condition. It was concluded that subjects' lack of experience in classifying contexts according to emotion labels may have influenced the previous research findings of face dominance.

The third study examined whether the order of presentation of contextual and facial cues affects the influence of contextual and facial cues in the perception of emotion. This was to examine whether the experimental procedure of study two had "enhanced the importance of contextual sources and centered subjects' attention on this information." Half the subjects were provided the contextual information before the facial information and half were provided the facial information before the contextual information. In this study both the conditions were the same as that of Walbott (1988a, study one). No significant differences were found in the response pattern for the two groups. The results tended to be quite similar to those of Walbott (1988a, study one) except that the influence of the contextual information was weaker.



The results of studies two and three suggest the possibility that experimental procedures used to study the perception of emotion from contextual and facial cues may lack ecological validity if making judgments concerning other peoples emotions in daily life requires category accessibility of labels for facial expressions of emotion. This issue has not been empirically examined.

Effects of Selection Criterion. Fernandez-Dols et al. argued that although Ekman et al.'s (1972) notion of source clarity is appropriate for facial information, it may not be appropriate for contextual information. They proposed three different properties for which contextual information should be examined. The first property is that of identity. "Subjects (should be) able to identify a unique emotion produced by the context." The second property is prototypicality. This asks whether the stimulus is a prototypical example in which the specific emotion would be experienced. The third property is intensity. This asks whether the emotional situation is intense. This third property is similar to Ekman et al.'s (1972) concept of source strength.

Fernandez-Dols et al (1993) selected contextual stimuli based on the above properties. Eight situations were used which were identifiable, prototypical, and intense. The facial stimuli were four photographs (joy, anger, fear, sad) selected from Ekman and Friesen's (1976) pictures of facial affect. Subjects were asked to rate the combinations (only discordant combinations were used) on four eight-point scales; joy, anger, sadness, fear.

No clear dominance of one cue over the other was found. The correlations between the context and the combinations ranged from  $-.57$  to  $.99$ . The correlations between the facial information and the combinations ranged from  $-.54$  to  $.99$ . Although the mean correlation, with Fisher's  $r$  to  $z$  transform, between the face and combination ( $z = .87$ ;  $r = .42$ ) was greater than that of the mean correlation, with Fisher's  $r$  to  $z$  transform, between the context and combination ( $z = .56$ ;  $r = .30$ ), the difference was not significant.

Fernandez-Dols et al. (1993) concluded that previous research may not have employed comparable stimuli in their designs. How a researcher selects stimuli may influence whether or not face dominance is found. The findings of both Fernandez-Dols et al. (1991) and Fernandez-Dols et al. (1993) suggest the need to carefully examine why facial dominance is being found in studies that use the Goodenough-Tinker paradigm.

#### Group II: Munn Paradigm.

A second method that has been used to examine dominance and which may be more ecologically valid is the Munn paradigm. In this paradigm subjects are presented pictures of people experiencing an emotion within some background or context. In addition the pictures are presented with at least the target persons face blacked out (context only) and also with the context blacked out (facial information only). Comparisons are made between face alone and face and context together and between the context alone and face and context

together to find out which source of information is more dominant or influential in the perception of emotion.

Two of the studies listed in table one used this method. Spignesi and Shor (1981) used this method to examine 10 photographs taken from popular magazines. The three conditions were face alone (the whole head and its orientation included), context alone (whole head covered over), and whole photograph. Subjects were required to rate the stimuli on a 13-point scale with end points maximum pleasure and maximum displeasure. Differences in the mean ratings of the three conditions were examined. For five of the photographs the mean ratings of the face were significantly different from both that of the context alone and that of the whole photograph, but there was no difference between the mean ratings of the context and the whole photograph. For one of the stimuli the mean rating of the context was significantly different from both that of the face alone and that of the whole photograph, but there was no difference between the mean ratings of the face and the whole photograph. For three of the stimuli the three conditions had mean ratings that were significantly different from each other with the mean rating of the whole photograph falling between the mean rating of the context and the mean rating of the face. Finally, for one of the stimuli, there was no difference between any of the three conditions. Spignesi and Shor (1981) concluded that both sources of information are involved in the perception of emotion but that their relationship in the perception of emotion is not a simple one. In other words, one source is not

consistently dominant over another and that a more complicated relationship must exist.

Walbott (1988a, study two) also used a method similar to the one described above. He examined 24 photographs taken from popular magazines. The photographs were selected based on two criteria. " The facial expression of this person had to be clearly visible. Furthermore, the context, that is, characteristics of the emotion-eliciting situation, also had to be depicted in a way that when presented alone allowed inferences about possible emotional experiences." The three conditions were the whole photograph, the photograph with the whole target person blacked out (context), and the photograph blacked out except for the target person (i.e. all parts of person that were visible in the photograph). Subjects responded to each condition by rating the target person on seven nine-point scales, one for each of seven basic emotions; happy, anger, surprise, disgust, fear, sad, and contempt (Ekman, 1986). To examine the influence of both context and facial expression in the perception of the concordant, discordant, and ambiguous combinations, the photographs were divided into three groups of eight based on the correlation between the context alone and person alone. The eight with the highest correlation were considered concordant, the eight in the middle were considered ambiguous, and the eight with the lowest correlation were considered discordant. This is a different way of creating discordant, concordant, and ambiguous groups than that of Walbott (1988a, study one) where posed photographs were used. However, it seems an

appropriate distinction since the correlations between the face alone and context alone groups are the same in this study as they were in Walbott (1988a, study one). In this study, however, the relative shift quotient was below zero (facial dominance) for the discrepant conditions and about 1 for the ambiguous and the concordant conditions (neither facial nor context dominance).

Using the Munn paradigm, both Spignesi and Shor (1981) and Walbott (1988a study two) found no consistent evidence for either face dominance or context dominance. The only exception is that with Walbott's (1988a, study two) method of differentiating discordant, ambiguous, and concordant pairings, facial dominance was found for the discordant pairs.

### Group III: Effects of dynamic stimulus presentation

Both the Goodenough-Tinker paradigm and the Munn paradigm use static facial and contextual cues. Three studies listed in table 1 used more dynamic stimulus presentations.

Goldberg (1951) showed subjects two short films. The first and final scenes in the films were the same. The first scene was of a boy riding a tricycle and the last scene was of a woman screaming. The two middle scenes of each film were different. Film A showed a foot depressing a car's brake pedal and then a scene of the auto wheel with the car not in motion. Film B showed a scene of the boy getting off the tricycle and placing a toy lamb on his head followed by a scene of a man laughing. All subjects were asked to select a word

from a list (fear, sorrow, rage, joy, anger, disgust) that best described how the woman was feeling.

One group of subjects watched and rated film A and then film B and a second group watched and rated the movies in the reverse order. For both conditions, the woman in film A was judged to be feeling fear over 90% of the time. Of those subjects that saw film A first, only 52% judged the woman in film B to be feeling fear, 27% indicated that the woman was feeling joy and 10% chose anger to describe the woman. Of those subjects that saw film B first, 77% judged the woman in film B to be feeling fear, 12% indicated that the woman was feeling rage and 9% chose joy to describe the woman. Regardless of order, the woman was judged by less subjects to be feeling fear in film B than in film A, suggesting that the contexts of the two films had a somewhat different influence on subjects judgments of emotion.

Walbott (1988b) designed a study that used 60 video clips from German television shows and movies as stimuli. Clips were chosen only if a situation was shown prior to a close up shot of the person reacting to the situation. Walbott provided the example of one person falling down the stairs and then a close up of a person who witnessed the accident showing a fear expression. It was also required that emotion could be interpreted from both the context clip and the facial clip.

Three groups of subjects, face only, context only, and whole clip were required to rate the emotion felt by the target person. In the context only

condition, subjects were asked to imagine what the person witnessing or taking part in the situation was feeling. All groups rated the emotion on nine five-point scales with the following labels: full of contempt, disgusted; angry, furious; afraid, fearful; deeply moved, touched; happy, joyful; skeptical, thoughtful; sad, gloomy; embarrassed, ashamed; surprised, astonished.

The film clips were divided into three equal groups; concordant, discordant, and ambiguous based on the same procedure as Walbott (1988a, study two). The correlation of the responses in the face only and full clip conditions was compared to the responses of the context only and full clip conditions for each group. The correlations were similar for all three groups. A relative shift quotient was calculated as the "sum of absolute differences between entire clip judgment and face alone judgment across the nine emotion scales divided by the sum of absolute differences between the entire clip judgment and the context judgment across the nine emotion scales." For each group the relative shift was slightly above one but not significantly so. Walbott interpreted this as suggesting that both the face and context were equally influential in the perception of emotion.

The sex of the target person was found to have an effect on the influence of contextual and facial information in the perception of emotion. Facial cues were more influential in the judgment of emotion in female targets persons and contextual cues were more influential in the judgment of emotion in male target persons. Walbott suggests three reason for this finding. The first is

that raters may expect and judge male actors facial expressions to be less informative. The second is that gender differences in display rules may have caused the difference. The third is that film directors may present male actors differently from female actors.

Nakamura, Buck, and Kenny (1990) used video to display the facial information but their operationalization of the contextual information was rather different from previous research. Subjects were presented with a still slide that supposedly had elicited the person's facial expression. Subjects were presented both the film of the facial expression and the context slide at the same time for a duration of five seconds. Nine slides were used, three pleasant, three neutral, and three negative and three expressions were used, one pleasant, one unpleasant, and one neutral.

Ratings for the combinations and for the individual cues were made on eight bipolar seven-point emotion scales with endpoints; pleasant-unpleasant, strong-weak, not at all happy-very happy, not at all angry-very angry, not at all afraid-very afraid, not at all surprised-very surprised, not at all disgusted-very disgusted. Their results show that subjects used the face more than the slide in deciding what the person was feeling. In this study it seems that the facial expressions were a much more "important information source than the elicitors (i.e. slides)" in the judgment of emotion. There are a number of problems with this study. First of all, in real life, elicitors come prior to a reaction (i.e. facial expression). The unnaturalness of the information presentation may have



disrupted subjects normal way of perceiving emotion. The second is that two sources of information are harder to look at than just one, especially when you are given only 5 seconds. Possibly the source that moved (facial information) attracted the attention of the subject more.

Findings of studies that have used dynamic stimulus presentations are inconsistent, possibly because the method of each study was quite different. In general, both facial and contextual information were found to effect subjects judgments. In both the Goldberg (1951) and the Nakamura et al. (1990) studies facial dominance was found.

### Summary

Thirteen of the sixteen studies listed in table one have used one of two very simple methods to examine cue dominance. In both methods, judgments are made of the contextual information alone, facial information alone, and contextual and facial information combined. This allows for comparisons to be made between the contextual information, facial information, and their combination. The Goodenough and Tinker paradigm may be less ecologically valid than the Munn paradigm, but it does allow for the controlled presentation of both concordant and discordant pairs of stimuli.

Twelve studies have used the Goodenough-Tinker paradigm. A general finding is that both facial information and contextual information have some influence on a subject's judgment of a target person's emotional state. Four studies have used the Goodenough-Tinker paradigm to examine the specific

question of whether facial or contextual information dominate in the perception of emotion. In all four studies, facial information has been found to dominate contextual information. Fernandez-Dols and his colleagues have remained skeptical of facial dominance, and have proposed both theoretical and methodological explanations for findings of facial dominance.

The two studies that have used the Munn-paradigm are those of Walbott (1988a, study 2) and Spignesi and Shor (1981). As a general conclusion, the results of Walbott (1988, study two) and Spignesi and Shor (1981) suggest that in random samplings of photographs of spontaneous behavior, contextual information, facial information, or neither may dominate for any given photograph. The general conclusion of facial dominance does not seem to follow from these studies.

Since Ekman et al.'s (1972) influential review, many studies have been conducted which examine the relative influence of facial and contextual information. Some studies have reported facial dominance, but none have reported context dominance. Although Ekman no longer considers context when he discusses emotion recognition from facial expressions (Ekman, 1989; Ekman, 1992a; Ekman 1992b; Ekman 1993), others, such as Nakamura et al. (1990), have responded to claims against facial dominance with their own evidence. However, since Ekman et al.'s influential review, no one has critically examined the question of dominance, the methods used to examine it, and the conclusions that have been drawn. This is the goal of the next chapter.

## Chapter Three

### Cue Dominance: A Critical Analysis

This chapter provides a critical analysis of research on cue dominance; the purpose being threefold. First, I examine under what conditions facial dominance occurs. This analysis suggests some reasons, other than that of facial dominance, to explain the findings. Second, I examine the ecological validity of research in cue dominance. Third, I argue that those who have interpreted their findings in terms of cue dominance have assumed a linear relationship between judgments of face and context alone and judgments of the two cues combined, and that this assumption may not always be correct.

#### When and why facial dominance occurs

##### Under what conditions does facial dominance occur

In research in cue dominance it is generally agreed that both the facial and contextual information can influence the response of the subject (Goodenough and Tinker, 1931; Ekman et al., 1972; Walbott, 1988a; Walbott, 1988b, Nakamura, Buck, and Kenny, 1990; Fernandez-Dols et al., 1991; Fernandez-Dols et al. 1993). Although both cues can influence subjects' response, many studies have suggested that facial information influences subjects' judgments far more than contextual information (Watson 1972, Walbott, 1988a (study 1), Nakamura et al., 1990) and no study has reported context dominance.

There are a number of commonalties shared by studies that have found facial dominance. One, facial dominance occurs when results are generalized across a number of trials. Two, facial dominance occurs when unnatural stimuli are used. Three, facial dominance has been found for only a limited set of facial expressions. These commonalties overlap and are confounded with each other in that more than one commonality is present in any given study. Because of this overlap, it is not possible to deduce the exact effect each of these commonalties has on findings of facial dominance.

When results are generalized across trials. In early studies that examined the roles of face and context in the perception of emotion, subjects' responses were examined for each trial (Goodenough and Tinker, 1931; Munn, 1940; Frijda, 1958). When dominance was examined at this level of analysis, context dominated for some cue combinations and face dominated for others. Although these early studies have been criticized for their lack of statistical evaluation (Ekman et al. 1972), with the advent of more sophisticated statistical tools, researchers have ignored specific cue combinations in order to make general statements about face and context. Why context dominates for some specific cue combinations and face for others has not been examined. Instead researchers have generalized over a number of cue combinations in order to make general conclusions. When results are generalized over a number of cue combinations, facial dominance has been found (Ekman et al, 1972; Watson, 1972; Nakamura et al., 1990).

Generalizing across many trials is not an uncommon practice. It is often done to reduce "random noise" such as individual differences, or to gain a more consistent measure as in studies that used response time. In these cases the random noise is considered unfluent to the researcher's hypotheses and the independent variable remains the same from trial to trial. In research in cue dominance, the independent variable (i.e. facial expression and contextual stimuli) changes from trial to trial. The fact that facial information dominates on most trials does not make the trials where context dominates less important. If we consider findings of facial dominance to be a main effect, there may also be interaction effects which have gone unnoticed. Perhaps, for certain types of cue combinations contextual information is dominant.

With unnatural stimuli. When the studies in table one which measured cue dominance are divided into those that have used close to natural stimuli such as photographs of live events or film clips from television shows and those that have used unnatural stimuli such as posed facial expressions or contexts such as a picture that supposedly elicited a the facial expression, facial dominance has been found consistently in only those studies which use unnatural stimuli (see table two). Studies that have used the Goodenough-Tinker paradigm, which uses posed facial expressions and verbal descriptions of context, have invariably demonstrated facial dominance. For studies that have used the Goodenough-Tinker paradigm and also Ekman et al.'s (1972) selection criterion for source clarity, facial dominance has been evidenced 5 of 6 times.

