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Development of Emotions and Emotion Regulation

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CHAPTER 4

ONTOGENESIS OF EMOTIONS AND THEIR REGULATION

The most important trends in development have already been sketched in Chapter 1: (1) During ontogenesis, the corpus of emotions increases in diversity; that is, new emotions emerge. (2) However, they decline in frequency and intensity (of expression). (3) Emotions "desomatize"; in other words, their attendant expressive and body reactions can become invisible to outsiders. (4) Emotions become increasingly accessible to regulation; that is, their intensity, duration, and quality can be modified voluntarily. The idea behind the present chapter is to rank these developmental trends in ontogenetic sequence, to describe the underlying developmental mechanisms, and to present empirical findings that support the assumptions of our internalization model on the course and mechanisms of development.

Emotional action regulation. First of all, and predominantly, this chapter deals with the development of *emotional action regulation*. We prefer this term to the usual term "development of emotions," because we want to emphasize that emotions do not develop as closed entities, but only in relation to their psychological *function*: the motive-related regulation of actions. Hence, our unit of analysis is not the actual emotion, but a compound that could be described as "cause–emotion–action." This is because an emotion is a psychological system that appraises internal or external, context-related causes in terms of their significance for the satisfaction of personal motives. It triggers expressive and body reactions that are adaptive and emotion-specific. These are perceived subjectively as feelings through body feedback and related to the cause of the emotion. As a result, coping actions are (or can be) triggered that serve an individual's motives, be this by the individual himself or herself or by an interaction partner (see Sections 3.1 and 3.2).

According to this definition of emotion, it is, strictly speaking, impossible to find any emotions in the neonate; they exhibit only precursor emotions (Sroufe, 1996). Hence, when describing emotional development, the question is how do the precursor emotions in the neonate develop into the variety of functioning emotions in adulthood that exhibit two properties: (1) They can regulate not only the actions of an interaction partner but also one's own actions in a motive-serving way (function aspect). (2) The corresponding expression signs and body reactions can become internalized so that outsiders no longer perceive them, though still perceived subjectively as conscious feeling (form aspect).

Reflective emotion regulation. Secondly, this chapter also deals with the complementary process, namely, the development of the regulation of emotions through actions that we have called *reflective emotion regulation* (see Section 3.4.4). This aspect deals with how individuals acquire the ability to contain or dam undesirable consequences of their emotions and to regulate them in line with their (anticipated) motives and future expectations. This means that they are no longer directly at the mercy of their emotions and their action readinesses (Campos *et al.*, 2004; Cole *et al.*, 2004; Friedlmeier, 1999a; Thompson, 1994; Walden & Smith, 1997).

Verbal and volitional means are particularly appropriate for this emotion regulation. Examples are the anticipation of goals, verbal self-instructions, and voluntary decisions (Kuhl, 1996; Kuhl & Kraska, 1992). The child acquires these means as part of the volitional action regulation (see Section 3.4.1) that originally emerges parallel to emotional action regulation (Bloom, 1993; Luria, 1961). However, this chapter will address only those aspects of the development of *volitional action regulation* that are relevant in the present context.

We believe that reflective emotion regulation and volitional action regulation have to be taken into account in any adequate explanation of the development of the emotions (or of emotional action regulation). Otherwise, it is impossible to explain how individuals learn to master and modify their emotions over the course of ontogenesis, or how the absolute frequency and intensity of emotional episodes can decline in general.

Phases of development. Following the internalization model, the development of emotions and their regulation can be broken down into five phases:

The *first phase covers the initial 2 years of life.* In this phase, infants are faced with the task of building up a differentiated repertoire of emotions mediated by expression signs and acquiring a repertoire of coping actions within the framework of interpersonal regulation with their caregivers.

The term interpersonal regulation already marks the process within which this development is embedded. In the neonate, the single components of the emotion system (appraisal, body reaction, expression sign, and feeling) and their contextual embedment (cause, coping action) are present only in precursor forms (Sroufe, 1996). Before they can adopt their advanced form and interrelate as a functioning system, the caregiver has to add those parts that are initially lacking or undeveloped.

Caregivers have to interpret the still unfocused infant expressive and body reactions appropriately, mirror them in their own expression in the form of exaggerated expression signs, and react promptly with coping actions that serve the infant's motives. It is only then that infant precursor emotions are augmented to form completely functioning motive-serving emotions.

The infant emotion episode accordingly starts off by being distributed between infant and caregiver. We call this distribution of the system components across two persons the interpersonal form of regulation. Together, infant and caregiver are both preadapted to act as a coregulated system. This can be seen in caregivers in the form of intuitive parenting skills (Papoušek & Papoušek, 1987); and in the child, in the form of an innate sensitivity toward temporal, sensory, and spatial contingencies (Gergely & Watson, 1999) as well as the ability to engage in motor mimicry (Meltzoff & Moore, 1988). This all helps to explain why parental sensitivity toward infant behavior is crucial for successful (emotional) development. It enables neonates to develop into infants with differentiated emotions who signal their motives to their caregivers through succinct, emotion-specific expression signs, enabling the latter to react promptly with appropriate motive-serving coping actions.

This emotional action regulation in infants is, nonetheless, still organized interpersonally, because emotions continue to be directed toward the other person. As yet, emotions do not (or only sporadically) enable children to perform motive-serving actions themselves, even when they have already learned such actions. Also with regard to reflective emotion regulation, infants still depend completely on an interpersonal regulation of emotions through their caregivers. They are still unable to control their emotions in line with higher motives and, for example, delay gratification. These tasks continue to be shouldered by caregivers.

In the *second phase of development—from about the third to the sixth year of life*—children are faced with the task of reducing the comprehensive support from their caregivers and becoming capable of both *intra*personal emotional action regulation and *intra*personal reflective emotion regulation (see Sroufe, 1996; Walden & Smith, 1997). Infants who still require the support of their caregiver in every emotional episode become children who can regulate their actions independently through their emotions and volitions, just as they can, to a certain extent, already influence their emotions through their own will. In this context, we also see the emergence of the self-evaluating emotions of pride, shame, and guilt that tie the actions of the increasingly "self-aware" child to cultural norms and rules. Children no longer always just want to have their motives satisfied by others in the here and now. They learn to coordinate motive satisfaction with their social environment; to comply with cultural norms and rules of social interaction while doing this; and, when necessary, to rank motives according to their importance and to delay or even suppress their gratification.

In the *third phase of development—from approximately the sixth year of life onward*—the means of psychological regulation (the expression and speech signs) undergo a change in the form in which they are implemented for *intra*personal regulation. With increasing autonomy, children's expression and speech signs adjust to the new *intra*personal regulation function by becoming internalized: Physical expression and speech signs that can be perceived by outsiders (observer perspective) become mental expression, and speech signs that, in the extreme case, can still be perceived only by the individual alone (actor perspective). Audible taunts and curses become silent ones; a visible smile becomes an inner, micromomentary one; audible speech becomes inner speech. One cannot say that expression and speech signs disappear; they become internalized. A mental level of expression, speech, and action emerges. Children develop "as-if" feelings (Damasio, 1994); that is, feelings that no longer refer to body feedback over real expressive and body reactions but to their somatosensory representations (see Section 3.1.2).

Two conditions have to be met before such internalization can occur: First, the expressive and body reactions do not have an instrumental function but (continue to have) a semiotic regulation function. They serve only as inner signals communicating the triggered emotional action readiness to the individual so that he or she can select appropriate coping actions. Signs can change their form without thereby losing their action-regulating function—something that instrumental reactions cannot do (see Section 3.3.2). Second, the child must be able to distinguish explicitly between subjectively perceivable feeling indicators and real expressive and body reactions. Only then is the child also able to interpret *mental* expression signs as sufficient indicators of a feeling and be guided by them. Acquiring conceptual knowledge about emotions thus becomes an integral component of emotional development.

Such an internalization of the psychological means of regulation leads to a further optimization of action regulation. It economizes the course of action: Just as one can think an idea more quickly and with greater complexity than one can put it into words (see Vygotsky, 1934/1987), one can feel an emotion more quickly and with greater complexity than one can put it into expressive and body reactions. Furthermore, it permits an optimization of expression control. When one can feel one's emotions by means of *mental* expression signs, one can adapt their externally visible expression to culture- and situation-specific affordances without impairing the motive-related content of one's feeling. These mental expression signs also make it possible to use emotions to "color in" thoughts over future action scenarios and thereby evaluate them in motivational terms.

The *fourth phase of development* covers *adolescence*. The task now is no longer just to anticipate and regulate one's actions and emotions with regard to the present and the near future, but to develop the ability to extend this self-controlling competence into the distant future as well. This means to evaluate one's actions in the here and now in terms of their consequences for satisfying motives in the future—and to decide and act accordingly. A classic example is accepting the need to spend more time on learning and less on leisure in the here and now in order to obtain good school-leaving qualifications in the future.

The expression of emotions is adjusted increasingly more finely to the specific interaction partner and context, and emotional events are recognized increasingly clearly as a part of the self. Hence, being able to accept one's own feelings is important for the development of self-esteem. At the same time, the pressure of socialization increases as the evaluation of emotional reactions by others, particularly by peers whose recognition is so important for adolescents, becomes important for individual development. Because not enough work has been done on the adolescent phase in the internalization model, it is not discussed further in this chapter.

The *fifth phase of development* encompasses *adulthood*. Adult emotions and the reflective way in which adults regulate them provide the standards for emotional development. These are the targets for the more or less conscious emotional upbringing of the offspring in a society. Hence, the outcome of emotional development needs to be displayed particularly succinctly in adults if studies on adults are also to be appropriate for testing the hypotheses on advanced emotional action regulation and reflective emotion regulation in the internalization model. We shall test these in the present chapter in terms of the model assumption that expression signs become internalized and a mental representation level of emotional regulation emerges (the so-called as-if feelings).

How far the emotions of adults and their regulation vary from culture to culture, and along with them the focuses of childrearing and socialization processes, will be considered in more detail in Chapter 5. In the present ontogenetic chapter, the standards for our model assumptions are given by adults in western cultures, particularly the Anglo-American and European cultural frames.

As the socioemotional selection theory from Carstensen (1993) as well as the life-course theory of control from Heckhausen and Schulz (1995) suggest, the functional ability of emotional action regulation, and of reflective emotion regulation in particular, is retained until advanced old age, because the sign mediated forms of regulation seem to be independent from processes of physical decline. Nonetheless, they can be impaired through processes of physical degeneration in the brain.

We shall only sketch this phase, because our research focuses on the first to third phases, and, up to now, hardly any studies have addressed emotional development in adulthood (see Carstensen, 1993; Magai & McFadden, 1996).

Structure of the sections. This chapter is divided into five sections that follow the course of ontogenesis. They will give more detailed arguments in favor of the individual assumptions and add empirical support, also in the form of our own studies. After presenting the ontogenetic starting level (Section 4.1), we shall describe the first phase of development involving the formation of a sign mediated

interpersonal regulation between child and caregiver (Section 4.2). This is followed by a description of the second phase involving the emergence of intrapersonal regulation (Section 4.3). Then, we shall sketch the internalization of the mental means of regulation in intrapersonal regulation as the central topic in the third phase (Section 4.4). Finally, we shall take a look at further development in adulthood (Section 4.5).

It has to be pointed out that the following sections present a developmental theory under construction that is not yet finished. They represent an attempt to integrate the conclusions drawn when discussing the emotion paradigms in Chapter 2 into one coherent model. The main goal is to emphasize general and prototypical features in the development of emotions and their regulation in each phase. Because the majority of concepts and findings come from the United States and Europe, this chapter is restricted to western culture. As mentioned above, the cultural perspective will be elaborated in Chapter 5.

4.1. PREADAPTATION OF INFANT AND CAREGIVER

The ontogenetic starting level of emotional development can be viewed as a reciprocal preadaptation of competencies in the neonate and the caregiver adapted to ensure the step-by-step development of the emotion system. We shall not consider intrauterine development here (see Brazelton, 1983). This starting level is the product of phylogenetic development that, in humans, is adapted in favor of a cultural environment. It is also genetically anchored and, finally, monomorphic in the sense that it is a given for all human beings. These two aspects are often equated with the term "innate," with the attendant conclusion that any competencies not already present at birth must be exclusively learned and hence culturally determined (see Ratner, 2000).

Griffiths (1997, pp. 55–64) presents a detailed discussion on the unacceptability of this simplified duality of "innate" versus "learned." Even when the complex interactions between genetic endowment and environmental influences have scarcely been explored up to now, prior research does support the conclusion that the psychological processes emerging later in ontogenesis, such as language acquisition or a set of basic emotions, may also have a genetic basis and belong to the universal endowment of each human being. However, their acquisition requires specific experiences and learning inputs that are generally made available to the individual by the species-specific social environment, and their innate species-specific potential is preadapted for this social environment (see Griffiths, 1997).

According to Prechtl (1993), human babies are "physiologically preterm." In terms of neurophysiological maturity, they are far less developed than the newborns of our closest relatives among the mammals. One consequence of this shortening of intrauterine development is that newborn humans have very retarded and immature

motor abilities (see Thelen, 1984). They are unable to perform the necessary actions to satisfy their own needs. This is why newborn humans are dependent on caregivers who feel obliged to respond to their emotional expression and ensure the satisfaction of their needs.

Babies compensate for this immaturity in motor abilities through a special adaptation to an interpersonal action and emotion regulation made up of innate precursor emotions and sensorimotor competencies. This is augmented by caregivers who are equipped with intuitive parenting skills that are fine-tuned to the competencies of the newborn and permit a progressive development of the infant within the framework of interpersonal regulation. This will be explained in more detail in the next section.

4.1.1. The Emotions of the Neonate

In terms of our systemic definition of emotion (see Section 3.1), strictly speaking, no fully functioning emotions are to be found in the neonates. They possess only the precursor emotions (Sroufe, 1996) that can form the basis for interpersonal regulation to start. These precursor emotions are triggered by absolute physical stimulus thresholds and not by any attribution of meaning (see, however, Soussignan & Schaal, 2005). Expressive and body reactions are still not coordinated with the cause of an emotion and its situational context. In part, they are still reflex-like. For example, Galati and Lavelli (1997) asked adults to view videotapes of neonates in five emotionally different situations (before feeding, forced movement, in mother's arms, detaching from mother, inoculation). They found that the adults could rate the neonates' facial expressions correctly only on the global dimensions of activation and valence. They were unable to rate them according to the situation or the specific emotion quality.

Caregivers augment the infant precursor emotions and form functioning emotions that serve motives by interpreting the still unfocused infant expressive and body reactions in a motivationally appropriate way, mirroring them in their own expression in the form of exaggerated expression signs, and reacting promptly with coping actions that serve infant motives. The expressive and body reactions of the infant in interplay with the interpretations, expression signs, and coping actions of the caregiver form a preadapted interpersonal unit.

The precursor emotions distress, disgust, and fright as well as interest and endogenous pleasure can be observed consistently in neonates (see Izard, 1978). The main purpose of the first three precursor emotions is to signalize need-related deficit states or impairments of physical integrity, whereas the main purpose of interest and pleasure is to build up psychological representations of the external and internal environment (Sroufe, 1996).

Distress and crying. Distress is initially an emotion with no specific motive that is triggered by a deficit state, for example, a lack of food, physical integrity

(hypothermia, pain, overstimulation), or external stimulation (body contact, sensory arousal) (Lester, 1984; Papoušek, 1989). The typical expression and body reaction is initial motor unrest followed by an unfocused crying that slowly increases in volume plus a rectangular open mouth with closed eyes. The quality of crying initially contains no indication regarding the cause of the emotion (Lester, 1984; Malatesta, 1981b). For the caregiver, it functions exclusively as a sign. Motor immaturity obliges the infant to draw the caregiver's attention to his or her need. Accordingly, the caregiver perceives the infant's crying as a directed appeal for help. It triggers measurable psychophysiological arousal (Boukydis & Burgess, 1982), an urge to seek the cause of the crying and remove it, as well as a number of intuitive actions designed to calm the infant (Papoušek, 1990). Accordingly, an infant's cries serving as an appeal for help and the caregiver's feeling of having to respond to this appeal form a preadapted unit.

Disgust and nose wrinkling. Disgust can be triggered by a bitter or an acidic taste (Fox & Davidson, 1984, p. 365; Soussignan & Schaal, 2005; Steiner, 1977; see also Rosenstein & Oster, 1988). The underlying reflex is gagging (Fridlund, 1994). The characteristic expressive reaction is to drop the lower lip, raise the upper lip, and wrinkle or screw up the nose—as elicited in spitting by opening the mouth and sticking out the tongue (see Izard, 1979, p. 73). The intrapersonal function of this expression is instrumental and serves to eject unpleasant foodstuffs. However, caregivers may interpret the expression of disgust as a sign indicating, for example, that they should stop feeding or switch to another foodstuff.

Fright and starting. Fright particularly follows a loss of balance, but also other abrupt and strong stimulus changes such as a sudden noise. Its underlying form is the Moro reflex. Although Prechtl (1993) assigns it no further instrumental function, it does possess a sign function for caregivers. In itself, fright is closer to a reflex in classification (see Ekman *et al.*, 1985). However, it serves as the starting point for the emotion of fear (Sroufe, 1996). If an abrupt or strong stimulus change persists, as in, for example, a sudden dunking in water when bathing, it is joined by characteristic expressive reactions of fear, such as a widening of the eyes as a sign of sympathicotonia, an A-shaped mouth, and clenching fists (Papoušek & Papoušek, 1999, p. 151). Should overstimulation persist, the reaction will shift to crying as a sign for distress.

Interest and focused attention. Interest can be viewed as a motive-specific emotion triggered by the novelty of an external stimulation. It serves the search for contingencies in the perception of the environment. This active exploration behavior is assigned an independent motivational basis, namely, that of curiosity (Hunt, 1965). Here as well, the "novelty" of a stimulation is linked initially to physical stimulus properties, namely, ones that elicit marked sensory contingencies. These particularly include the "speaking" and slowly moving face of a person holding the baby in his or her arms (Langsdorf, Izard, Rayias, & Hembree, 1983). The underlying reflex for interest is the orienting response (see Sokolov, 1963).

Characteristic expressive reactions are a turning toward the source of the stimulus, visual fixation, inhibition of unfocused motor activity, and, at times, an open mouth (Langsdorf *et al.*, 1983). These expressive reactions possess the instrumental function of priming the sensory system to analyze what is new. Their interpersonal semiotic function is to signal receptivity for information intake to the caregiver (Malatesta & Wilson, 1988).

Interest is absolutely crucial for the development of psychological representations of the internal and external environment and for their introduction by caregivers. Sroufe's tension modulation hypothesis (Sroufe, 1996) presents a model of how interest, pleasure, and distress interact with the help of caregivers to form psychological representations. The model proposes that every processing of novel stimulation generates not only the reactions mentioned above but also a tension (see Berlyne, 1969) that raises muscle tonus to just below the ceiling of tolerable stimulation. Papoušek (1967) reports that operant learning in babies is also accompanied by heightened tension and clenched fists before a stimulus-reaction contingency is formed. Physical agitation and tension signal the threshold of external stimulation to caregivers with the appeal to reduce stimulation before it turns into distress. If, in contrast, the infant can assimilate the stimulation, it leads to relaxation accompanied by a smile.

Pleasure and smiling. Whether neonates already possess the ability to react with the emotion of pleasure is a matter of some controversy. In contrast to the other precursor emotions addressed here, pleasure does not exhibit any coincidence between the typical expression sign for the emotion—the smile—and an externally observable cause. In neonates, smiling occurs during REM sleep (Emde & Koenig, 1969). This led Fogel and Thelen (1987) to conclude that smiling might still possess no function and not yet be associated systematically with motivation states. In contrast, Sroufe's tension modulation hypothesis (Sroufe, 1996) offers an explanation that can integrate existing theories and findings on smiling and laughing (see Rauh, 1995) into one consistent theory.

According to Sroufe's model, endogenous smiling is already the outcome of a relaxation reaction marking the completion of a tension–relaxation cycle. In the neonate, however, this cycle is still set in motion by subcortically generated tension. Nonetheless, the relaxation–smile reaction is designed to be triggered by a striving toward the assimilation of external stimulations, and thus to provide an emotional marker for the end of the successful construction of psychological representations (see Kagan, 1971; Sroufe, 1996). Pleasure serves to keep the infant oriented toward the situation to be learned. At the same time, smiling signals to caregivers that the infant is feeling good and that they should allow the situation to continue or even repeat it (see Malatesta & Wilson, 1988). Different positive emotions like pleasure, joy, delight, and pride can be classified as a function of the level of this assimilation and the expression and body reactions accompanying it (Sroufe, 1996, p. 68).

