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# Attributions of male college students to variations in facial features in the line drawing of a woman's face

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**Twenty college students were asked to rate and then rank a set of nine line drawings of a woman's face in which three mouth angles by three pupil diameters had been varied. For these stimuli, the facial feature variations that determined affective attributions were the mouth angles. These data are thought to be instructive in the sense that they clearly indicate the need to covary important facial features when assessing the role of a facial feature, such as pupil size, in nonverbal communication.**

As an adjunct to the study of the role of the pupil in nonverbal communication, Hess (1975) adopted a procedure in which subjects were asked to fill in the pupils on line drawings of happy and frowning faces. When comparison is possible, data derived using these drawings appear to comport with results obtained using either ratings of photographs of real faces or subjects' pupillometric responses to real faces (e.g., see Tarrahian & Hicks, 1979; Williams & Hicks, 1980). Thus, as Hess and Petrovich (1978) have recently implied, it appears that their schematic outline faces may provide a useful tool for use in research designed to elaborate the role of pupillary behavior in nonverbal communication.

In his comprehensive review of the pupillometric literature, Janisse (1977) concluded that "it is difficult to seriously entertain the notion that the pupil plays a major role in nonverbal communication, for no convincing research has shown the proposed phenomenon to be veridical" (p. 170). A considerable portion of Janisse's concern seems to stem from the results of the few studies that have used photographs of real faces to covary pupil size with some other facial feature(s) (e.g., Hicks, Reaney, & Hill, 1967; Jones & Moyel, 1971, 1973). As a rule, the results of these studies have provided only equivocal support for Hess' (1965) hypothesis that large pupils are associated with happiness and attractiveness and small pupils are associated with anger and unattractiveness. This is because these studies have provided data that suggest that when other facial features (i.e., facial angle, iride color, and gender) are covaried with pupil size, these other features tend to be more salient than pupil size as determinants of the subjects' responses to the stimulus faces. However, since these studies failed to consider other major facial features, such as the mouth, and since the manipulations employed were somewhat ambiguous and thus difficult to replicate, perhaps the major contribution of these studies is that they serve to reinforce the rather obvious need to measure pupil size effects in the context of the covariation of other major facial features. Thus, the purpose of this research was, using the schematic outline of a woman's face, to measure the effects of the covariation of pupil diameter and the angle of the mouth on the attributions of male students to these stimuli.

For reprints and/or copies of the stimulus faces, write to Robert A. Hicks, Department of Psychology, San Jose State University, San Jose, California 95192.

## METHOD

### Subjects

Our subjects were 20 male university students who volunteered for the individual testing procedure.

### Stimuli

The set of nine stimulus faces was composed of three pupil diameter by three mouth angle variations that were imprinted on the line drawing of a woman's face. The three pupillary diameters were drawn so that these covered 15% (small), 30% (medium), or 50% (large) of the iris of the stimulus face. The three variations in mouth angle were smiling or expressing positive affect (i.e., the mouth was turned upward 10 deg at its outer edges), neutral (i.e., there was a 0-deg turn at the edges of the mouth), and frowing or expressing negative affect (i.e., the edges of the mouth were drawn with a 10-deg downturn). Thus, all possible combinations of these pupil size and mouth angle variations were represented in the nine stimulus faces.

### Procedure

The subjects, who were tested individually, were asked to make two separate assessments of each of the nine stimulus faces. The first of these involved rating each face on each of the two 5-point graphic scales that had been used in an earlier and similar study (i.e., by Hicks et al., 1967). Essentially, this task involved rating each face on scales that were bounded by these sets of bipolar adjectives: pleasant-unplesant and warm-cold. The faces were rated one at a time and were presented in a random order to each subject. In the second assessment task, the subjects were asked to rank order the stimulus faces from most preferred to least preferred.



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## RESULTS AND DISCUSSION

In analyzing the rating data, the scores for the two bipolar scales were summed to form a single score, so that a score of 2 was the most positive rating possible and, conversely, a score of 10 was the most negative rating possible. The results of these ratings are summarized in Table 1.

