

Smile and (Half) the World Smiles With You, Frown and You Frown Alone

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The facial expression responses of adults to the display of facial expressions were examined in a variety of public settings to test predictions from a contagion hypothesis, that the display of smiles and frowns results in smiles and frowns, and folk wisdom that the display of a smile will result in a smile but that a frown will not lead to a frown in response. It was also predicted that female subjects would smile more frequently than male subjects and that people would smile at females more than at males. The results supported the folk adage rather than the contagion hypothesis: Over half the subjects responded to a smile with a smile, whereas few subjects responded to a frown with a frown. The predicted effects of subjects' and displayers' gender were also observed. The results were interpreted in the context of internalized norms of reciprocity for brief encounters. The potential for enhanced affect as a result of the contagion of smiles is discussed.

There is extensive research on expressions and emotions in the human face (Ekman, Friesen, & Ellsworth, 1972; Izard, 1971), but less consideration is given to how humans respond to facial expressions (Hall, 1984; Kraut & Johnston, 1979). Tomkins (1962, 1963) provides perhaps the most extensive discussion of responses to the facial expressions of others. He argues that a person's facial expression engenders a corresponding expression in a respondent. According to this contagion hypothesis, "One learns to respond with negative affect to negative affect on the face of the other, as well as with positive affect to positive affect on the face of the other" (Tomkins, 1962, p. 214). Although there is evidence that the contagion of facial expression occurs for smiling (Jorgenson, 1978; Rosenfeld, 1967), no research is known that examines facial responses to frowns (or other displays of negative affect).

Tomkins's contagion hypothesis is interesting in comparison with the expression "Smile and the world smiles

with you [frown and you frown alone]" (Hustle and grin, 1927, p. 340). Lay perceptions and folk wisdom about social behavior sometimes reflect empirically observable phenomena (e.g., Hinsz, 1989) but can also be inaccurate and contradictory (Kohn, 1988). Although this quotation agrees with Tomkins's contagion hypothesis that the display of a smile results in a smile by a respondent, it makes a different prediction for frowns. The contagion hypothesis proposes that a frown will result in a frown, whereas the quotation suggests that it will not. The studies reported here contrast the contagion and folk wisdom hypotheses.

GENDER EFFECTS ON FACIAL EXPRESSIONS

Much of the research on facial expressions indicates that the respondent's gender plays an important role in the facial expressions produced, with females more likely to smile than males (Hall, 1984). This difference is often observed in laboratory settings but has also been demonstrated in a variety of natural settings (Hall & Halberstadt, 1986; Kraut & Johnston, 1979). The rate of frowning among males and females, however, has not been examined to the same extent (Hall, 1984). Given that females

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are more likely to smile than males, they might have less opportunity to frown than males, and therefore females would frown less than males. Alternatively, research has indicated that females are more facially expressive than males (Buck, Miller, & Caul, 1974; Hall, 1984), and so females may be more likely to frown.

The gender of the person displaying the facial expression may also influence the degree to which someone responds by smiling or frowning. In a literature review, Hall (1984) found that smiles were more likely to occur toward females than toward males. Given the contagion of smiles, perhaps females are more likely to smile than males because people smile at them more often. To separate the effects of the respondents' and the displayers' gender on facial expression responses, both factors were considered in this study. By including both gender factors, we can also consider the potential for an interaction between displayers' and respondents' gender on facial expressions. Although research has generally ignored such interaction effects (Hall, 1984), there is evidence that females smile more at females than males smile at males (Hall, 1984). This finding could result from the combined effects of females smiling more often than males and people smiling more often at females than at males. An examination of facial expressions of female-female, male-male, and male-female dyads may help identify the pattern of gender effects on facial expression.

Research on romantic attraction suggests one pattern a respondent's gender by displayer's gender interaction might take. A smile by a female to a male (or vice versa) may be a sign of romantic interest (Tidd & Lockard, 1978), and because of the rewarding aspects of this interest (Rosenfeld, 1967), the recipient of the smile might smile in response. A smile by a male to another male would not hold the same meaning, and consequently a smile response would be less likely. Additionally, smiles by females appear to be influenced by general social norms of politeness in facial expressions (Bugental, 1986). Thus, females might be more likely to respond to females with a smile than males to smile at males. Therefore, an interaction might arise wherein females would smile at males and females equally often and that males would smile at females as often as females smile at males but that males would smile less often at males than at females.

