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WHAT THE FACE REVEALS

Basic and Applied Studies of Spontaneous Expression Using the Facial Action Coding System (FACS) Second Edition

Edited by
Paul Ekman &
Erika L. Rosenberg

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A Measure of Early Joy?

DANIEL S. MESSINGER

How is early joy expressed and how does joy develop? The preceding chapter—"All smiles are positive, but some smiles are more positive than others"—is part of an ongoing FACS-based research program to address these questions. I summarize below some of what has been learned and what remains to be learned about infant positive emotion and communication. The discussion examines the emotional meaning of different types of smiles, their development, the communicative importance of smiling and its development, and new techniques for understanding the timing of facial expression and emotion.

The anatomically based FACS (and its application to infants, BabyFACS) were used in the preceding article to document how infants smile during different periods of naturalistic interaction. Various FACS-differentiated smiles reflected different types of infant positive engagement with the environment. Infant cheek-raise (Duchenne) smiling was involved in reciprocating positive affect (smiling in response to mother's smile), and infant open-mouth smiling was involved in social engagement (gazing directly at mother). Infants' combined open-mouth cheek-raise (duplay) smiling reflected both qualities and was highest when infants were reciprocating positive affect while socially engaged.

These results are consistent with the position that different types of smiles index different intensities of joy. Combined open-mouth cheek-raise smiles are more emotionally positive than smiles involving only mouth opening or only cheek raising. Smiles involving only mouth opening or only cheek raising are more positive than smiles involving neither of these characteristics. Supportive evidence is provided by Fogel and colleagues, who documented the strength of the underlying smile action (zygomatic major contraction) in different types of smiles (Fogel, Hsu, Shapiro, Nelson-Goens, & Secrist, 2002). Open-mouth cheek-raise smiling had the strongest contraction, followed by cheek-raise smiling, open-mouth smiling, and, finally, smiling alone (simple smiling).

Evidence for differences in affective intensity is also provided by the perceptions of naïve observers. In experimental studies, we altered photographic images of smiles to assess the impact of smile strength, cheek raising, and mouth opening on naïve observers (Messinger, 2002). College students rated stronger smiles as more positive than

weaker smiles, and rated cheek-raise and open-mouth smiles as more positive and joyful than smiles without these features. Strong smiles involving cheek raising and mouth opening were seen as most affectively positive and joyful.¹

How does the association between engagement with the environment and smiling change with age? How does joy develop? As infants grow older in the first half year of life, they became more likely to use open-mouth cheek-raise smiling to respond to their smiling mothers. Open-mouth cheek-raise smiling also occurs in adults, where—perhaps through links to laughter—it appears to index intensely positive emotion (Ruch, 1997) and resilience (Keltner & Bonanno, 1997). Surprisingly, developmental changes in how infants smile during peek-a-boo and tickle games have not been evident in the second half year of life. There is strong evidence, however, that the way in which smiles are patterned with other expressive actions changes dramatically during this period.

In the first 6 months of life, infants tend to begin smiles while gazing at their mothers, but the context in which infants end their smiles changes with age (Yak Messinger, & Cobo-Lewis, 2003). As infants near 6 months of age, they become more likely to gaze away from their parents' faces before ending their smiles, suggesting that infants are regulating their own positive arousal. This development in affective regulation is likely related to changes in the affective intensity of smiles. Infants become more likely to regulate their own positive arousal at the same time as they become more likely to engage in intensely affective smiling interactions. Both processes reflect a developmental increase in infants' active engagement in interpersonal interactions.

Yet despite their affective development, 6-month-olds have clear communicative limitations. They never *refer* to events or objects outside the immediate interaction. After 8 months, infants begin to use conventional gestures to communicate to others, but the origins of these more clearly intentional messages are not clear (Messinger & Fogel, 1998). We recently found that between 8 and 10 months, infants gaze at object smile, and then turn toward an interactive partner while smiling (Venezia, Messinger, Thorp, & Mundy, in press). This pattern suggests infants are sharing their positive affective reaction to an interesting object with their interactive partners. (Before 6 months, infants first gaze at their partners and then smile, often in reaction to the partner's smile.) The transition to sharing positive affect—which may herald a change in infants' understanding of others—depends on the timing of behaviors. More generally, the results suggest the importance of the temporal patterning of smiles and other expressive actions.