With the Munn paradigm, which uses photographs of live events, neither face nor context has been found to consistently dominate. Of the three studies listed in table 1 that don't fit in either of these categories, Nakamura and Buck (1990) found facial dominance, Walbott (1988b) found neither facial nor context dominance, and Goldberg (1951), although he was not examining dominance per se, provided data which support facial dominance. Of these three studies, only that of Walbott (1988b) used close to natural facial and contextual stimuli.

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 Insert Table Two Here  
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With a Limited set of emotions. In all studies that have found facial dominance, except for that of Frijda (1969), only a limited set of emotions have been examined. These studies have used facial expressions of basic emotions and situational descriptions of basic emotions. Ekman contends that there are a number of basic emotions (there is agreement among theorists for at least six: happiness, sadness, anger, fear, surprise, and disgust), each with their own universally recognizable facial expression ( Ekman, 1972, 1989, 1992a, 1993; Ekman and Friesen, 1971,1986).

Findings of facial dominance are much less impressive if they occur for only six posed facial expressions. Especially given the myriad of emotions that one perceives in another. Those studies that have used facial stimuli which are not representative of basic emotions have found little evidence of facial

dominance (Walbott, 1988a, study two; Spignesi and Shor, 1981; Walbott, 1988b). However, these studies did not use posed facial expressions.

#### Why does facial dominance occur

Facial dominance has been found only when the stimuli are not particularly natural, but what is it about these unnatural stimuli that leads to facial dominance? A number of possibilities are discussed below. One, facial information actually dominates contextual information when unnatural stimuli are used. Two, the stimulus selection procedure favors facial information. Three, the contextual information is more vulnerable to reinterpretation than the facial information. Four, contextual and facial stimuli are generated independently. These four possibilities are not mutually independent. That is, any one of these possibilities could occur in combination with any of the others.

Facial Dominance. Perhaps when the facial stimuli are unnatural, such as posed facial expressions, facial information will dominate contextual information in a judgment task. If this is the case, then subject's judgments are based primarily on the facial information regardless of what context is paired with it.

Selection Criterion. In research conducted prior to Ekman et al.'s (1972) review, the stimuli were often arbitrarily chosen by the experimenter. Since the Ekman et al. (1972) review, many researchers have selected stimuli based on the clarity of the stimuli. The need for equally clear facial and contextual stimuli was argued by Ekman et al. (1972) as necessary for a fair comparison of face and context, and their argument has met with little resistance. Ekman et al.

(1972) outlined a selection criterion that they thought would ensure equal clarity between stimuli. Five of six studies that have followed Ekman et al.'s (1972) selection criterion have found facial dominance (Watson, 1972; Fernandez - Dols et al., 1991 (studies 1 and 3); Walbott, 1988a (study 1); Nakamura et al., 1990). Fernandez-Dols (1993) and his colleagues suggest that, perhaps, Ekman et al.'s selection criterion is not appropriate for contextual information. Using a different selection criterion, one more suitable for contextual information, Fernandez-Dols et al. (1993) found neither face nor context dominance. However, Fernandez-Dols et al. did not include a comparison group in their study, one which would be presented stimuli selected according Ekman et al.'s criterion. Without a comparison group, it is questionable whether the null findings are attributable to the selection criterion. No research has examined if indeed Ekman et al.'s (1972) and Fernandez-Dol et al.'s (1993) selection criteria lead to a different choice of stimuli.

Vulnerability to reinterpretation. When contextual information has been provided by situational descriptions, these descriptions have been no longer than a sentence or two. For example, the situational descriptions used by Watson (1972) were simply generated by the experimenter and thought of as prototypical situations in which a specific emotion would be elicited. One context line associated with the emotion of sadness was "He is told that a close friend, stricken with leukemia, has died". Although a one line situational description may be easily recognized as associated with a specific emotion, it may also be



relatively vulnerable to reinterpretation. In other words, when presented with a facial expression, the situation may be easily reinterpreted to be consistent with the interpretation of the facial expression. For example, if a facial expression of anger was paired with the sad context described above from Watson (1972), it is possible that the subject may interpret the person as feeling angry because he was not able to say good-bye to his friend, or he's angry at the person who gave his friend leukemia, etc. If a facial expression of surprise was paired with the same sad context (the notification of a friend's death), perhaps the subject would interpret the person as feeling surprise because he did not expect his friend to die so quickly.

Ekman et al.'s (1972) notion of source clarity does not take vulnerability of reinterpretation into account because reinterpretation is a relational phenomenon between facial and contextual information rather than one concerning the perception of each cue on its own. That is, one situation may be vulnerable to reinterpretation if paired with one facial expression, but not when paired with another. No index of cue reinterpretation vulnerability is possible without knowledge of the cue it will be presented with.

Vulnerability to reinterpretation is consistent with Frijda's (1969) account of how individuals interpret discordant pairings of facial and contextual information. Frijda (1969) outlined four strategies that subjects might use to interpret discrepant combinations as congruent with the facial information. One, the subject considers the facial expression the result of something other than

what is described by the context as stated. Two, the subject may consider the target indifferent or withdrawn from the context as stated. This strategy would explain a lack of facial movement in the target. Three, subjects might interpret the facial expression as a mask, hiding true feelings (i.e. putting on a smile when you are disappointed). A strategy similar to Ekman and Friesen's (1969) notion of display rules. Four, the subject might re-interpret the situation in such a way that it seems congruent with the facial expression. For example, Frijda (1969) describes the response of one subject to a sad expression paired with the sentence "Her boyfriend speaks sweet words to her". The subject interpreted the expression alone as sad and worried, and the context alone as eliciting happiness and contentment. When combined the subject said the target was feeling "Irritated, not in the mood for sweet words. Tired." (Frijda, 1969). This strategy is different from the first in that the subject considers the context as eliciting the emotional reaction.

The first three of Frijda's (1969) reinterpretation strategies all incorporate the assumption that the subject notices the discrepancy between the contextual and facial information and tries to eliminate the discrepancy by reinterpreting the contextual information. The fourth strategy is somewhat different in that the subject may not notice a discrepancy between the two types of information. It is not necessary for the subject to notice a discrepancy between the facial expression and the contextual information to use this strategy. It is possible that

instead of examining each source separately, the subject analyzed the information as a whole and then made a single judgment.

Contexts are generated independent of facial movement. In all studies where facial dominance has been found, the contextual stimuli have been developed independent of the facial stimuli. When discordant pairings of independently created facial and contextual stimuli are combined, subjects are more likely to notice the discrepancy. When the facial and contextual stimuli are not created independent of each other, such as photographs of live events, subjects are less likely to notice a discrepancy between the facial and contextual stimuli. Perhaps facial dominance occurs because the facial and contextual information are created independent of each other, and when this is the case, the contextual information, which is vulnerable to reinterpretation, is reinterpreted in terms of the facial information.

A Comparison of the Munn paradigm with the Goodenough-Tinker paradigm illustrates the above possibility. In the Munn paradigm, photographs of live events are used as stimuli. In as such the facial and contextual stimuli are created together. The facial and contextual information, whether discordant or concordant when viewed separately, seem to fit together when combined. In the Goodenough-Tinker paradigm, facial and contextual information are developed independent of each other, with the focus on generating stimuli which are judged to represent specific emotions. When discordant pairs are viewed, generated in such a manner, it is less likely, although possible, that subjects

view them as fitting together. Because they don't fit together, reinterpretation strategies are used.

Possibly context dominance could be evidenced with facial and contextual stimuli that seem to fit together, but no research has specifically examined this question. In order to test this possibility, specific contexts would need to be generated for specific facial expressions. Given the right situation, Ekman and Friesen's (1976) and Matsumoto and Ekman's (1988) photographs of posed facial expressions of "basic" emotions might be reinterpretable as other emotional states. It may be possible to create pairings of context and facial expressions which would be judged as discrepant when presented on their own, but would be judged as congruent and similar to the judgment of the context when presented together.

Two strategies could both be used to generate specific contexts for specific facial expression. One strategy is to generate contexts that describe an emotion that is close to the emotion expressed by the face on the circumplex model of emotion (Schlosberg, 1952; Russell, 1980). The circumplex model organizes facial expressions on the dimensions of pleasure and arousal. When judgments of facial expressions are placed on this two dimensional space, they tend to form a circle. Emotions that are close to each other in the circumplex have similar ratings of pleasure and arousal. For example, fear and anger, although phenomenologically different, are close to one another on the circumplex.

A second strategy is to generate contexts that match certain components of the facial expression (Ortony and Turner, 1990). Ortony and Turner use the example of anger to illustrate this point. They suggest that the prototypical facial expression of anger has a variety of components. These components include a frown, the raising of the eyelids and staring of the eyes, and either an open and tight mouth with teeth showing or closed mouth with lips tightly pressed together. Each of these components may be associated with some aspect of the experience of anger. The frown with frustration and the raising of the eyelids and staring of the eyes may be associated with visual attention (Smith, 1989). The open tight mouth with teeth showing may be associated with aggression, whereas the closed mouth with lips pressed together with determination and self control (Frijda, 1986).

#### Ecological Validity

The studies listed in table one that examined cue dominance attempted, by using facial and contextual information referring to a variety of emotions, to make general hypotheses and conclusions about the relative influence of facial and contextual information in the perception of emotion. In this general sense, dominance is an ecological question. Do people, in everyday life, place more emphasis on the face than on context when perceiving emotion in others? The methods used to answer this question, such as that of Goodenough and Tinker (1931) lack ecological validity. It is not even known what facial and contextual cues are available and co-occur in real life and whether people attend to both

cues when making judgments concerning emotion. Even if it were found that both facial and contextual cues are available and used in real life, other factors, specific to method question the ecological validity of previous research in cue dominance. Specifically, the stimuli, the use of discordant information, and the selection of stimuli based on source clarity are all ecologically questionable.

Nonrepresentative stimuli. Cue Dominance research, to be ecologically valid, assumes that both the facial and contextual information used in experiments is representative of the information available in the real world. Most studies that have examined dominance have used posed facial expressions and verbal descriptions of situations as stimuli. These stimuli may not be representative of the information available in daily life.

Use of Discordant information. Most studies that have made general conclusions about the relative dominance of one cue over the other have done so by presenting discordant pairings of facial and contextual stimuli. For example, a subject is shown a posed photograph of someone looking disgusted and told that this particular person is responding to news that they have just won the lottery. The use of discordant pairings of facial and contextual cues limits generalizability to those situation in daily life where facial and contextual information are discordant. In addition, it is likely that some discordant pairings do not occur in daily life, or only very rarely. It is ecologically questionable to generalize any finding of dominance using discordant pairings that would not occur in the real world. There is a need to identify whether discordant pairings

exist that make sense to subjects and to find out why. Doing this may help to explain previous findings of face dominance.

Source Clarity. Ekman, Friesen, and Ellsworth's (1972) proposed that if the clarity of one source was greater than that of the other it would create an inequality in the stimuli which would be reflected in the judgment of the combined sources. Many studies since Ekman et al.'s (1972) review have controlled for source clarity in their experiments. In doing so they are limiting their generalizability to a set of situations where the clarity of the facial and contextual information is similar. Put simply, the real world might not honor the quality of source clarity. If situations are more often clearer in daily life, then studies that control for source clarity do not reflect this natural bias. The same, of course, is true for facial information. Having subjects judge people's emotions from natural behavior would be a more ecological way to examine the question of cue dominance.

#### Assumption of Linear Combination

One generality among all the studies that have examined the perception of emotion from facial and contextual cues is that they have used a specific linear model to explain their findings. By a linear model, I mean that it is assumed that each cue is examined and weighted separately before a global judgment is made about how the target person is feeling. This is because dominance is interpreted by examining how similar judgments of individual cues are to judgments of combined cues. Both Frijda's (1969) widely used relative

shift index and Ekman et al.'s (1972) notion of source clarity assume a linear model. The relative shift index assumes a linear model in that dominance is measured by the difference between the perception of emotion from face and context combined and each of the cues separately. Source clarity suggests a linear model in that it assumes that a judgment of emotion will be based on the clarity of each individual source.

The linear model does not consider that the perception of emotion from facial and contextual cues may result from an interaction of the two cues.

Although no research has examined the possibility of nonlinear judgments in the perception of emotion, some data suggest that it does occur. Frijda (1969), for example, observed that for 13 of 28 trials in which discrepant pairings of stimuli were used, ratings of the combined cues were more extreme than ratings of either cue alone. The interaction of the two cues in these 13 trials generated responses which were not directly attributable to ratings of either cue alone.

Although the linear model is relatively good at predicting judgments of combined cue sources (Walbott, 1988a), no attempts have been made to examine the possibility that the perception of emotion is a non linear process (as opposed to linear in the sense described above). If the relationship between facial and contextual information is not the result of a linear relationship of the judgment of the two cues, then the question of cue dominance will take on a whole new perspective.

#### Summary and Conclusions



Facial dominance has been found only in studies that use less naturalistic stimuli (see table two). A close examination of method reveals that what is being considered the result of facial dominance may be due to the contextual stimuli that are used. The selection criterion and the contextual stimuli's vulnerability to reinterpretation may be responsible for findings of facial dominance. In addition, no research has examined whether contextual stimuli can be generated to influence subjects to reinterpret facial information.

The ecological validity of the methods used to study cue dominance is problematic. Cue dominance is too general a question for specific methods such as that of Goodenough and Tinker (1931). Field studies and natural observation would be appropriate methods for examining cue dominance from an ecological perspective.

Previous research has used a linear model to examine and explain cue dominance. Evidence from a number of studies suggests that the use of a linear model is an oversimplification (Frijda, 1969; Goodenough and Tinker, 1931). In addition, the use of a linear model may impede a thorough understanding of how facial and contextual information interact in the perception of emotion.

The available evidence suggests that both facial and contextual information have some effect on subjects' judgments, but what these effects are, remains unclear. If the goal of the research area is to understand how emotion is perceived from facial and contextual information, more specific hypotheses concerning the perception of emotion need to be examined. The Goodenough-

Tinker paradigm might be useful for this purpose. By having subjects rate facial and contextual information alone and combined, it may be possible to tease apart some of the processes involved in the perception of emotion. For example, it may be possible to evaluate what it is about specific facial and contextual stimuli which leads them to be judged in a certain way when presented together.

Without a more thorough understanding of the processes involved, little can be said about the influence of facial and contextual information in the perception of emotion.

## Chapter 4

### An investigation of the influence of facial and contextual information in the perception of emotion

In this chapter a sequence of studies is described that examine two claims made in the previous chapters. One, that evidence of facial dominance is the result of method and that contextual stimuli can be created to dominate facial information in the perception of emotion. Two, that the use of the linear model that has been used to understand how individuals perceive emotion from face and context is oversimplified.

Three studies are described, each using the Goodenough and Tinker paradigm. The first two specifically challenge the facial dominance hypothesis. The third examines the use of a linear model in describing the perception of emotion of facial and contextual information.

In each study, contextual information is specifically generated for each facial expression in order to influence the perception of emotion of the combined sources. By visually examining the facial expressions it was possible to think of situations where the same facial movements may occur without the emotion that is typically interpreted from the facial expression. In addition two strategies discussed earlier were used to create the contexts; 1) creating contexts for facial expressions which are close on the circumplex (i.e. anger and fear), 2) creating contexts which incorporate some of the components of the facial expression (i.e. if eyes are wide open a component of the context will involve visual attention).