Feeling as an unfocused body sensation. Along with the components of appraisal, expression, and body reaction mentioned above, a complete emotion system also requires the feeling component. However, two problems emerge when trying to ascertain whether neonates can already feel: a methodological one and a content-related one.

The *methodological problem* is that, by their very definition, feelings cannot be measured objectively, because they are the subjective representation of one's personal emotional state. Only the actor can report on this, providing he or she possesses the necessary symbolic means of communication. However, such a communication is not identical to the feeling. It is only its subjective reconstruction with the help of signs. Because the neonate (and also the young infant) still lacks command of symbolic means of communication, this methodological approach is not available.

Nonetheless, the internalization model proposes a second indirect way to tap feelings. A feeling is defined as proprioceptive and interoceptive feedback over expression and body reactions (see also the Differential Emotions Theory formulated by Izard & Malatesta, 1987). Therefore, for a neonate to be able to perceive a feeling, the neural afferences of expression and body reactions would have to function already at birth and elicit corresponding feedback sensations in the somatosensory areas of the brain. However, we are unaware of any research findings on this topic.

The *content-related problem* concerns what is understood precisely by the term "feeling." We have defined a feeling as becoming subjectively aware of the emotion-specific expression and body sensations directed toward the cause of an emotion (see Section 3.1.2). According to the available findings (see Sroufe, 1996; Stenberg & Campos, 1990), the above-mentioned expression reactions of crying and the first endogenous smiling only swell up and subside slowly, and their focus on the cause of the emotion is only rudimentary (Malatesta, 1981b). Hence, the feeling is probably the visceral and proprioceptive sensations related to the triggered body reaction and expression. This is not the same as a characteristic feeling for adults: a "becoming aware" in the sense of a categorically organized feeling focused on a cause that can be used to monitor the course of the emotion and that allows coping actions to be triggered. As Gergely and Watson (1999) state:

> The set of internal (visceral as well as proprioceptive) cues that are activated when being in and expressing an emotion state are, at first, not perceived consciously by the infant, or, at least, are not grouped together categorically in such a manner that they could be perceptually accessed as a distinctive emotion state. (p. 110)

One can imagine this as being analogue to the perception of the external environment: Of course, neonates perceive their external environment, but not as categorically grouped together objects but as a relatively unorganized bundle

of sensory impressions with only a few preformed perceptual contingencies (see Stern, 1992, pp. 74–82). This means that neonates may well have a subjective representation of their emotional state, but only in the form of unfocused body sensations. Section 4.2.1 will describe how these body sensations are transformed into an emotion-specifically organized feeling that is related to a cause.

4.1.2. Sensorimotor Abilities for Engaging in Interpersonal Regulation

The facial expressive reactions for precursor emotions are joined by a number of further facial expressions that babies exhibit predominantly during REM sleep. These show similarities to the prototypical facial expressive reactions of surprise (raised eyebrows), sadness (pouting mouth), and anger (frowning), but are very fleeting. Malatesta and Haviland (1982) ascertained that the facial expressions of 3-month-olds change, on average, every 7 s, and they concluded that infant emotions are very unstable. However, this interpretation is questioned by the finding that these expressive reactions do not covary consistently with external causes of emotions (Camras, 1992). Moreover, the expressions of anger and sadness cannot be distinguished reliably from global distress reactions (Oster, Hegley, & Nagel, 1992). Hence, although these expressions follow an innate motor pattern, they do not yet serve as emotional expression symptoms in the baby's behavioral organization. They acquire this function only through interpersonal regulation during the course of the first year of life (see Camras, 1992; Fogel & Thelen, 1987; Lewis & Michalson, 1985).

Further sensorimotor abilities in the neonate reveal a special preadaptation for face-to-face interaction with responsive caregivers. For example, a neonate's field of visual perception starts off by being specialized for human faces: Initially, babies can see clearly only at a distance of 20–25 cm, and they exhibit a preference for face-shaped forms (Umiltá, Simion, & Valenza, 1996) as well as objects that move slowly enough for them to track them (see Brazelton, 1983). Their hearing favors the frequency range of human speech or slightly higher, and their favorite sound pattern is the human voice (Papoušek, 1994).

Sensitivity for contingencies. Babies also possess a special sensitivity for temporal, sensory, and spatial contingencies as well as an active interest in searching for them (Stern, 1992, pp. 66–68). Gergely and Watson (1999) assume babies must have a so-called contingency detection module. Detecting such contingencies in one's perception of the internal and external environment and exploiting them for one's own behavioral organization form the elementary building blocks for the many-layered mental representation of the world that the baby builds up successively. Nonetheless, there is controversy over whether sensory contingencies actually need to be "detected" through repeated contingent experience. Indeed, babies prove to be capable of amodal perception. This enables them to translate

input to one sensory modality into another sensory modality and to assign the corresponding sensory impressions to this second modality without having had to experience an actual contingency between the two modalities (Meltzoff, 1981; Meltzoff & Borton, 1979; Stern, 1985).

Motor mimicry. One particular form of this amodal perceptual ability is *motor mimicry*. Even neonates are able to imitate the facial expressions of their caregivers such as sticking out their tongues or opening their mouths and also their head movements (Meltzoff & Moore, 1988, 1989). Field, Woodson, Greenberg, and Cohen (1982) were even able to demonstrate that 2-day-old neonates can imitate facial expressions for emotions, namely, smiling, frowning, and pursing their lips. Hence, neonates can translate visually perceived motor patterns into the appropriate proprioceptive ones.

Hatfield, Cacioppo, and Rapson (1994) assume that motor mimicry is a primitive mechanism through which individuals can "catch" feelings from their interaction partners without having to be exposed to the "real" cause of an emotion. The mechanism is "primitive" insofar as motor mimicry generally occurs without conscious awareness. Furthermore, it does not need to assume any cognitive processes in the sense of perspective taking, namely, that individuals place themselves in the situation of the other in order to experience the other's emotion.

We assume that motor mimicry plays a major role in the differentiation of emotions through interpersonal regulation. It makes it possible to synchronize the expression signs transmitted between caregiver and infant with their corresponding proprioceptive body sensations (see also Saarni *et al.*, 1998), and, hence, to assign expression signs to specific emotions.

This ability to engage in motor mimicry corresponds to a complementary ability in caregivers to mirror their babies' expressive reactions in their own expression, and to use exaggeratedly succinct expression signs in their interaction in order to regulate their babies' behavior. These aspects will be addressed in more detail in Section 4.2.1.

At the present time, research is still unable to state whether the motor mimicry of emotion-specific expression signs can already trigger the corresponding feelings in the baby, or whether this is initially only a motor imitation that does not lead to an emotional contagion until the corresponding emotions have formed.

The only clear-cut case in which neonates already catch the feeling of others does not seem to be triggered by motor mimicry: When neonates are exposed to the crying of other neonates, they start to cry themselves (Sagi & Hoffman, 1976; Simner, 1971). The crying of other neonates proves to be particularly catching compared with other forms of crying such as the baby's own cry, that of older infants, or that of a chimpanzee (Martin & Clark, 1982). This trigger specificity would seem to indicate that the crying of other neonates is an unconditioned trigger stimulus for distress crying (see also Thompson, 1987). Although one could imagine that babies would find their own crying particularly easy to imitate well, they do not do this. Moreover, it seems to be functional to cry particularly intensively when other neonates are crying to ensure that one gets more attention from one's caregiver than the other neonates do.

Precursor strategies for regulating emotion. Precursor strategies of *emotion regulation* that can be observed at birth are sucking (Blass & Ciaramitaro, 1994) and looking away from an overwhelming source of stimulation (see Mangelsdorf *et al.*, 1995). The latter serves to control arousal when an interesting source of stimulation cannot be assimilated adequately. Both behaviors calm the infant within a limited arousal range. When the strength of internal or external stimuli exceeds this range, interpersonal regulation has to be performed by the caregiver.

4.1.3. Intuitive Parenting

The child-nurturing and -rearing activities of parents, or, in general, caregivers, can be viewed as a necessary and development-promoting complement to the still incomplete action regulation of the baby. Caregivers are preadapted for this complementary task. When observing the interaction between babies and parents, Papoušek and Papoušek (1987) found that parents competently perceived important signals from their babies and reacted appropriately, even though they were unable to provide information on their reactions in subsequent questioning. The authors concluded that such interactions represent a biologically determined foundation of parental competence composed of numerous intuitive behaviors.

Such intuitive parenting does not just cover the ability to attend to the baby's current needs but also an ability to enable babies to experience contingencies both in their interaction with the material environment and in interpersonal emotion regulation. Papoušek and Papoušek (1999) describe three different processes in which parents apply a variety of skills.

Parents as coregulators of infant emotions. Parents register the state of their baby and his or her readiness to interact, and they adjust their facial, vocal, and gestural behavior accordingly. For example, they test muscle tone by opening the baby's mouth or hands. Lax tone indicates that the baby is tired. Parental sensitivity, that is, being able to interpret expressive reactions adequately as feeling indicators and to react promptly with appropriate coping actions, is essential in this process. Such skills also include the direct regulation of infant emotions by maintaining an optimal level of arousal in the infant through appropriate activation or calming.

Infants are generally receptive to distracting coping actions by their caregivers designed to ameliorate crying and physical agitation. Hence, seeing a face, listening to a voice, and having one's freedom of movement restricted during physical agitation by being taken into the caregiver's arms and cradled has a calming effect on the baby's psychological arousal modulation. Vice versa, by performing the same stimulations more intensively, parents can heighten their baby's arousal.

Parents' use of emotional expressions to direct infant behavior. In the way they speak and express themselves, parents provide the baby with models and encourage imitative behavior by reacting contingently with positive emotions. Because of the contagious effect of parental expression on feeling, a comparable emotional reaction can be triggered in the baby, so that the emotional expression of the parents serves to reinforce infant behavior. The use of succinct expressive reactions in interpersonal regulation by overexaggerating facial expression or voice modulation in baby talk is a particularly important means of expression that lead to emotional contagion and the transformation of expressive reactions into expressive reactions and conscious feelings. These processes will be discussed in Section 4.2.1.

The role of the infant's emotional expression to direct parental behavior. Positive feedback signals in response to parental interventions such as visual attention, smiling, quiet cooing, or snuggling up serve as a reward and as a source of positive emotional experiences for the parents and reinforce their competence. By doing everything they can to elicit positive reactions while avoiding and ending negative ones, they focus themselves intuitively on the needs of their baby and encourage his or her learning behavior. This is the way in which the baby's emotional reactions and intuitive parenting join together in a positive feedback loop.

4.1.4. Summary

Neonates enter the world with a repertoire of emotion-relevant abilities. They possess a number of emotional expressive reactions that provide a congruent display of their current needs, an interaction-specific sensorimotor ability (of which motor mimicry is a particularly important aspect), and the ability to engage in contingency formation. However, these basic abilities permit only an extremely limited *intra*personal regulation. Nonetheless, babies are very well equipped for an *inter*personal regulation through contact with a social environment that can interpret their expressive reactions appropriately and react with motive-serving actions.

Inspection of the *form* of the expressive reactions used by neonates shows clearly that they start off as global, undifferentiatedly positive or negative reactions that are not directed toward any specific object. In part, they swell up and subside slowly (except fright), and do not yet possess any *specific* appeal. These unfocused and undifferentiated expressive reactions form the starting point for the further differentiation of the emotion components. One of the tasks of caregivers is to interpret unfocused signs as an appeal, to use their own initiative to ascertain the reason for distress or a smile, to remove the cause of distress, and to repeat or allow to continue the cause of smiling.

Within this process, caregivers do not just interpret infant expressive reactions as personally directed appeals and react to them with appropriate care. They additionally try to maintain the baby at a level of arousal that is optimal for learning. They make it possible for the baby to experience temporal, sensory, and spatial

contingencies that represent the elementary building blocks of psychological representations, and they mirror the infant expressive reactions in their own expression in succinct and prototypical ways so that the baby will also experience contingencies between expression and feeling (see Gergely & Watson, 1999; Stern, 1985). They adapt their communication intuitively to the baby's perceptual limitations described above by reducing its complexity and making the message so succinct that it can elicit contingent reactions in the baby. The unthinking nature of this impressive array of skills led Papoušek and Papoušek (1987) to talk about intuitive parenting.

4.2. THE EMERGENCE OF SIGN-MEDIATED REGULATION IN INFANCY

4.2.1. The Emergence of Sign-Mediated Emotion Systems

In the first phase of infant development, children have to master two tasks through *interpersonal* regulation with their caregivers: (1) to build up differentiated emotion systems mediated by expressive reactions such as frustration, anger, sadness, joy, fear, or embarrassment; and (2) to acquire a repertoire of (coping) actions.

Whereas caregivers still have to complement the neonate's precursor emotions to form functioning emotions, interpersonal regulation optimizes all emotion components (appraisal, expression, body reaction, and feeling) and their interplay in a way that leads to the emergence of differentiated, sign-mediated emotion systems in infants. These systems enable infants to take over an increasingly equal share of interpersonal regulation while orienting and guiding their caregivers precisely and promptly toward satisfying infants' motives. Intuitive parenting plays a crucial role in this process.

Nonetheless, infant emotions continue to be focused on the other person. They do not yet (or only sporadically) allow infants to autonomously select and apply previously learned actions to satisfy their motives. Emotional support also continues to be important for them.

In the following, we shall use the internalization model to derive three postulates describing the mechanisms involved in the development of the emotion components.

First Postulate: The Processes That Differentiate the Appraisal and Expression Components are Interdependent

The differentiation of appraisal patterns is interwoven with their corresponding expression and body reactions. These processes are embedded within the interpersonal regulation between caregiver and child. Through sensitive and prompt nurturing, caregivers create contingencies between the elicitors (causes) of an

emotion, their baby's expression and body reactions, their own interpretations in terms of motives, and their own actions to deal with these motives. This is how the components become integrated into cause-specific, functioning emotion systems.

Differentiation of appraisal patterns. Functionalistically oriented emotion theories consider the development of meaning-dependent appraisal patterns to be the driving force behind the emergence of new emotions (see Barrett & Campos, 1987; Sroufe, 1996; Tangney & Fischer, 1995). In meaning-dependent appraisal patterns, a relation is established between features of the situation and the motive-relevant expectations and interpretations that the individual infant has built up through his or her interactions with the environment (see Sroufe, 1996, pp. 56–57). This transforms the neonate's precursor emotions (distress, disgust, fright, interest, and endogenous pleasure), triggered by crossing the thresholds of internal or external key stimuli, into "real" appraisal-guided emotions triggered by the personal meaning of the perceived stimulus.

Hence, these functionalistic theories focus on identifying the decisive developmental milestones in the construction of infant meaning structures and testing whether these meanings are accompanied by the emergence of the corresponding emotion in the infant's repertoire (see Dickson, *et al.*, 1998, pp. 254–255).

One of the first developmental milestones is when babies recognize contingencies in the flow of incoming external stimuli. Generally, this is recognizing the caregiver in face-to-face interaction. Sroufe's tension modulation hypothesis (Sroufe, 1996) proposes that this recognition is preceded by a phase of effortful assimilation of the incoming stimuli. This increases internal tension and triggers relaxation and a smile at the moment of recognition. It keeps the baby oriented toward the situation and encourages the caregiver to continue or repeat the stimulation. Sroufe describes this emotional state as "true" pleasure. For Sroufe, the onset of *social* smiling marks the turning point at which it is no longer the stimulus properties themselves that are the essential cause of pleasure, but their meaning for the baby. With increasing experience, the baby also recognizes other contingencies such as the visual and auditory contingency of a ringing bell ball. Its perception and recognition then also generates a tension–relaxation cycle that leads to a smile directed toward the toy.

Hence, functionalistic theories explain the emergence of new emotions exclusively through the formation of contingencies between prior cause, learned meaning structures, and subsequent action. Expression and body reactions are involved only insofar as they are used as indicators for the underlying appraisal pattern. This is because appraisal patterns cannot be observed directly, and they are, by definition, psychological processes (Barrett, 1998). Hence, methodologically speaking, expression and body reactions are conceived exclusively as *dependent* variables that are *caused* by the prior appraisal pattern. As a result, they are unable to make any contribution to the differentiation of appraisal.

Differentiation of the expressive reactions. The *internalization model*, in contrast, assumes that the *emergence* of the appraisal pattern is linked inseparably to the differentiation of the expression and body reactions. Naturally, in adult emotions, the appraisal process precedes expression and body reactions, and so one can talk about a cause–effect relation. However, when new emotions are *emerging*, effects tend to be reciprocal. The impact of the baby's casually displayed expressive reactions on the nurturing behavior of the caregiver can also be the trigger for the formation of a new appraisal pattern.*

This can be illustrated by smiling: Intuitive parenting leads caregivers to seek contact with their baby from the very onset. The first and easiest way to do this is to position oneself so that mutual gaze contact becomes possible. However, caregivers do not simply observe their baby passively, but talk and smile in order to provoke a reaction. Because neonates are also already able to imitate facial expressions (Field *et al.*, 1982), the first smile directed toward the caregiver may well arise as a result of imitation rather than the formation of a contingency. Hence, it may be a smile without any internal tension–relaxation cycle. For caregivers, however, baby's first smile is an outstanding event. Many mothers report feeling a complete personal and positive bonding with their baby only after intensive eye contact and the beginnings of a smile (Robson & Moss, 1970). As a result, they will mark such events contingently by increasing their own smiling and vocalizations. This establishes ideal conditions for the infant to build up contingencies and initiate the tension–relaxation cycle of pleasure with "real" smiling.

One finding supporting such a bidirectional influence of expressive reactions is that smiling does not emerge as a prompt on–off reaction during the first weeks of life. It starts in the neonate as a gentle lifting of the corner of the mouth that appears only after a delay of about 7 s following the cause and, at times, with eyes closed. It is only in the 3-month-old that it develops into an active grinning with vocalization (cooing) that follows the cause promptly and is directed toward it (Sroufe, 1996, p. 81). Throughout these 3 months, there are countless face-to-face interactions in which caregivers smile at their babies and create opportunities not only for detecting contingencies but also for motor mimicry.

It is particularly expressive reactions that develop rapidly in the first 2 years of life. Not only do new expressive reactions emerge, their dynamics and their reference to a context also become better organized, more focused, and more prompt.

Stenberg and Campos (1990) have depicted a comparably continuous development of expressive reactions for anger in a study of 1-, 4-, and 7-month-old babies whose arms were restrained in order to induce a negative emotional reaction. One-month-olds reacted with a series of undifferentiated negative facial

*Adults may also be confronted with completely new kinds of situation for which no clear appraisal are yet available to be triggered. Then, the appraisal patterns may be a product of the expression and body reactions elicited and the subsequent effects experienced.

expressions before starting to cry. Their gaze was unfocused. In contrast, 4- and 7-month-olds exhibited a clear expression of anger (drawn eyebrows, open rectangular mouth, sometimes narrowed eyes). At the beginning of restraint, their gaze was directed toward the hand or the face of the person restraining them. Hence, they already localized the source of discomfort. Whereas 4-month-olds kept their head directed toward the face or the hand of the person restraining them, 7-month-olds shifted their gaze toward their attendant mothers—a possible call for assistance. Their anger expression had acquired a socially directed appeal character. In another study of 5- to 12-month-olds, Camras, Oster, Campos, Miyake, and Bradshaw (1992) observed that whereas anger expression still took some time to build up in 5-month-olds, 12-month-olds responded promptly to having their arms restrained.

We can summarize the development of expressive reactions as follows: The unfocused, in part, still unorganized expressive reactions of the neonate, which require some time to build up, turn into emotion-specifically organized expressive reactions that are directed toward a cause. These follow the cause promptly, are fine-tuned to their context in terms of timing and focus, are supported by coordinated body reactions, and can purposefully trigger motive-serving coping actions—generally, in the caregiver.