As a means of analyzing the data summarized in Table 1, we first computed a 3 (pupils) by 3 (mouth angles) analysis of variance with repeated measures in both factors. The results of this analysis revealed that there was a significant main effect for mouth angle [$F(2,38) = 55.60$, $p < .001$] and that the main effect for pupil size and the Pupil Size by Mouth Angle interaction were not significant [$F(2,38) = 1.26$ and $F(4,38) = 1.02$, respectively].

The mean ranking and the standard deviation for each pupil size by mouth angle stimulus face are presented in Table 2. These data were first analyzed by computing a Friedman two-way analysis of variance by ranks. The results of this analysis revealed a significant overall effect [$\chi_r^2(8) = 128.13$, $p < .001$]. As an adjunct to interpreting the meaning of this result, separate one-way analyses were computed for the effects of each mouth angle on pupil size and of each pupil size on mouth angle. Like the analysis of variance computed to analyze the rating data, this set of results suggests that mouth angle was much more salient than pupil size in determining preference for the stimulus faces. Specifically, mouth angle had a significant effect regardless of pupil size [for small pupils, $\chi_r^2(2) = 36.05$, $p < .001$; for medium pupils, $\chi_r^2(2) = 40.00$, $p < .001$; for large pupils, $\chi_r^2(2) = 36.05$; $p < .001$], whereas the effects of pupil size were significant only when the mouth angle was neutral [for frowns, $\chi_r^2(2) = .90$, n.s.; for neutral mouths, $\chi_r^2(2) = 11.20$, $p < .01$; for smiles, $\chi_r^2(2) = 5.70$, n.s.].

Collectively, these data demonstrate that the salience of pupil size as an interpersonal cue may be diminished when it is covaried with another important facial feature. In drawing conclusions from these data, we do not wish to argue that pupil size is not a cue that can be used in nonverbal communication, for our data (for the neutral mouth faces) and those of other studies suggest that this is not the case. Further, we do not feel that our results indicate that mouth angle is necessarily a more important or dominant facial cue than pupil size in nonverbal communication. (In this regard, we are aware that the frowns and smiles that were incorporated into certain of our stimulus faces employed rather extreme angles. Thus, it may be true that we utilized mouth angles that, because of their novelty, drew attention away from the more subtle, and perhaps more realistic, pupil size manipulations.) However, it does seem clear that our data indicate that the salience of pupil size as an interpersonal cue depends, at least in part, on the facial context in which these cues are presented. In this case, fairly pronounced changes in mouth angle, rather than pupil size, proved to be the primary determinants of our subjects' affective responses to the stimulus faces that we used. This result should be instructive to those who wish to study these variables further. Obviously, in real life, pupil size variations occur in the context of variations of other facial features. Our data suggest the need for subsequent studies that covary important facial features in a manner that provides for a less ambiguous understanding of the role(s) that these facial features may play in nonverbal communication.

**Table 1**
**Mean Ratings and the Standard Deviations for the Nine Stimulus Faces**

| Mouth Angle | Pupil Diameter | | | | | |
|---|---|---|---|---|---|---|
| | Small | | Medium | | Large | |
| | Mean | SD | Mean | SD | Mean | SD |
| Frown | 7.7 | 1.4 | 7.5 | 1.8 | 7.2 | 1.4 |
| Neutral | 6.1 | 1.8 | 5.4 | 1.6 | 5.1 | 1.6 |
| Smile | 4.4 | 1.8 | 4.4 | 1.8 | 4.4 | 1.6 |

**Table 2**
**Mean Rankings and the Standard Deviations for the Nine Stimulus Faces**

| Mouth Angle | Pupil Diameter | | | | | |
|---|---|---|---|---|---|---|
| | Small | | Medium | | Large | |
| | Mean | SD | Mean | SD | Mean | SD |
| Frown | 8.2 | .9 | 7.9 | .5 | 7.8 | 1.5 |
| Neutral | 5.3 | 1.3 | 5.0 | .9 | 3.5 | 1.4 |
| Smile | 3.1 | 1.5 | 2.6 | 1.1 | 1.8 | 1.2 |

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