HYPOTHESES AND OVERVIEW OF THE STUDY

Both Tomkins's contagion hypothesis and the folk adage suggest that the display of a smile will lead to a smile in response. The more interesting condition is when a frown is displayed. Tomkins suggests that a frown will result in a frown in return, whereas the adage sug-

gests that a frown will not lead to a frown (i.e., a smile or a neutral expression should result). To test these predictions, individuals displayed one of three facial expressions (smile, neutral, or frown) to adults in a natural setting (e.g., shopping center). Another individual blind to the displayed expression then coded the facial expression (smile, neutral, frown) of the adult respondent.

The gender of the adult respondents and the gender of the individuals displaying the stimulus facial expression were also considered. Female respondents were expected to smile more than male respondents, and female displayers were expected to be more likely to be smiled at than male displayers. In addition to these two direct effects of gender, an interaction was predicted in which males and females would be equally likely to smile at a female, but males would be less likely than females to smile at a male. It is less clear how the respondent's and displayer's genders might influence frowning, as relevant literature is sparse (Hall, 1984), although female respondents may be more likely to frown than male respondents. To test these gender effects, both males and females displayed facial expressions to both male and female respondents. Responses to the displays of positive and negative facial expressions of adults were investigated in *natural settings*, both aspects that have received limited consideration in past research (Hall, 1984; Kraut & Johnston, 1979).

STUDY 1

Method

Experimenters and subjects. Students in a social psychology course at North Dakota State University acted as experimenters in this study as part of the requirements for the course's research project. Students made their observations in 38 student pairs. Three students dropped the course before turning in their data, resulting in data from 73 students (47 females and 26 males). Facial expressions of 612 female and 483 male participants were observed in a variety of public settings (e.g., shopping centers, grocery stores, library, sidewalks) in a community of approximately 120,000 people.

Design. Three factors were considered for their influence on the respondent's facial expression response (i.e., smile, neutral, or frown). The three variables were the stimulus facial expression of the displayer (smile, neutral, or frown), displayers' gender (female or male), and respondents' gender (female or male). Each experimenter displayed five of each of the stimulus facial expressions in random order to 15 different respondents.

Procedure. Discussion of the class project hypotheses and procedure occurred in several sessions of the course.

In addition to these discussions, extensive written instructions were given to the students to help them prepare for making their observations and collecting data. Students were instructed to be diligent in making their observations and admonished not to fake or misrepresent their observations. Examination of the data sheets and research reports, as well as discussions with the students, suggests that they heeded the instructions not to falsify data.

The stimulus facial expressions were to be displayed according to instructions provided to the students. A smile was defined as "the eyes wide open, the forehead is not creased, and the corners of the mouth are pulled back and turned up." A frown was defined as "the corners of the mouth turned down, the forehead is creased, and the eyes are focused." A neutral facial expression was "when the corners of the mouth go neither up nor down, and the eyes and the forehead stay in a neutral position." These operational definitions for the facial expressions were extracted from the literature on facial expressions (see Kraut & Johnston, 1979).

The students were asked to use mental imagery to help display the facial expressions (see Mueser, Grau, Sussman, & Rosen, 1984). To produce a smile, they were to "imagine that you are with a good friend that you enjoy being with very much. Let what you feel express itself through your facial expression." To produce a neutral expression, "Try to imagine a blank wall. Let your facial muscles relax and try to keep the corners of your mouth from going either up or down." To produce a frown, "Imagine you are with a close friend. Now imagine that something very bad happens to that friend. Let your feelings be expressed in your facial expression." The students were told to practice producing the expressions before beginning to collect data so that the facial expression would appear natural and consistent with the definitions of a smile, frown, and neutral expression.

Students were given specific instructions for constructing a randomized order for displaying the facial expressions that also ensured that five of each of the facial expressions would be displayed randomly to the 15 different respondents. Each member of the student pair displayed facial expressions to 15 subjects and also coded facial expressions of 15 subjects, with the order of display and coding determined by a coin flip.