Expression signs as mediators between infant and caregiver. The reciprocal influencing of appraisal patterns and expression reactions is generated by the special context in which infant emotions develop: *interpersonal* regulation with the caregiver. Fogel (1993) talks explicitly about coregulation, thereby stressing the interdependence of infant and parent behavior.

Babies build up their emotion-specific appraisal patterns not just in a physical but also in a semantic space in which their emotional experiences are mediated by the interpretations of caregivers. Infant expressive reactions play an important role in the emergence of these interpretations—and not just as instrumental adaptation reactions to the physical environment, but also as indexical and iconic signs that appeal to the caregiver (see Section 3.3.3). Caregivers infer their baby's emotions and intentions through the coincidence of situational features, knowledge of their baby's character, and his or her current expression and body reactions, and they respond with actions that are coordinated with this *interpretation* of their baby's expression. In turn, they infer the success or failure of their interventions from the course of the baby's expression and body reactions. In attachment research, this coregulation is called (maternal) sensitivity (Ainsworth, Blehar, Waters, & Wall, 1978).

Nonetheless, it is not just any combinations of appraisal pattern and expression sign that can be generated in this process of coregulation between baby and caregiver. To a large extent, expressive reactions are coded *iconically*; in other words, they are similar to the action readiness triggered by the appraisal pattern (see Section 3.3.3).

For example, the perception of a goal blockage by another person (anger appraisal) requires the following expression and body reaction: the mobilization of those physical powers needed to engage in an aggressive confrontation. This also includes instrumental acts such as scratching and biting that even infants apply to persuade their opponent to stop blocking their goal. Instrumental acts of aggression can then lead to the emergence of iconic threatening gestures that signal a readiness to fight in the hope that one's opponent may perhaps back down. Hence, raising muscle tone is more appropriate as an anger-specific body reaction than relaxing it. Likewise, iconic expression signs for acts of aggression such as teeth baring or fist clenching are less likely to be misinterpreted in this context than iconic expression signs of appeasement such as smiling or cowering.

We assume that the form in which expression signs are coded as icons and the instrumental usefulness of many body reactions impose limits on how expression signs and appraisal patterns can be combined. Such limits can also explain why some facial expressions are interpreted and used in the same way across different cultures. However, this does not imply that such expression signs have not been learned (or fine-tuned) originally in interpersonal regulation.

Compared with this relationship, that between speech signs and the concepts they describe is obviously arbitrary, because speech signs are coded symbolically; in other words, sign and concept are combined on the basis of convention (see Section 3.3.3)—with the exception of onomatopoeic words such as "bow wow" for a dog.

In interpersonal regulation, caregivers can react to expression signs in their baby (such as crying) that possess an unequivocal emotion-specific anchor. However, they can also make emotion-specific interpretations of expression reactions that are exhibited more or less randomly, and then perform what they consider to be appropriate coping actions—as in the example of the baby's first smiling reaction (see above). Because the initially accidental expression reactions of the baby make an appeal to the caregiver who then reacts to them contingently, the expression sign can also serve as an incentive for the formation of appropriate emotion-specific appraisal patterns, or both components may reinforce each other in the sense of a positive feedback loop.

If the caregiver then reacts sensitively, promptly, and consistently to the baby's expression signs, temporal contingencies will emerge from the baby's perspective between cause, own/other appraisal, own expression, and actions by others. Certain expression signs in this sequence of contingencies then prove to serve motives better than others, thus increasing the probability that they will be used again in a similar situation—and the continuing coregulation process advances to a more developed level.

Affect mirroring and motor mimicry. The special developmental mechanism of coregulation between caregiver and baby mentioned above can now be described in more detail. The interplay between the caregiver's affect mirroring of

the baby's expression reactions (Gergely & Watson, 1999) and the baby's motor mimicry (Field *et al.*, 1982; Meltzoff & Moore, 1988) leads to the emergence of context-coordinated, emotion-specific expression signs and to the differentiation of emotion-specific appraisal patterns.

As mentioned in the previous section, one aspect of intuitive parenting (Papoušek & Papoušek, 1987) is the way in which caregivers contingently mirror the emotional expression signs of their babies in their own expressions. As a rule, they use clear-cut expression signs to represent the emotion they have inferred. This is what makes the way in which parents express themselves to their babies often seem so exaggerated. We assume that this contingent affect mirroring by caregivers combined with the motor mimicry by the baby represents a preadapted system that encourages the formation of emotion-specific expression signs. One should not conceive infant imitation as a one-to-one mirroring of expression, but more as a rudimentary expression imitation that is taken up by sensitive caregivers and shaped into salience through further succinct affect mirroring. This is how both contribute to an emotion-specific synchronization of expression signs in the sense of a self-optimizing system.

A number of studies confirm this relationship: For example, Haviland and Lelwica (1987) showed that the motor mimicry of emotion-specific expression signs observed in neonates by Field *et al.* (1982) also functions in 2.5-month-old babies. Mothers were asked to display the mimic and vocal expression signs for happiness, sadness, and anger to their babies in a preordained random sequence. Infant expression was analyzed with Izard's MAX scale (Izard, 1979). Babies showed increased happiness expression in response to happiness expression and increased anger expression in response to anger expression. However, they did not respond to the expression of sadness with sadness expression (drooping mouth, pouting, raised eyebrows), but with clear sucking and mouthing movements. The authors interpreted these infant reactions as being not just motor mimicry but also emotional contagion. Caregivers' own expression signs seem to have a model function for babies.

Malatesta and Haviland (1982) showed that mothers respond selectively to the emotion-specific expression signs of their 3- or 6-month-old babies when interacting with them, and that they mirror them intuitively in their own expression. In a play episode and in a reunion after a brief separation, mothers reacted to their babies' expression of interest with increased own expression of interest; to happiness, with increased happiness; and to surprise, with increased surprise—measured, in each case, with Izard's MAX scale (Izard, 1979). The expression of negative emotions such as sadness and anger was not mirrored so frequently but, nonetheless, more than randomly. For example, anger expression was, in part, mirrored only through knit eyebrows, and negative forms of expression were rapidly replaced with more positive ones. In contrast, both the expression of

distress and simple knit eyebrows were ignored. The authors discussed whether the observed infant expression signs reflected actual emotions in each case or only shifting expression patterns. The latter interpretation was supported by the high fluctuation rate of infant expression that changed approximately every 7–9 s without being classifiable to any available external cause. Hence, infants offered a variety of different expression patterns in face-to-face interaction with their caregivers, mirroring in particular the emotion-specific positive expressions. The finding that those expression signs that were not mirrored by caregivers such as knit brows were less frequent in 6-month-olds compared with 3-month-olds supported the impact of selective affect mirroring. There was also a reduction in the fluctuation of infant expression signs between these age groups. The correlation between infant and maternal expression patterns, in contrast, increased. Hence, it seems that expression signs between caregiver and baby become more coordinated as time goes by.

Malatesta, Grigoryev, Lamb, Albin, and Culver (1986) also confirmed this developmental trend in a longitudinal study of infants at the ages of 2.5, 5, and 7.5 months. Moreover, the pattern of cross-correlations between the first and second measurement waves indicated that contingent maternal mirroring of infant expression signs led to higher infant expressiveness, particularly for positive signs. The pattern of cross-correlations between the second and third waves of measurement even confirmed emotion-specific imitation effects: The emotional expression of happiness and interest revealed imitation effects from mother to baby, whereas the expression of surprise and anger revealed imitation effects from baby to mother.

Furthermore, using a sophisticated experimental design, Legerstee and Varghese (2001) confirmed that 2- to 3-month-olds are able to recognize the contingent affect mirroring of their caregivers and, in response to this, even anticipate such a contingent mirroring from them—as if it were part of a synchronous, bidirectional, face-to-face interaction. They used a face-to-face interaction to split the mothers into a high versus a low affect-mirroring group. Then, the babies interacted with their mothers live over a television screen so that the mothers could respond contingently to the reactions of their babies. In another condition, babies watched only a recording of an earlier interaction with their mothers on the screen, so that no contingency was given between infant and maternal behavior. Babies with high affect-mirroring mothers exhibited increased smiling and vocalizations in the live condition but not in the replay condition. Hence, they were able to discriminate between contingent and noncontingent conditions. Babies of low affect-mirroring mothers were unable to do this: They smiled and vocalized comparatively infrequently in both conditions. The experience of interaction with affect mirroring had already led to marked differences in the babies' responsiveness toward the high versus low affect mirroring of their mothers at the age of 2–3 months.

In summary, we can draw the following conclusions from these studies:

1. Caregivers intuitively mirror their infants' emotion-specific expression signs in their own expression.
2. Infants register the contingent mirroring at an early stage, and then anticipate this from their caregivers.
3. Infants imitate their caregivers' expression signs.
4. The interplay between parental affect mirroring and infant motor mimicry leads to a synchronization of expression signs. Alongside universal expression signs, dyad-specific expression patterns also start to emerge.

The impact of affect mirroring can also be derived from studies on children of depressive mothers. These studies indicate that the prompt reacting of depressive mothers to infant expression behavior may be reduced. Field *et al.* (1988) studied face-to-face interactions between depressive mothers and their infants. They found that depressive mothers used fewer mimic expression signs, fewer vocalizations, and less imitative and contingent behavior than nondepressive mothers, and that these differences were also reflected in fewer mimic expression signs and vocalizations in their babies. This muted expression behavior in the babies even generalized to interactions with nondepressive strangers. Moreover, Pickens and Field (1993) found emotion-specific effects: Babies of depressive mothers displayed more anger and sadness expression and less interest expression than babies of nondepressive mothers.

All these findings support the interdependence between the emergence of emotion-specific appraisal patterns and their corresponding expression signs, as assumed by the internalization model, and contradict any one-sided cause–effect relationship between appraisal and expression.

Second Postulate: Expression Signs Can Be Used Symbolically

A further transformation accompanies the emotion-specific differentiation of expression signs: Their emotion-specific conventionalization during interpersonal regulation transforms expressive reactions into expression signs. As conventionalized signs, they represent generalized emotion-specific action readinesses and their corresponding subjective feeling states (see Section 3.3.1). An expression sign does not just stand for a simultaneously triggered emotion (as a symptom), but can also, just like a word, be used to represent this emotion (as a symbol). Hence, it can also be used intentionally, be it for affect attunement, social referencing, play, or deceiving an interaction partner. According to Lewis and Michalson (1985), the process of conventionalization transforms those facial reactions that are generally interpreted as expressive patterns of basic emotions into expression signs that can also be used symbolically.

The symbolic use of expression signs in social referencing. One of the clearest examples of the conventionalization of expression and its symbolic use is the social

(or emotional) referencing exhibited by infants from about 10 months onward (see Hirshberg & Svejda, 1990; Klinnert, Campos, Sorce, Emde, & Svejda, 1983; Walden, 1991; Walden & Baxter, 1989). Infants seeking assurance from their mothers do not perceive their mother's facial expression as a reflection of their own infant action readiness, but as a symbol for an emotional action readiness. Let us take an example: A stranger offers a 10-month-old boy a cookie in his mother's presence. This confronts the little boy with a previously unknown situation. He first looks at his mother and reads off how he should behave from her facial expression. If she smiles, he will reach happily for the cookie; if she looks anxious, he will refuse it.

This is an enormous learning achievement for our 10-month-old. First, he has learned that he can attract his mother's attention with a questioning gaze. Second, he has learned that this attention can also be focused on feelings—in this case, his own uncertainty about what he should do. Third, he has learned that facial expressions provide information on feelings—something he has learned through affect mirroring. Fourth, he has learned that his mother's facial expression in this situation does not signal her feeling state and also does not mirror his own feeling state. It is an answer to his "question." Smiling means, "Everything's fine, you can do it!" A worried look means "Careful! Don't do it!" And all this is managed without any speaking; just by using expression signs symbolically.

This example shows that even at the age of 10 months, expression signs can be perceived as symbols indicating what one should do. The expression sign "mother's smile" is not taken as a symptom for a real-life feeling state in the mother, but as a symbol that has become detached from it. Nonetheless, this first symbolic use of signs is still embedded completely in the situational action context, and initially possesses only an indicative character: It indicates approach or avoidance. The expression sign has not yet acquired the multifaceted, generalized meaning that it possesses for adults. The same can be said about the use of first words (see Luria, 1982, pp. 51–70; see also Section 4.2.2).

The symbolic use of expression signs is not just found in social referencing. Demos (1982a) observed that all the infants in her study already displayed mimic emblems (Ekman & Friesen, 1969). Emblems are conventionalized mimic signs that are assigned a specific meaning with which they are used to regulate interaction. Demos observed, for example, raised eyebrows to express a question directed toward a partner, as well as exaggerated forms of expression applied very intentionally, such as prolonged nose wrinkling to express arousal. Another example from daily life is the cry that infants can initiate promptly when a wish is denied, but discontinue just as promptly if the wish is then met. This can also be characterized more appropriately as an intentionally applied expression *symbol* than as an authentic expression *symptom* of intense distress. Likewise, infants start to display emotions in symbolic play by imitating prototypical expressions, for example, they imitate a baby's whining and crying or the comforting practices of parents in mother–child play.

Affect mirroring. Before infants can use expression signs symbolically, they have to perceive and acquire a subjective representation of contingencies between the cause of the expression, the expression itself, and handling it. This is the way in which expression signs acquire a relational meaning.

Furthermore, a second series of contingencies has to be built up so that an expression sign can be detached from the concrete emotion episode and used as a symbol, that is, to *represent* an emotion. These are contingencies between the sensations in infants generated by their own expression signs and the expression signs of the caregiver that mirror the infant expression signs in succinct, conventionalized ways. The mirrored expression thus becomes a sign marking the currently experienced feeling state (the object of the sign) that has acquired an emotion-specific meaning (the interpretant of the sign) for the infant through the repeatedly experienced contingency between cause, feeling, and action (see Section 3.3.1).

The smile that the caregiver uses to mirror the infant's smile refers to the infant's proprioceptively sensed smile. For the infant, this felt smile is linked to further typical sensations for the emotion of pleasure such as relaxation. It is also linked to a cause such as seeing the caregiver again and to an action to deal with it, namely, letting the state persist or initiating it again.

The affect mirroring of infant expression signs by caregivers who apply exaggerated conventionalized expression signs is accordingly also the mechanism that, at a later stage—from about the age of 9 months onward—enables the child to use expressions signs symbolically.

Caregiver's affect mirroring can be compared with the supportive speech known as "scaffolding" (Bruner, 1983) in language acquisition. Here as well, caregivers take the still incomplete signs, the babbled protowords of the infant such as "mama" or "nanna," and repeat them in their conventionalized prototypical forms (e.g., "grandma" for "nanna"). This establishes a reference to the object to which the word refers. Just as this transforms the babbled protowords of the infant into object-related speech signs, the facial expressions of 3-month-olds become the emotion-related expression signs of the young child through face-to-face interaction with the caregiver. Just as infants require verbal stimulation and models before they can realize their innate speech potential in the acquisition of a language, they also require expressive stimulation and models before their innate emotion potential can unfold in the acquisition of an—in part, universal—expression culture.

In child development, symbol formation after the first year of life focuses particularly on speech signs. However, it is not fixated on language alone. In role-play, children also use abbreviated action schemes as symbols for their actions, when, for example, they pretend to be driving an automobile by sitting on a chair and making engine noises. They also use expression signs to display emotions. If the auditory channel is blocked by sensory impairment, then symbol formation may shift its medium to sign language, or in children who are deaf and dumb, to finger spelling (see Aprauschev, 1988). The precondition for this, however, is a social environment that uses this alternative system of signs with the child, and facilitates acquisition of this system through supportive gestural or finger speech.

Third Postulate: Body Sensations Accompanying Emotions Are Transformed into Conscious Feelings

Affect mirroring elicits a further major transformation involving the feeling components of an emotion: the emergence of *conscious* feelings. This goes hand in hand with the emergence of expression *signs*. Without signs, there can be no consciousness (Vygotsky, 1931/1997); without expression signs, no conscious feelings.

The internalization model claims that feeling emerges from interoceptive and proprioceptive feedback on body and expressive reactions. Through affect mirroring, the unconscious sensation of this body feedback in the neonate becomes a conscious feeling in the infant. The all-encompassing, unfocused sensation of body and expressive reactions induced by an emotion is transformed into a categorically organized feeling. Characteristic for the latter is that from the range of simultaneous interoceptive and proprioceptive sensations, it singles out and emphasizes those sensations that are typical for the specific emotion and symbolizes these through an expression sign.

For the feeling state of pleasure, the expression sign that is also felt proprioceptively is smiling. At the same time, further feedback sensations are felt such as relaxation and warmth, vocal gurgling, or effusive movements that all characterize the subjective feeling of pleasure. In contrast, other current feedback sensations, for example, an itchy leg, although internally represented, are not classified to the pleasure feeling. Just as the formation of symbols in speech signs categorizes and structures the perception of the external world, the formation of symbols from expression signs links together and structures the perception of the internal world, that of interoceptive and proprioceptive sensations.

Gergely and Watson (1999) illustrate this transformation process through the analogy of biofeedback therapy for adults. Biofeedback provides an external display of internal body reactions such as heartbeat. Such external mirroring increases the sensitivity for those interoceptive body *sensations* that provide subjective representations of body *reactions*. It also enables clients to gain a degree of voluntary control over these body reactions (Dicara, 1970; Miller, 1978).

Parents' affect mirroring provides a kind of natural biofeedback training for infants. Initially, infants may experience emotional expression and body reactions only as all-encompassing, unfocused proprioceptive and interoceptive sensations. Through affect mirroring, caregivers provide a contingent external representation of the infant expressive reactions. Because infants are very receptive to contingencies, sooner or later they will discover this contingency between their internal

sensations and the external expression representations. Stern (1985) has described this "discovery" as the outcome of parental affect attunement.

However, caregivers also possess their own emotions and display them in their expression. So, how can infants recognize that the emotional expression of their caregiver mirrors their own personal feeling state rather than that of the caregiver? According to Gergely and Watson (1999), the difference is that when caregivers engage in affect mirroring, they use exaggerated expressions of the emotion to be displayed. These correspond to the conventionalized expression signs used in their specific culture or subculture that, nonetheless, continue to possess enough similarity to the real expression reactions because of their iconic coding.

In their study of the interaction between mothers and their 3- to 6-month-old infants, Malatesta and Haviland (1982) reported that mothers generally mirrored, for example, infant anger with a mimically exaggerated play form of anger, so-called mock anger, or only with the succinct expression sign of wrinkling their brow. Papoušek and Papoušek (1987) reported that parents predominantly use exaggerated expression signs when interacting with their babies. The exaggeratedly affected practice of so-called baby talk is another well-known example of this.

This succinct way of mirroring expression signs and the temporal contingency between own sensation and mirrored expression is repeated over many episodes for infants. As time goes by, they no longer attribute the expression sign mirrored by the caregiver to their caregiver, but to the self, and they start to interpret it as an expression sign for their own current feeling. Gergely and Watson (1999) call the former process referential decoupling; the latter, referential anchoring. In this process, infants gradually develop a sensitivity for those proprioceptive and interoceptive sensations that correspond to their own *emotion*-specific expressive and body reactions. They learn to use expression signs to group these sensations in an emotion-specific manner and to relate them to their corresponding causes and actions. This makes them aware of their feelings. Unmediated, unfocused body sensations become conscious cause-focused feelings.

The phenomenon of affect attunement also fits into this context. Stern (1992) uses this term to describe a form of caregiver interaction with infants from the age of 9 months onward in which they mirror the characteristic style of their infant's expression signs in another sensory modality. Stern (1985) gives an example:

> A nine-month-old boy bangs his hand on a soft toy, at first in some anger but gradually with pleasure, exuberance, and humor. He sets up a steady rhythm. Mother falls into his rhythm and says, 'kaaaaa-*bam* kaaaaa-*bam*,' the '*bam*' falling on the stroke and the 'kaaaaa' riding with the preparatory upswing and the suspenseful holding of his arm aloft before it falls. (p. 140)

The mother does not imitate the boy's instrumental behavior, but the emotional shape and rhythm of his behavior through the emotional shape and rhythm of her voice.

This affect attunement is only a continuation of affect mirroring with a special means, namely, cross-modally mirrored expression signs. Stern assumed that the purpose of affect attunement is for the infant to acquire intersubjectivity, that is, to interpret and apply expression signs as a means for sharing intentions and feelings with others. This can direct the attention shared between caregiver and infant not only toward external objects (as seen so obviously in pointing gestures) but also to one's own feelings and those of other persons.

