Bulletin of the Psychonomic Society
1980, Vol. 16 (1), 67-68

Sex, iride pigmentation, and the pupillary attributions of college students to happy and angry faces

SUSAN L. WILLIAMS and ROBERT A. HICKS
San Jose State University, San Jose, California 95192

As a means of clarifying relationships reported by Hess and Petrovich (1978) between sex, iride pigmentation, and sensitivity to pupillary cues in nonverbal communication, the responses of 117 college students, who had been divided into four sex by iride pigmentation groups, to Hess' (1975) happy-angry faces task were measured. The results were congruent with predictions that were drawn from Hess and Petrovich's finding that women and light-eyed persons are more sensitive to pupillary cues than are men and dark-eyed persons.

Hess and Petrovich (1978) have suggested that both sex and iride pigmentation are variables that seem to be associated with degree of sensitivity to pupillary cues in nonverbal communication. Specifically, as a consequence of testing 10 male and 10 female college students on Hess' (1975) happy-angry faces task (i.e., a task that is completed by drawing in the pupils on line drawings of a happy and an angry face), Hess and Petrovich reported data that seem to indicate that women are more sensitive than men and that persons with easy-to-see pupils (i.e., light eyes) were more sensitive than persons with hard-to-see pupils (i.e., dark eyes). In this study, sensitivity was defined as the degree of appropriate differentiation between the happy face (large) and the angry face (small) pupils.

Unfortunately, Hess and Petrovich's (1978) data are only suggestive of these relationships, because Hess and Petrovich elected to omit any mention of the results of significance tests of their data and they failed to include the standard deviations that would have permitted others to compute these statistics. Further, the design of their study precluded the possibility of assessing the effects of a Sex by Iride Pigmentation interaction on pupillary attributions. Thus, this research was designed to measure the relationships among sex, iride pigmentation, and pupillary attributions on the happy-angry faces task in a manner that eliminated certain of the deficiencies noted in the Hess and Petrovich study.

METHOD

Undergraduate students were tested either individually or in small groups. As part of a larger set of tasks, each student was asked to complete the happy and angry faces task (see Hess, 1975, p. 117). To do this, these students were instructed to draw in the pupil on blank irides (diameter = 5 mm) of exact copies of the faces used by Hess and Petrovich (1978). When this task was completed, the iride pigmentation of each student was assessed in a manner that was congruent with the procedures described by Hess and Petrovich. As a consequence, each student was assigned to either the light- or dark-eyed group or was dropped from the study. The total sample size was 117, and the number of subjects in each sex by iride pigmentation group is given in Table 1. Then the responses of each student were measured using procedures adopted by Hicks, Williams, and Ferrante (1979a, 1979b). That is, each pupil was measured with a metric ruler at the point of maximum horizontal diameter. The largest value for each face was recorded as the individual's response to that face.

Reprint requests should be sent to Robert A. Hicks, Department of Psychology, San Jose State University, San Jose, California 95192.

RESULTS AND DISCUSSION

The happy and angry face means and standard deviations for each sex by iride pigmentation group are listed in Table 1.

To analyze these data, first a 2 by 2 by 2 factorial ANOVA with repeated measures in one factor (faces) was computed. The results of this analysis showed that both the sex and face type main effects were significant and the Sex by Face Type interaction approached significance [$F(1,113) = 5.59$, $p < 02$; $F(1,113) = 41.21$, $p < .001$; and $F(1,113) = 2.95$, $p < .10$]. The effect of iride pigmentation and all of the other interactions were not significant.

As a means of further elaborating these results, we considered the possibility that the significant sex effect could, in part, be explained by stylistic differences in the way that men and women respond to the happy-angry faces task. To explore this possibility, we summed the pupillary diameters drawn by each subject, and then, using these values, we computed the means for males (mean = 5.65 mm) and for females (mean = 4.91 mm). The difference between these means was significant [$t(115) = 2.11$, $p < .05$]. These data suggest that the absolute pupil diameters for each face were partially confounded by sex-linked stylistic differences in completing the faces task. Therefore, to measure the relative

0090-5054/80/070067-02$00.45/0

Table 1
Mean Pupillary Attributions (in Millimeters) and Standard Deviations to the Happy and Angry Faces by the Various Sex by Iride Pigmentation Groups

		Face Type				Sensitivity Scores		
		Happy		Angry				
Group	N	Mean	SD	Mean	SD	Mean	SD	t
Light-Eyed Men	27	3.02	.88	2.28	1.06	.74	1.17	3.22
Dark-Eyed Men	18	3.24	1.33	2.92	1.80	.32	2.05	.67
Light-Eyed Women	32	3.09	.62	1.77	.88	1.33	1.24	6.05
Dark-Eyed Women	40	2.89	.98	2.07	1.18	.83	1.48	3.61

sensitivity of each sex by iride pigmentation group to pupillary cues, we computed a sensitivity score for each subject by subtracting the angry face value from the happy face value. These data are summarized in Table 1. Next, for each group, the sensitivity (difference) mean was tested using the direct-difference method for computing t. The results of these analyses are listed in Table 1. If one can assume that the magnitude of these critical ratios is an index of a group's sensitivity to pupillary cues, then our results conform exactly to the predictions that could be derived from Hess and Petrovich's (1978) data. That is, if females and light-eyed individuals are more sensitive than males and dark-eyed individuals, as Hess and Petrovich suggest, the light-eyed females should be most sensitive, dark-eyed males should be least sensitive, and the other two groups should fall midway on a continuum drawn between these two points. An inspection of the ts presented in Table 1 will show that our results fit these predictions.

In explaining the relationships between eye color and sensitivity to pupillary cues, Hess and Petrovich (1978) considered two alternatives; namely, these observed differences either are due to the force of evolution or are indicative of an acquired cultural effect. In explaining our data, we wish to emphasize the latter of these alternatives. Recently, Tarrahian and Hicks (1979) have reported that predominantly dark-eyed Persian children (i.e., children reared in a pupil-intensive culture) are substantially more sensitive to pupillary cues, as measured by the faces task, than are comparable groups of American children. Thus it is likely that the relationships described in this paper are relevant only to the cultural group(s) from which these subjects were drawn.

In concluding, we wish to note that as a consequence of his review of the literature, Janisse (1977) argued 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). As Fried (in press) has recently observed, research published after Janisse's review suggests that some modification of this conclusion is in order.

REFERENCES

FRIED, R. Deep dark lovely pools: Joys and perils of pupillometrics. *Journal of Personality Assessment*, in press.

HESS, E. H. The role of pupil size in communication. *Scientific American*, 1975, **233**, 110-119.

HESS, E. H., & PETROVICH, S. B. Pupillary behavior in communication. In A. W. Siegman & S. Feldstein (Eds.), *Nonverbal behavior and communication*. Hillsdale, N.J: Erlbaum, 1978.

HICKS, R. A., WILLIAMS, S. L., & FERRANTE, F. Eye color and the pupillary attributions of college students to happy and angry faces. *Bulletin of the Psychonomic Society*, 1979, **13**, 55-56. (a)

HICKS, R. A., WILLIAMS, S. L., & FERRANTE, F. Pupillary attributions of college students to happy and angry faces. *Perceptual and Motor Skills*, 1979, **48**, 401-402. (b)

JANISSE, M. P. *Pupillometry: The psychology of the pupillary response*. Washington, D.C: Hemisphere, 1977.

TARRAHIAN, G. A., & HICKS, R. A. Attributions of pupil size as a function of facial valence and age in American and Persian children. *Journal of Cross-Cultural Psychology*, 1979, **20**, 243-250.

(Received for publication June 2, 1980.)