The contextual stimuli to be used in all five studies are longer and more elaborate descriptions than have been used in previous research. The descriptions are still only a short paragraph long, but they are referred to as stories because they describe a sequence of events.

In order to eliminate the possibility of the confound of a lack of source clarity for the facial information, the facial stimuli to be used in all five studies were chosen from photographs published by Ekman and Friesen (1976) and Matsumoto and Ekman (1988); these photographs are the clearest documented photographs of basic facial expressions of emotion.

### Study One

The goal of the first study was to examine whether situational descriptions could be created which influence the perception of emotion from facial expressions. In as much, an attempt is made to demonstrate contextual dominance for a given set of facial expressions and contextual descriptions. In addition, the first study used only facial and contextual information which describe basic emotions. It is expected that although the individual in both the stories and the facial expressions, when viewed separately, would be judged to be feeling different emotions, when paired together subjects would choose the emotion label consistent with the context.

### Method

#### Subjects

Subjects were 175 undergraduate students from the University of British Columbia. All subjects received partial course credit for their participation.

### Stimuli

Five stimulus photographs of facial expressions (see appendix A), considered to represent basic emotions, were selected from those published by Matsumoto and Ekman (1988) and Ekman and Friesen (1976). According to the authors, two of the facial expressions express anger, two express fear, and one expresses sadness. The contextual stimuli were six short stories (see appendix B). Each story describes the context within which an individual may experience a specific emotion. Each of the stories was designed to be presented with specifically one of the stimulus photographs. One fear story was created for each of the anger expressions, one anger story was created for each of the fear expressions, and two disgust stories were created to go with the sad expression. Each of these six face-context combinations is considered a stimulus condition.

### Procedure

Experimental Conditions. Of the 150 subjects in the experimental group, 25 were randomly assigned to each of the six stimulus conditions. Subjects were tested one at a time and the session lasted approximately 10 minutes. Each subject was read the story by the experimenter and then presented the corresponding stimulus photograph. After the photograph had been presented for a few seconds, the experimenter said, "What emotion is the woman/man

feeling? The subject was then provided a response sheet which has a list of six emotion words; happy, anger, sad, surprise, fear, disgust. Subjects were asked to circle the word that "best describes how the individual is feeling". Subjects were then asked to provide some demographic information about themselves and were subsequently debriefed.

Comparison Group. Twenty-five subjects participated in the comparison group. The procedure for the comparison group was similar to that of the experimental group except, for the sake of simplicity, subjects were asked to rate all five facial expressions and all six stories. Subjects rated the faces first. The faces were presented one at a time and in a random order with the constraint that each face be presented first the same number of times. The stories were rated next. Each story was read by the experimenter. The stories were read in a random order with the constrain that each story be read first the same number of times. Since there were 25 subjects in the comparison group and six stories, the story from condition three was randomly chosen to be read first an extra time.

## Results and Discussion

Frequencies of responses for each emotion label to the face alone, context alone, and face plus context for each condition are shown in table 3. In addition, the original norms from Ekman et al. (1976) for each facial expression, are also shown in table 3.

### Contextual Dominance

Tallying over the six conditions, subjects chose the emotion label consistent with the modal response to the context alone 105 times, the emotion label consistent with the modal response to the facial expression alone 17 times, and an emotion label consistent with neither modal response 28 times. The number of subjects choosing the emotion label consistent with the context was significantly greater than that choosing any other emotion label,  $\chi^2$  (df = 1) = 24,  $p < .001$ . Although the stories were highly designed, the results nonetheless clearly demonstrate that context can dominate the face in the perception of emotion.

#### Facial Influence

Although it is obvious that the facial information did not dominate the contextual information, the fact that the face was chosen less often than the total of the responses that fit neither the context nor the face may be misleading. It is misleading because, when the emotion label congruent with the context is ignored, there remain four emotion labels to choose from in addition to the one congruent with the facial information. To examine whether the face had any influence on subjects' judgments, the frequency of face congruent responses was compared against that of chance when the responses congruent with context were ignored. Of the remaining 45 responses, the face was chosen significantly more often than predicted by chance (45 responses divided by five response categories = 9;  $Z = 2.98$ ,  $p < .01$ ). This result remains significant even when the category choice of "Happy" is ignored,  $Z = 1.98$ ,  $p < .05$  (no subjects

ever perceived the target as feeling happy). In this study the face did influence subjects judgments to some extent.

#### Source Clarity

Ekman et al. (1972, 1984) argued that a difference in the clarity of contextual and facial information may bias the perceiver's judgment towards the source that is more clear. In an attempt not to have to deal with the issue of source clarity, both highly designed stories and highly designed posed photos of facial expressions of basic emotions were used as stimuli. This does not seem to have been enough. In the present study, the comparison group's rating of the contexts was much more clear than their ratings of the facial expressions. When the stories were presented alone, 94% of the responses were consistent with the predicted emotion label. When the faces were presented alone, only 69% of the responses were consistent with the emotion labels proposed by Ekman and Friesen (1976) and Matsumoto and Ekman (1988).

Adjustment for Clarity. Although the responses of the comparison group suggest that contextual information can be made to be much more clear than facial information, it nonetheless creates a possible confound which could be considered responsible for findings of context dominance. A correction factor was implemented as an attempt to reconcile this possible bias. The frequencies for context congruent and face congruent responses before and after the correction factor are shown in table 4. To generate this correction factor, responses of the comparison group were used. To correct for face clarity, the



frequency of responses consistent with the facial information in the experimental group was multiplied by one over the proportion of face congruent responses to the face alone. To correct for context clarity, the frequency of responses consistent with the contextual information in the experimental group was multiplied by one over the proportion of context congruent responses to the context alone. Although with this adjustment the total frequencies will be higher than the number of responses, the adjustment will allow for a comparison of face and context while taking into consideration unequal source clarity. The overall difference between context congruency and face congruency, after the adjustment, is still highly significant,  $\chi^2$  (df = 1) = 61.99,  $p < .001$ . It should be noted that this adjustment assumes a linear relationship between the clarity and the relative influence of the source of information. Whether this assumption is correct is unknown.

High vs. Low Clarity. Since it is arguable that the correction that was implemented above to avoid the possible confound of unequal source clarity may not be appropriate, conditions where the face was clear and conditions where the face was not clear were examined. This dichotomy was not necessary for context because it was quite clear in all conditions. The clarity of the facial expressions used in condition one and three was less than 50%. In these conditions the context congruent emotion label was chosen 38 times and the face congruent emotion label (according to Ekman and Friesen's 1976 norms) was chosen only twice. The clarity of the facial expressions used in conditions

two, four, five, and six was greater than 88%. In these conditions the context congruent emotion label was chosen 67 times and the face congruent emotion label was chosen 15 times. From this perspective, the clarity of the face does have some impact, but not enough to deter from the finding of context dominance.

### Specific Emotions

In conditions one and two, subjects were read a story that provided an angry context and were shown a fear expression. In conditions three and four, subjects were read a story that provided a fear context and were shown an anger expression. In conditions five and six, subjects were read a story that provided a disgust context and were shown a sad expression. Means and confidence intervals for the proportion of responses to each type of condition are shown in figures 1-3. For each of the three types, the emotion label consistent with the context was chosen significantly more often than any other emotion label.

Fear expression and anger story. In the case of a fear expression and an anger story, judgments of fear were almost nonexistent. Only one out of fifty subjects chose the emotion label fear. What may seem surprising is that 10 out of the 50 subjects chose the emotion label surprise. Judgments to the face alone in Condition 1 suggest the face may have been partially responsible for this finding, but the surprise judgments were also probably due to the stories that were used. In order to accommodate for the arousal seen in the fear photos the anger stories were specifically designed to imply an increased level of arousal.

For example, in the first story, the individual had just seen children vandalize his car. Most would agree that this type of situation would increase arousal in the individual.

Anger expression and fear story. In the case of an anger expression and a fear story, some subjects did judge the individual as angry. This occurred most for the fourth condition. The story in the fourth condition was of a woman who refused to leave her seat when it was her turn to parachute jump. Subjects may have judged this combination occasionally as anger because it is possible that the woman in the story was mad at herself or others for getting into such a situation.

Sad expression and disgust story. In the case of a sad expression and a disgust story, the results are most clear. Although the source clarity was highest for the face in this condition, subjects' judgments of the combined cues matched that of the context. It seems that given the right disgust story, the sad expression can be almost totally dominated by context.

### Study Two

The goal of study two was to examine whether contextual information referring to non-basic emotional states could be created which would dominate facial expression of basic emotions in the perception of emotion. In addition, it was hypothesized that alleviating the restriction of using contexts referring to basic emotions would allow for more convincing stories to be matched with the

facial expressions, and thus there would be an increase in the effect of context dominance from that found in study one.

## Method

### Subjects

Subjects were 75 undergraduate students from the University of British Columbia. All subjects received partial course credit for their participation.

### Stimuli

Eight stimulus photographs of facial expressions (2 open mouth anger, 2 closed mouth anger, 2 surprise, and two fear; see appendix C) of basic emotions, were selected from those published by Matsumoto and Ekman (1988) and Ekman and Friesen (1976). The contextual stimuli were four short stories (see appendix D). Each story describes the context within which an individual may experience one of the following specific emotions; hope, determination, puzzlement, pain. The hope story was created to be presented with each of the surprise expressions. The determination story was created to be presented with each of the open mouth anger expressions. The puzzled story was created to be presented with each of the close mouth anger expressions. The pain story was created to be presented with each of the fear expressions. Each of these eight face plus context combinations is considered a stimulus condition.

### Procedure

Experimental Conditions. Of the 50 subjects in the experimental group, 25 were randomly assigned to one of two conditions. In one condition, each

subject was read each story, and following each story were presented with one of the facial expressions designated to that story. In a second condition each subject was read each story, and following each story were presented with the second facial expressions designated to that story. Subjects were tested one at a time and the session lasted approximately 10 minutes. Sessions consisted of four trials, one for each of four face-context combinations. Trials were presented in a random order.

For both experimental groups, for each trial, the subject was read the story by the experimenter and then presented the corresponding stimulus photograph. After the photograph had been presented for a few seconds, the experimenter said, "What emotion is the woman [man] feeling?" The subjects then chose from a response sheet, which has a list of ten emotion words; anger, determination, disgust, fear, happy, hope, pain, puzzled, sad, surprise, the one word that best described how the woman/man was feeling. Subjects were then asked to provide some demographic information about themselves, explained the rationale for the study, and then debriefed.

Comparison Group. Twenty-five subjects participated in the comparison group. Subjects were asked to rate all eight faces and all four stories. Subjects rated the faces first. The faces were presented one at a time and in a random order with the constraint that each face be presented first the same number of times. The stories were rated next. Each story was read by the experimenter.

The stories were read in a random order with the constraint that each story be read first the same number of times.

## Results and Discussion

Although study two is a rather simple extension of study one, an unexpected complication arose because subjects' judgments of the facial stimuli showed low clarity. Because of this complication, I begin by examining subject's judgments of the face and context alone, and then I discuss subjects judgments of the combined cues. Frequencies of responses for each emotion label to the face alone, context alone, and face plus context for each condition are shown in Table 5. The original norms from Ekman et al. (1976) for each facial expression are also shown in table 5.

### Judgment of facial stimuli

Subjects' responses to the facial stimuli alone were much less consistent than would be expected from Ekman et al.'s (1976) normative data. For seven of the eight facial expressions, frequencies of responses consistent with the emotion label predicted by Ekman et al.'s (1976) were significantly lower than those of Ekman et al. (1976) normative data (see table 6). Lower consistency in the present study may be accounted for by the difference in response format used in the present study from that used by Ekman et al. (1976). In the present study, to accommodate the emotions labels consistent with the context stories of non-basic emotions, there were four additional response choices corresponding to the four context stories: determination, pain, hope, and puzzled. The addition

of these four response options may have reduced the percentage of responses congruent with that predicted from Ekman et al. (1976). When subjects' responses to the new response options are added to subjects' responses to the emotion label predicted by Ekman et al's (1976) norms, the differences becomes insignificant for most facial expressions and actually became significant in the opposite direction for one of the facial expressions (see table 6).

For the closed mouth anger facial expression the modal response for the face alone was not anger, as predicted by the Ekman et al. (1976) norms, but puzzled, suggesting that simply adding the new response options may alter subjects' interpretation of the facial information. In addition, it was found that for all facial expressions, at least one subject selected the emotion label congruent with the modal response to the context to be paired with that facial expression.

Because the response patterns to the face alone were quite different in the present study from those predicted by Ekman et al. (1976), a distinction is made here between the modal response to the facial stimuli found in Ekman et al. (1976), which I refer to as the 'theoretical norm' and the modal response to the facial stimuli in the present study which I refer to as the 'empirical norms'.

#### Judgment of context

For judgments of the context alone, the percentage of responses congruent with the predicted emotion label were lower than that found in study one. These percentages ranged from 64% to 84%. Eighty-four percent of subjects chose the predicted emotion for the stories that described pain,

determination, and hope contexts. Sixty-four percent of subjects chose the predicted emotion for the story that described a puzzled context. In no cases was the context ever judged to be congruent with Ekman et al.'s (1976) prediction of the emotion label for the facial information to be paired with that context.

#### Judgment of combined cues

Across all face-context combinations, responses to the combined cues showed high agreement (modal response selected by 86.5% of subjects). Tallying over the eight conditions, subjects chose the emotion label consistent with the context 173 times, the emotion label consistent with the theoretical norms for the face 9 times, the emotion label consistent with the empirical norms for the face 38 times, and an emotion label consistent with neither of these three possibilities 18 times.

Contextual influence. Context had by far the greatest impact on subjects judgments. The number of subjects choosing the emotion label consistent with the context was significantly greater than that choosing any other emotion label,  $\chi^2$  (df = 1) = 292.41,  $p < .001$ .

To examine whether there was greater context dominance in study two than in study one, the proportion of subjects choosing the emotion label consistent with the context was compared across studies. The proportion of subjects choosing the emotion label consistent with the context in study two was



significantly greater than the proportion of subjects choosing the emotion label consistent with the context in study one,  $\chi^2$  (df = 1) = 14.28,  $p < .001$ .

Facial influence. The facial information did affect judgments, but not as predicted by the theoretical norms, only as predicted by empirical norms generated in the present study. The number of subjects choosing the emotion label consistent with the theoretical norms was significantly less than that predicted by chance (200 responses divided by ten response categories = 20;  $\chi^2$  (df = 1) = 4.49,  $p < .05$ ). The number of subjects choosing the emotion label consistent with the empirical norms was significantly greater than that expected by chance (200 divided by ten response options = 20;  $\chi^2$  (df = 1) = 6.53,  $p < .05$ ). This effect is attributable to the facial expression that was judged as puzzled rather than as anger, but this effect cannot be considered to show facial influence because the modal response to the face alone and context alone were the same in this condition. If this condition is dropped, the result becomes non-significant.