A signal system was developed so that the student observing the respondent's facial expression knew the respondent had received the display of the stimulus facial expression. The student displayer walked about 5 ft in front of the coding student and made eye contact with a single oncoming subject. The displayer then signaled the student following behind (e.g., a slight wave of the hand from the wrist down on an arm held behind

TABLE 1: Relative Frequency of Respondents' Facial Expression Responses as a Function of Stimulus Facial Expressions, Study 1

Response Expression	Stimulus Expression			Total
	Smile	Neutral	Frown	
Smile	52.6% (192)	22.7% (83)	13.7% (50)	29.7% (325)
Neutral	45.2% (165)	73.2% (267)	78.9% (288)	65.8% (720)
Frown	2.2% (8)	4.1% (15)	7.4% (27)	4.6% (50)
Total	(365)	(365)	(365)	(1,095)

NOTE: Values in parentheses are frequencies; percentage values are relative frequencies within columns.

the body) to observe the respondent's facial expression response. The students were instructed to practice the signal so that they could clearly identify when the signal was given.

The respondents' facial expression responses were operationalized in a manner similar to the stimulus facial expressions. A response of a smile was defined as the corners of the mouth being turned up, a frown was coded when the corners of the mouth were turned down, and in a neutral expression the corners of the mouth were turned neither up nor down (see Kraut & Johnston, 1979). The students were instructed to practice coding facial expressions by going with their partner to a public area and examining facial expressions until they attained agreement about the three facial expression responses.

Results

The respondents' facial expressions (smile, neutral, or frown) are categorical in nature, and so a multidimensional cross-classified categorical data analysis was conducted (Bishop, Feinberg, & Holland, 1975; Feinberg, 1980). Stimulus expression, respondents' gender, and displayers' gender were considered for their ability to predict the respondents' facial expression response. The prediction that respondents' facial expression responses would be predicted by the stimulus expressions displayed was confirmed, $\chi^2(4) = 106.80, p < .0001$. Cell and marginal frequencies for this result are presented in Table 1. As Table 1 indicates, 52.6% of the respondents responded to the display of a smile with a smile, more than responded to a smile with a frown (2.2%) or neutral expression (45.2%) combined. This supports both the contagion and the adage predictions that the presentation of a positive facial expression engenders a positive facial expression in response. The prediction from the contagion hypothesis that a negative facial expression would be

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TABLE 2: Facial Expression Responses Directed at Male and Female Displayers by Male and Female Respondents, Study 1

Respondents' Gender	Response Expression	Displayers' Gender		
		Female	Male	Total
Female	Smile	31.8% (125)	33.3% (73)	32.4% (198)
	Neutral	64.6% (254)	61.2% (134)	63.4% (388)
	Frown	3.6% (14)	5.5% (12)	4.2% (26)
	Total	(393)	(219)	(612)
Male	Smile	31.1% (97)	17.5% (30)	26.3% (127)
	Neutral	65.7% (205)	74.3% (127)	68.7% (332)
	Frown	3.2% (10)	8.2% (14)	5.0% (24)
	Total	(312)	(171)	(483)

NOTE: Values in parentheses are frequencies; percentage values are relative frequencies within columns and within one respondent gender.

responded to with a negative facial expression was not supported. Only 7.4% of the respondents frowned in response to the display of a frown—fewer than those who responded to a frown with a smile (13.7%) and substantially fewer than those who produced a neutral expression in response to a frown (78.9%). Therefore, these data support the prediction of the quotation and refute the hypothesis that both positive and negative facial expressions are responded to in kind.

The facial expression responses of female and male respondents to the stimulus expressions displayed by females and males are summarized in Table 2. Consistent with our prediction and previous research, respondents' gender did influence the distribution of facial expressions produced by the respondents, $\chi^2(2) = 10.14, p < .007$. Overall, females were more likely to smile (32.4%) than males (26.3%), and females were about as likely to frown (4.2%) as males (5.0%). Consequently, males were slightly more likely to produce a neutral expression (68.7%) than females (63.4%). This finding is consistent with previous research (Hall, 1984) indicating that females are more likely to produce positive facial expressions than males, but it contradicts the speculation that females are more likely to frown than males because they are generally more expressive.

