

performance of requested facial movements. In describing how the photographs were taken, Friesen and I wrote that the photographic models "were not told to feel an emotion, but rather given instructions such as lower your brow so that it looks like this, . . . or tighten your lower eyelid" (5, p. 170). Because our photographs were of requested facial movements, not of emotional poses, there must be even more caution in generalizing to spontaneous facial expression of emotion.

The fact that they found no left-right differences in judgments of the happy photographs is important since, unknown to Sackeim *et al.*, these were the only photographs of spontaneous emotional expression rather than deliberately performed facial actions. In making the happy photographs, we caught the models off guard during a spontaneously occurring happy moment in the photographic session. It might be argued that the reason no left-right differences were found in these happy pictures was not because they showed spontaneous rather than requested actions, but because positive emotions alone are not asymmetrical in appearance (6). However, Ekman, Hager, and Friesen (7) found that asymmetrical deliberate smiles are usually more intense on the left than on the right side, and they replicated findings by Lynn and Lynn (8) that asymmetrical spontaneous smiles are relatively infrequent and are not usually more intense on a particular side of the face. These findings suggest that facial asymmetry (with left stronger than right) is apparent only with deliberate and not spontaneous expressions, but studying muscle movements involved in the negative emotions is necessary to generalize beyond the smile.

The issue of left-right differences is not resolved for either emotional expression or requested facial movements. Both types of action need to be studied, ideally in the same subjects and in situations that clearly differentiate the type of facial movement elicited. The methods must control or bypass the type of peripheral differences in facial anatomy that cloud results based solely on observers' judgments of emotion. For now, more caution is needed in interpreting the findings from studies based on observers' judgments of emotion to either requested facial movement or emotional expression, and in generalizing from studies of the former to the latter.

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#### References and Notes

1. H. A. Sackeim, R. C. Gur, M. C. Saucy, *Science* **202**, 434 (1978).
2. As a facial surgeon with wide experience with face-lifts, parotid gland operations, and surgery to remedy facial paralysis, R. Crumley (personal communication, 1 February 1980) has stated that he has little doubt that asymmetry of facial structure is the rule rather than the exception.
3. Data on consistent differences in the relative size of the left and right sides of the face are reported in P. H. Burke, *Hum. Biol.* **43**, 536 (1971).
4. A. Mehlke, *Surgery of the Facial Nerve* (Saunders, Philadelphia, 1973); R. E. Myers, *Ann. N.Y. Acad. Sci.* **280**, 745 (1976); K. Tschiaschy, *Ann. Otol. Rhinol. Laryngol.* **62**, 3, 677 (1953).
5. P. Ekman and W. V. Friesen, *Unmasking the Face* (Prentice-Hall, Englewood Cliffs, N.J., 1975); *Pictures of Facial Affect* (Consulting Psychologists Press, Palo Alto, Calif., 1976).
6. There are still ambiguities about asymmetry in smiling. R. Campbell [*Cortex* **14**, 327 (1978)] found asymmetries in requested smiles, but has said, "I did find expressor asymmetries. . . . These have turned out to be due to the left side of face . . . being rated 'more sad' in a 'relaxed,' unposed still photo than the right side of face. In fact, of the eighteen right-handers I used I did not find that a posed smile was stronger on the left of the face. So the discussion in the paper is a bit misleading" (personal communication, 3 December 1977). G. E. Schwartz (personal communication) has found asymmetries in electromyographic activity in the facial area relevant to the smile, but it is not certain that he was studying spontaneous emotional expression.
7. P. Ekman, J. C. Hager, W. V. Friesen, in preparation.
8. J. G. Lynn and D. R. Lynn, *J. Abnorm. Soc. Psychol.* **33**, 291 (1938); *ibid.* **38**, 250 (1943).
9. I thank W. V. Friesen, J. Hager, H. Oster, and M. O'Sullivan for their comments.

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The conclusion of Sackeim *et al.* (1) that the greater perceived intensity of emotional expression on the left side of the face "points to greater right-hemispheric involvement in the production of emotional expression" is probably premature.

Having access to the same set of stimuli as Sackeim *et al.*, we tested the equality of the sides of the face directly. Of the 110 slides of facial affect (2), 34 were selected on the basis of their "measurability." Measurability was determined by the extent to which precise measurements could be taken from vertical midline of the face to the edge where the head and ear merge. The remaining 76 slides were rejected because such things as interfering sideburns or hairlines made it difficult to obtain accurate measurements.

The 34 stimuli chosen consisted of five male and two female models and the same six expressions used by Sackeim *et al.* Each slide was projected onto a white background, to a chin-to-eyebrow height of approximately 13 cm. Measurements were taken from the edge where the ear and head meet (easily distinguishable in a two-dimensional photograph) to the vertical midline of the head. A comparison of means for the left and right sides of the face was thinner ( $\bar{X} = 6.44$  cm, standard deviations =

.70) than the right side ( $\bar{X} = 6.75$  cm, standard deviations = .58) (Wilcoxon matched-pairs signed-ranks tests,  $T = 30$ ,  $P < .001$ ). In 25 of the 34 slides the left side was thinner than the right, in two they were equal, and in only seven did the left side exceed the right in width.

The significant difference in the width of the left and right sides of the face leads us to suggest that the greater apparent intensity of expression on the left side of the face is not a function of differential right-hemispheric control of expression but rather results from the fact that the left side of the face provides a smaller area on which to distribute the same features.

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1. H. A. Sackeim, R. C. Gur, M. C. Saucy, *Science* **202**, 434 (1978).
  2. P. Ekman and W. V. Friesen, *Pictures of Facial Affect* (Consulting Psychologists Press, Palo Alto, Calif., 1976).
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In the example set of original and derived left- and right-side composite photographs of a posed facial expression furnished by Sackeim *et al.* (1), the original full-face photograph is not uniformly illuminated. The left side of the model's face shows a greater proportion of shadow than does the right side. Thus the derived left-side composite photograph appears darker and more "dramatic" than does the composite right-side photograph. Disparities in amount of shadow present between right and left composite photographs could influence subjects' assessments of expression intensity irrespective of actual facial differences.

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1. H. A. Sackeim, R. C. Gur, M. C. Saucy, *Science* **202**, 434 (1978).

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We reported (1, 2) that voluntary expressions of emotion are rated as more intense on the left than on the right side of the human face. We interpreted our finding as supporting the hypothesis of hemispheric asymmetry in the control of facial emotional expression.

Nelson and Horowitz, Spinrad, and Ekman submit that our finding may be

# Science

## Asymmetry in facial expression

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