#### Source Clarity

In study one the clarity of the face was operationalized as the percentage of responses to the face only consistent with the emotion label predicted by Ekman et al.'s (1976) norms. Similarly the clarity of the context was operationalized as the percentage of responses consistent with the emotion label predicted from the context. This operationalization only makes sense if the predicted response is also the response chosen most often by subjects, which

was the case in study one. In study two, as was mentioned, the predicted response for two of the facial expressions (both closed mouth anger expressions) was not the response chosen most often by subjects. Because of this discrepancy, the clarity of the facial information becomes ambiguous. If clarity refers to the percentage of responses consistent with the emotion predicted by Ekman et al. (1976), then the clarity of these two facial expressions was 0%. If clarity simply refers to the percentage of responses congruent with the emotion label chosen most often by subjects, then the clarity of these two facial expressions was moderate, 60% for one expression and 64% for the other.

The above ambiguity did not occur for the contextual information. For all four contexts, the dominant response was consistent with the predicted emotion label. When the stories were presented alone, 79% of the responses were consistent with the predicted emotion label.

If the same measure of clarity is applied to the combined cues, then the clarity of the combined cues was 86.5 %, which is higher than the clarity of either the face alone or the context alone. Thus two supposedly discrepant cues create more clear responses patterns when combined than they do when presented alone. Because the combined cues did not differ significantly from the judgments of the context alone, it is difficult to say whether this finding is simply due to context dominance or actually to some interaction of the two sources of information.

### Specific Emotions

In two conditions, subjects were read a story that provided a hope context and were shown a surprise expression. In two conditions, subjects were read a story that provided a determination context and were shown a closed mouth anger expression. In two conditions, subjects were read a story that provided a puzzled context and were shown an open mouth anger expression. In two conditions, subjects were read a story that provided a pain context and were shown a fear expression. Means and confidence intervals for the proportion of responses to each type of condition are shown in figures 4-7. For each of the four types, the emotion label consistent with the context was chosen significantly more often than any other emotion label.

### Study Three

According to the "linear" model, judgements of discordant cues will be some weighted combination of the two cues. Agreement therefore, could never exceed agreement for either source alone. A hint of non-linear processes, although not statistically significant, was found in study two. For three conditions, the percentage of subjects choosing the modal response to the combined cues was greater than the percentage of subjects choosing the modal response to either cue alone.

The goal of study three was to specifically examine whether nonlinear judgments would be made from facial and contextual information. The contextual stimuli used in study two were slightly altered so that they are more ambiguous. It was expected that judgments of the combined cues would be

more consistent than judgments of either cue alone. In other words, the addition of facial information, which is judged as discordant to the context information, will increase rater agreement as to the emotion of the target individual. For example, if a context that describes a determined rower is made ambiguous, the addition of an anger facial expression will lead subjects to judge the rower as determined, not angry.

### Method

The method of study three was exactly the same as that for study two except for the contextual stimuli. The contextual stimuli were the same four short stories used in study two except they were altered so that when presented alone, consensus as to the predicted emotion would be lower (see appendix E).

### Results and Discussion

Frequencies of responses for each emotion label to the face alone, context alone, and face plus context for each condition are shown in table 7. In addition, the original norms from Ekman et al. (1976), for each facial expression, are also shown in table 7.

#### Manipulation check of contextual information.

All stories in study three were more ambiguous in terms of the predicted emotion than those used in study two. Subjects chose the predicted emotion label significantly less often in study three (36%) than in study two (79%),  $\chi^2$  (df = 1) = 37.83,  $p < .001$ ). The predicted emotion remained the dominant response

for three of the four stories. For the pain story, the dominant response switched from pain to anger.

#### Judgment of facial Information

Fifty-five percent of subjects chose the emotion label consistent with Ekman et al.'s (1976) prediction. Although greater than that found in study two, it was not significantly different,  $\chi^2$  (df = 1) = 2.25, n.s.. For one of the closed mouth anger facial expressions, the dominant response was no longer puzzled, as found in study two, but anger (see table 7).

#### Judgment of combined cues.

Tests of non-linearity. It was expected that agreement as to the emotion label used when asked to describe the face and context combined would be greater than that of the same emotion label when asked to describe the face or context alone. Averaged across all face-context combinations, the percentage of subjects choosing the emotion label for which agreement was highest was 66%. The response frequency of the most agreed upon emotion label was significantly greater for the combined condition than for the context only condition ( $\chi^2$  (df = 1) = 24.35,  $p < .001$ ), for which only 36% of responses corresponded to the most agreed upon label of the combined conditions. More importantly, the response frequency of the most agreed upon emotion label was significantly greater for the combined condition than for the context only condition plus the face only condition ( $\chi^2$  (df = 1) = 7.5,  $p < .001$ ). Therefore

responses to the combined condition do not seem to be a simple linear combination of responses to the face and context alone.

Facial Influence. The number of subjects choosing the emotion label consistent with Ekman et al.'s (1976) predictions did not differ from chance (19 responses evidenced and 20 expected by chance). There was, however, a significant increase, from study two to study three, in the number of responses to the combined sources consistent with the emotion label predicted by Ekman et al. (1976; 9 responses in study two compared to 19 responses in study 3),  $\chi^2$  (df = 1) = 3.84,  $p < .05$ .

#### Specific Emotions

The responses of subjects to each condition were quite similar to that of study 2. Means and confidence intervals for the proportion of responses to each type of condition are shown in figures 8-11. For three of the types, the emotion label consistent with the context was chosen significantly more often than any other emotion label. This was not the case for condition 4. In condition 4 the context on its own was judged as anger instead of the intended emotion of pain, and the face on its own was judged as fear. When combined, the intended emotion judgment of pain prevailed and was chosen significantly more often than any other emotion label (see figure 11). The combination was also rated as anger by a fair number of respondents. Although this finding was not expected to occur, it provides an especially clear case in which a non-linear combination of cues took place. That is the modal response to the combined cues (pain) was

different from the modal response to face alone (fear) and context alone (anger).

## Chapter Five

### General Discussion

The present studies examined and supported two hypotheses concerning cue dominance. Studies 1 and 2 supported the hypothesis that contextual stimuli can be made to dominate facial expressions of basic emotions in the perception of emotion. Study 1 showed context dominance for contexts referring to basic emotions and Study 2 showed context dominance for contexts referring to non-basic emotions. Study 3 supported the hypothesis that the use of the linear model to describe emotion perception from face and context is oversimplified in that subjects' judgments of face and context combined were not a weighted linear combination of judgments of face alone and context alone.

Both evidence of context dominance and of "non-linear judgments", in the context of previous studies, have many implications for the study of emotion perception. I will begin by discussing the implications specific to the finding of context dominance, and then discuss the implications specific to evidence of non-linear judgments. I will also discuss the implications of both evidence of context dominance and non-linear judgments on the concepts of source clarity and cue discrepancy. Finally, I will discuss the results of the present studies in terms of what they imply about the process of judging emotion from face and context.

#### Implications of context dominance



Evidence of context dominance brings to question a number of issues which have gone unexamined, possibly due to overwhelming support of previous research for facial dominance. In particular, evidence of context dominance questions the usefulness of the Goodenough-Tinker paradigm to examine cue dominance, the ecological validity of the facial dominance hypothesis, and cue dominance itself.

Cue dominance and the Goodenough-Tinker paradigm. Unlike previous studies in cue dominance, the studies presented here showed context dominance. In both studies 1 and 2, the modal response to the face and context combined was always the same as the modal response to the context alone, but different from the modal response to the face alone. The incongruity between my results and those of previous studies should not be taken to imply that either the present studies or previous studies are flawed. Both facial dominance and context dominance may occur given the right circumstances. Differences in findings may simply be due to differences in method. Although both the studies presented here and previous studies used the Goodenough - Tinker paradigm, details of method such as the stimuli and stimulus combinations differed. In the present studies, more elaborate contexts were used and contexts were generated for specific facial expressions. In previous research the combining of facial and contextual cues has been purely random. These differences in detail, even within the Goodenough-Tinker paradigm, probably influenced whether context dominance or facial dominance was found. Depending on how the

context is described and chosen, anything from extreme facial dominance to extreme context dominance can occur. In a sense then, any result can occur from the Goodenough-Tinker paradigm.

Ecological validity of facial dominance. The studies presented in chapter four were, to my knowledge, the first studies ever to show an overwhelming context dominance effect using the Goodenough-Tinker paradigm. It should not be misconceived here that I am supportive of context dominance as an ecological phenomenon. In fact, I interpret the results of the present studies as simply providing support against facial dominance as an ecological hypothesis. If facial dominance had held true under all stimulus conditions, even with an artificial paradigm, it would seem more likely that facial dominance occurs in everyday life.

Cue dominance. Possibly because previous research has found only support for facial dominance, little attention has been paid to what is actually implied by the concept of dominance. Given that both context dominance and facial dominance can be found with the Goodenough-Tinker paradigm, we can now make a distinction between what must occur when face and context are judged and what does occur when face and context are judged. If cue dominance is considered a question of what must happen when asked to perceive emotion from face and context, the present studies shows that neither face nor context must dominate, but that either may dominate depending on the circumstances. If cue dominance is considered a question of what does happen

in everyday life, then the results of the present studies are uninformative. That is, using an artificial method, such as that of Goodenough and Tinker (1931), with artificial stimuli (i.e. posed facial expressions and written descriptions), both facial dominance and context dominance can be shown.

Furthermore, it is not apparent whether the method used in the present studies or the method used in previous studies that have used the Goodenough-Tinker paradigm is more ecologically valid. That is, there is no way of examining whether one method provides a better explanation of what happens in everyday life unless everyday life itself is examined. Therefore more ecological methods need be used to examine if cue dominance actually occurs in everyday life.

#### Implications of evidence of non-linear judgments

Traditionally, researchers have interpreted dominance by examining how well judgments of discrepant cues combinations match that of each cue presented separately. The idea was that the dominant cue should have a greater influence on subjects judgments than the combined cues. For example, if a face is perceived to express sadness and a context is perceived to describe a fear situation, facial dominance is considered to have occurred when more subjects judge the combined cues as sad and context dominance is considered to have occurred when more subjects judge the combined cues as fear. This way of thinking about cue dominance implies a linearity between judgments of each cue alone and the judgment of the combined cues.

Two clear examples of non-linear judgments were found in study 3. One, judgments of discrepant cues combinations were more consistent than judgments of either cue alone. Overall, the response frequency of the most agreed upon emotion label was significantly greater for the combined condition than for the context only condition plus the face only condition. Two, the judgment of one particular discrepant cue combination was found to be categorically different from the judgment of either cue alone. For condition 4 of study 3, the modal response to facial expression was fear, the modal response to the context was anger, but the modal response to the face and context combined was pain. In this case, it was not the dominance of face or context which resulted in the judgment of the combined sources, but rather their interaction. When the two cues were combined, a new perception emerged.

Evidence of non-linear judgments has a particular impact on the interpretation of judgments of the combined cues in terms of cue dominance. If the judgment of combined cues is not linear, then interpreting dominance from comparisons with the judgment of each cue separately may be inaccurate because the judgment of the combined cues is not the result of the judgment of each cue alone. In a sense, the interaction of the two cues may conceal the influence of each cue alone. The reverse may also occur. That is, examining cue dominance may conceal the interaction of the two cues. For example, cue dominance would not detect if the combination of two cues led to a categorically different judgment.

Non-linearity suggests that when two discrepant cue are presented together, rather than pitting one cue against the other, as would be suggested by cue dominance, subjects actually attempt to integrate the two sources of information. In other words, non-linear judgments imply that there is both an interaction between the two cues and also that there is some integration of the two cues. I will bring up the issue of cue integration later when I discuss the judgment of face and context in terms of process.

#### Source clarity

It has been proposed that judgments of face and context combined may be biased if one source of information is less clear than the other (Ekman et al., 1972). The results of study 1 suggest that source clarity does have a slight positive association with dominance. That is, context dominance was slightly greater for combinations in which the facial information was low in clarity. It was also shown, however, that dominance is not solely contingent up on source clarity. For example, in study 1 the sad expression showed the most agreement, but in combination with a disgust story was judged as disgust over 90% of the time. Perhaps source clarity has its strongest effect when one source of information is extremely ambiguous and the other source of information is particularly clear. In this case, judgments of emotion would be made based on the clear source of information.

Findings of non-linear judgments in Study 3 provide a particularly convincing criticism against a strong view of source clarity. For both conditions

one and two, the clarity of the facial information was greater than the clarity of the contextual information, but nonetheless context dominance was found. In addition, in study two, the overall clarity of the combined cues was greater than the clarity of either the face alone or the context alone. Given these results, the exact effect of source clarity on judgments of combined cues now seems rather vague. Under what conditions source clarity may have an important impact on judgments of combined cues is at best unclear.

### Discrepancy

Previous research has used a number of different ways to describe discrepancy, but all have been based on judgments of each cue in isolation. For example, Watson (1972) determined discrepancy by having groups of subjects judge the facial and contextual cues alone. This same procedure was used in the present studies. Having subjects judge cues separately may not be the only way of measuring discrepancy. Another way of measuring discrepancy is to present subjects with both cues and to ask them how well they fit together. This measure of discrepancy involves the subject's opinion of the likelihood that two cues may co-occur. Differences between responses in study 1 and study 2 indirectly imply this second type of discrepancy. In study 2 I suggested that an increase in context dominance from that evidenced in study 1 occurred because the contexts in study 2 were not limited to basic emotions and thus more believable face-context combinations could be generated. More believable face-

context combinations imply a greater perceived congruency between face and context.

Evidence of non-linear judgments in study 3 suggest that both measures of discrepancy described above may not be perfectly related. That is, although the two cues are judged to be discrepant when presented in isolation, combined, the two cues lead to more consistent judgments. For example, in condition 3 of study 3, 64% of subjects judged the face to express anger and 40% judged the context to describe determination. When the two cues were combined, 84% of subjects judged the combination as determination.

Both measures of discrepancy discussed above may have their utility. Examining perceptions of each source separately provides the experimenter with baseline information about each cue. Examining how well two cues fit together, provides the experimenter with information concerning the extent to which the facial and contextual information is integrated by the subject. If both measures are used in a given study, it may be possible to examine the interaction of the two types of discrepancy and their effect on emotion perception. In other words, different results may occur when both measures indicate low discrepancy, where both measures indicate high discrepancy, and where one measure indicates low discrepancy and the other indicates high discrepancy. Future research is needed to address this issue.

#### Processing combined cues

Although Bruner and Tagiuri (1954) suggested a need to examine the processes involved when making emotion attributions from face and context, no research has followed this lead. The present studies do not explain exactly how subjects make emotion attributions from facial and contextual information, but both the evidence of cue integration and the idea that discrepant cues can be perceived to fit have implications in terms of how individuals process combined cues.

If we begin by examining a linear model, the process of interpreting emotion from face and context is rather simple. The result of the combined cues depends solely on the judgment of each cue alone. For example, Wallbott (1988a) proposed that subjects examine each cue alone and create a list of the possible emotions that can be interpreted from each source. Subjects then choose the emotion label that best fits both cues. The problem though, is that a linear model, as was shown in study three, may not be an accurate way to describe how emotion is perceived from face and context. The non-linear judgments found in study 3 suggest that subjects attempt to integrate facial and contextual cues rather than using each cue in isolation.

Given that subjects' judgments of combined cues is the result of some sort of integration of the combined cues, differences in the fit between the two cues may influence how individuals process the combined cues. In the present studies, contextual information was generated to fit with particular facial expressions so that judgments of the combined cues would match that of the



context alone (It may also be possible to generate contexts which generate opposite results so that judgments of the combined cues would match that of the face alone). Also, as was shown in study 3, it is possible for judgments of the combined cues not to match judgments of either the face alone or the context alone. In previous research face and context were matched randomly. There was no attempt to generate faces and contexts which fit well together. These differences suggest that cue dominance possibly occurred for different reasons. In the present studies context dominance may have occurred because the face fit well with the context and in previous studies facial dominance may have occurred because the face and context did not fit well together leading subjects to use a reinterpretation strategy such as those described by Frijda (1969).