Displayers' gender also appeared to influence the distribution of the respondents' facial expression responses, $\chi^2(2) = 6.64, p < .037$. Overall, respondents were more likely to smile at a female (31.5%) than at a male

(26.4%), and respondents frowned more often at males (6.7%) than at females (3.4%). This effect of displayers' gender needs to be interpreted in the context of an interaction with the respondents' gender, $\chi^2(2) = 6.17, p < .046$ (see Table 2). Female respondents were about equally likely to smile at a female (31.8%) as at a male (33.3%) and did not differ much in their likelihood of frowning at females (3.6%) and males (5.5%). However, male respondents were almost twice as likely to smile at female (31.1%) as to smile at a male (17.5%). Male respondents were also more likely to frown at males (8.2%) than at females (3.2%). Thus, male respondents were much less positive and more negative in their facial expression responses toward males than females, whereas female respondents did not react differentially to male and female displayers.

No other interaction effects attained significance, all $\chi^2(4) < 5.5, p > .20$. Note that the effects of respondent and displayer gender did not interact with stimulus expression. This suggests that smiling in response to a smile and not frowning in response to a frown are consistent over gender and are not conditioned by the respondents' or displayers' gender.

STUDY 2

The results reported above are based on a large number of subjects and a number of different displayers, providing a strong basis for the generalizability of the findings. However, the observations involved relatively inexperienced displayers and coders, and so the reader may have concerns about the use of undergraduate students as experimenters and coders. In particular, concerns may be raised regarding the reliability of the observations of the facial expression responses as well as the adequacy of the stimulus facial expressions. As a consequence of these potential concerns, a second study was conducted.

Method

Experimenters, subjects, and design. Two female and two male undergraduate students were recruited to serve as displayers and coders. The facial expression responses of 300 (160 male and 140 female) subjects were observed in one large and two small shopping centers and at one university library in the same community as in Study 1. The design of this study was identical to that of Study 1 except that a computer generated the random sequence for the displayed expressions and the displayers presented stimulus facial expressions in blocks of 25 instead of 15.

Procedure. Without discussing the hypotheses of the study, the four students were given extensive training in the reliable observation of facial expression responses,

as well as the reliable display of the stimulus facial expressions. In one training session, the experimenters were provided with the same operational definitions as in Study 1 for the facial expressions that would be displayed. They were also instructed about the importance of producing the facial expressions in a consistent fashion. After the experimenters had learned the facial configuration for each expression, they were left to practice the different expressions on their own. The experimenters returned later to display a random sequence of expressions at the authors' command. Once the experimenters had successfully demonstrated their ability to display the three expressions, the authors and the experimenters went to public settings to establish reliable observations of facial expressions. Specific criteria were established for the three facial expression responses, and the authors discussed these observations until agreement about the definitions of the response expressions was reached. The experimenters then conducted the display and observation of facial expressions in pairs as in Study 1.

The authors conducted independent checks of the manipulation of the stimulus facial expressions as they were presented in the public setting and found a high level of agreement between the displayers' intended facial expressions and the authors' observations of the expressions (44 of 48 expressions). The authors also made observations of the subjects' facial expression responses simultaneously and independently of the coders and again found a high level of agreement with the student observers (77 of 81 responses).

Results

The relative frequency of the respondents' facial expression responses by the stimulus facial expressions displayed are presented in Table 3. Consistent with the preceding study, subjects in this study were likely ($\chi^2[4] = 25.97, p < .0001$) to respond to a smile with a smile (39.4%) and were unlikely to respond to a frown with a frown (6.2%). The pattern of expression responses in Study 2 was similar to that found in Study 1; however, the relative frequencies of smile and frown responses were lower.