Nonetheless, Stern (1985) assumes that infants already possess a conscious feeling experience that they only need to extend to other persons through affect attunement. We, in contrast, agree with Gergely and Watson (1999) that in affect mirroring or also affect attunement, both awareness of others' feelings *and* awareness of one's own feelings emerge. A conscious categorical feeling can start to exist only as a feeling that can be communicated through a sign and thus shared with others. One could call this a "public" discovery that the infant makes in interaction with others, and not a "private" discovery that the infant makes alone.

We assume that once feelings have become conscious they do not just make it possible to adjust expressive and body reactions to fit one's motives, but that they are also a first step toward reflective emotion regulation. Accordingly, becoming aware of feelings does not simply emerge from the symbolic use of speech signs and thereby during verbal symbol formation, but is already present at a much earlier stage in the symbolic use of expression signs (see Lewis & Michalson, 1985; Malatesta & Izard, 1984).

4.2.2. The Emergence of Volitional Action Regulation

The internalization model assumes that the symbolization of expression signs paves the way for symbol formation with the help of speech signs, and that volitional action regulation becomes possible only through the acquisition of language.

As already explained in Section 3.4.1, one can assign to volitional processes the function of anticipating a future situation of motive satisfaction as goal that direct current actions toward this future situation through self-instruction and shield them from competing action impulses (Kuhl, 1996). This requires a symbolic medium with which future, still only potential, event scenarios can be presented and manipulated voluntarily. Although this medium is predominantly language, it also includes gestures or expression signs. Hence, the use of speech signs and other signs marks the beginning of the volitional regulation of actions and emotions.

These voluntary processes also emerge interpersonally within infant language acquisition. The beginning of speech acquisition can be traced back to the early intentional utterances of babies (see Papoušek, 1994). Up to approximately the

third year of life, two milestones in speech development occur that are significant for volitional action regulation.

The initial complementarity of emotional and volitional action regulation. Initially, both forms of regulation seem to function in a complementary way. Infants use their first speech signs almost exclusively either within emotionally neutral states or within the emotional state of interest. As soon as other emotions are induced such as anger or even pleasure, interaction returns to being regulated almost exclusively with the help of expression signs (see Bloom, 1993). Put plainly, infants either speak or they have emotions; they do not have both at the same time.

In a longitudinal study, Bloom (1993) observed play interaction sessions with mothers in six girls and six boys once every month from the age of 9 to 21 months. She compared the infants' verbal and expressive behavior at the time of the first clear use of conventional words with that at the time of their vocabulary spurt. This is the phase in which infants make a rapid advance in the acquisition of new words. On average, the observed children used their first words at the age of 12.8 months, and their vocabulary spurt occurred at 19.2 months.

She found that:

1. The percentage of emotional expression in the entire observation session remained constant throughout the study, whereas the percentage of speech rose from almost zero to the same level as emotional expression. Hence, speech signs do not replace expression signs.
2. Generally, the infants spoke their first words predominantly while exhibiting no expression, in other words, while in a neutral emotional state. At the time of the vocabulary burst, in contrast, they already used significantly more words while displaying a slightly positive emotional expression, but not while displaying either negative or more highly positive ones. This applied particularly to those words with which they were most familiar. Hence, expression signs and speech signs start off by being used independently from each other. It is only with the onset of the vocabulary spurt that infants begin to combine the two and speak emotionally toned words. This can be interpreted as an increasing integration of the emotional and volitional regulation levels.
3. In infants displaying a high proportion of emotional expression, both the first use of words and the vocabulary spurt started notably later.
4. Up until the vocabulary spurt, infants nearly always applied their words indicatively to describe what they were doing at the time or what had attracted their attention, but not in an instrumental sense to influence their mother to do something particular for them.

So, infants predominantly use their first words indicatively. They show objects to their caregivers and utter a more or less appropriate word (Luria, 1982, pp. 56–63). Caregivers repeat the word—they mirror it—and also establish its

relation to an object by performing a typical action with it or uttering a typical sound for it (e.g., the cow goes "moo"). Observing this behavior leads to the conclusion that infants, unlike older children and adults, do not yet use speech signs as a universal means of regulating relationships. This is still the preserve of expression signs.

Initially, the first words seem to serve only a limited purpose, namely, to attain intersubjective understanding: By using words indicatively, infants get their caregivers to participate in their perceptions and to either confirm that the indication is correct or rectify "mistakes." This mirroring by caregivers—analogue to affect attunement in expression signs—establishes an intersubjectivity over the common focus of attention, namely, the object or condition described by the word. Hence, a sign is not used as a reciprocal instrumental appeal for the other to act to serve one's own motive satisfaction, but in the sense of obtaining a reciprocal agreement on one's own "worldview." Bloom (1993) summarizes her observations on early language acquisition as follows:

> Children learn language in the first place because they strive to maintain intersubjectivity with other persons—to *share* what they and other persons are feeling and thinking. (p. 245, italics added)

One can interpret this as a social reassurance that becomes generalized to the use of words. This striving toward intersubjectivity can be characterized as a motive to attain social agreement on one's own "worldview." We assume that this communication motive is a fundamental human need that cannot be reduced to other human motives. It is an end in itself.*

Speech signs as an action appeal. The second milestone in volitional development is the realization that speech signs can be used universally as action appeals toward others—not just to establish intersubjectivity, but also to persuade others to carry out actions serving all other motives. This also includes the child's appeal to his or her caregiver not to block his or her intentions and actions, emphatically signaled by the phrases "*I want* ..." or "*myself*" (see Geppert & Küster, 1983). Parallel to this, it starts to become possible to tell infants what to do through speech signs.

Initially, however, speech has only the character of *compelling action.* Although 1- to 2-year-olds can carry out verbal instructions such as clap hands or wave without any problem, such instructions only trigger reactions that cannot be regulated or inhibited.

*In this context, it is interesting to note that research on primates reveals that chimpanzees can be taught to use symbols, but they generally apply them only in relation to instrumental behaviors of need satisfaction such as the search for food. It is only very rarely that they use them for communication or to seek agreement over mutual perceptions (see Fouts, 1997). Hence, chimpanzees do not seem to feel a genuine need to *communicate*.

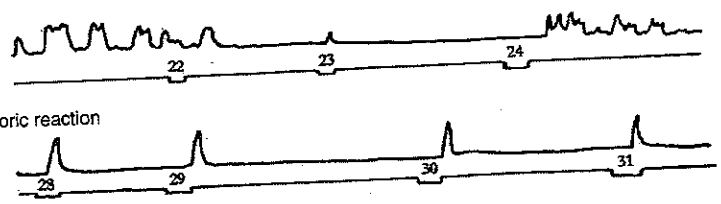

FIGURE 4.1. Control of inadequate overshoot reactions (ORs) through exteroceptive light signal with feedback by Ser, 2 years and 2 months old. Condition A: Spoken command—"If the light comes on, squeeze the ball." With no feedback effect, ORs occur. Condition B: Exteroceptive feedback (ball squeeze extinguishes light) inhibits OR. Adapted from Luria, 1961, p. 109.

Luria (1961) reports a study in which 2-year-olds were instructed to squeeze a rubber ball when a light came on in order to switch it off again. When told, "If the light comes on, squeeze the ball," the 2-year-olds immediately started squeezing, and carried on doing this repeatedly (see Figure 4.1A) If there was an immediate contingency between reaction (squeeze) and stimulus (light off), they could control their behavior in line with the task (see Figure 4.1B). However, even the commands, "Don't squeeze!" or "That's enough!" triggered the squeeze reaction. In addition, the infants performed the task less well when the light was occasionally extinguished independently from the ball squeeze. Hence, at this stage of development, speech functions exclusively as an action-initiating appeal by others—independent from the specific meaning of what is spoken. Two-year-olds are not yet able to control, and certainly not to stop, their actions.

Hence, being told *not* to do something is cognitively too demanding for a child of this age, unless the nonverbal part of the "No!" is so emotionally impressive that children abandon their intentions because of the emotion induced. A tiresome learning process is required before the *meaningful content* of what is spoken becomes effective in action, and self-instruction can be used effectively for one's own action regulation (see Luria, 1982).

4.2.3. Precursors of Reflective Emotion Regulation in Infants and Toddlers

The development of emotional action regulation can be understood more appropriately by also considering the complementary process: namely, the development of the ability to regulate one's own emotions. Babies and infants extend their repertoire of emotion regulation strategies, and these can be viewed as precursors for reflective emotion regulation.

Infants possess two innate strategies that they can use to modify their emotions in intensity and duration but not in quality. These are *averting their gaze* and *sucking* (see Section 4.1.2). Because these strategies can be successful only within a relatively narrow band of arousal, emotional regulation develops predominantly in the form of an interpersonal regulation between child and caregiver. Initially, caregivers take over the task of activating babies when they display signs of disinterest and calming them when they display signs of distress. This enables them to maintain an optimal level of arousal (Papoušek & Papoušek, 1987). When doing this, caregivers can augment the innate strategies directly by, for example, *distracting*, *calming*, or *affective contagion*. In addition, they can resort to an *antecedent emotion regulation* by preselecting contexts that are suitable to serve motives in order to rule out over- or understimulation of the baby in advance. Thompson (1990) called this "control of opportunity."

As babies interact with their caregivers, they learn to address their emotions toward them intentionally (see Bridges & Grolnick, 1995). This is because caregivers generally respond promptly with measures that will help negative emotions to subside and positive emotions to persist.

Babies are initially unaware whether caregivers react to their emotions with either problem- or emotion-focused actions. The former serve to satisfy a motive that has been stimulated; the latter, to make the emotion subside when a motive cannot be satisfied (Lazarus & Folkman, 1984). For example, through purposeful distraction with a new toy, a father may try to capture his baby son's attention and make him forget his original frustration at not being allowed to play with his big sister's felt-tip pens. Because infants live very much in the immediate present and have not yet built up lasting intentions or expectations, it is easy to influence their emotions by distracting them.

During the course of the second year of life, this changes as infants learn to distinguish self from other *consciously*, become aware of their own intentions and expectations along with those of others, and begin to perceive the two separately. This newly acquired ability leads to a qualitative change in caregiver–infant relations: The conscious differentiation between self and other marks the onset of an independent regulation of own actions and emotions.

From the child's perspective, emotional action regulation is the dominant level of regulation; that is, the goal is to satisfy motives immediately. It can be seen that toddlers increasingly use instrumental acts to eliminate the source of a negative emotion during the second year of life (Stansbury & Sigman, 2000). Studies on emotion regulation view such instrumental acts as emotion-regulating strategies (e.g., Grolnick, Bridges, & Connell, 1996; Parritz, 1996; Stansbury & Sigman, 2000). However, because they are performed with the goal of motive satisfaction and not the goal of making the emotion subside, our internalization model views them as *problem*-focused actions located on the level of emotional action regulation and not as emotion-focused actions located on the level of reflective emotion regulation.

The same holds when problem-focused actions fail to achieve the intended goal, as in studies on delay of gratification. Staring at the desired present, touching

it, or trying to grab it are problem-focused actions aimed toward acquiring it. They are scarcely appropriate for keeping the current desire for the present under control and coping with a delay in gratification. Hence, infants are generally unable to delay their gratifications by themselves (Raver, 1996).

Nonetheless, infants also acquire a few strategies during these first 2 years of life that enable them to exercise a degree of *intra*personal regulation over the intensity and duration of their emotions. For example, action schemes already used for a problem-focused actions can also be applied as emotion-focused strategies. By the end of the second year of life, the repertoire of emotion-focused strategies includes calming, distraction, and the first symbolic strategies (cognitive reinterpretation). These will be sketched in the following.

Calming strategies. Innate sucking is expanded to sucking on a pacifier, thumb sucking, or using a comfort blanket. Bridges and Grolnick (1995) talk about physical self-soothing. Mangelsdorf *et al.* (1995) report that such strategies are applied at a very early stage and decline toward the end of the second year of life.

Distraction strategies. The only response to overstimulation available to young babies is to avert their gaze. The acquisition of mobility expands the action options of infants to include running away, avoiding, or "leaving the stage." This provides them with a greater spatial range of tension regulation (Mangelsdorf *et al.*, 1995). Object manipulation can also become an emotion-focused action when it is used to distract from a negative stimulus. Bridges and Grolnick (1995) observed this strategy in a study of delay of gratification in 2-year-olds and called it active engagement with a substitute toy.

Symbolically mediated strategies. These are cognitive reinterpretations that first become possible with the development of symbolic functioning. As a result, they are still very rare in infants (see Bridges & Grolnick, 1995), and this is also why caregivers hardly ever apply them.

Antecedent strategies. These involve the purposeful selection and control of contexts providing situations that trigger positive emotions and avoiding situations that trigger negative emotions (see Thompson, 1990). Only caregivers apply these strategies because they require a volitional representation of future situations that is still beyond the reach of infants.

During infancy, the central developmental trend is the formation of emotion-focused *intra*personal strategies out of prior experiences with *inter*personal regulation. All the strategies mentioned here can be applied both inter- and intrapersonally. For example, by providing physical contact, caregivers can exert a calming effect on their infant. They can distract the infant with a substitute toy, or they may even try to offer a reinterpretation of the situation. It can also be assumed that infants do not proceed directly from inter- to intrapersonal regulation, but pass through a preliminary stage in which they initiate *inter*personal regulation themselves and actively seek the support of others (see Walden, 1991). For example, they may actively seek their caregiver in order to be calmed and solaced. They

may initiate joint actions (Mosier & Rogoff, 1994) with the goal of distracting themselves from the source of a negative emotion (Bridges & Grolnick, 1995). Finally, they may initiate an interactive reinterpretation of the cause by directing pointing gestures or questioning emblems toward their caregivers.

4.2.4. Interindividual Differences

Up to now, we have assumed that caregivers are generally able to mirror infant expression adequately, to interpret their appeals appropriately and to respond to them. Thereby, they offer optimal conditions for infants to develop their repertoire of emotional action regulation. Even when most caregivers are fairly efficient in "reading" emotional expression, there are still interindividual differences. On the side of caregivers, these are seen in their sensitivity toward infant signals. For example, sensitive mothers tune their reactions better to the state of their infants than less sensitive mothers (Malatesta, Shepard, Culver, & Tesman, 1989; Tronick, 1989). On the side of the infants, there are individual differences in dispositional emotional readiness that make it easier or more difficult for caregivers to interpret their emotional expression and to regulate their emotions in a motive-appropriate way. These dispositional emotion readinesses are attributed to infant temperament (see Zentner, 1999).

Differences in Temperament

Even though there is still no generally accepted definition of temperament, Kagan (1994, p. 40) proposes that the different temperament concepts have one common denominator: "Temperament conventionally refers to stable behavioral and emotional reactions that appear early and are influenced in part by genetic constitution."

Nonetheless, different fields of research and theories continue to disagree on the number and organization of temperament factors. For example, Buss and Plomin (1984) assume only three factors: Emotionality, Activity, and Sociability, although they also assess a Shyness factor separately in their questionnaire. In contrast, Martin, Wisenbaker, and Huttunen's review (Martin, Wisenbaker, & Huttunen, 1994) of studies on the temperament model of Thomas and Chess (1977) concluded that seven factors could be identified reliably and validly: Approach/Withdrawal, Activity Level, Negative Emotionality, Distractibility/Persistence, Adaptability, Regularity, and Sensory Threshold. A comparison of the various concepts and their empirical operationalizations reveals that several of these individual factors overlap (see also Goldsmith *et al.*, 1987; Kohnstamm, Bates, & Rothbart, 1989).

What is interesting in our context is the observation that temperament factors appear in typical clusters or syndromes that impact significantly on the

development of effective *interpersonal* regulation. Thomas, Chess, and Birch (1968) were the first to identify three syndromes of temperament factors in infants. These have now been confirmed at least in part by other groups of researchers.

Robins, Johns, and Caspi (1998) report that these clusters discriminate between children who are ego-resilient, overcontrolled, and undercontrolled. The first cluster contains approximately two thirds of all children; each of the other two, 15–20%. Ego-resilient children are extraverted, good-natured, and, of course, resilient, making them relatively easy for caregivers to rear. Overcontrolled children appear to be socially inhibited and anxious, but are also comparatively easy to rear because they are receptive and easy-going with familiar persons. In contrast, undercontrolled children are highly active and impulsive; they have irregular eating and sleeping habits (so-called low Regularity); they try to avoid new persons or situations (Withdrawal); they are slow to adapt to changes in, for example, daily routines or foodstuffs (low Adaptability); and when frustrated, their emotional reactions are highly negative (high Negative Emotionality). These dispositional temperament characteristics make it harder to give these children a sensitive and caring upbringing. Parents, pediatricians, and nursery school teachers generally report having difficulties in regulating their emotions adequately and maintaining them at an optimal level of arousal. These are also the children who most frequently develop psychological disturbances.

When dealing with undercontrolled children, caregivers have to develop very special adaptation and regulation routines in order to build up an effective interpersonal regulation. As a result, recent temperament concepts (see Zentner, 1998, 1999) do not regard temperament *per se* as the decisive variable for successful or unsuccessful development, but the fit between the temperament of the child and the expectations, perceptions, and reactions of caregivers.

Caregiver Sensitivity and Attachment Qualities

Caregiver sensitivity. The sensitivity of caregivers is a further central variable contributing to the emergence of interindividual differences in the quality of emotional action regulation. Sensitivity means that caregivers perceive the infant signals transmitted through emotional expression and acts, interpret them correctly, and react to them promptly and appropriately (Ainsworth *et al.*, 1978). Sensitive caregivers are capable of adequately perceiving the, in part, very unspecific and subtle forms of expression in their babies and using these to deduce their babies' needs appropriately, regardless of their own personal motives at the time. Hence, sensitivity is an important condition if intuitive parenting is to follow an undisturbed course.

In a longitudinal study, Spangler, Schieche, Ilg, Maier, and Ackermann (1994) observed infants and their mothers in an unstructured play situation at the ages of 3, 6, and 9 months. They recorded expression components (extent of negative vocalization and motor restlessness) as well as salivary cortisol secretion as an important body component. The level of the hormone cortisol in saliva is a well-known physiological indicator of stress. Children of sensitive mothers displayed less pronounced negative expression and body reactions at all three measurement times than children with less sensitive mothers. Ainsworth and Bell, (1974; Bell & Ainsworth, 1972) reported that babies whose mothers reacted very sensitively to their crying in the first months of life cried far less frequently at the end of the first year of life and also possessed more differentiated communication abilities.

Sensitive caregivers do not just encourage the development of children's emotions through affect mirroring. They also enable them to experience that it is "useful" to express positive and negative emotions because these will elicit the appropriate reaction in the caregiver to satisfy the child's motives. Our own study of 2-year-olds showed that in an emotionally stressful situation, children of sensitive mothers displayed a markedly more negative emotional expression compared with children with less sensitive mothers (Friedlmeier & Trommsdorff, 2001). Maternal sensitivity seems to encourage children to clearly express their emotional state.

Sensitivity, however, should not just be viewed as a personality trait in caregivers. How far they actually achieve a sensitive interaction with their babies also depends on internal and external conditions. For example, an unwanted pregnancy or a (postpartum) depression in the mother may impact negatively on intuitive parenting and sensitivity (see Field *et al.*, 1988). Regulation disturbances in babies' sleeping and eating habits as well as excessive crying or a so-called undercontrolled temperament (see above) may also impact negatively on parental sensitivity (Papoušek & Papoušek, 1997).

Attachment qualities as differential emotional regulation patterns. Attachment is conceived as an emotional bond between two persons in which closeness and contact to the other person are sought in order to satisfy the need for security, contact, and affection. Its adaptive function is considered to be that closeness to caregivers protects babies from danger and provides opportunities for learning (see Bowlby, 1969). Children's attachment to their caregivers develops during the course of the first year of life. The caregiver's sensitivity has a major impact on the quality of this attachment relationship—as confirmed in numerous studies (Ainsworth *et al.*, 1978; Grossmann, Grossmann, Spangler, Suess, & Unzner, 1985; Spangler, Fremmer-Bombik, & Grossmann, 1996).