How does an emphasis on patterning inform our understanding of the emotional meaning of different types of smiling? There is converging evidence that strong open-mouth cheek-raise smiles are the most affectively positive and joyful. Yet one aspect of smiles—and joy—has received little attention. Facial expressions and emotional processes occur in time. But we know relatively little about their natural history. How do feelings and facial expressions begin, change, and end? We know that infant smiles with cheek raising are frequently preceded by smiles without cheek raising, suggesting that infants experience a rise in joy during the course of this smiling pattern (Messinger, Fogel, & Dickson, 1999). Understanding these patterns requires that smiles be examined in their entirety. Too often, time spent in various types of smiling is analyzed and the natural course of smiles from onset to offset is not investigated.

New automated measurement software offers a window onto the natural occurrence of smiles and other expressions. These techniques show strong concurrence with FACS and electromyographic measurements of facial muscle activity (Cohn, Zlochower, Lien, & Kanade, 1999). This software has the potential to document specific characteristics of smiles such as lip corner movement and mouth opening as they occur in time from smile onset to smile offset (Cohn, Schmidt, Gross, & Ekman, 2002). Such measurement techniques may definitively document how the strength of smiles and other facial actions is related to other potential indices of affective intensity such as mouth opening and cheek raising. Ultimately such techniques may help document how real-time changes in smiles and other expressions are related to concurrent changes in the environment. This would provide a portrait of key elements of emotional functioning as they naturally occur.

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Notes

1. A parsimonious twist is that similar features may influence perceptions of the prototypical infant negative expression, the cry-face. Cry-faces that are stronger and involve greater cheek-raising and mouth opening were perceived as more negative and distressed than cry-faces without these features.

References

- Cohn, J. F., Schmidt, K., Gross, R., & Ekman, P. (2002). *Individual Differences in Facial Expression: Stability over Time, Relation to Self-Reported Emotion, and Ability to Inform Person Identification*. Paper presented at the IEEE International Conference on Multimodal Interfaces (ICMI), Pittsburgh, USA.
- Cohn, J. F., Zlochower, A., Lien, J., & Kanade, T. (1999). Automated face analysis by feature point tracking has high concurrent validity with manual FACS coding. *Psychophysiology*, 36(1), 35-43.
- Fogel, A., Hsu, H.-C., Shapiro, A. F., Nelson-Goens, G. C., & Secrist, C. Effects of normal and perturbed social play on the duration and intensity of different types of infant smiles. Submitted.
- Keltner, D., & Bonanno, G. A. (1997). A study of laughter and dissociation: Distinct correlates of laughter and smiling during bereavement. *Journal of Personality & Social Psychology*, 73(4), 687-702.
- Messinger, D., & Fogel, A. (1998). Give and take: The development of conventional infant gestures. *Merrill-Palmer Quarterly*, 44(4), 566-590.
- Messinger, D. S. (2002). Positive and negative: Infant facial expressions and emotions. *Current Directions in Psychological Science*, 11(1), 1-6.
- Messinger, D. S., Fogel, A., & Dickson, K. L. (1999). What's in a smile? *Developmental Psychology*, 35(3), 701-708.
- Ruch, W. (1997). Will the real relationship between facial expression and affective experience please stand up: The case of exhilaration. In P. Ekman & E. L. Rosenberg (Eds.), *What the*

face reveals: Basic and applied studies of spontaneous expression using the Facial Action Coding System (FACS) (pp. 89-111). New York: Oxford University Press.

- Venezia, M., Messinger, D. S., Thorp, D., & Mundy, P. (in press). Timing changes: Anticipatory smiling rises between 8 and 10 months of age. *Infancy*.
- Yale, M. E., Messinger, D. S., & Cobo-Lewis, A. B. (2003). Facial expressions of affect: A keystone of early infant communication. *Developmental Psychology*, 39(5), 815-824.