Whether face and context fit together or not, both facial dominance, contextual dominance, or neither should be able to occur, but the processes involved may be quite different. For the case where face and context fit, the process involved in interpreting emotion is probably not at the level of discrete emotion categories. That is, interpretation occurs without the subject applying discrepant categorical labels to the face and context. For example, a surprise facial expression may be judged as hope in certain contexts. For the case where face and context do not fit, the process involved in interpreting emotion may be at the level of discrete emotion categories. Subjects notice a discrepancy between face and context and then try to explain the discrepancy.

For example, a subject may reinterpret a sad situation as provoking anger if the facial expression shows anger.

Although a distinction was made above between two types of interpretation processes subjects may use depending on the fit between face and context, the exact processes involved are unknown. The present studies do not provide explicit evidence of particular processes, but it seems an area of research that warrants some attention. Knowledge of how individuals interpret combinations of facial and contextual information may explain when facial or contextual dominance ought to occur.

#### Limitations of the present studies

Like other studies that have used the Goodenough-Tinker paradigm, the studies presented here lack ecological validity. That is, the results should not be taken as evidence that context dominance necessarily occurs in everyday life. The results of the present studies, given what has been found in previous research, confirms that both context dominance and face dominance can be found with the Goodenough-Tinker paradigm. If cue dominance is to be thought of as an ecological question, a more ecological approach is necessary.

The studies presented in chapter 4 also have a number of other limitations; 1) response format, 2) limited set of emotions, 3) limited type of stimuli, 4) limited set of stimuli, none of which necessarily affect the conclusions that were drawn, but which may constrict the generalizability of the results. These limitations do not affect the conclusions of the present studies because

the present studies were conducted to demonstrate that certain phenomenon could occur, but not that these phenomenon occur all the time under all conditions. The limitations, however, may have impeded a more thorough understanding of the perception of emotion from face and context.

The forced choice format, although restrictive, was used in the present studies because it is the response format traditionally used in this type of study. A restrictive response format limits the information obtained from subjects which in turn provides less information as to how emotion is perceived from face and context. In addition, if anything, linear models and cue dominance probably work best with a restricted response format. If subjects were allowed more response options, the simplicity and effectiveness offered by linear models and cue dominance would most likely disappear.

Other response formats may have provided additional information as to how emotion is perceived. For example, subjects could have rated the stimuli on all emotion labels using some form of Likert scale. Another possible response format would be to have subjects rate appraisal dimensions rather than discrete emotions. Specific appraisal dimension patterns have been found to exist for different facial expressions of basic emotions (Smith, 1989). Using appraisal dimensions may be particularly useful because they do not require the subject to make categorical distinctions between the face and context. That is, it may be possible to find out what similarities there are between discrepant cues in terms of appraisal dimensions. Such a response format may also provide some

explanation as to why certain cue combinations are categorically discrepant when judged apart, but fit well when presented together.

A limited set of emotions, a limited number of stimuli, and a limited type of stimuli are not only problematic to the studies presented in chapter 4, but also problematic to the field of emotion perception in general. Facial stimuli are of a few well documented facial expressions and are usually posed still photographs. Contexts are usually verbal descriptions of a persons situation. There is a need to examine more dynamic types of stimuli, ones more representative of what is perceived in everyday life. This would require researchers to first find out what actually occurs in everyday life.

#### Future directions

The question of cue dominance has been the focus of research in emotion perception for over 25 years. This research has generated little progress towards understanding how emotion is perceived from face and context. There is a need to shift the focus away from the stimuli and towards the individual perceiving the stimuli (i.e. How does the perceiver process and integrate facial and contextual information when perceiving emotion in others). Of course, one component of understanding how emotion is perceived is to know which cues are important (cue dominance) to the perceiver, but importance does not tell the whole story, as evidenced by non-linear judgments of face and context. Moreover, which cue is dominant might depend on how the perceiver processes and integrates the facial and contextual information.

No research has examined emotion perception in everyday life. There is no information concerning basic questions such as what cues are available and what cues are used when subjects perceive emotion in everyday life. Answers to these questions would at least provide the field with some understanding of what cues are present and important in emotion perception in everyday life. Of course, examining these questions would require researchers to abandon simple research methods such as that of Goodenough and Tinker (1931) and to conduct more ecologically valid field studies using primarily naturalistic observation.

### Conclusion

The present studies suggest that facial dominance, as it has been researched in the past, is the result of method. Either facial or contextual dominance can occur using the Goodenough-Tinker paradigm depending on the stimuli and stimulus combinations. In addition, the present studies have questioned the use of a linear model to describe emotion perception from face and context. That is, judgments of face and context combined, are not merely some combination of judgments of face and context alone. There is a need to abandon the question of cue dominance, which does not seem to have a single interpretation, and to focus on developing an understanding of how people process facial and contextual information in the perception of emotion in everyday life.

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Table 1: Studies that have examined the relative influence of facial and contextual information in emotion perception

Author	Date	Research Question	Facial Stimuli	Contextual Stimuli	Judgment Task	Normative data recorded for both types of stimuli?	General Conclusion Made by Researcher
Goodenough and Tinker	1931	What are the relative influences of knowledge of the situation and observation of facial expression in interpreting the emotions of others?	Posed still photographs	Verbal descriptions	Judged emotional state from concordant and discordant pairings of facial and contextual information.	Yes	Both context and facial expression play a role in the perception of emotion
Goldberg	1951	Does the context preceding the scene of an emotional reaction affect judges' interpretations of that emotional reaction?	Motion picture of actress acting	Movie clips prior to facial expression	Judged emotional state portrayed by actress following one of two sets of movie clips.	No	Both context and facial expression play a role in the perception of emotion
Frijda	1958	What are the relative influences of knowledge of the situation and observation of facial expression in interpreting the emotions of others?	Posed still photographs	Verbal description	Judged emotional state from concordant and discordant pairings of facial and contextual information.	Yes	Both context and facial expression play a role in the perception of emotion
Frijda (Januus study)	1969	Does either facial or contextual information dominate subjects' judgments of the pleasure another person is feeling?	Posed still photographs	Verbal description	Judged emotional state from concordant and discordant pairings of facial and contextual information.	Yes	Facial expression dominates in the perception of emotion
Frijda (Warries study)	1969	Does either facial or contextual information dominate subjects' judgments of the attentiveness of another person?	Posed still photographs	Verbal description	Judged emotional state from concordant and discordant pairings of facial and contextual information.	Yes	Facial expression dominates in the perception of emotion

Author	Date	Research Question	Facial Stimuli	Contextual Stimuli	Judgment Task	Normative data recorded for both types of stimuli?	General Conclusion Made by Researcher
Watson	1972	Does either facial or contextual information dominate in the perception of emotion?	Posed still photographs	Verbal description	Judged emotional state from concordant and discordant pairings of facial and contextual information.	Yes	Facial expression dominates in the perception of emotion
Spignesi and Shor	1981	Does either facial or contextual information dominate subjects' judgments of the pleasure another person is feeling?	Candid camera still photographs	Picture surrounding facial expression with caption	Judged emotional state of individual in picture.	Yes	Neither the facial expression nor the context dominate in the perception of emotion
Knudsen and Muzekani	1983	Does contextual information affect judgments of emotion from facial expression?	Posed still photographs	Verbal description	Judged emotional state from concordant and discordant pairings of facial and contextual information.	Yes	Context influences the perception of emotion from facial expressions
Walbott	1988 (study 1)	Does either facial or contextual information dominate in the perception of emotion?	Posed still photographs	Verbal descriptions	Judged emotional state from concordant and discordant pairings of facial and contextual information.	Yes	Facial expression dominates in the perception of emotion
Walbott	1988 (study 2)	Does either facial or contextual information dominate in the perception of emotion?	Candid camera still photographs	Picture surrounding facial expression	Judged emotional state of individual in picture.	Yes	Neither the facial expression nor the context dominate in the perception of emotion

Author	Date	Research Question	Facial Stimuli	Contextual Stimuli	Judgment Task	Normative data recorded for both types of stimuli?	General Conclusion Made by Researcher
Walbott	1988a	Does either facial or contextual information dominate in the perception of emotion?	Motion picture of actors acting	Movie clips prior to facial expression	Judged emotional state from concordant and discordant pairings of facial and contextual information.	Yes	Neither the facial expression nor the context dominate in the perception of emotion
Nakamura, Buck, and Kenny	1990	Does either facial or contextual information dominate in the perception of emotion?	Video recording of spontaneous facial expressions	Selected film clips of facial expressions	Judged emotional state from concordant and discordant pairings of facial and contextual information.	Yes	Facial expression dominates verbal information in the perception of emotion
Fernandez-Dols, Walbott, and Sanchez	1991 (Study 1)	Does either facial or contextual information dominate in the perception of emotion?	Posed still photographs	Verbal descriptions	Judged emotional state from discordant pairings of facial and contextual information.	Yes	Facial expression dominates verbal information in the perception of emotion
Fernandez-Dols, Walbott, and Sanchez	1991 (Study 2)	Does either facial or contextual information dominate in the perception of emotion?	Posed still photographs	Verbal descriptions	Judged emotional state from discordant pairings of facial and contextual information.	Yes	Judgements are equally influenced by facial expression and context
Fernandez-Dols, Walbott, and Sanchez	1991 (Study 3)	Does either facial or contextual information dominate in the perception of emotion?	Posed still photographs	Verbal descriptions	Judged emotional state from discordant pairings of facial and contextual information.	Yes	Facial expression dominates verbal information in the perception of emotion

Author	Date	Research Question	Facial Stimuli	Contextual Stimuli	Judgment Task	Normative data recorded for both types of stimuli?	General Conclusion Made by Researcher
Fernandez-Dols, Sierra, and Ruiz-Belda	1993	Does either facial or contextual information dominate in the perception of emotion?	Posed still photographs	Verbal descriptions	Judged emotional state from discordant pairings of facial and contextual information.	Yes	Judgements are equally influenced by facial expression and context

Table 2: Facial Dominance as a Function of Type of Stimuli.

Type of Stimuli	Facial Dominance	Context Dominance	No Dominance	Total
Almost Natural	0	0	3	3
Unnatural	7	0	2	9
Total	7	0	5	12



Table 3: Percentage of responses for each emotion for each condition; Study 1.

	Condition 1				Condition 2			
	Fear facial expression with anger context							
Emotion	Norms	Face	Context	F + C	Norms	Face	Context	F + C
Happy	0	0	0	0	-	0	0	0
<b>Angry</b>	<b>0</b>	<b>4</b>	<b>100</b>	<b>76</b>	-	<b>0</b>	<b>84</b>	<b>60</b>
sad	4	0	0	0	-	0	0	4
surprise	4	48	0	20	-	8	0	20
<b>fear</b>	<b>88</b>	<b>44</b>	<b>0</b>	<b>4</b>	<b>76</b>	<b>88</b>	<b>0</b>	<b>0</b>
disgust	4	4	0	0	-	4	16	16
	Condition 3				Condition 4			
	Anger facial expression with fear context							
Emotion	Norms	Face	Context	F + C	Norms	Face	Context	F + C
Happy	0	0	0	0	-	0	0	0
<b>Angry</b>	<b>76</b>	<b>44</b>	<b>0</b>	<b>4</b>	<b>85</b>	<b>88</b>	<b>0</b>	<b>32</b>
sad	0	0	0	0	-	0	0	0
surprise	3	16	0	16	-	8	0	0
<b>fear</b>	<b>15</b>	<b>12</b>	<b>100</b>	<b>76</b>	-	<b>0</b>	<b>100</b>	<b>56</b>
disgust	6	28	0	4	-	4	0	12
	Condition 5				Condition 6			
	Sad facial expression with disgust context							
Emotion	Norms	Face	Context	F + C	Norms	Face	Context	F + C
Happy	-	0	0	0	-	0	0	0
Angry	-	0	0	0	-	0	4	4
<b>sad</b>	<b>89</b>	<b>92</b>	<b>0</b>	<b>8</b>	<b>89</b>	<b>92</b>	<b>4</b>	<b>4</b>
surprise	-	4	4	0	-	4	0	0
fear	-	4	4	4	-	4	0	0
<b>disgust</b>	-	<b>0</b>	<b>88</b>	<b>88</b>	-	<b>0</b>	<b>92</b>	<b>92</b>

Note. Norms refers to original data from Ekman et al. (1976) or Masumoto et al. (1986). Percentage of responses to the emotion label predicted by face alone and situation alone are highlighted. F + C = face plus context.

Table 4: Actual frequencies and adjusted frequencies for emotion labels congruent with context dominance hypothesis and face dominance hypothesis; Study 1.

Condition	Context			Face		
	Actual Frequency	Correction	Adjusted Frequency	Actual Frequency	Correction	Adjusted Frequency
1	19	1	19	1	2.27	2.27
2	15	1.19	17.85	0	1.14	0
3	19	1	19	1	2.27	2.27
4	14	1	14	8	1.14	9.12
5	22	1.14	25.08	2	1.09	2.18
6	16	1.09	17.44	5	1.09	5.45
Total	105		112.37	17		21.29

Table 5: Percentage of responses for each emotion label for each condition; Study 2.

	Condition 1				Condition 2			
	Surprise facial expression with hope context							
	Norm	Face	Context	Face + Context	Norm	Face	Context	Face + Context
Anger	0	0	0	0	0	0	0	0
Determinantion	-	0	0	0	-	0	0	0
Disgust	4	0	0	0	3	4	0	0
Fear	0	4	8	4	23	4	8	8
Happy	0	0	8	8	0	0	8	0
Hope	-	20	84	84	-	4	84	72
Pain	-	0	0	0	-	0	0	0
Sad	0	0	0	0	0	0	0	0
Surprise	96	68	0	4	74	64	0	20
Puzzled	-	8	0	0	-	24	0	0

	Condition 3				Condition 4			
	Anger facial expression with determination context							
	Norm	Face	Context	Face + Context	Norm	Face	Context	Face + Context
Anger	100	84	0	0	100	68	0	4
Determination	-	8	84	88	-	24	84	84
Disgust	0	8	0	0	0	8	0	0
Fear	0	0	0	4	0	0	0	0
Happy	0	0	4	4	0	0	4	0
Hope	-	0	12	0	-	0	12	12
Pain	-	0	0	0	-	0	0	0
Sad	0	0	0	0	0	0	0	0
Surprise	0	0	0	4	0	0	0	0
Puzzled	-	0	0	0	-	0	0	0

	Condition 5				Condition 6			
	Anger facial expression with puzzled context							
	Norm	Face	Context	Face + Context	Norm	Face	Context	Face + Context
Anger	74	0	0	4	92	0	0	4
Determinantion	-	36	8	0	-	8	8	4
Disgust	19	0	0	0	0	0	0	0
Fear	0	0	12	0	4	12	12	0
Happy	3	0	4	0	0	4	4	0
Hope	-	0	0	0	-	0	0	0
Pain	-	0	0	0	-	0	0	0
Sad	0	4	0	0	4	0	0	4
Surprise	3	0	12	0	0	12	12	8
Puzzled	-	60	64	96	-	64	64	80

	Condition 7				Condition 8			
	Fear facial expression with pain context							
	Norm	Face	Context	Face + Context	Norm	Face	Context	Face + Context
Anger	0	8	8	4	13	8	8	4
Determinanation	-	4	0	0	-	0	0	0
Disgust	0	12	0	0	0	4	0	0
<b>Fear</b>	<b>100</b>	<b>44</b>	<b>0</b>	<b>0</b>	<b>88</b>	<b>60</b>	<b>0</b>	<b>0</b>
Happy	0	0	0	0	0	0	0	0
Hope	-	0	0	0	-	0	0	0
<b>Pain</b>	<b>-</b>	<b>12</b>	<b>84</b>	<b>96</b>	<b>-</b>	<b>12</b>	<b>84</b>	<b>92</b>
Sad	0	0	8	0	0	0	8	0
Surprise	0	20	0	0	0	16	0	4
Puzzled	-	0	0	0	-	0	0	0

Note. Norms refers to original data from Ekman et al. (1976) or Masumoto et al. (1986). Percentage of responses to the emotion label predicted by face alone and situation alone are highlighted.