This quality of attachment corresponds with specific patterns of emotional expression ability and emotional action regulation (Spangler, 1999). That can be seen very clearly in the Strange Situation Test. This test presents a situation designed to initially stimulate explorative behavior and then to activate the attachment motive by separating babies twice from their mothers and confronting them with a stranger (Ainsworth & Wittig, 1969). Attachment quality is deduced from the behavior and expression displayed in the two separation and reunion episodes. In general, four qualities of attachment are distinguished (Ainsworth *et al.*, 1978; Main & Solomon, 1990): secure, insecure-ambivalent, insecure-avoidant, and disorganized.

Spangler (1999) has analyzed these attachment qualities from an emotional perspective, and reinterpreted them as differential patterns of interpersonal emotional regulation between caregiver and child in which the emotion components of expressive and body reaction (see Section 3.1.1) interact in different ways. To a major extent, this interplay of emotion components seems to be determined by the experiences in the caregiver–child interaction and the parental sensitivity this involves. Therefore, these differential findings can also be integrated into the internalization model of emotional development. They can be used to provide further support for the premise that emotions are not fixed, immutable reaction patterns, but that the emergence and interplay of their components is first generated by early interaction experiences in interpersonal regulation. We shall now support this through a detailed description of the different "orchestrations" of the emotion components that Spangler (1999) found in the attachment qualities and a discussion of how they have emerged.

Emotional expression pattern of children with secure attachment. The emotional expression pattern of these children is situationally appropriate in each phase of the Strange Situation Test and possesses a clear appeal character toward the caregiver. In the presence of their mothers, they display exploration behavior and express their positive emotions clearly as a sign that they wish to maintain the relationship and the joint activity (see Cassidy, 1994). When the stranger joins them, these children regulate possible irritations through social referencing with their mothers. When the mothers leave, they clearly express sorrow about being left alone: They start to cry and try to follow their mothers. When the mothers return, they actively seek (physical) contact and let themselves be picked up. Their mothers' consoling behavior calms them relatively quickly so that they can return their attention to play. Emotional expression has adopted a clear symptom and appeal function that orients caregivers promptly and unequivocally toward the needs of their children so that they can then perform motive-serving acts just as promptly. In earlier chapters, we have described such an interpersonal regulation pattern as adaptive and "normal."

The, in part, high negative expression intensity in the separation and reunion phases is not accompanied by a comparable intensity in autonomous body reactions. Although Spangler and Grossmann (1993) found that the children's heart rate increased during the separation phase, which can be interpreted as a sign of tension, there was no increase in the secretion of cortisol, the physiological indicator for stress reactions (Gunnar, Broderson, Nachmias, Buss, & Rigatuso, 1996; Hertsgaard, Gunnar, Erickson, Nachmias, 1995; Spangler & Grossmann, 1993; Spangler & Schieche, 1998). Intraindividual comparisons also revealed no correlation between the intensity of negative expression and cortisol secretion (Spangler & Schieche, 1998; see Table 4.1).

This pattern is explained through the interaction experiences that securely attached children have been able to have with their sensitive and attentive caregivers. In countless distress episodes, they have experienced that their caregivers react to

TABLE 4.1. Correlations between Cortisol Secretion and Negative Expression during the Separation and Reunion Phases of the Strange Situation Test at the Age of 12 Months[a]

	Attachment quality							
	Secure		Insecure avoidant		Insecure ambivalent		Disorganized	
Cortisol	T	W	T	W	T	W	T	W
After 15 min	−.08	−.10	−.07	.00	.23	.88**	.22	.71**
After 30 min	.16	−.04	.13	.69**	.14	.89*	.23	.51**

[a]Adapted from Spangler and Schieche (1998). T: negative expression during separation. W: negative expression during reunion. $^{*}p < .05$. $^{**}p < .01$.

their expression of distress and sorrow promptly—with the consequence that the infant motive is satisfied and positive emotions are triggered. The expression components of the emotions are able to optimize their appeal function so successfully that there is no need for an endocrinological adaptation to the stress situation. The emotional reaction here does not support a rigid arousal model in which the triad of expression, body reaction, and feeling is always activated with the same intensity, but indicates an experience-dependent regulation model in which emotion components are singled out and activated according to their relative success in past experience (see Spangler, 1999).

Emotional expression pattern of children with insecure-ambivalent attachment. The emotional expression pattern of these children has a clear symptom function, but its appeal function is not really developed effectively (see Spangler, 1999). During the play phases of the Strange Situation Test, these children seem to be rather anxious and clinging; they find it hard to start playing. Their attention is focused strongly on the availability of their caregiver, and this impedes exploration of their physical and social environment. Just the mere appearance of the stranger already clearly impairs play quality. They react to separation from their mothers with a strong negative expression. When mothers return, these children also make contact, but simultaneously display anger and protest. They fend off physical gestures of consolation and calm down only slowly. They require a correspondingly long time to get back into their play.

Unlike the securely attached children, cortisol levels in this group increased during the Strange Situation Test (Spangler & Schieche, 1998), with a high correlation between the strength of negative emotional expression and the amount of cortisol secretion: Children who cried and protested strongly had high cortisol levels (see Table 4.1).

This interaction pattern can likewise be explained by the infant interaction experiences with their caregivers. The latter exhibit an inconsistent caring behavior in response to their children's emotions. Sometimes, they react sensitively and promptly; other times, not. And this does not follow a predictable pattern for the

child. This ambivalent caring behavior obliges children to increase their emotional expression until caregivers have to respond, but they then tend to do this irritably and reluctantly. The outcome is an ambivalent experience for the infants that they sometimes gain comfort and attention with their sorrow, but at other times, not. This goal blockage triggers, in turn, frustration and anger. The children cannot build up any reliable expectations regarding the availability of their caregivers, and so they also cannot be calmed by them effectively. The dysfunctionality in interpersonal regulation based on emotional expression makes it necessary to adapt on the level of body reactions. This involves, among others, the secretion of the stress hormone cortisol and an activation of further stress-sensitive systems such as the immune system and the adrenal medulla system. After being reunited with their mothers, these children return to play only slowly because stress hormones are still effectively preventing relaxed exploration and play.

Emotional expression pattern of children with insecure-avoidant attachment. The emotional expression behavior of these children leaves the impression that they experience the Strange Situation as being only slightly emotionally disturbing. When caregivers are present, they display interested play and explorative behavior; and this also continues when the stranger joins them. During the separation phase, they also reveal an increase in heart rate and a restricted play and exploration behavior (Spangler & Grossmann, 1993), which can be interpreted as symptoms of emotional tension. However, they display hardly any negative emotional expression. When mothers return, they initially pay no attention to them. They avoid body contact, and also continue to show hardly any negative emotional expression.

Findings on cortisol reactions are contradictory. Spangler and Grossmann (1993) found an increase in cortisol levels in the children with insecure-avoidant attachment in their sample. However, further studies failed to replicate this (Hertsgaard *et al.*, 1995; Spangler & Schieche, 1998). Nonetheless, Spangler and Schieche (1998) were able to show that the degree of negative emotional expression correlated with the increase in cortisol (see Table 4.1). Children with intensive negative emotional expression had a high cortisol secretion, but also—vice versa—children with no mentionable emotional expression did not have high cortisol levels. Because children with insecure-avoidant attachment generally show little negative emotional expression, their endocrinological stress reactions should accordingly also be limited. This would indicate that the symptom function of the weak emotional expression in these children is a reliable indicator that they tend to experience little emotional stress in the Strange Situation Test.

This runs counter to a previously popular interpretation in terms of attachment theory. It claims that the attachment system has to be activated in the Strange Situation Test, and the children therefore experience sorrow but suppress its expression. This is then considered to be a sign of a dysfunctional emotion organization. Main (1981), in contrast, views the avoidant attachment pattern as a "second-best" strategy that may well be functional for a given caregiver–child dyad. The avoidant

expression behavior in attachment-relevant situations continues to permit a certain closeness to the caregiver and protects children from the negative parental rejections that would have resulted from negative emotional expression.

Children with insecure-avoidant attachment have insensitive caregivers who tend to respond to their negative emotional expression with rejection and avoid close physical and emotional contact (Spangler *et al.*, 1996). Nonetheless, they still attend to their children and satisfy their needs—but according to their own rhythm and not that of their child. In the children, this leads to the extinction of a strongly negative emotional expression in favor of an avoidant-reserved reaction pattern, and emotional reaction readiness becomes muted.

The internalization model assumes that when these children find themselves in the Strange Situation, they should neither display a negative emotional expression of sorrow nor reveal autonomous sorrow or stress reactions, and they should also not experience a subjective feeling of sorrow. Hence, they would not suppress a sorrow expression, but actually feel hardly any sorrow, because the subjective feeling arises through feedback on expressive and body reactions (see Section 3.1.2).

Accordingly, the symptom and appeal function of the expression seems to be undeveloped in these children. The possibility of finding support from caregivers is abandoned at a very early stage in favor of intrapersonal strategies. In a study by Braungart and Stifter (1991), children with insecure-avoidant attachment displayed more self-focused behaviors such as thumb sucking and less orientation toward their mothers when reunited with them in the Strange Situation Test. This denies the children learning opportunities in which they could experience and internalize efficient regulation strategies through *inter*personal regulation. Instead, they have to work out the effectiveness of their arbitrarily chosen *intra*personal regulation strategies for themselves through trial and error.

These differential findings indicate the developmental openness of the emotion system. The emergence and interplay of emotion components adapts to the interaction experiences acquired in the interpersonal regulation between caregiver and child.

4.2.5. Summary

Through their sensitivity toward infant expression signs, caregivers are able to regulate the emotions of their babies. They interpret the infant expression sign as an appeal directed toward them and feel obliged to provide prompt and appropriate care. This enables infants to experience temporal, sensory, and spatial contingencies between the cause of an emotion, its expression, and the action to deal with it, and this leads to the emergence of meaning-dependent appraisal patterns.

In addition, caregivers mirror infant expression signs in their own expression in succinct and conventionalized ways. Through this affect mirroring, children also experience contingencies between expression, feeling, and its action-regulating

consequences, and this leads to the emergence of the symbolic use of signs and the conscious perception of feelings (see Gergely & Watson, 1999; Stern, 1985). Repeatedly experienced contingencies between cause, expression, and action in conjunction with the affect mirroring of caregivers and the motor mimicry of the infants produce two interlinked effects in infants: (1) Expressive reactions are transformed into expression signs. (2) These signs categorize the perception of the internal world of feelings emotion-specifically through body feedback—just like speech signs organize the perception of the external object world into categories.

Out of the interpersonal emotion regulation initiated by caregivers, children develop a more independent form of regulation during the course of the second year of life. This is characterized particularly by the way they become able to actively demand their caregivers' assistance in regulation.

4.3. THE EMERGENCE OF INTRAPERSONAL REGULATION LEVELS IN TODDLERS AND PRESCHOOLERS

The first 2 years of life are characterized by enormous progress in development. Children build up a differentiated spectrum of emotion systems such as pleasure, joy, affection, amusement, frustration, anger, defiance, fear, surprise, sorrow, sadness, and embarrassment (Sroufe, 1996, p. 68). They discover language as a universal medium that they can use to direct the actions of others. They acquire a broad repertoire of actions with which they can manipulate objects appropriately in their daily lives and satisfy their own motives. In their interactions with their caregivers, children become increasingly equal partners insofar as they can use expression and speech signs to attract caregivers' attention relatively clearly and promptly to their motives and expectations, so that caregivers can then ensure that infants' motives are satisfied just as clearly and promptly.

Up to now, we have assumed that caregivers do everything in their power to attend to their babies' emotional appeals promptly and reliably. They try to satisfy the motives signalized to them unconditionally, or, if this is impossible, to regulate infant emotions with the help of distraction strategies. This requires caregivers to exercise a high level of reflective regulation in their own emotions. Infants do not query whether their appeals are in any way compatible with their caregivers' motives; in other words, how far their caregivers are willing and able to respond to them. Infants want their motives satisfied here and now, and they are not prepared to wait until tomorrow or even later. This forces caregivers to take notice of infant appeals straight away, even when this runs counter to their own motives. If caregivers are not capable of such a reflective emotion regulation, interpersonal regulation may become severely disturbed, and this may even lead to abuse and neglect (Cicchetti & Carlson, 1989; Esser, 1994).

Hence, the relation between caregiver and infant continues to reveal a major imbalance in *reflective emotion regulation*. Overcoming this imbalance and

becoming able to regulate actions and also emotions *intra*personally is the major developmental task for infants and preschoolers. They have to learn to coordinate satisfaction of their motives with their social environment; if necessary, to rank their motives in order of importance and to either delay their gratification or even abandon them completely. This confronts them with completely new demands. It is no longer enough for children to simply be guided by their emotions and to expect from their caregivers that they furthermore are willing to follow their emotional appeals in every case and situation. Children have to develop the ability to *not* live out an emotional action readiness, that is, to inhibit an emotion and to engage in alternative actions for which no spontaneous emotional action readiness is available.

This task reveals a fundamental characteristic of human motive satisfaction. It is something that we have not considered up to now, although it plays a central role in the development of an autonomous regulation of actions and emotions in adults as well.

Human motive satisfaction is not an individual act, but is always embedded within a network of social relations. For many of the actions required to satisfy their motives, individuals are dependent on coordination with other persons and their motives. Even just obtaining food to satisfy one's hunger requires a coordination of actions by numerous human beings. The way in which such social relations are coordinated cannot be varied at random, but is subject to material constraints as well as cultural norms and rules that map out how this social coordination of individual motives should proceed and how much scope is available to the individual. Hence, a fully developed adult emotional and volitional action regulation requires not only the possession of differentiated emotions and volitions, but also the ability to coordinate them with cultural norms and demands.

Mastery of this developmental task requires a further qualitative change in the three levels of regulation. This is also accompanied by a change in the relation between caregiver and child. Sooner or later, caregivers start to no longer just care for their children's needs unconditionally, but also to encourage them increasingly to regulate their actions and emotions themselves. They also start to evaluate their children's actions in the light of cultural norms and rules. Here again, there is a broad cultural and individual diversity in how these demands for autonomy should be presented to the child. However, all paths to more self-regulation are linked to the following three developmental trajectories:

1. On the level of emotional action regulation, caregivers shift to encouraging and helping their children to take the expression signs acquired in *inter*personal regulation and apply them in *intra*personal regulation. They should no longer understand their own expression appeals as appeals to another person who will then ensure motive satisfaction, but as an appeal to the self, and they should perform the necessary emotion- and problem-focused actions themselves.

Caregivers can encourage their children to form new motives directed toward maintaining cultural norms such as wanting to be like admired others (Holodynski, 1992) or wanting to achieve something (Heckhausen, 1985). These norm-oriented motives lead to the emergence of new emotions that evaluate the self in the light of cultural norms and rules, control norm-violating emotional action readinesses, and divert them onto norm-appropriate paths. They include the self-evaluative emotions pride, shame, guilt, and indignation (see Buss, 1980; Geppert & Heckhausen, 1990; Holodynski, 1992; Mascolo & Fischer, 1995; Sroufe, 1996; Stipek, 1995; Stipek, Recchia, & McClintic, 1992).

2. On the level of volitional action regulation, growing language competence leads caregivers and children to increasing use of verbal instructions and demands in their mutual action regulation. The *meaning* of speech becomes effective for action, and children begin to use speech for self-instruction as well and thus for *intra*personal regulation. Private speech emerges (Diaz & Berk, 1992; Vygotsky, 1934/1987).

   As a result, caregivers expect their children to stop communicating their appeals with expression signs and to start formulating them verbally. Instead of reaching a hand out for the cookie and whining loudly, they should now utter a verbal request. This calls for the further development of speech in terms of its action-regulating aspects, and, in many aspects, an, in part, wearisome relearning of expression signs as speech signs.
3. On the level of reflective emotion regulation, caregivers can start to exploit the newly acquired ability to create and use signs and also apply symbolic strategies of emotion regulation. Through the use of reinterpretations, imagery, or organizing motives into a time schedule, they can encourage their children to regulate their own emotions and give up contrary intentions at least in the short term. However, this calls for a level of symbol formation and volitional regulation that only starts to be mastered at 4–5 years (Bischof-Köhler, 2000). As a result, these strategies tend to be implemented *after* the emergence of self-evaluative emotions. In the following, we shall discuss how the development of intrapersonal regulation proceeds on all three regulation levels.

4.3.1. The Emergence of Intrapersonal Emotional Action Regulation

Intrapersonal Regulation as a Zone of Proximal Development

Intrapersonal regulation emerges as children start to satisfy their motives for themselves by doing that which caregivers have previously done for them. Infants already possess differentiated emotions, but these are directed toward regulating others. They also have a series of motive-serving actions at their disposal, but they still do not apply them consistently for their own emotional action regulation. Their task is now no longer to demand the support of others in every emotional episode, but to autonomously select and carry out suitable actions. At first, their mastery of this task is rather random and fluctuating. The transition does not occur abruptly, but is more of a slow withdrawal of interventions by the caregiver.

For example, a little girl wants to fetch her rag doll from a drawer, but it has got stuck inside. She starts to get angry, and looks toward her father in a demanding way. Instead of fetching the doll for her, he considers it sufficient to give her back an encouraging appeal to try again with a little more force, and he demonstrates the movement she needs to make. The girl can follow this cue, tug strongly at the doll several times, and actually manage to release it by herself. The action of the caregiver was to mirror the child's emotional impulse, but to return the emotional appeal directed toward him back to her, so that she feels challenged to act for herself.

Mirroring the appeal shows how one can conceive intrapersonal regulation on the basis of the model of interpersonal regulation. The appeal is conceived as an appeal to the own person, and the other person is no longer needed as a mirror.

In this process, children start off by being dependent on the guidance and encouragement of a competent other, as also seen in the frequent use of social referencing at this age. Intrapersonal regulation is still, to use Vygotsky's terminology (Vygotsky, 1998, p. 201), their zone of proximal development and not yet their zone of actual development. The zone of proximal development refers to that level of development in own actions that a child attains only when cooperating with a (trusted) competent interaction partner; the zone of actual development refers to that level that the child can attain alone without external support or the presence of others (see Griffin & Cole, 1984).

Strictly speaking, we can only tell whether a child is capable of completely autonomous intrapersonal regulation when he or she is alone and going through an emotional episode without fetching social assistance. This autonomization process can be divided into three stages:

1. Initially, infants generally do not remain alone at all. They need their caregivers to be available even when currently engaged in other activities and not interacting with them. However, everything has to take place within the same room. Should their intrapersonal regulation fail, they can fall back immediately on interpersonal regulation with their caregiver.
2. Three- to 4-year-olds may well remain alone for short periods of time and play by themselves. However, when they experience an emotion, they seek social support. Hence, their emotion does not trigger problem- or emotion-focused coping actions, but social-focused ones. Their actions are directed

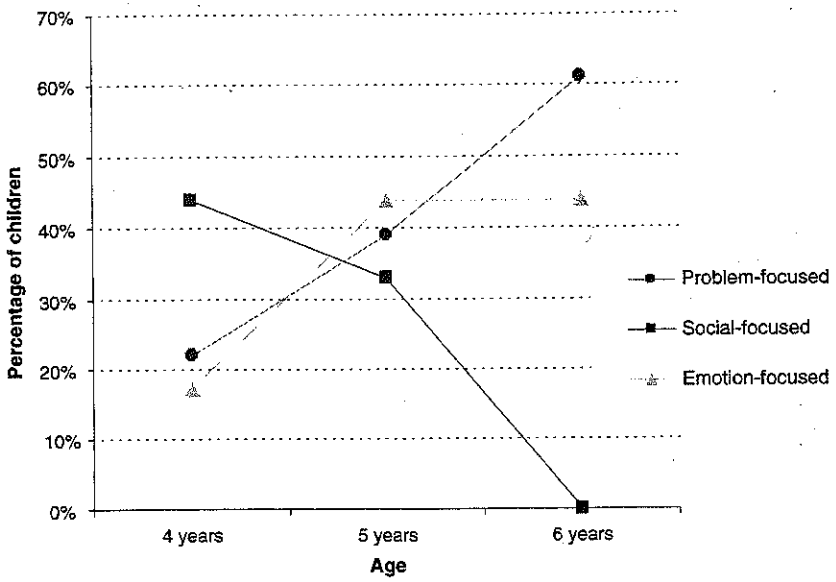

FIGURE 4.2. Type of coping actions triggered by disappointment in solitary situation from the ages of 4 to 6 years ($n = 18$).

toward first making contact with a (familiar) interaction partner who can help them to cope with the emotion episode.

