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2 Facial Expression Learning

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8 Synonyms

9 [Emotional Expression Development](#)

10 Definition

11 *Facial expression learning.* Facial expressions are produced
12 as the muscles of the face contract, creating facial config-
13 urations that serve communicative and emotional func-
14 tions. Facial expression learning involves changes in the
15 coordination of facial muscles such that new configura-
16 tions and patterns of facial action emerge.

17 Theoretical Background

18 Facial expression learning is typically a focus of theories of
19 emotional development. These theories differ in the
20 importance they assign to innate versus environmental
21 factors, and the degree to which they emphasize change
22 in the form of facial expressions with age. Learning theory
23 argues that the development of facial expression proceeds
24 through both imitation and reinforcement. Infants, as
25 young as a couple of hours of age, appear to imitate
26 mouth opening and tongue protrusion. Early imitation
27 would allow infants to produce multiple types of facial
28 expressions that they perceive others performing. Rein-
29 forcement increases the rate of a target behavior (e.g.,
30 infant smiling) through an environmental contingency
31 (e.g., excited talking) over the course of repeated pairings
32 or trials. Imitation and reinforcement are logically
33 necessary to multiple accounts of facial expression
34 development.

35 Discrete Emotion Theory (DET) holds that the emo-
36 tions of surprise, interest, joy, anger, sadness, fear, and
37 disgust each have their own distinct facial expression.
38 After the first months of life, infants are thought to possess

the same universal and distinguishable prototypic emo- 39
tion expressions as adults. These prototypic expressions 40
are produced by affect programs. Affect programs are 41
neurophysiological mechanisms that link subjectively felt 42
emotions to facial expressions in an invariant fashion 43
across the lifespan. Changes in facial expressions are 44
thought to be due to maturation and the influence of 45
societal display rules on underlying expressions. 46

Cognitive theories of facial expression suggest that 47
newborns begin life with three primary emotion expres- 48
sions: distress, pleasure, and interest. As cognitive func- 49
tions grow in complexity across development, these facial 50
expressions become more differentiated in their presenta- 51
tion and more tightly linked to specific contexts. The 52
cognitive concepts that are necessary to develop the basic 53
emotions of surprise, interest, joy, anger, sadness, fear, and 54
disgust develop over the first 6–8 months of life and 55
consist of perceptual and representational abilities. For 56
example, the expression of anger requires the ability to 57
represent a goal and realize that the goal has been blocked. 58

Functionalist theories of emotion view facial expres- 59
sions as components of emotion. Emotion, in turn, is 60
conceptualized as attempts or readiness to establish, main- 61
tain, or change significant relations between the infant and 62
his or her circumstances (Campos et al. 2004). Facial 63
expressions, then, are part of a communicative system 64
for changing or maintaining these significant relations. 65
An extreme functionalist perspective, stemming from evo- 66
lutionary-oriented studies of animal behaviors, suggests 67
that facial expressions need not have any intrinsic connec- 68
tion with emotion. Facial expressions may or may not be 69
linked to underlying emotional processes. An infant who 70
produces a cry-face expression to obtain a desired out- 71
come may or may not be experiencing distress. Function- 72
alist theories emphasize a socialization process whereby, 73
for example, infant distress expressions in response to 74
minor mishaps might be minimized over development 75
by caregivers who ignore or discourage such expressions. 76

Dynamic systems approaches argue that facial expres- 77
sions are formed by the interface of muscular, emotional, 78
and social constituents. No individual factor is given 79
theoretical precedence in understanding the generation 80
of facial expressions nor is there a categorical distinction 81

82 between the child and their social surroundings. Both
83 intra- and inter-individual factors interface when facial
84 expressions occur. Each factor can emerge on a different
85 developmental timetable (Messinger and Fogel 2007).
86 Neonates produce Duchenne smiles (which involve
87 raising of the cheeks and constriction of the eyes) sponta-
88 neously, before these smiles occur in situations, which
89 might be associated with positive emotion and joy, such
90 as face-to-face interactions with a smiling mother. The
91 dynamic systems approach argues that emergent associa-
92 tions between a facial expression, the social context, and
93 emergent emotional feelings create attractor states.
94 Mutually reinforcing patterns of co-occurrence between
95 these elements yields stable changes in facial expressions.