The experimenters were trained to use specific criteria for coding the facial expression responses of the respondents and so coded fewer smiles and frowns than the observers in the preceding study. Of the total set of subject responses in Study 2, fewer smiles (18%) and frowns (2%) were observed. This difference probably occurred because the experimenters in Study 2 were instructed to use only specific details in coding the facial responses (i.e., the corners of the mouth being turned

TABLE 3: Relative Frequency of Respondents' Facial Expression Responses as a Function of Stimulus Facial Expressions, Study 2

Response Expression	Stimulus Expression			Total
	Smile	Neutral	Frown	
Smile	39.4% (41)	11.3% (13)	0.0% (0)	18.0% (54)
Neutral	59.6% (62)	87.8% (101)	93.8% (76)	79.7% (239)
Frown	1.0% (1)	0.9% (1)	6.2% (5)	2.3% (7)
Total	(104)	(115)	(81)	(300)

NOTE: Values in parentheses are frequencies; percentage values are relative frequencies within columns.

up or down), whereas the experimenters in Study 1 probably relied on agreement with their partner regarding what a smile and a frown would be. In Study 1, therefore, the general affective tone of the facial expression may have played a more important role in its categorization.

Because so few frowns were coded by the experimenters in Study 2, statistical analysis using frowns as a response was not appropriate (several cells had expected frequencies less than 5; see Siegal & Castellan, 1988). Consequently, for the remaining statistical analyses reported for this second study, the subjects' facial expression responses were recategorized as smiles and nonsmiles (neutral expressions and frowns combined). However, all the facial expression responses are included in the table data.

Facial expression responses as a function of the displayer's and the respondent's gender are presented in Table 4. Consistent with Study 1, subjects were about twice as likely (24% vs. 12%) to smile at female as at male displayers, $\chi^2(1) = 7.32, p < .007$. Study 2 also found that female subjects were more likely than male subjects (22.9% vs. 13.8%) to smile at the displayers, $\chi^2(1) = 4.20, p < .042$. Study 2 also found that female subjects were nearly as likely to smile at male as at female displayers (20.0% vs. 25.7%), whereas male subjects were much less likely to smile at male displayers than at female displayers (5.0% vs. 22.5%), although this finding did not attain traditional levels of significance ($p < .13$). Therefore, this study replicated the preceding study in finding the same pattern of smiling and nonsmiling facial responses under conditions that demonstrated the reliability of the methods.

GENERAL DISCUSSION

This research produced asymmetrical results for smile and frown facial expressions, smiles being reciprocated

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TABLE 4: Facial Expression Responses Directed at Male and Female Displayers by Male and Female Respondents, Study 2

Respondents Gender	Response Expression	Displayers' Gender		
		Female	Male	Total
Female	Smile	25.7% (18)	20.0% (14)	22.9% (32)
	Neutral	68.6% (48)	77.1% (54)	72.9% (102)
	Frown	5.7% (4)	2.9% (2)	4.3% (6)
	Total	(70)	(70)	(140)
Male	Smile	22.5% (18)	5.0% (4)	13.8% (22)
	Neutral	77.5% (62)	93.8% (75)	85.6% (137)
	Frown	0.0% (0)	1.3% (1)	0.6% (1)
	Total	(80)	(80)	(160)

NOTE: Values in parentheses are frequencies; percentage values are relative frequencies within columns and within one respondent gender.

while frowns were not reciprocated. Over 50% of the subjects in the initial study responded to the display of a smile with a smile (cf. Jorgenson, 1978), clearly suggesting a contagion of smiles in public encounters. A frown, however, was very unlikely to be responded to with a frown. This latter result is inconsistent with Tomkins's contagion hypothesis, but both the smiling and frowning results follow from the folk adage predictions. The data presented here for responses to frowns are unique in the literature on responses to facial expressions because frowns are rarely examined (Hall, 1984).

The results of these studies are generally in agreement with the hypotheses regarding gender effects on facial expressions and the meta-analysis by Hall (1984) on which these hypotheses were based. Females were more likely to smile than males, and people were more likely to smile at a female than a male. Contrary to some speculation, females did not frown more often than males. Rather, there was a consistent pattern of males and females not differing in their frown expressions.