3. As intrapersonal regulation becomes increasingly confident and autonomous, children start to seek less social participation and support. Instead, they can experience an emotion episode alone.

We have studied this increasing autonomization over the preschool years in two of our own studies. As 3-year-olds so frequently refused to be left alone in our pilot studies, we started off with 4-year-olds. In a cross-sectional study, members of three 20-participant groups of 4-, 5-, and 6-year-olds respectively (with equal gender participation) each received a coin that they could use to fetch a candy packet from a slot machine (Holodynski, 1997, Study V). The children were alone, and the candy packet was empty. On a bipolar rating scale with the poles *joy* and *disappointment*, 80.7% of all children reported being disappointed. At the same time, the social-focused actions (looking for the experimenter) declined from 8 (47.1%) in the 4-year-olds and 8 in the 5-year-olds to 2 (10.0%) in the 6-year-olds, $\chi^2(2) = 6.85$, $p = .033$. The children then received a second coin and collected a second packet that was full of candy. All children reported joy. The social-focused actions declined from 15 (78.9%) in the 4-year-olds to 4 (23.5%) in the 5-year-olds and 2 (10.0%) in the 6-year-olds, $\chi^2(2) = 21.80$, $p < .001$.

These results could also be replicated in a longitudinal study of 8 boys and 10 girls (Holodynski & Upmann, 2003b) exposed to the same research design once a year at the ages of 4, 5, and 6 years. With increasing age, the children responded less and less to the inductions of joy and disappointment by seeking the experimenter and demanding support in solitary situations. For disappointment, social-focused actions declined between the ages of 4 and 6 years from 8 (44%) to 0 (Cochran's Q test: $Q(2) = 9.46$, $p = .005$) and from 9 (50%) to 3 (17%) for joy (Cochran's Q test: $Q(2) = 5.64$, $p = .072$). In contrast, problem-focused actions in response to disappointment (e.g., persisting on the task, waiting for the experimenter) increased from 4 (22.2%) to 11 (61%) (Cochran's Q test: $Q(2) = 4.63$, $p = .099$). Emotion-focused actions (e.g., making fun of the situation, controlling expression, or shifting attention) did not increase significantly (see Figure 4.2).

For ethical reasons, the causes of emotions in our studies were relatively harmless. Hence, results only generalize to weak emotional intensities in solitary situations. We assume that 6-year-old children will still seek social participation when emotions become more intense, just like adolescents and adults still do when they feel overwhelmed by the intensity of an emotion episode and seek social support.

The Internalization of Cultural Norms through Self-Evaluative Emotions

Self-evaluative emotions permit children to relate themselves not only to objects and persons but also to the norms determining social life. Even a fully autonomous intrapersonal regulation continues to be embedded in a social context without which successful actions would be impossible. In the end, autonomous action functions only because of the existence of cultural norms that people generally comply with. This is what makes social coordination predictable and one's own activity something that can be planned.

Individuals use self-evaluative emotions to assess their actions in relation to cultural norms. They feel pride when they find themselves in tune with them; shame or guilt when they violate them (Barrett, 1995); and indignation—as a special form of anger—when others disregard them (Mascolo & Griffin, 1998a).

Such self-evaluative emotions guarantee that a child's intrapersonal regulation remains embedded within the broader social coordination of individual actions and life plans and does not develop in opposition to them. This embedment of the child's newly awakened will within the social coordination of motive satisfaction is a highly significant developmental task. It leads to the emergence of a new balance on the emotional and motivational level between the newly awakened striving for autonomy on the one side and the need for relatedness, belonging to a social group, and feeling at home there on the other (see Oerter, 1999). Because self-evaluative

emotions play such an important role in development, we shall now address the emergence of pride and shame in more detail.

The emergence of these self-evaluative emotions also seems to possess a zone of proximal development. Our own studies (Holodynski, 1992, 2003a) have shown that infants and preschoolers initially experience pride and shame only in social interaction with an adult. When, in contrast, they are alone, they exhibit only effect-oriented emotions such as joy, frustration, or disappointment. It is only as they advance through elementary school that they also start to react with pride and shame when they are alone—just as adults do. Young children, accordingly, still require social interactions in which an adult represents norms through his or her presence if they are to experience pride over a success rather than joy over an effect, shame over a failure or a moral transgression rather than disappointment, or frustration over an unsuccessful effect (see also Stipek, 1995).

We assume that self-evaluative emotions also emerge through the interplay between affect mirroring by caregivers and motor mimicry by infants (see Section 4.2.1). In coregulation with their child, caregivers establish emotion-specific contingencies between cause, social evaluation, expression reactions, body reactions, and actions. They mirror infant expression reactions in their own expression, and they present expression signs in their own behavior as models. This affect mirroring coincides with the infant sensitivity for contingencies and their ability to "pick up" the feelings of their partner through motor mimicry.

The emergence of self-evaluative emotions depends decisively on how caregivers communicate their approval and disapproval toward their child and his or her actions (see also Stipek *et al.*, 1992; Trudewind, Unzner, & Schneider, 1989). This process can be depicted in four phases.

Phase 1: The informative and affective impact of social evaluation. During the second year of life, children pass a major developmental milestone: They learn to differentiate consciously between self and other. They become aware of themselves as acting subjects with their own intentions and expectations and are able to distinguish their own intentions and expectations from those of others. This ability manifests in the use of the word "I." Stern (1985) calls this the birth of the verbal self. The production of self-caused effects becomes a strong motive, namely, wanting to do things oneself (Geppert & Küster, 1983). During this stage, the desire to do things oneself is not yet directed toward the parental reaction, but still exclusively toward the physical effect that it can produce. The effect has to be immediately perceivable in order to elicit joy when effects succeed, and frustration or disappointment when they fail.

There are many ways in which caregivers can involve themselves in this process and encourage the gradual emergence of self-evaluative emotions in the child. Harter (1978) has pointed out that social evaluation does not just have an incentive impact in the sense that the child anticipates reward or punishment. It also has an informative and affective impact. At this stage of development, social

evaluation is still a means of orienting and directing children's desire to do things themselves and not yet an incentive that they strive toward for its own sake.

The *informative impact* of social evaluation is that approving (but also disapproving) certain infant actions or action outcomes marks them and makes them stand out for the child. Caregivers focus particularly on those action outcomes they consider worthy of praise because they comply with cultural norms or represent culturally valued achievements.

Many of these outcomes are so unspectacular in terms of their physical effects that they would never hold the child's attention by themselves. However, from the parents' perspective, they mark the gateway to the complex universe of increasingly difficult cognitive or behavioral tasks that are important for the child's further development. For example, the first time a child manages to complete a simple jigsaw puzzle does not produce any particularly strong personal effect. The child lacks the experience to see that putting together puzzles is a perceptual *achievement*, and that the simple puzzle marks the gateway to a complex world of challenging tasks and achievements.

However, for adults it marks the beginning of a major new development. They generally express this perception by linking together the infant performance and the performance of "grown ups." The child can now do something that adults do. This shifts attention from the things to the persons who do something particular with these things, and signals to the child that in this aspect, he or she is already like an adult. When caregivers consistently mark such initially unspectacular action outcomes through their approval, contingencies emerge for the child between his or her actions and parental reactions. The child notices that certain actions can elicit emotional effects in *adults*.

The *affective impact* of social evaluation is that caregivers communicate their approval through exaggerated expression signs of pride. They do not just react to the achievement with smiles and joyous vocalizations, but also with exaggerated expression signs of admiration and self-presentation: They puff out their own chest and utter exaggerated cries of admiration. They get the child to show them what they have achieved and encourage the child to stand up tall and feel like a grown up. Because of their motor mimicry ability, children can attune to these expression signs and "catch" the pride—even though, at first, they may not really know what they should feel "proud" about. The evaluation of the caregiver has an affect-contagious impact.

Hence, the effects marked by adults have the pleasant effect of stimulating a socially evaluative form of an effect-related joy in the child. This differs from a "simple" effect-related joy. In the latter, joy is directed toward the effect, whereas in the effect elicited by social evaluation, the caregiver places the child and his or her achievement at the center of attention. The child becomes the object of overt attention in order to emphasize that, at this moment, he or she has surpassed his or her actual level of development and done something in the same way as grown ups

do. Such a new person–environment relation lends itself to being coded iconically in expression signs of self-expansiveness characteristic for pride such as standing up straight, smiling broadly, and making celebratory gestures (see Barrett, 1995; Mascolo & Fischer, 1995).

Social exclusion as the origin of shame. The negative side of social evaluation is disapproval. It leads to the emergence of the negative self-evaluative emotions of shame and guilt. These appear in conflict situations when children's wanting to do things themselves runs up against the decisive disapproval of caregivers, because they are either *doing something or want to do something* that they *should not do*, or they *should do something* that they already *can do* in principle, but *do not want to do* in practice.

In the first case, caregivers confront children with the normative prohibition that one is *not allowed* to do everything that one *can* do, for example, smearing paint all over the wallpaper. This is a situation in which children have to inhibit their own action impulses. If they defy the prohibition, caregivers can take advantage of their greater strength and reach by, for example, removing the paints. Children may well protest, but the situation is definitely defused.

This approach is ineffective for the second form of conflict—over normative commands—when children *should do something* that they *can do*, but *do not want to do*. These are actions that children have already mastered. However, they should no longer just carry them out when they feel like it, but in a norm-driven form, for example, eating by oneself with a spoon without making a mess. However, children may prefer using the spoon to play with their food, because this produces far more interesting effects. Indeed, there are hardly any limits to children's desire to do things themselves.

Caregivers, however, pose limits. As children gain autonomous mastery of certain abilities, particularly in looking after themselves, caregivers switch sooner or later, more or less gently, to no longer viewing them as babies in need of care, but as children who *can* already do things, and, therefore, *should* also do those things they are capable of. Hence, they confront children with the demand to be like grown ups, like "big" children, and also behave as such—even though, at the present time, the children do not *want* to behave in this way.

This conflict becomes critical when the emergence of the conscious self–other distinction allows children to recognize when their own intention is being inhibited or even thwarted by that of another person. Because they are aware that the other person wants something different from what they want, it is no longer so easy to apply the simple strategy of distracting them from their intentions. From the children's perspective, there is no reason to desist from what they are doing. Indeed, their anger over the parental goal blocking grows into massive bouts of defiance aimed at forcing caregivers to relinquish their own goals instead.

At this stage, "negotiation" is not yet possible, because it would require symbolic regulation strategies that children of this age still do not possess (see

below). Hence, caregivers cannot appeal to "reason" in their children, to their conceptual insight into the legitimacy of the demanded norm, even when many mothers and fathers attempt this—without success—in daily childrearing.

When all "well-intentioned" strategies fail, what "final" means can caregivers apply to make their children drop their intentions and do something that they can do, but do not want to do, although they should do? The means is to break off the relationship, either by leaving children alone or literally putting them outside the door—to exclude them socially, and thereby give them to understand that they have made themselves unlikable.

But, why is such exclusion so effective? To understand this, it is necessary to take the children's perspective. They do not initially see exclusion by one's caregiver as being something temporary but as something permanent and fundamental. They correctly infer that they have been excluded intentionally. At the same time, the person excluding them is also the person to whom they have always been able to turn for support in difficult situations. Their attachment motive is activated to a high degree, but it is precisely the target person of this attachment that refuses all help. This is what makes exclusion by the caregiver such an existential experience. Children are helplessly alone in this situation and experience themselves as objects of a parental "despotism" directed toward their person as a whole. The child is excluded as a person. Children's reactions are correspondingly vehement in that they bitterly petition for the attachment to be reinstated through hefty, stubborn, or pleading protest.

Sooner or later, caregivers allow their child to return. The intensity of a child's powerlessness in the face of the respected other depends on the extremity of the exclusion and the warmth or coldness of the way in which the caregiver resumes the attachment relationship. This can range from a warm-hearted reconciliation with comforting to a more rejecting, mere tolerance of the return. Essentially, however, the child has had to experience that he or she was small, rejected, and powerless in relation to his or her caregiver in this situation.

It is unclear how many such exclusion episodes children have to go through before they can extract the experience that they are no longer accepted unconditionally but have to meet the normative demands of their caregiver. This is the only way to regain approval—otherwise, subjectively, they are faced with the threat that the relationship will break down (see also Barrett, 1995, p. 47; Buss, 1980; Lewis, 1971).

We assume that such exclusion experiences form the basis for the emergence of shame. Buss (1980, p. 157) interprets shame as social anxiety, as a fear of social expulsion, of being abandoned by one's parents. Lewis (1971) talks about shame as the fear of losing parental love and approval (see also Piers & Singer, 1953; Wurmser, 1981).

After experiencing such exclusions, the caregiver often has to only threaten renewed exclusion when children once more either violate or fail to comply with a

norm. Children promptly feel themselves to be the focus of a disapproving evaluation of the self, and will try to evade the threatened exclusion through expression signs such as averting their gaze, burying their head in their hands, hunching themselves up to make themselves look small, and hiding. We think this is the *intra*personal regulation function of shame-related expression signs (see Barrett, 1995, p. 42). At the same time, such expression signs can also be interpreted as gestures of appeasement toward the caregiver. This is because children use their expressive behavior to portray a self-exclusion iconically, so that caregivers no longer have to resort to actual exclusion. We think this is the *inter*personal regulation function of shame-related expression signs. Because shame is a special form of anxiety, fear-related body reactions also appear (see, once again, Barrett, 1995, p. 42).

In one way or another, all children must have gone through the experience that their defiant or stubborn wanting to do things themselves can lead to exclusion or a break in the relationship with the caregiver when it violates normative standards. As a result, they will react to comparable disapprovals in subsequent situations with shame.

A similar and effective method of inducing shame is to ridicule children for their norm violations. This leads to the insight that the way they are behaving at the moment is not adult-like at all, but still like a silly baby. Such ridicule is also a form of social exclusion to which children react with shame.

Phase 2: The search for positive social evaluation. As discussed in detail above, the informative and the affective impact of social approval introduces a new aspect to wanting to do things oneself: wanting to do that which caregivers or adults in general approve of and thus triggering a positive social evaluation in adults. This splits wanting to do things oneself into two different motives: The first continues to be oriented toward a material effect. In line with White (1959), it can be called the effectance motive. The other is oriented toward a social effect and adopts the content of the social norms and regulations. This form of motive can also be called the identification motive—wanting to be like the respected adult (see Holodynski, 1992). In the terminology of a self-theory, it can be equated with the formation of the ideal self (Allport, 1937; Erikson, 1973).

The autonomy of these two motive forms can be seen when children shift to testing what effects these positive evaluations can trigger in adults. This leads to the typical young child behavior of wanting to show off everything to adults—in anticipation of a positive evaluation. Social evaluation has developed an *incentive* function (see Harter, 1978). During this testing process, the first positively weighted norm standards crystallize for the child—what caregivers consider to be admirable and what children are spurred to achieve.

For children, this is accompanied by a further "discovery": Whereas they were initially fixated on the functional properties of daily objects (What can you do with it?), they now discover increasingly that objects and the actions linked

to them can be joined together to form action scripts that then belong to certain adult roles. Children start to acquire the world as a world of social roles: Mother feeds and looks after her baby, the baker bakes bread, the doctor heals the sick, and so forth. These discoveries also make children aware of the norms and rules of a cultural community. They are reflected in role-related action scripts and are enacted in children's role-play (see Elkonin, 1980; Oerter, 1993).

Phase 3: Pride and shame as self-evaluations requiring a social context. When children no longer wait for evaluation by adults, but react immediately to a success with pride or to a failure with shame, they are already evaluating their activities according to normative standards. This is then no longer a response to the explicit approval or disapproval of caregivers, but an anticipation of these reactions. In a study of performance-related tasks, Stipek (1995; Stipek *et al.*, 1992) found that 3-year-olds already exhibited shame-related reactions (e.g., gaze aversion; avoidant posture such as head and chin down, body to one side, or squirming; closed posture such as arms/hands in front of face, shoulders hunched) more often in response to failures than to successes, and pride-related reactions (e.g., open posture such as hands or arms up, head or chin up, "puffed chest," sitting up tall) more often in response to successes than to failures. However, no developmental trend in the intensity or frequency of these reactions could be observed from the third to the fifth year of life. Therefore, Stipek (1995) concluded that even 3-year-olds have already internalized normative standards: "Self-evaluative emotions . . . become independent of the anticipation of others' approval or disapproval" (p. 249).

We consider such a conclusion to be premature. An experimenter was always present in these sessions, so the children's pride and shame reactions need not have been triggered by an *internalized* self-evaluation. They could also have been induced by the *presence of the adult*. To test whether self-evaluation is independent of social context, that is, whether children comply with norm standards for their own sakes rather than for those of others, it would be necessary to analyze task behavior in *solitary* situations, that is, isolated from all social interaction. If preschoolers then still react to their successes or failures with pride or shame respectively, this could be interpreted as clear confirmation that competence-related self-evaluations can already be performed at this age without the mediation of social processes.

An inspection of the literature on the origins of self-evaluative emotions reveals that all studies used exclusively social situations. They either studied competitive behavior—an intrinsically social setting (Heckhausen & Roelofsen, 1962)—or experimenters were present, and the children had to show them whether they had been able to master the task (Lewis, Alessandri, & Sullivan, 1992; Schneider & Unzner, 1992; Stipek *et al.*, 1992).

This deficit led us to study solitary situations (Holodynski, 1992). We gave Heckhausen and Wagner's tower-building task (Heckhausen & Wagner, 1965) to

18 female and 17 male preschoolers (M = 62.0 months, SD = 10.1 months). In this task, children had to build towers of a given height with wooden blocks, and they had to do this not only in the presence of the experimenter but also alone. We recorded how far the children exhibited pride-related expression signs (open posture such as raised head, "puffed chest," sitting up tall; gestures of triumph such as hands or arms up, cries of triumph) or shame-related expression signs (avoidant posture such as head and chin down; closed posture such as arms/hands in front of face, shoulders hunched, pressed lips, biting lips, averted gaze, fumbling gestures). Thirteen children (37%) displayed pride when building a tower successfully or shame when it collapsed only in the social situation when the experimenter was present. Only one child did this in the solitary situation. This does not support a self-reference of pride and shame in this age group.

Twenty-two children (63%) reacted with neither pride nor shame; they displayed joy, embarrassment, anger, or disappointment. Therefore, a second experiment was performed in which an emotional self-evaluation regarding the task was encouraged systematically through performance-related behavior in the experimenter, and a less effect-oriented task was selected—using jigsaw puzzle pieces to assemble squares of ascending difficulty (Holodynski, 2003a). From 38 children (M = 61.5 months, SD = 10.3 months), 26 reacted with pride (68%) and 15 with shame (39%). Only 5 children (13%) displayed neither of these two emotions. This confirmed that the children already reacted to the task with self-evaluative emotions. In the subsequent main study, children had to solve another set of square puzzles: once by themselves in a solitary condition, and once in the presence of an experimenter who watched the child in a reserved, neutral way. Two of the puzzles were impossible for the children to solve. After each child had made a few unsuccessful attempts, the experimenter asked: "Can't you do it?" In the solitary condition, only 3 (7.9%) of the 38 children displayed pride at their success and 2 displayed shame at their failure. The others displayed effect-oriented emotions such as joy, anger, or disappointment (see Table 4.2). In the social condition, in contrast, 22 children (57.9%) responded with pride and 26 with shame (68.4%).

These findings indicate that preschool-age children initially display the self-evaluative emotions of pride and shame almost exclusively in the presence of other persons. At this age, norm standards do not seem to have attained the necessary degree of detachment from direct social interaction with a respected person that would enable them to be effective on their own. Young children still require adults as living representants of standards, and they wish to demonstrate their own ability to meet these standards. Self-evaluative reactions with pride or shame still belong to the zone of *proximal* development and not yet to the zone of *actual* development (Vygotsky, 1998, p. 201).