Table 6: Responses to facial stimuli from Ekman et al. (1976) and Study 2.

Ekman et al. (1976)		Present Study (empirical norms)		
	Theoretical norms	% consistent with theoretical norms	% consistent with new response choices	theoretical norms + new response choices
Surprise	96	68*	28	96
Surprise	74	64	28	92
Anger	100	84*	8	92
Anger	100	68***	24	92
Anger	74	0***	96	96*
Anger	92	0***	72	72*
Fear	100	44***	16	60*
Fear	88	60*	12	72
Average	90.5	48.5***	35.5	84

Note. Comparisons were made between the present study and that of Ekman et al. (1976) for the percentage of responses consistent with the theoretical norm.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

Table 7: Percentage of responses for each emotion label for each condition; Study 3.

	Condition 1				Condition 2			
	Surprise facial expression with hope context							
	Norm	Face	Context	Face + Context	Norm	Face	Context	Face + Context
Anger	0	0	4	0	0	0	4	0
Determinantion	-	0	0	0	-	0	0	0
Disgust	4	0	0	0	3	0	0	0
Fear	0	0	8	0	23	8	8	12
Happy	0	0	28	8	0	4	28	4
Hope	-	4	56	68	-	0	56	56
Pain	-	0	0	0	-	0	0	0
Sad	0	0	0	0	0	0	0	0
Surprise	96	80	4	20	74	72	4	20
Puzzled	-	16	0	4	-	16	16	8



	Condition 3				Condition 4			
	Anger facial expression with determination context							
	Norm	Face	Context	Face + Context	Norm	Face	Context	Face + Context
Anger	100	64	0	0	100	80	0	8
Determinantion	-	16	40	84	-	12	40	68
Disgust	0	20	0	0	0	8	0	0
Fear	0	0	0	0	0	0	0	0
Happy	0	0	36	0	0	0	36	0
Hope	-	0	24	12	-	0	24	12
Pain	-	0	0	0	-	0	0	8
Sad	0	0	0	0	0	0	0	0
Surprise	0	0	0	4	0	0	0	4
Puzzled	-	0	0	0	-	0	0	0

	Condition 5				Condition 6			
	Anger facial expression with puzzled context							
	Norm	Face	Context	Face + Context	Norm	Face	Context	Face + Context
Anger	74	0	4	0	92	36	4	16
Determinantion	-	12	16	16	-	4	16	0
Disgust	19	4	12	0	0	28	12	28
Fear	0	0	0	0	4	0	0	0
Happy	3	0	16	0	0	0	16	0
Hope	-	4	8	0	-	4	8	0
Pain	-	0	0	0	-	4	0	0
Sad	0	0	0	0	4	8	0	0
Surprise	3	0	0	0	0	0	0	0
Puzzled	-	80	44	84	-	16	44	56

	Condition 7				Condition 8			
	Fear facial expression with pain context							
	Norm	Face	Context	Face + Context	Norm	Face	Context	Face + Context
Anger	0	0	80	32	13	0	80	16
Determinantion	-	0	0	0	-	0	0	0
Disgust	0	16	16	8	0	16	16	12
<b>Fear</b>	<b>100</b>	<b>52</b>	<b>0</b>	<b>8</b>	<b>88</b>	<b>60</b>	<b>0</b>	<b>4</b>
Happy	0	0	0	0	0	0	0	0
Hope	-	4	0	0	-	0	0	0
<b>Pain</b>	<b>-</b>	<b>0</b>	<b>4</b>	<b>48</b>	<b>-</b>	<b>16</b>	<b>4</b>	<b>64</b>
Sad	0	0	0	0	0	0	0	0
Surprise	0	28	0	4	0	8	0	4
Puzzled	-	0	0	0	-	0	0	0

Note. Norms refers to original data from Ekman et al. (1976) or Masumoto et al. (1986). Percentage of responses to the emotion label predicted by face alone and situation alone are highlighted.

Figure 1: 95% confidence intervals for the proportion of subjects choosing each emotion label for the fear expression with anger context in Study 1.

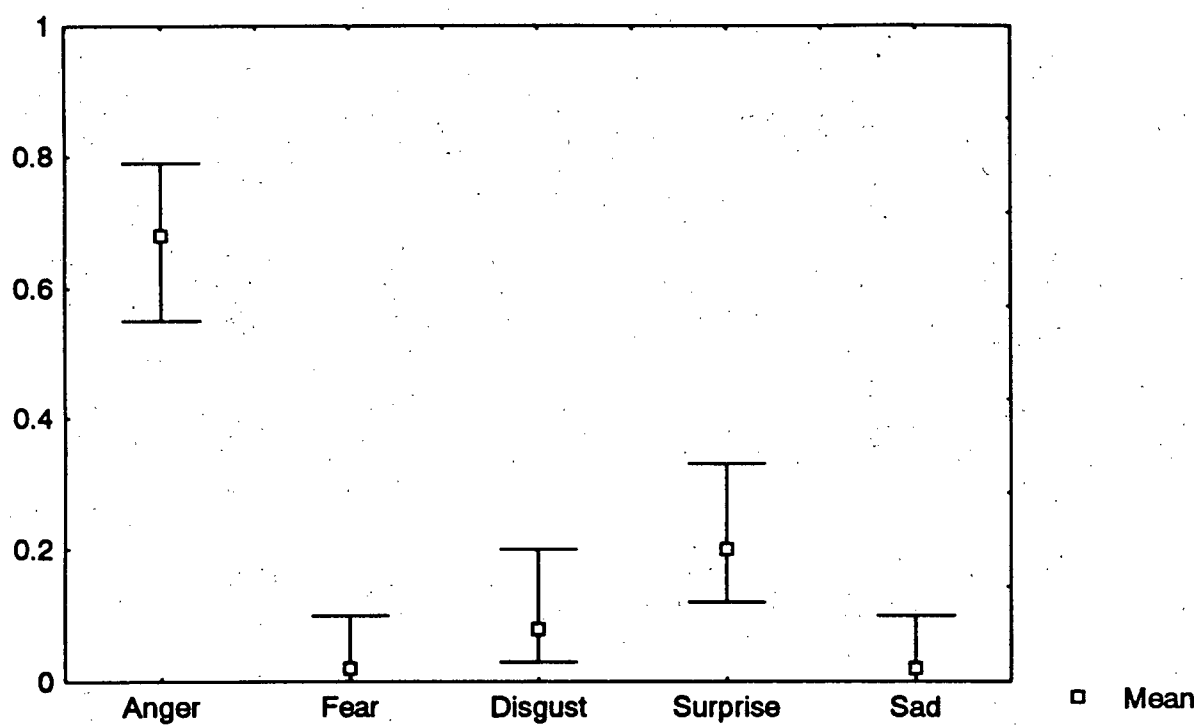


Figure 2: 95% confidence intervals for the proportion of subjects choosing each emotion label for the anger expression with fear context in Study 1.

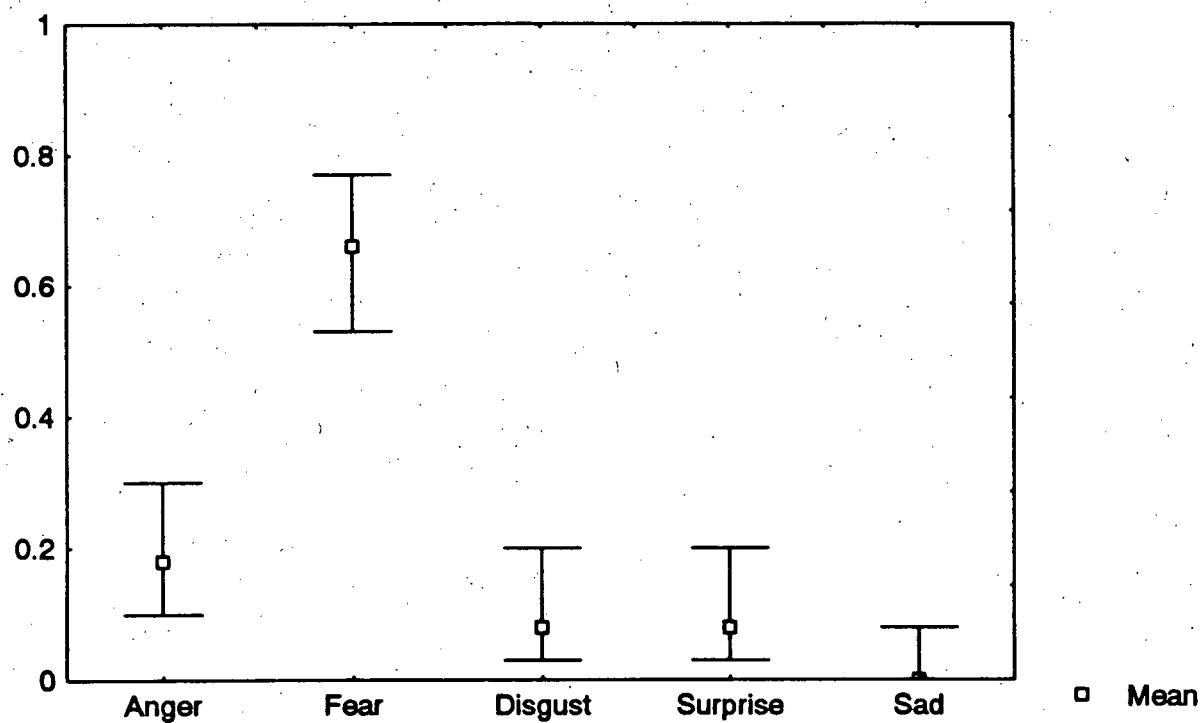


Figure 3: 95% confidence intervals for the proportion of subjects choosing each emotion label for the sad expression with disgust context in Study 1.

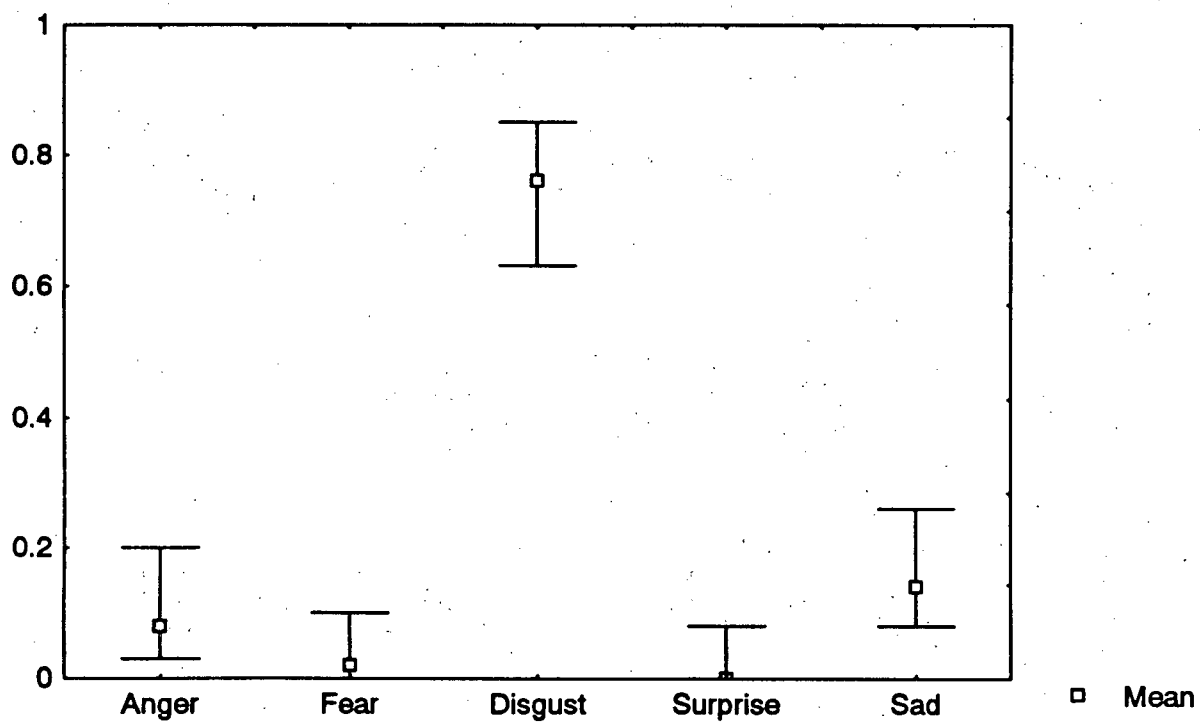


Figure 4: 95% confidence intervals for the proportion of subjects choosing each emotion label for the surprise expression with hope context in Study 2.

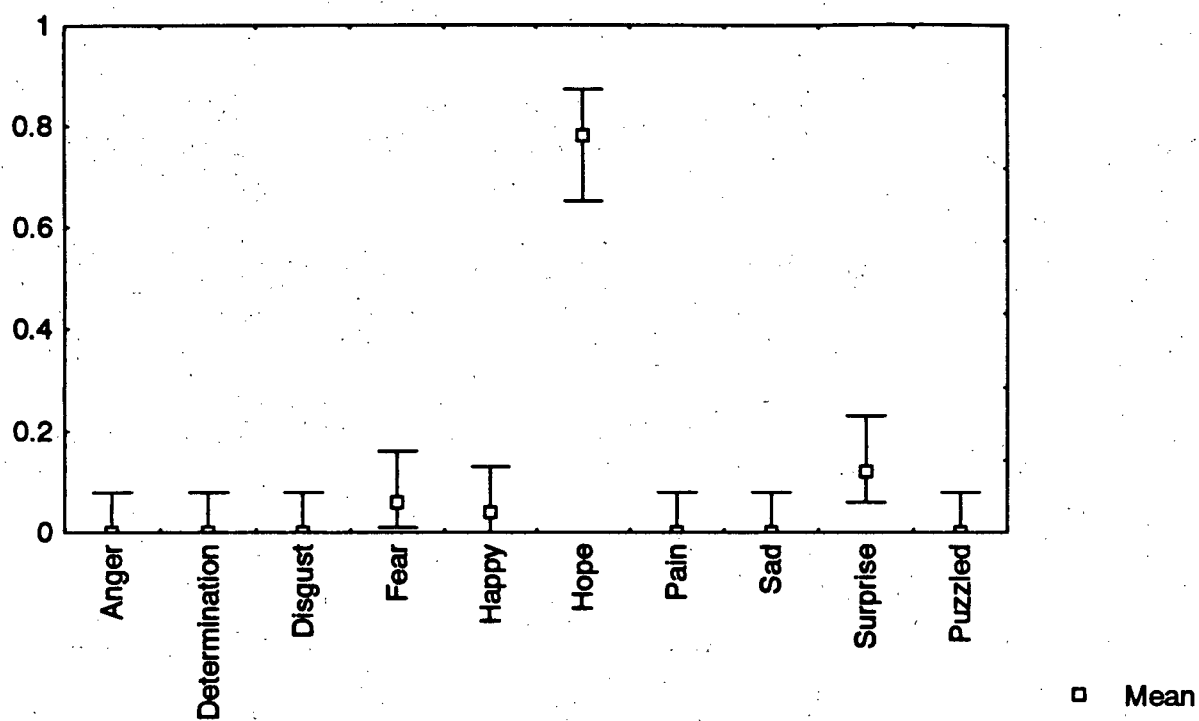


Figure 5: 95% confidence intervals for the proportion of subjects choosing each emotion label for the anger expression with determination context in Study 2.