96 The internalization model of emotion attempts to
97 account for the miniaturization of facial expressions with
98 age. In this account, external facial expressions initially
99 serve as social communications and are internalized as
100 emotional signals to oneself. During this process, facial
101 expressions in solitary situations become less intense and,
102 eventually, intrapsychic symbolic images are used to reg-
103 ulate behavior (Holodynski and Friedlmeier 2010).
104 Thus, an adolescent may smile to themselves about the
105 outcome of a social situation, representing their positive
106 feelings about what transpired, without actually produc-
107 ing a smile.

108 **Important Scientific Research and Open** 109 **Questions**

110 Before birth, fetuses possess the full complement of facial
111 muscles used in adult expressions and have the ability to
112 contract those muscles. Nevertheless, infants appear to
113 have a limited repertoire of facial expressions they produce
114 at birth. Newborns without prior taste experience respond
115 to sensory stimuli with specific facial expressions
116 (Rosenstein and Oster 1988). Neonates' responses to
117 a sweet liquid solution, for example, were characterized
118 by facial relaxation and sucking while responses to sour
119 and bitter solutions were characterized by actions such as
120 brow furrowing and nose wrinkling. With respect to
121 mechanisms of facial expression learning, Meltzoff and
122 Moore (1977) reported neonatal imitation of tongue pro-
123 trusion and mouth opening facial expressions, although
124 the imitative nature of these expressions is contested.
125 Careful work on the imitation of facial expressions in
126 neonates and older infants could shed light on this
127 powerful mechanism of facial expression development.

128 Beginning in the second week of life, infants exhibit
129 smiles which have a relatively mature form when they
130 involve the constriction of the muscle around the eye.
131 These smiles occur especially, but not exclusively, during

132 drowsy and sleep states and do not appear to be responses
133 to environmental stimuli. Infant smiles appear initially to
134 be responses to perceptual stimuli such as high pitched
135 sounds. With the development of more cognitively sophis-
136 ticated recognition of visual stimuli, such as the outline of
137 human face, a preference toward smiling to visual stimuli
138 emerges. Around two months of age, infants transition
139 from brow knitting expressions while engaged gazing at
140 the face of the parent, to smiles. In line with cognitive,
141 dynamic systems, and internalizations models, this real-
142 time transition may herald the developmental emergence
143 of the infant's first social smiles.

144 In the course of face-to-face interaction, infant smiles
145 develop increasingly specific associations with the social
146 context. Between one and six months, infant smiles that
147 involve both constriction of the muscles around the eyes
148 and mouth opening become increasingly more likely when
149 the infant is gazing at their smiling mother. Smiling with
150 mouth opening and eye constriction becomes an increas-
151 ingly frequent component of infants' apparently joyful
152 engagement with their mothers. Ultimately, young infants
153 appear to express positive emotion along a continuum.
154 This continuum involves linked changes in the strength of
155 the smile action, the strength of the constriction of mus-
156 cles around the eyes, and the degree of mouth opening.
157 Increases in these intensity indices are likely to be followed
158 by similar increases in the intensity of mother smiling,
159 although complete characterization of how infants and
160 mothers respond to one another's facial expressions will
161 require continued research.

162 Around 8 months, infants begin to smile at interesting
163 events and then gaze at an adult while continuing to smile.
164 This pattern, known as anticipatory smiling, suggests that
165 infants are smiling *about* the shared event. In early child-
166 hood, this patterns of gazing and smiling support increas-
167 ingly complex communicative messages that reference
168 past, present, and future events. Between 3 and 4 years of
169 age, when children are successful in game contexts and
170 when they gaze at a friendly adult or peer, they tend to use
171 stronger smiles and Duchenne smiles, which involve eye
172 constriction. However, a basic understanding of the situ-
173 ations in which children smile in childhood, and the social
174 functions of those smiles with peers and others, is still
175 lacking. One intriguing insight concerns the miniaturiza-
176 tion of expressions (Holodynski and Friedlmeier 2010).
177 Children between 6 and 8 years of age exhibit decreases in
178 the intensity of their expressions of joy and disappoint-
179 ment in situations when they are alone. As predicted by
180 the internalization theory of emotion (Holodynski and
181 Friedlmeier 2010), lower levels of expression are required
182 for children to regulate their behavior at older ages.