Phase 4: Pride and shame as internalized self-evaluations. An internalized self-evaluation in which children react with pride and shame for themselves alone first seems to develop during elementary school age and not as early as the third

TABLE 4.2. Percentage of 4- to 6-Year-Olds Who React to Success with Pride and Joy and to Failure with Shame, Anger, and Disappointment ($n = 38$)

	Context	
	Alone	Together with experimenter
Embarrassment	0	76.3
Success on jigsaw puzzles		
Pride	7.9	57.8
Joy	34.2	86.8
Failure on jigsaw puzzles		
Shame	5.3	68.4
Anger	39.5	44.7
Disappointment	47.4	84.2

year of life as claimed by Stipek (1995). Thirty of the 38 preschoolers in our experiment (Holodynski, 2003a) described above were followed up with similar square puzzles 2.5 years later when attending elementary school (M = 94.0 months, SD = 11.9 months). In the solitary condition, 7 children (23%) now displayed pride when successfully solving a puzzle and 15 (50%) displayed shame when they failed. In the social condition, 27 (90%) children displayed pride; 29 (97%), shame (Holodynski, 2003b).

Accordingly, it was only after entering elementary school that children started to react more frequently to success and failure with self-evaluative emotions in solitary situations as well. That this transition to elementary school is accompanied by an internalization of norms and thereby a genuine self-evaluation is not surprising. This is the first time children are confronted systematically with achievement measures—at least in Germany—and they also compare each other's achievements so that success and failure become meaningful to them.

Of course, the things they are either proud or ashamed about become more differentiated over the next years of life. Mascolo and Fischer (1995) have addressed this topic and conceived a developmental sequence in the appraisal patterns of pride and shame.

Finally, one special case of norm violation is when children cause injury to another person through their behavior. Caregivers may differ in how they react to such situations: They may focus the child's attention on the injury and the negative feelings (sadness, pain) that this has triggered in the injured party and take measures to make reparation. Such strategies should tend to favor the emergence of guilt (see Barrett, 1995). However, they may also focus on the norm violation, particularly when it has been carried out intentionally, and threaten the child with social exclusion. Then, such episodes should tend to elicit more shame.

Summary. The process by which pride and shame emerge can be broken down into four phases: In the first phase, children display only effect-oriented activity and effect-oriented emotions of joy over an intended effect and frustration or disappointment over an unsuccessful effect. During this phase, caregivers introduce normative standards into their interaction with the child through their reactions of approval and disapproval. This makes children aware of the reactions that their effect-oriented actions trigger in caregivers: vicarious pride reactions for norm-attuned behavior (including the attainment of competence standards) and social exclusion for norm-violating behavior. These experiences lead into a second phase in which young children direct their actions toward triggering approval in their caregivers. When behavior violates norms, threatening the child with social exclusion is sufficient to activate the social fear that this will reoccur. In the third phase, norm standards have become internalized to such an extent that the presence of a respected other, particularly an adult, is sufficient to elicit pride or shame at norm-appropriate or norm-violating behavior respectively. It is only in the fourth phase during elementary school age that children seem to internalize norm-oriented behavior to such an extent that they react to norm-relevant action outcomes with pride or shame in front of themselves—or, at least, in front of an imagined other—but without requiring the real presence of that other.

4.3.2. The Emergence of an Intrapersonal Volitional Action Regulation

The transition from using language as an interpersonal means of regulation to using it as an intrapersonal, self-referring one is a complex and multitiered process (see Luria, 1980). Within our context, we shall focus only on that development trajectory in which speech signs can acquire an action-regulating function—an aspect that becomes decisive for the volitional control of emotional action readinesses (see Section 4.3.3). It is decisive, because it takes time for children to acquire the ability to stick to an intended plan in the face of adverse conditions and existing emotional action readinesses and to correct impulsive actions through self-instruction. It is only during preschool age that they become able to *inhibit* their own behavior through language. Hence, a tiresome learning process is needed before the *meaning* of what is spoken actually impacts on action, and verbal instruction becomes an effective regulator. Luria (1961, 1980) distinguished three stages of development in his studies.

External instruction as an impulse to initiate action. The previous section (see 4.2.2) showed that 2-year-olds are still unable to inhibit action readinesses on the basis of verbal instruction. At this stage, speech serves as an action-initiating appeal to others that is associated only vaguely with the meaning of what is spoken. External instruction, that is, verbal instruction, seems to be able to only trigger reactions in children of this age. It cannot inhibit them or regulate their course without the support of situational or action cues (Luria, 1961).

Self-instruction as an impulse to initiate action. Luria (1961) extended his light signal experiment (see Section 4.2.2) to cover self-instructions in 3- to 4-year-olds (see Figure 4.3). The children had to squeeze a rubber ball for a red light signal and not squeeze it for a green one. In Condition A, children did not give themselves self-instruction. As a result, they made a lot of errors. In Condition B,

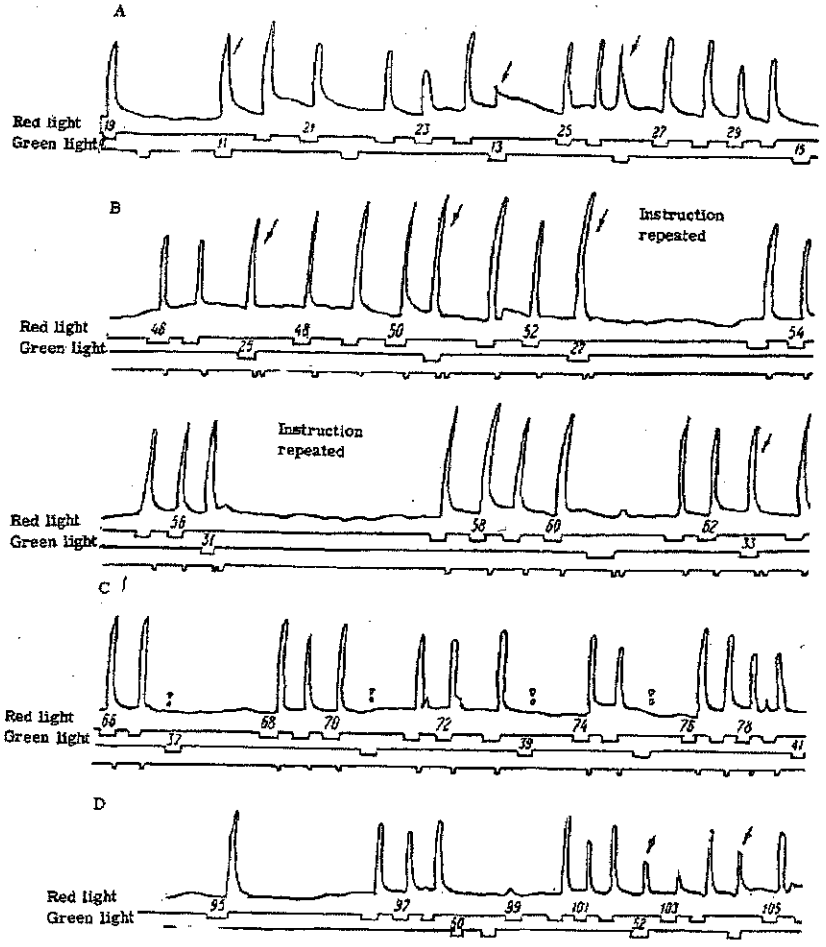

FIGURE 4.3. Impulse-controlled inadequate squeeze reactions (errors marked by arrows in conditions A, B, and D) to light signal by Gena P., 3 years, 7 months. Condition A: No self-instruction—squeeze for red; don't squeeze for green. Condition B: The same reinforced with twofold self-instruction—squeeze and don't squeeze. Condition C: Adequate reaction to only positive command—squeeze for red. Condition D: Reaction with no spoken command—inadequate reactions return. Adapted from Cole, 1978, p. 253.

children had to give themselves a twofold self-instruction, namely, the initiating instruction "squeeze" for a red light and the inhibitory instruction "don't squeeze" for a green light. Results showed that the "don't squeeze" instruction also led to regular ball squeezing. Only the simple action-initiating command to "squeeze for red" in Condition C led to optimal regulation. When spoken commands were dropped once more in Condition D, the error rate rose again.

This shows that 3- to 4-year-olds are clearly able to initiate motor reactions through their own speech. However, here as well, speech initially serves only as an action readiness, because the inhibitory self-instruction "don't squeeze" also triggers the squeezing response.

Self-instruction as meaning-controlled action regulation. This is the stage at which attention is also paid to the *meaning* of speech signs without the need for situational or action cues, and it becomes possible to inhibit action through speech. The meaning content of self-instruction acquires its action-regulating function at the age of 5–6 years. When children of this age were given the experimental condition with the twofold instruction described above, they frequently formulated the task in their own words as: "If the red light comes on, I have to squeeze the ball; if the green one comes on, I mustn't squeeze it." After a short time, they were able to perform the reaction (and also its inhibition) correctly without continuing to speak out loud. A new volitionally generated routine action had formed. Adults also still resort to speaking out loud to regulate their actions when they have to perform complex action chains such as following instructions in a user manual or learning to drive an automobile.

Speech signs become more important in *inter*personal regulation as well, because children increasingly have to use them to help deal with tasks that they previously tackled with expression signs. Sooner or later, caregivers encourage their children to start to formulate their appeals verbally rather than continue to use expression signs. Instead of sticking out their hand for a biscuit and whining loudly, they are now expected to express a verbally formulated request. Infants shift increasingly to expressing their wishes and intentions through speech. Kopp (1992) has plotted this transition in terms of the reduction in crying between the ages of 1 and 4 years. One can also view this transformation of expression signs into speech signs as a form of emotion regulation, because children are encouraged to modify the expression components of an emotion (see Thompson, 1990).

4.3.3. The Emergence of an Intrapersonal Reflective Emotion Regulation

Between the ages of 3 and 6 years, children also pass a major milestone in the development of their reflective emotion regulation. Increasingly, they become able to inhibit a currently pressing emotional action readiness volitionally and not pursue it here and now but at a later and more suitable time. This ability to engage in

reflective emotion regulation is essential for adult motive satisfaction. As already noted at the beginning of Section 4.3, most motives cannot always be satisfied in the here and now. One has to seek out suitable situations, wait for the appropriate moment, reach an agreement with the other persons necessary for motive satisfaction, and defer one motive in favor of another. In some ways, one can view all development up to adulthood as a continuous postponement of motives and their attendant emotional action readinesses: Children have to learn to wait until it is their turn, until they are given the object they desire (at Christmas or on their birthday), or until they are old enough.

Prototypical situations of this kind are when children are required to delay gratification. Mischel and colleagues (Mischel, 1971; Patterson & Mischel, 1976) were among the first to study this ability systematically. They used an experimental paradigm in which children could receive either a small reward immediately or a large reward after a waiting period. The children began to choose to delay gratification and stick to their choice only when they were about 4 years old. When asked, even preschool-age children knew that delaying gratification really was the "cleverer choice," but the majority still tended to prefer the smaller but immediate reward (Nisan & Koriat, 1977).

A follow up of these 4-year-olds at the ages of 15 or 18 years showed that those who had already been able to "resist temptation" as preschoolers were more socially competent as adolescents than the one third of the children who succumbed. The former could tolerate more frustration, were more self-confident, and also had better school grades (Shoda, Mischel, & Peake, 1990). This shows how important reflective emotion regulation is in ontogenetic development.

Development of behavioral regulation strategies. Which regulation strategies do children apply in order to delay gratification, and which age-specific changes can be observed?

Bridges and Grolnick (1995) studied five age groups (12, 18, 24, 32, and 45 months) in two situations with delay of gratification. One promised a much-loved snack (an animal-shaped cracker) and the other an attractively wrapped present. However, the children always had to wait before receiving the "desired" object. The experimenter made an excuse to leave the room and placed the object in sight of the child but out of reach. Although the mother remained in the room, her availability was varied. In a passive condition, she was asked to busy herself by reading a magazine; in an active condition, she was not busy and available to her child.

With increasing age, children more frequently used self-initiated *intra*personal distraction strategies such as playing with other objects, particularly when the mother was unavailable. Thirteen percent of the 12-month-olds, 25% of the 32-month-olds, and 65% of the 45-month-olds exhibited such strategies. Self-initiated *inter*personal distraction strategies in which the child engaged the mother in play or conversation (by smiling, showing her toys, or asking her to play) also increased markedly, particularly in the active condition in which the

mother was available. These increased from 1% of the 12-month-olds to 4% of the 32-month-olds and 25% of the 45-month-olds. In contrast, calming strategies in which the children sought consolation and support from their mothers decreased in the passive condition from 28% in the 32-month-olds to 1% in the 45-month-olds (see also Table 4.3).

Hence, between the ages of 1 and 4 years, children increasingly apply distraction strategies by themselves, and by the age of 4, they are also able to vary them context-specifically. When their mothers are busy, they direct far fewer interpersonal distraction strategies toward them and apply more intrapersonal distraction strategies than when their mothers are available. Stansbury and Sigman (2000) showed that these age-specific changes do not just apply to situations with delayed gratification but generalize to other causes of negative emotions. They also found that children favored the regulation strategies preferred by their mothers. This points to the existence of dyad-specific learning processes.

We have still not considered how successfully the children's strategies regulate their own emotions and also lead to the desired goal. We tackled this question in our own study by assessing not only the child's regulation strategies but also the course of the emotion (Friedlmeier & Trommsdorff, 2001).

We observed 2-year-old ($n = 20$) and 3-year-old ($n = 35$) girls in a mother–child interaction in which we induced a "frustration situation." A stranger entered the room, removed the toy the child was playing with, and left the room again. We assessed the intensity of negative emotional expression by rating facial expression, gestures, and body posture on a 6-point scale at four time points: (1) before the removal of the toy (baseline), (2) 10 s after the removal of the toy, (3) 1 min later, and (4) 2 min later. After 2 min, the experimenter returned and gave the toy back to the child. Furthermore, maternal sensitivity was operationalized as an aggregated measure of maternal warmth and maternal responsiveness, which were assessed by a 6-point-scale each. Both scales were highly intercorrelated in both groups. A median split was calculated for each age group in order to differentiate between high and low sensitive mothers.

The children's regulation strategies were assessed in another observation situation in which the children experienced the mishap and the sad reaction of their play partner. In this situation, the mothers were instructed to remain passive so that, in contrast to the frustration situation described above, the child would have to take the initiative. Three types of strategy were discriminated: seeking physical closeness to mother, making eye contact, and seeking no support from her. The first two forms were viewed as an *inter*personal regulation initiated by the child; the latter, as an *intra*personal regulation.

The proportion of children exhibiting exclusively intrapersonal strategies tended to be higher in the 3-year-olds compared with the 2-year-olds. However, the interesting question was whether children using intra- versus interpersonal regulation would differ in the way they reacted to the frustration situation.

TABLE 4.3. Type of Reflexive Emotion Regulation Strategies and Who Can Initiate Them

Type of strategy	Initiator of the emotion regulation: Caregiver (CG) initiates interpersonal regulation for child	Child initiates interpersonal regulation by CG	Child initiates intrapersonal regulation
	Behavioral strategies		
Touch	Rocking, stroking, comforting mode of speech, body contact	Child seeks closeness to CG in order to be comforted	Child calms self through such actions as sucking, stroking, or hugging self
Distracting attention	Shifting attention to another object	Child asks CG to play	Directing gaze away from source of arousal, child turns to another object, goes off to play
Flight, withdrawal	CG removes child from the situation	Child appeals to CG to be taken out of situation	Child flees from the situation, also social withdrawal
	Symbolic strategies		
Comforting, consoling	Verbal consoling and comforting	Verbal request to be consoled by CG	Child calms self through (positive) self-instruction
Distracting attention	Talking about something else	Child changes the topic, poses questions on other topic	Child distracts self with thoughts, e.g., thinks about something attractive
Reinterpreting (e.g., trivializing, downward comparison, rejection of guilt, denial)	Reinterpreting the emotion episode, giving a plausible explanation	Child asks CG questions about emotion episode, seeks an explanation, initiates role play	Child personally reinterprets emotion episode in role play and fantasy
Ranking motives in time hierarchy	Parents put off gratification of child's motive to later point in time	Child appeals to CG to promise later gratification of motive	Child imagines gratification of motive at later point in time
	Antecedent strategies		
Approach	Providing positive emotion episodes	Child requests CG to provide positive emotion episodes	Child seeks out positive emotion episodes
Avoidance	CG protects child from potentially negative emotion episodes	Child asks CG about the negative valence of situations	Child avoids potentially negative emotion episodes
Discourse over the regulation of emotions	CG talks to child about emotions and their regulation	Child asks about emotions and their regulation	Child thinks about potential emotion episodes

Although the 2-year-olds showed no differences, the 3-year-olds did: Girls using interpersonal regulation showed more intensive emotional expression and took longer to recover than those using intrapersonal regulation.

The assumption that interpersonal regulation continues to be dominant in the 3-year-old girls and is also the age-appropriate strategy would have led us to anticipate the opposite. This outcome can be interpreted in one of two ways: (1) Interindividual differences of the children cause the effects: Three-year-olds who still seek closeness to mother find it difficult to regulate their emotional reaction appropriately and are also less easy to calm. (2) Interindividual differences in the mothers' childrearing styles cause the effects: Mothers of 3-year-olds who regulate interpersonally encourage a frank exchange over the cause of the frustration situation and the emotion it triggers, leading to a greater persistence of the negative expression over time.

This second interpretation is supported by the finding of a relation between the sensitivity of the caregiver and the child's emotions (see Figure 4.4): Whereas the initial emotional intensity was comparably strong, it declined far less in girls with sensitive mothers than in their peers with less sensitive mothers. In dyads with less sensitive mothers, a stronger effort was made to dispel a negative emotion rapidly.

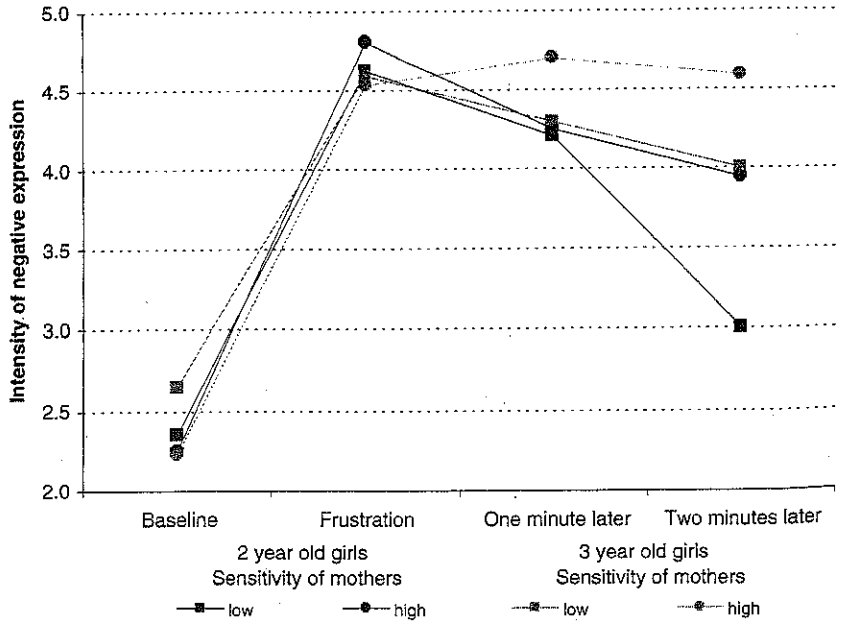

FIGURE 4.4. Temporal course of negative expression intensity (1 to 6 maximum) in 2- and 3-year-old girls as a function of the sensitivity of their mothers. Adapted from Friedlmeier & Trommsdorff, 2001.

In contrast, more sensitive mothers focused more attention on the negative emotion of their child, and it subsided more slowly (Friedlmeier & Trommsdorff, 2001).

Further support for this interpretation is provided by an analogue observation of mother–child interaction in 5-year-olds (Friedlmeier & Trommsdorff, 1999) in which children were exposed to the frustration situation described above, and their mothers' regulation behavior was coded. Compared with less sensitive mothers, sensitive mothers focused less on letting the frustration subside but dealt extensively with its cause and the child's emotional reaction (see Section 5.2.3).

This type of approach can also be viewed as an affect mirroring of children's emotions by their mothers. The emotions are not just mirrored with the help of expression signs but also with the help of speech signs. By not just regulating their children's emotions "away," but by using them as an opportunity to talk about emotions, children gain an opportunity to become aware of emotional causes, types of expression, consequences, and regulation strategies, and they can forge a link between volitional and emotional action regulation. Gottman (1997) recommends this style in his parental childrearing manual and calls it "emotion trainer." In their longitudinal study, Gottman, Fainsilber Katz, and Hooven (1997) showed that parents practicing such a childrearing style had children with a greater knowledge of emotions at their disposal, were more emotionally well-balanced, and were more popular with their classmates (see below).