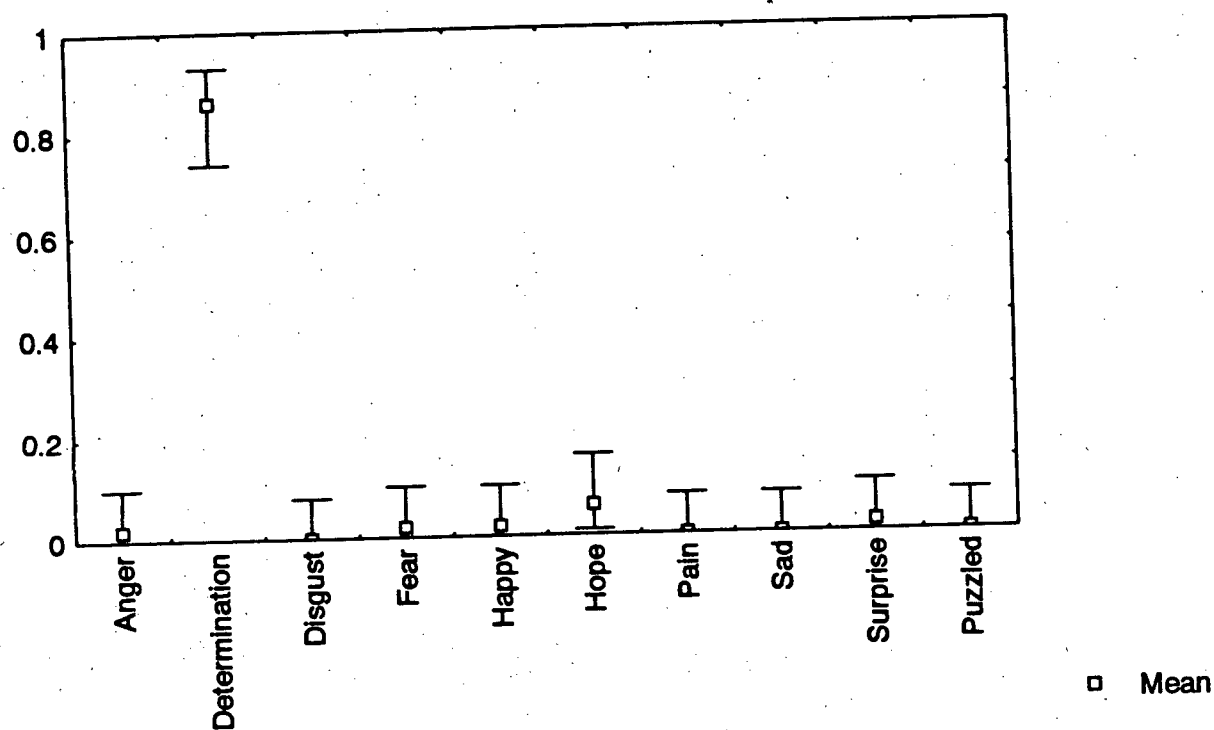




Figure 6: 95% confidence intervals for the proportion of subjects choosing each emotion label for the anger expression with puzzled context in Study 2.

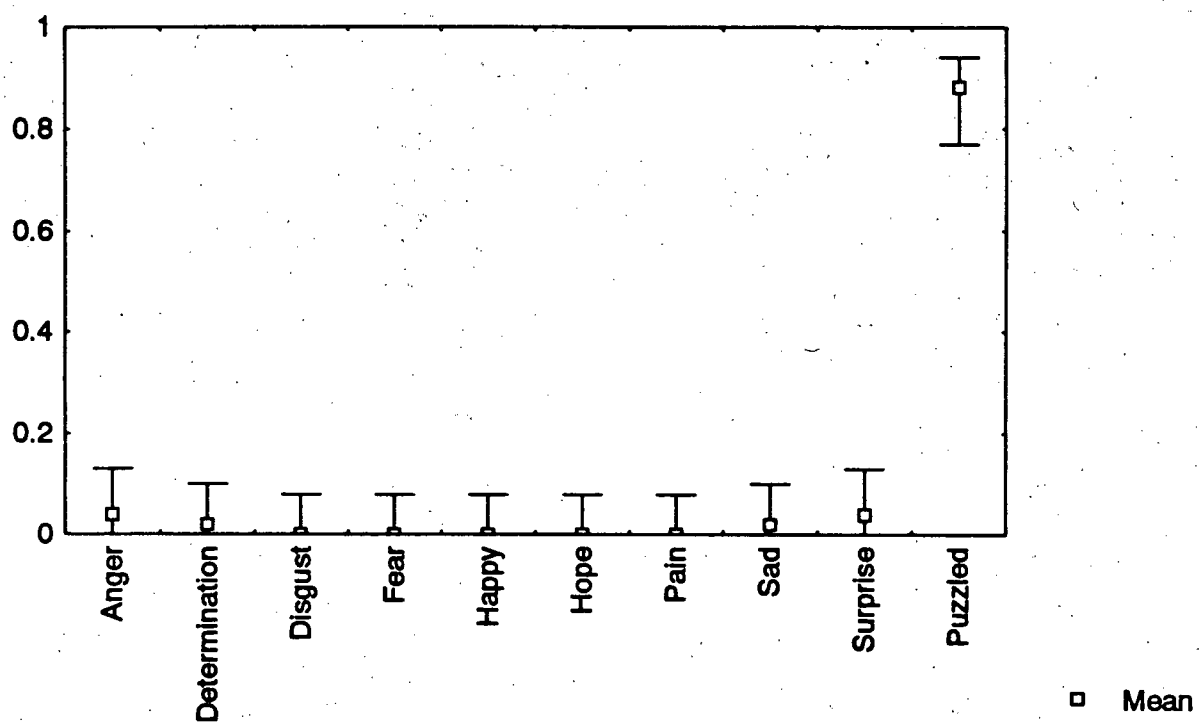


Figure 7: 95% confidence intervals for the proportion of subjects choosing each emotion label for the fear expression with pain context in Study 2.

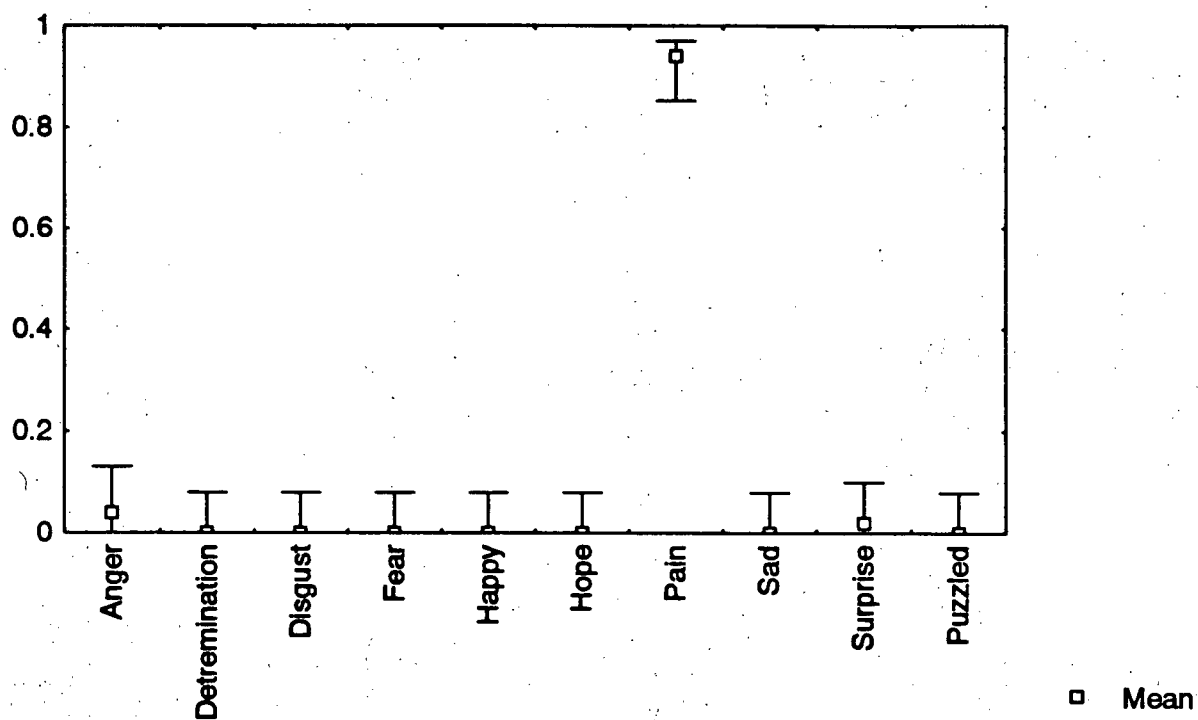


Figure 8: 95% confidence intervals for the proportion of subjects choosing each emotion label for the surprise expression with hope context in Study 3.

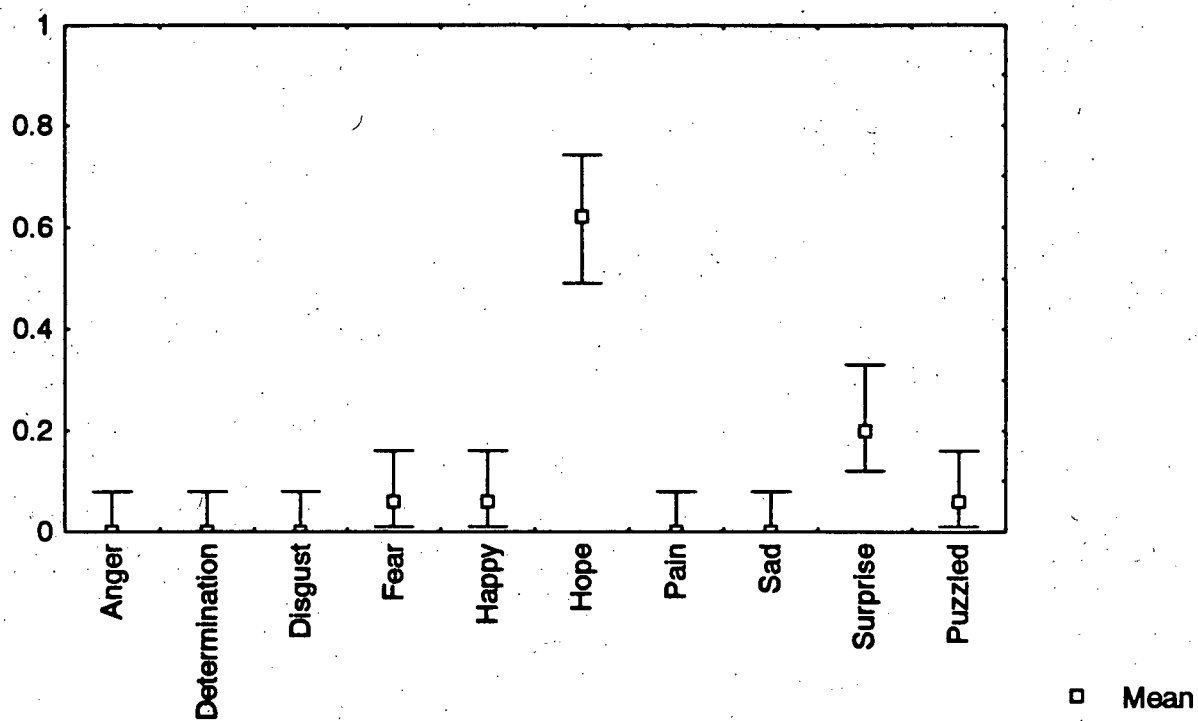


Figure 9: 95% confidence intervals for the proportion of subjects choosing each emotion label for the anger expression with determination context in Study 3.

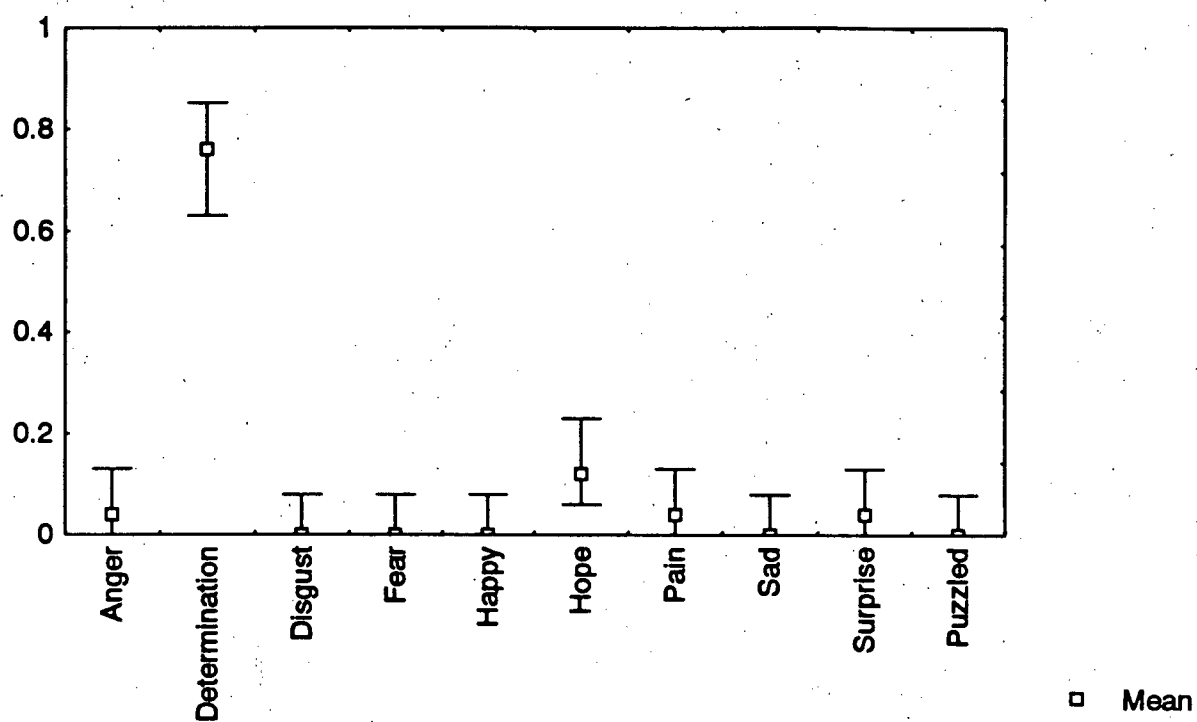


Figure 10: 95% confidence intervals for the proportion of subjects choosing each emotion label for the anger expression with puzzled context in Study 3.