183 Through at least the first year of life, the cry-face
184 expression, in which the brows are drawn together and
185 the lip corners retracted, is the prototypical expression of
186 negative emotion. The intensity of negative emotion com-
187 municated by cry-faces appears to be linked to the strength
188 of co-occurring eye constriction and mouth opening.
189 These actions, which appear to index the intensity of
190 positive emotion communicated by smiles, may serve as
191 dual-purpose indices of emotional intensity, suggesting
192 a certain economical logic to infant facial expressions.
193 Infant facial expressions of fear and anger appear to be
194 variants of the cry-face and tend to be judged as distress,
195 an undifferentiated negative emotion.

196 How do facial expressions of discrete negative emo-
197 tions such as anger, sadness, and disgust develop? There is
198 evidence that between 4 and 12 months, these facial
199 expressions become increasingly associated with situa-
200 tions likely to elicit the corresponding emotions. Although
201 this suggests the early development of inter-situational
202 specificity – linkages between emotion-eliciting social cir-
203 cumstances and associated facial expressions – less than
204 a quarter of infants exhibited these emotion-expression
205 pairings at either 4 or 12 months (Bennett et al. 2005).
206 These results make clear the importance of understanding
207 the degree to which expressions of specific negative emo-
208 tions co-occur with their expected elicitors in childhood
209 and the need for research on how this development occurs.

210 A lack of clear associations between emotion-eliciting
211 circumstances and specific facial expressions also charac-
212 terizes surprise. Only about half of one-year-olds exhibit
213 a surprise facial expression involving raised eyebrows and
214 an open mouth in response to an unexpected event. In this
215 case, however, a dynamic systems account suggests that
216 associations between these facial elements of surprise
217 emerge in particular environmental conditions (Michel
218 et al. 1992) When infants open their mouths, for example,
219 when mouthing toys, they also tend to raise their brows,
220 suggesting that “surprise” expressions may emerge from
221 facial synergies involved in early oral object exploration.
222 The results highlight the importance of context in attrib-
223 uting emotion to infants on the basis of their facial expres-
224 sions. They also underscore the role of apparently non-
225 emotional movements of the face in the emergence of
226 what are typically understood as emotional facial
227 expressions.

In summary, careful research on facial expressions in 228
infancy must be paralleled by detailed descriptions of 229
older children in order to understand how links between 230
facial expressions and emotional and communicative con- 231
texts develop. A striking example of the need for such work 232
concerns the mouth portion of anger expressions, which 233
in infants involves retracted lip corners and mouth open- 234
ing. By contrast, anger in older children and adults is 235
thought to involve tightening and pressing together the 236
lips. It is not clear how this change occurs, nor is the 237
developmental fate of the open-mouth anger expression 238
known. Similarly, crying and related expressions decline in 239
childhood, perhaps particularly among boys. However, 240
the mechanisms involved in this decline and other nor- 241
mative developmental changes in facial expression are not 242
yet well understood. 243

Cross-References 244

- ▶ Emotional Regulation Regular 245
- ▶ Imitation and Social Learning 246
- ▶ Infant Learning and Development Regular 247
- ▶ Learning Human Emotion from Body Gesture Regular 248
- ▶ Learning in the Social Context 249
- ▶ Mimicry in Social Interaction: Its Effect on Learning 250
- Regular 251
- ▶ Neuropsychology of Emotion Regular 252
- ▶ Social Interactions and Learning Regular 253
- ▶ Socio-Emotional Aspects of Learning Regular 254

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