The facial expression and gender effects observed in these studies are quite clear and reliable, despite the suboptimal conditions under which the observations occurred. Hall (1984) suggests that weaker effects of facial expressions will result among individuals who are not well acquainted and who interact in passing public interactions—conditions clearly involved in these studies.

The facial expression responses observed in these studies can be considered forms of greeting or acknowl-

edgement (Tomkins, 1962) that occurred between strangers in public settings. The responses to the experimenters occurred quite quickly and, we suspect, without much thought, suggesting that they may arise from internalized norms (Aronfreed, 1970), or social schemata regarding appropriate responses to facial expressions of greeting. Because all the subjects were adults, their notions of appropriate greeting should have been well learned and might be activated automatically (Cialdini, 1985; Langer, 1983) as a result of the displays initiated by the experimenters.

In the brief social encounters involved in this study, the internalized norm for the appropriate response might be a reflection of the reciprocity norm (Cialdini, 1985; Rosenfeld, 1967). The reciprocity norm suggests that people should respond in degree and kind to the rewarding actions of others—people should respond to a smile with a smile. In this case, a smile on the face of an approaching person can serve two functions. First, it is a greeting that has rewarding properties (Jorgenson, 1978; Rosenfeld, 1967). Second, it can serve as a cue to the observer regarding social behavior and make the norm more salient (Darley & Latané, 1970). Both functions would increase the likelihood that the observer would respond to a smile with a smile. As a result, these smiles may have the effect of facilitating and maintaining positive social interactions.

A frown does not serve as a general form of greeting, but generally represents an unfriendly stance or negative affect. Frowns occur rarely in brief encounters and have ambiguous implications for the observer without some knowledge of the context. Therefore, individuals probably do not have internalized norms for the appropriate way to respond to a frown on the face of a stranger. Anecdotal evidence from Study 2 indicates that many subjects responded to a displayed frown with a look of bewilderment. For a stranger confronting a frowning person who appears to be unfriendly, the appropriate response is not a frown or a smile, but to avoid the person. Consequently, a neutral response would be more likely, as was observed in these studies.

Internalized norms of reciprocity in social encounters can also be used to account for some of the gender differences in facial expression responses. There is a general tendency for females to adhere to social norms more often than males (Eagly & Carli, 1981). This could imply that the internalized norms of social behavior are more salient for females than males (Darley & Latané, 1970). If a smile is the more appropriate response to the display of a smile, then females may smile more often in response to a smile than males because females are more likely than males to engage in normative behavior.

Another unique finding in this research was the respondents' gender by displayers' gender interaction.

Males and females smiled (and frowned) about equally often at females, whereas males smiled at males about half as often as at females. Although observations have been reported for some of the cells involved in this interaction in past research, this is the only study known to include observations from all four cells that are necessary to test for an interaction. A similar interaction was reported in a study in which females and males requested the names of females and males (Darley & Latané, 1970). Females did not differ in the rate at which they divulged their names to males and females, but males were more likely to divulge their names to females than to males. Research also indicates that male-male interactions are less intimate than female-female or male-female interactions (Reis, Senchak, & Solomon, 1985). Reis et al. conclude that the most plausible explanation for this finding is that although males are capable of having intimate interactions, they choose not to. In all these studies, the potential for romantic involvement with a female appears to lead males to want more intimate interactions. Under conditions in which the males interact with males, it is presumed that they do not desire an intimate interaction.

An interesting implication of the finding of reciprocation of smiles observed in these studies can be drawn from the facial feedback hypothesis. Tomkins (1962; see also Laird, 1984) proposes that we learn to associate positive affect and mood with the muscular configuration required to display a smile. The facial feedback from the display of a smile leads the displayer to have a more positive mood. In addition, the rewarding properties of a smile (Rosenfeld, 1967) should make the recipient of the smile feel more positive. Therefore, along with the contagion of the smile expression, a contagion of positive affect might also occur through positive facial expressions. When smiles are initiated in a social setting, the smiling may spread by contagion, and with it a better mood among the people in the situation. Assuming such a result occurs, it is not surprising that smiling is recommended in some service enterprises (Sutton & Rafaeli, 1988; Tidd & Lockard, 1978), and one wonders why smiling is not encouraged more in our culture.

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