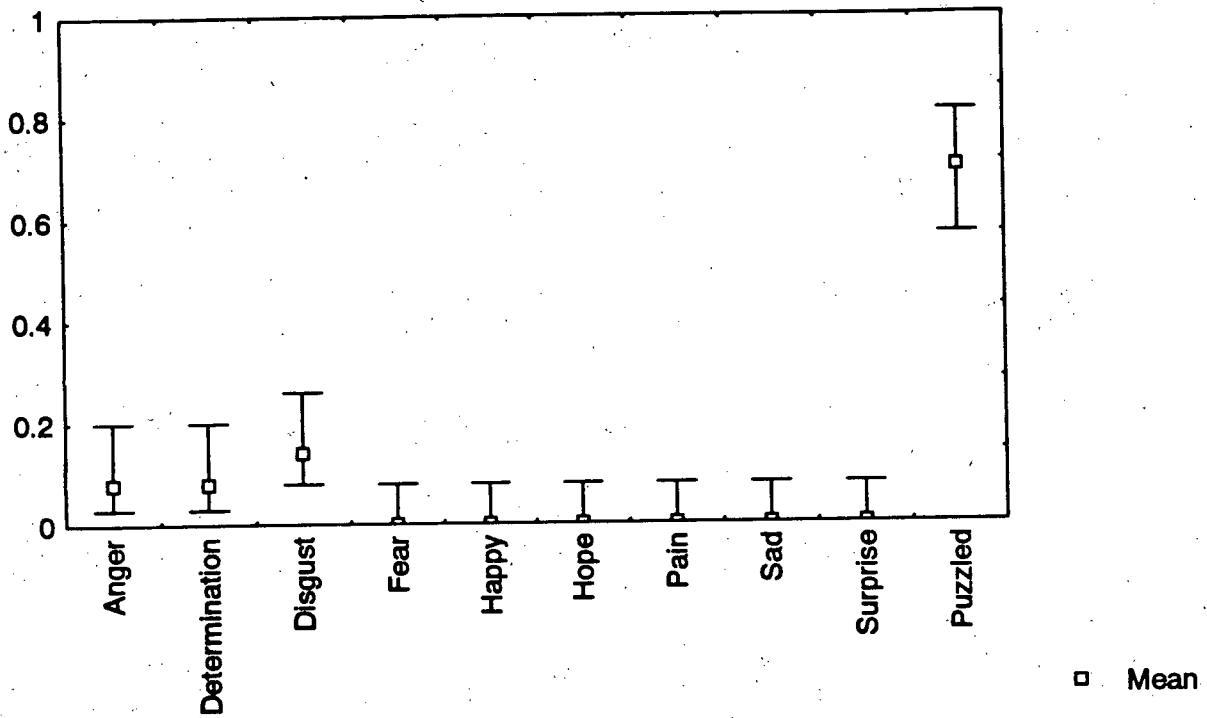
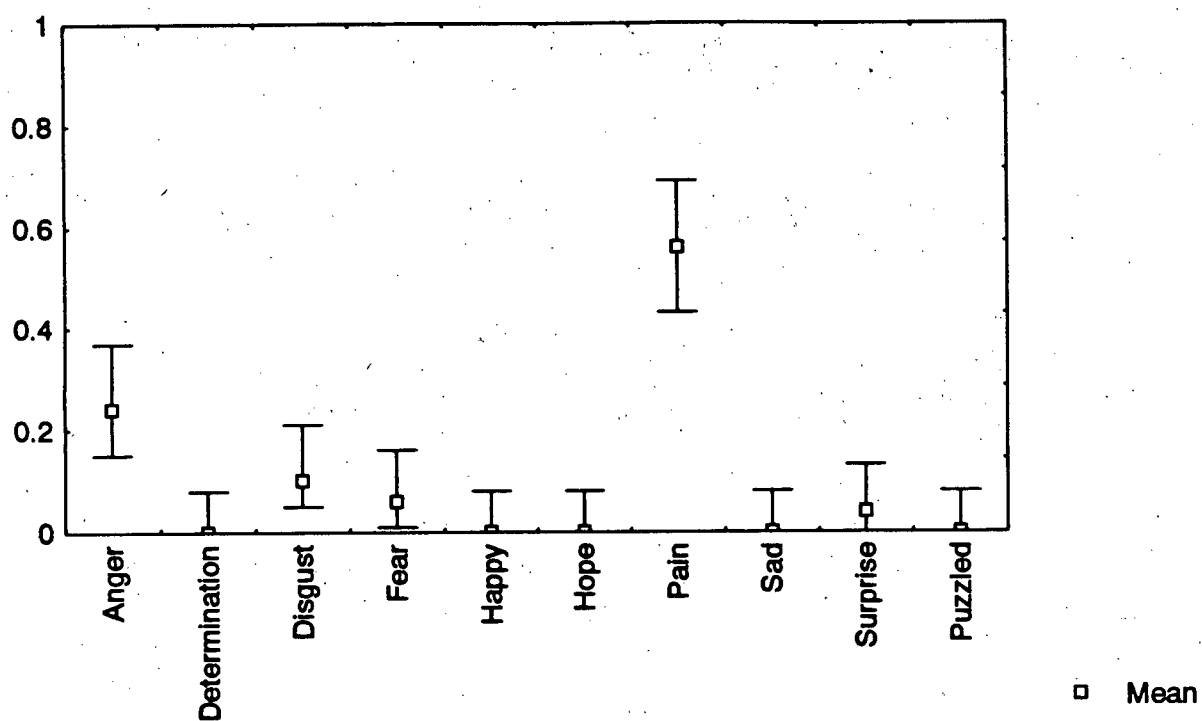


Figure 11: 95% confidence intervals for the proportion of subjects choosing each emotion label for the fear expression with pain context in Study 3.



## Appendix A: Facial stimuli; Study 1

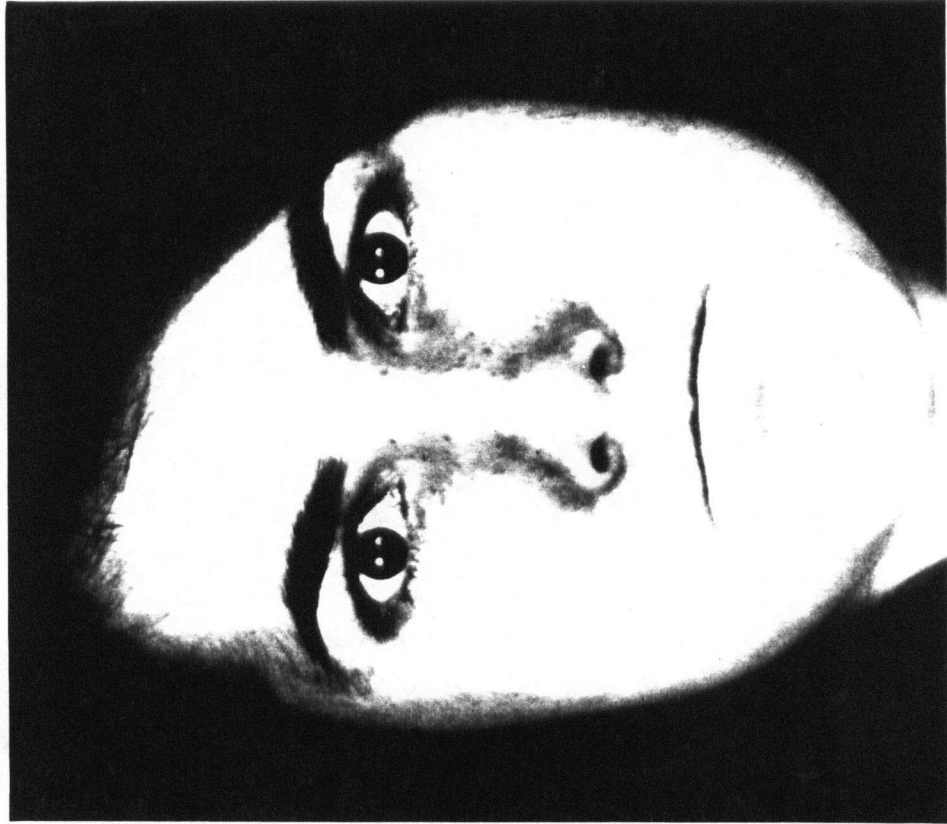
Condition 1: Fear



Condition 2: Fear



Condition 4: Anger



Condition 3: Anger





Condition 5 and 6: Sad



## Appendix B: Contextual stimuli; Study 1

### Condition 1: Anger

This is a story of a man who had recently bought a new car. Today, he is walking back to his car across the parking lot after running errands at the post office. From a distance, he can see some kids around his car. Then he sees one of them holding one of the car's hubcaps. He yells at the kids and they take off to a nearby forest waving the hubcaps in their hands. Now that he is close to his car he can see that it is certainly missing its hubcaps. What emotion is the man feeling?

### Condition 2: Anger

This is a story of a woman who wanted to treat her sister to the most expensive, exclusive restaurant in their city. Months ahead, she made a reservation. When she and her sister arrived at the restaurant, they were told by the maitre d' that their table would be ready in 45 minutes. Still, an hour passed, and no table. Other groups arrived and were seated after a short wait. The woman went to the maitre d' and reminded him of her reservation. He said he would do his best. Ten minutes later, a local celebrity and his date arrived and were immediately shown a table. Another couple arrived and were seated immediately. The woman again went to the maitre d', who said that all the tables were now full, and that it might be another hour before anything was available. What emotion is the woman feeling?

### Condition 3: Fear

This is a story about a man who is on vacation with his family. He decided to go for a hike while the rest went down to the beach for the afternoon. He enjoyed walking through the quiet shaded mountain side. He followed a small brook in and out of large rocks and crevices. Without realizing he stumbled into a small cave which the brook must have been flowing through, and only about five yards in he sees some small bear cubs. He turns and sees the adult bear coming through the entrance of the cave. He backs away slowly as the bear approaches him growling loudly. The bear has him cornered. What emotion is the man feeling?

### Condition 4: Fear

This is a story about a woman who had never done anything really exciting in her life. One day she decided she had to do something exciting so she enrolled in a class for parachuting. Today is the day that she will make her first jump. She and her class are seated in the plane as it reaches the right altitude for parachute jumping. The instructor calls her name. It is her turn to jump. She refuses to leave her seat. What emotion is the woman feeling?

Condition 5: Disgust

This is a story about a woman who was earning a few dollars helping her teacher organize the biology lab. Her job was to count the contents of different containers stored in boxes in the storage room. The list of items to count ranged from frogs and worms, to human brains. The job was going quickly until she opened the container of human brains. The container was so full that she would have to take out the brains and put them in a new container to get a proper count. She put on a rubber glove and began to immerse her hand into the liquid to pull out the first brain. What emotion is the woman feeling?

Condition 6: Disgust

This is a story of a woman who went away on quite a long business trip. When she arrived home, even at the front door, she could smell something was wrong. As she entered the kitchen the smell grew even stronger. She found that she had forgotten to take out the kitchen garbage. The rancid smell was whooshed out as she closed the bag. The bag was so full that as she carried it to the curb it tore slightly and she could feel liquid from the bottom of the bag drip down her leg. What emotion is the woman feeling?

## Appendix C: Facial stimuli; Studies 2 and 3

Condition 1: Surprise



Condition 2: Surprise



Condition 4: Anger



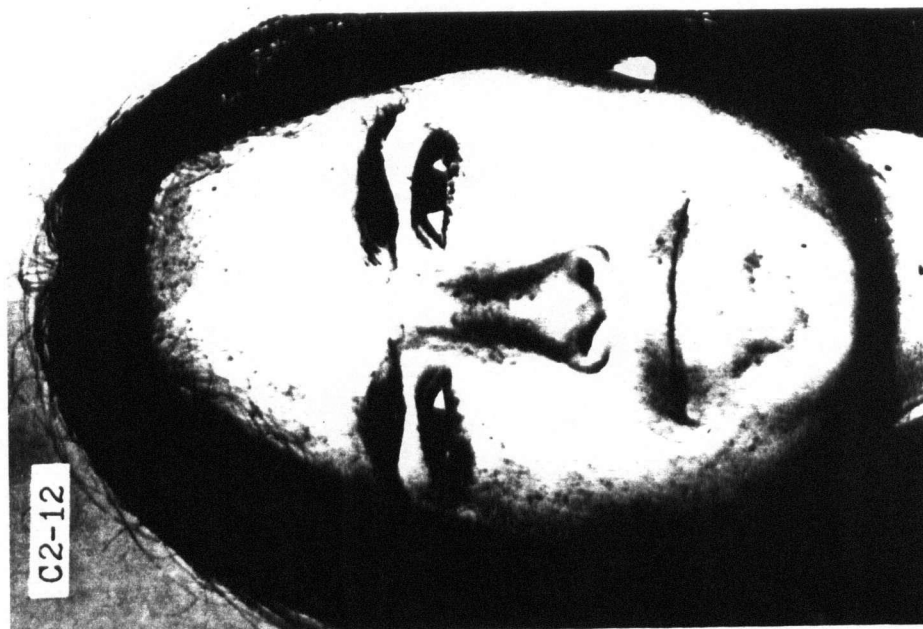
Condition 3: Anger



Condition 6 Fear



Condition 5: Anger



Condition 8: Fear



Condition 7: Fear



## Appendix D: Contextual stimuli; Study 2

### Conditions 1 and 2: Hope

This is a story of a woman who went to the horse races to bet their last five hundred dollars. She bet it all on horse number 7. She is now watching the horses make the final turn down the stretch to the finish line. Horse number 9 and horse number 7 are neck and neck. It looks like horse number 7 is going to take the lead. What is the woman feeling?

### Conditions 3 and 4: Determination

This is a story about a woman who made it onto the Olympic rowing team. She is now in the race for the gold medal. Halfway through the race she is third, but gaining on second. Two thirds of the way through the race she sees that she is in position to pass the boat in first. She rows as fast as she ever has in her life. What is the woman feeling?

### Conditions 5 and 6: Puzzled

This is a story of a woman who is going to a McDonalds for the first time. While waiting in line she stares up at the menu. Several people are served and without realizing it she arrives at the front of the line. The cashier says "may I help you please". The woman acknowledges the cashier and returns her attention to the menu. What is the woman feeling?

### Conditions 7 and 8: Pain

This is a story of a woman who has just had her ingrown toenail operated on. She is now waiting in line to see a movie. As another movie ends the crowd is asked to step back to let then through. Someone accidentally steps on her toe. What is the woman feeling?



## Appendix E: Contextual stimuli; Study 3

### Conditions 1 and 2: Hope

This is a story of a woman who went to the horse races to bet five hundred dollars. She bet it all on horse number 7. For her to win, the horse has to finish first or second. She is now watching the horses make the final turn down the stretch to the finish line. Horse number 7 is in second place. What is the woman feeling?

### Conditions 3 and 4: Determination

This is a story about a woman who had worked very hard and made it onto the Olympic rowing team. She is now in the race for the gold medal. Halfway through the race she is in first place out of five boats. What is the woman feeling?

### Conditions 5 and 6: Puzzled

This is a story of a woman who went to McDonalds for lunch. After a short wait in line it is her turn to order. The cashier says "may I help you please". The woman acknowledges the cashier and returns her attention to the menu. What is the woman feeling?

### Conditions 7 and 8: Pain

This is a story of a woman who went to the cinema to see a movie. She is now waiting in line to see the movie. Just as they are letting the audience into the cinema, a pair of individuals rudely push their way through the crowd bumping the woman and stepping on her bruised toe. What is the woman feeling?