Development of symbolic regulation strategies. Even at an early age, children already apply distraction strategies in order to master a delayed gratification. However, this often requires such a great volitional effort that they are unable to do anything other than wait and *try* (more or less successfully) to distract themselves.

One particularly successful regulation strategy for overcoming motive conflicts and waiting situations is the ability to engage in "mental time travel" and perform a temporal ranking of motives and emotional action readinesses (see Bischof-Köhler, 2000). This is understood as the ability to bring to mind past and future motives and to take them into account when organizing one's actions (see Table 4.3).

Bischof-Köhler (2000) has identified two necessary preconditions for this ability: a theory of mind and a comprehension of time. A theory of mind (see Wimmer & Perner, 1983) includes the knowledge that other persons may have a false belief that does not agree with the facts. It also contains the ability to bring to mind two intentions (one's own and that of one's partner) simultaneously and perceive them as differing. Such achievements require the ability to handle reference systems in one's mind. One has to represent two reference systems at the same time, for example, the situation as actually found and the possibly incorrect notions that a person has of it.

Time comprehension, the second precondition for mental time travel, is based initially, according to Bischof-Köhler (2000), on the application of spatial categories to temporal phenomena (e.g., behind and in front of to before and after)—that

is, the use of space as a model for (invisible) time. Gradually, this makes it possible to relate earlier and current events to each other in the mind.

The temporal conjunction of theory of mind and time comprehension leads to the ability to travel through time in one's mind and to coordinate one's actions by ranking various motives and emotions *in time*. One can satisfy one motive now and the other one later. Nonetheless, purely mental actions is not enough; there is also the need for an "executive control"—a kind of volitional authority that can check readiness- and stimulus-controlled actions and focus attention on planning actions that serve one's motives. This also includes the development of speech signs as a means of action-regulating self-instruction, as described in Section 4.3.2.

Bischof-Köhler (2000) tested time comprehension and theory of mind in 55 girls and 56 boys aged 3–5 years. To test the former, children had to estimate the temporal duration of action sequences; to test the latter, they had to master so-called false-belief tasks. They also had to perform a task with delayed gratification (waiting for a present) and master a conflict of motives. In the latter, they could apparently choose between catching candies by hand as they came out of a machine at irregular intervals and eating them or going into the next room and watching a cartoon on television. However, they could also place a bowl beneath the candy machine, watch television in the next room, and then come back and empty the candies out of the bowl.

Hardly any of the 3-year-olds possessed time comprehension compared with approximately 90% of the 5-year-olds. There was also an increase in the ability to answer the false-belief tasks correctly from 20% in the youngest to 100% in the oldest. The results on delayed gratification and on the motive conflict task were particularly revealing: Of 21 children who displayed fixed waiting behavior during delay in gratification (staring continuously at the hourglass until the waiting time was over), only 5 (23.8%) possessed time comprehension and a theory of mind.

In contrast, of the 24 children who displayed flexible waiting behavior (distracting themselves in a relaxed way through play and only glancing at the hourglass occasionally), 21 (87.5%) possessed a theory of mind and a comprehension of time. In the motive conflict task, of 56 children using a to-and-fro strategy (moving to and from between candy machine and television and thereby missing both), 19 (33.9%) possessed a theory of mind and a comprehension of time. In contrast, of 45 children applying a planning strategy (using the bowl to catch the candies, calmly watching television, and then emptying the bowl), 32 (71.1%) possessed a theory of mind and a comprehension of time.

Hence, the ability to engage in mental time travel is a reflective strategy for regulating emotional action readinesses that is highly efficient and proves to be a necessary precondition for applying behavioral strategies such as distraction successfully.

Play and emotion regulation. Finally, it should be mentioned that children of this age do not acquire strategies for reflective emotion regulation only as a product

of the direct experience of emotional events. Children can also practice and further refine the use of these strategies in play (Galyer & Evans, 2001). "Pretend" play makes it possible to reinterpret reality in one's own terms. One can use role-play and construction games, for example, to satisfy unfulfilled motives in one's mind, to relive impressive experiences, and to reinterpret oppressive experiences so that they lead to a more motive-serving solution (see Oerter, 1993). In rule-governed games, children learn to tolerate and regulate failures and the negative emotions that accompany them.

How children learn regulation strategies. Generally, children learn these volitional strategies through parents and friends (see also Friedlmeier, 1999b). Thompson (1990) names four potential paths of learning that emerge in parallel and supplement—but may also contradict—each other:

1. *Direct instructions.* In situations in which children should learn to regulate their feelings, parents use direct verbal instructions such as "calm down" or "stop whining" and demand the child's compliance.
2. *Proposals for reinterpreting the cause.* When their children need to modify their emotions, parents reinterpret the cause or the situation and get their children to adopt this interpretation—in the hope that this will lead to a change in their emotion.
3. *Model learning.* In their own (more or less commentated) regulation behavior, parents present their children with models of how one can regulate emotions, and their children can try these out and adopt them.
4. *Discourse over emotions.* Parents talk to their children about when to express and experience which feelings in which way, which consequences feelings may have, how one can influence one's own as well as others' feelings, and so forth. This enables children to acquire a knowledge of emotions that they can exploit to regulate their feelings (see Gottman *et al.*, 1997; Janke, 1999).

A further path not mentioned by Thompson (1990) involves the role of parents as play partners. One important finding in Galyer and Evans' study (Galyer & Evans, 2001) was that children who had more opportunities to engage in symbolic play with caregivers exhibited more appropriate expressive behavior in an induced frustration situation.

Families vary greatly in how they apply these strategies. Research has shown that children from families that successfully make these paths of learning available to their children also possess greater emotional and volitional regulation competence than children from other families (see Gottman *et al.*, 1997). Currently, this topic is being discussed under headings such as emotional competence or emotional intelligence (see Goleman, 1997; Saarni, 1999; Salovey & Sluyter, 1997; von Salisch, 2002).

4.3.4. Summary

Compared with the first phase of development in which caregivers are at pains to satisfy emotional reactions and their attendant motives promptly and appropriately, in the second phase, caregivers shift to demanding an increasingly independent regulation of actions and emotions. The developmental tasks for infants and preschoolers impose three demands on them:

1. Children should perform emotional action regulation themselves. They are encouraged to apply the expression signs and coping actions acquired during *inter*personal regulation in *intra*personal regulation. Emotional expression should also be understood as an appeal to oneself to carry out the necessary actions alone.
2. Furthermore, children now also have to learn that their current motives cannot always be satisfied right away, but that motive satisfaction has to be coordinated with the social environment. This calls for the ability to rank motives according to their importance, to delay their gratification, or even to drop them completely. Caregivers set behavior standards and demand that infants form new motives directed toward complying with these standards. These new norm-oriented motives also lead to the emergence of new emotions such as pride, shame, or guilt. During such pride or shame episodes, infants experience that they can attain their own individual motives only when they realize that their actions are socially embedded—and take this into account. This represents the ability to view oneself through the eyes of the esteemed other and coordinate one's own actions with behavioral norms. Such norm-appropriate activity is attained through the emotions of pride and shame that signal compliance with or threat to the self-ideal. It is not yet the product of a voluntary decision based on a conceptual insight into the legitimacy of the norm.

   As infancy progresses, children start to orient themselves toward the reactions of adults and to seek positive responses to their successes and avoid responses that threaten them with exclusion, in other words, ones that could lead them to experience shame. Self-evaluation is encouraged through external evaluation with adults functioning as the incarnation of cultural norm standards. By the end of preschool, children have started to internalize this evaluation. They evaluate their performance independently from external judgments and orient themselves exclusively toward their own success or failure.
3. Increasing language competence leads to the demand to start formulating expression signs as verbal appeals. Particularly on the level of reflective emotion regulation, caregivers increasingly apply symbolic strategies, and verbal communication becomes increasingly important for regulation.

4.4. The Internalization of Mental Means of Regulation from Age 6 Onward

Between the ages of 3 and 6 years, children increasingly reduce their dependence on comprehensive support from their caregivers. They can use emotions and volitions to regulate their actions themselves and also, to a limited extent, modify their emotions volitionally. This grants them the fundamental ability to satisfy their motives by themselves and in negotiation with their social environment. An *intra*personal regulation of actions and emotions has become distinct from the *inter*personal regulation of actions and emotions. Children can now apply either form of regulation as the context demands.

A major milestone in the third phase of development—starting approximately at the age of 6—is, according to the internalization model, a change in form in the means of psychological regulation (the expression and speech signs) that children apply for intrapersonal regulation. With increasing independence, expression and speech signs adjust to this new *intra*personal regulation function by becoming internalized: Physical expression and speech signs that are perceivable for outsiders (observer perspective) become *mental* expression and speech signs that, in the extreme case, are only perceivable for the individuals themselves (actor perspective). External actions become internal "as-if" actions in the mind. A mental plane of expression, speech, and action emerges on which individuals act in a mental space, imagine all kinds of scenarios, and can also develop an emotional feeling about such mental scenarios. The means of mental regulation in subjective feeling (i.e., in the actor perspective) retain their similarity to externally perceivable expression, to loud speech, and to real acts.

One central premise of the internalization model is that this formation of a mental plane (the internalization) does not just take place in the domain of speech and action; this *internalization also occurs in the domain of emotional expression.* Speech signs and also expression signs do not disappear; they become internalized. They continue to exist on a mental plane as mental expression signs. This idea is also the major innovation that the internalization model contributes to the theory of emotional development.

Correspondingly, Section 4.4.1 describes the ontogenetic onset of this expression internalization from the ages of 6 to 10 years and presents some of our own studies on its course. The phenomenon of expression internalization in adults is addressed in Section 4.5. Section 4.4.2 sketches the internalization of speech signs in order to emphasize the parallels between the internalization of speech signs in volitional action regulation and the internalization of expression signs in emotional action regulation. Section 4.4.3 presents a more detailed examination of the necessary conditions for an internalization of expression signs that children meet successively over the course of ontogenesis. These also include—according to the assumptions of the internalization model—the development of symbol

comprehension. This only becomes sufficiently mature to support internalization during the "5–7 year shift," the transition to the "age of reason" (Sameroff & Haith, 1996; White, 1996). In the terminology of the internalization model and its levels of regulation, this addresses the level of reflective emotion regulation.

This chapter focuses exclusively on *intra*personal regulation. Naturally, the development of *inter*personal regulation also continues, but we shall not address it here for reasons of space (see Feldman, 1982; Josephs, 1993; Lewis, 1993; Saarni, 1999; Saarni & Weber, 1999; Zivin, 1985). This includes the acquisition and application of further display rules regarding which emotions are to be shown in which social situations to whom with which expression. It also includes the use of expression signs to optimize the interaction with others directed toward serving one's own motives (see Goffman, 1958, 1967).

4.4.1. The Internalization of Expression Signs

According to the internalization model, a so-called *internalization of expression signs* occurs round about the age of 6 onward. Under certain conditions, this can lead to the disappearance of the externally perceivable expressive reactions of an emotion, because the emotion system draws on representations of emotion-specific expression sensations stored in the central nervous system (see Section 3.1.2). This enables persons to feel expression sensations subjectively and interpret them as the subjective feeling of an emotion without these expression sensations needing to be objectively measurable at the same time.*

Malatesta and Haviland (1985) talk about a "desomatization of affect" during ontogenesis in which overt display is displaced by internal representations. Magai and McFadden (1995) draw on the ontogenetic interiorization concept of Vygotsky (1934/1987), which we also refer to in our approach, when they write:

> Emotion socialization is seen as ... learning to transfer overt expressive behavior into the internal world of elaborated representation (the interiorization process). (p. 142)

Certain conditions are necessary for an internalization of expression signs to occur (see also Sections 3.1.4 and 3.3.2):

The first condition is for expression signs to serve communication with the self and not with others. This is met in the intrapersonal regulation that emerges as a distinct entity alongside interpersonal regulation by the age of 6, as two studies have shown (Holodynski, 1997, Study V; Holodynski & Upmann, 2003b). Whereas 4-year-olds still displayed the action impulse of seeking a trusted person when in emotionally charged solitary situations, by the age of 5 years, they were able to perform their own motive-serving actions. When doing this, they displayed overt expression signs. However, these now served exclusively to communicate with the self. The expression feedback signals the actual person–environment relation to children in motive-relevant ways, and leads them to act in line with their motives.

The second condition is for expression signs to serve an exclusively sign function in the regulation process. For mimic and vocal expression reactions, it seems clear that their semiotic function is nonverbal communication (see Ellgring, 1987). Accordingly, expressive reactions should be internalizable. However, Ekman (1988), for example, claims that the expression of surprise in the form of raised eyebrows plus wide-open eyes and mouth possesses the instrumental function of opening the sensory channels for information input. In this case, internalization would be dysfunctional. Nonetheless, Ekman's claim has yet to be confirmed sufficiently in empirical studies (see Bruckschen, 2002; Camras, 2000; Reisenzein, 2000; Reisenzein, Bördgen, Holtbernd, & Matz, 2005). The expression reactions accordingly have to be internalizable.

For physical expression signs in the form of elementary emotion-specific actions such as approach during affection or flight during fear, the instrumental function seems plausible. This also holds for laughing when their function is to disperse a build up in tension (Sroufe, 1996) and, in limits, also for crying (see Vingerhoets, Cornelius, Van Heck, & Becht, 2000). Nonetheless, here as well, the semiotic function can be more important. We assume that the instrumental function is particularly salient when an emotion is so overwhelming that the individual possesses no differentiated actions to deal with it, for example, when panicking or feeling ecstatically happy.

The change in form from externally perceivable to mental expression signs can be operationalized and examined empirically from two perspectives.

The miniaturization hypothesis. The change in form refers to the observable *intensity of expression.* It should weaken as children grow older. This should occur in situations in which emotions possess an intrapersonal regulation function, in other words, when individuals perform the motive-serving actions by themselves, for example, when they are alone. The intensity of expression can become so miniaturized that no expression remains visible, although the individual concerned credibly insists on feeling an emotion.

The internalization hypothesis. The change in form can refer to the *relation between expression and feeling*. The internalization model claims that expression does not simply disappear but becomes internalized. In their subjective feeling, individuals continue to have expression sensations although, in the extreme case, they are no longer based on any objectively observable expressions. This aspect is far more difficult to assess and confirm empirically. Because we have studied this only in adults, we shall discuss *internalization* versus the mere *miniaturization* of expression in Section 4.5.1.

Studies on the miniaturization hypothesis. Testing the hypothesis on the intensity aspect of the internalization hypothesis calls for a special research design:

* We also assume that the body component of emotions becomes internalized when the above-mentioned conditions are met. However, we shall not pursue this topic here, because we have not yet done any empirical work on this topic.

Children have to experience emotions in a situation in which intrapersonal regulation is dominant, which is generally the case when they are alone. The miniaturization hypothesis states that between the approximate ages of 6 and 10, expression intensity will weaken as a function of age.

There are two ways to rule out the possibility that the decline in the intensity of expression is due to a decrease in the intensity of emotion: First, one can ask children to report the intensity of the feeling they are experiencing. However, in this age range, they still find it hard to perform a valid intensity rating on an interval scale.

Therefore, a second option is to introduce a control condition. This presents the same cause of an emotion in an interpersonal condition in which a familiar person is available to whom participants can communicate and display their emotion. In such a condition, *inter*personal regulation should be dominant. Familiarity is an important variable here, because studies on adults have shown that expression is weaker in the presence of a stranger (Hess, Banse, & Kappas, 1995; Wagner & Smith, 1991). Because the cause of the emotion remains the same, its intensity should be equally strong in both the solitary and interpersonal conditions. As a result, the internalization model states that children should continue to exhibit comparable expression intensity up to the age of 6 years, because they still require the real body feedback from their expression reactions to feel the induced emotion. Between the ages of 6 and 10, expression should weaken in the solitary condition compared with the interpersonal condition, which can be interpreted as an increasing miniaturization of expression. In this case, the decreasing intensity of expression in the solitary condition cannot be explained through a decrease in the intensity of the emotion.

Because such a research design has not yet been implemented in empirical research, we carried out a series of our own studies that are reported below.

Experiment 1: Cross-sectional study of adults and children. This study (Holodynski, 1995) was designed to test whether a miniaturization effect in solitary situations could be observed in adults but would prove to have not yet emerged in young children. Participants were 18 girls and 18 boys aged 3.6–6.9 years ($M = 5.19$, $SD = 0.85$) and 18 male and 18 female college students. They worked on tasks in which they could experience success and failure and correspondingly feel joy or disappointment in both a solitary and an interpersonal condition. The children had to stack towers of increasing height with wooden blocks. In the interpersonal condition, they did this in the presence of a familiar experimenter. The college students had to compose six different figures of increasing complexity from a tangram puzzle. In the interpersonal condition, they did this together with a friend. Hence, both interpersonal conditions were designed to enable participants to express their feelings to their interaction partners spontaneously. Among the college students, the intensity of their feelings was assessed at the end of the trial. They watched video recordings of their performance and were asked to recall and rate what they had felt after each success or failure. In the success condition, participants reported equally strong feeling intensities for both the solitary ($M = 5.2$) and communication ($M = 5.1$) conditions. The same applied for failure ($M = 4.1$ and $M = 4.4$ respectively).

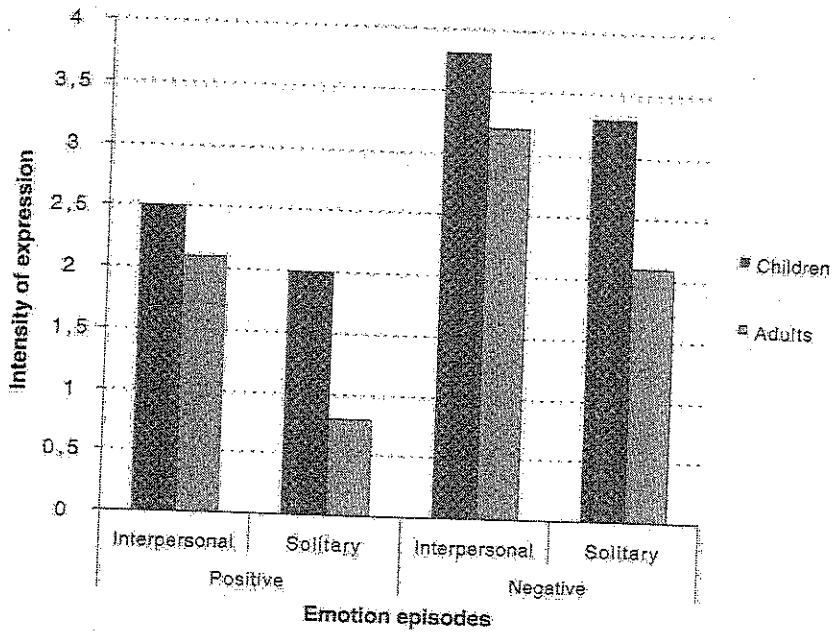

FIGURE 4.5. Mean expression intensities for positive and negative emotion episodes as a function of age group (children aged 4–6 years vs. adults) and context (social and solitary condition) (expression scale from 0 to 5 [*very strong expression*]).

The success and failure episodes of children and college students were videographed so that face and upper body were visible. Both child and adult recordings were cut and spliced in random sequence to produce one rating videotape. Five naïve judges watched these episodes with sound and rated expression intensity on a 10-point scale and expression duration in seconds. Interrater reliability (Cronbach's alpha) was .88 for expression intensity and .76 for expression duration in the success episodes versus .83 and .75 respectively in the failure episodes.

Results confirm the ontogenetic miniaturization effect (see Figures 4.5 and 4.6): The expression of adults in the solitary condition was markedly weaker and also markedly shorter than that of the 4- to 6-year-olds. This held for both the success and the failure episodes. Adult expression in the solitary condition was also weaker than in the corresponding interpersonal condition. An analysis of covariance with felt intensity as covariate revealed that the adults' lower expression intensity in the solitary condition was not determined by a lower intensity of feeling. Feeling had been comparably intensive in both conditions.

In contrast, the children showed a similar expression intensity in the success episodes but a shorter expression duration in the solitary condition compared with

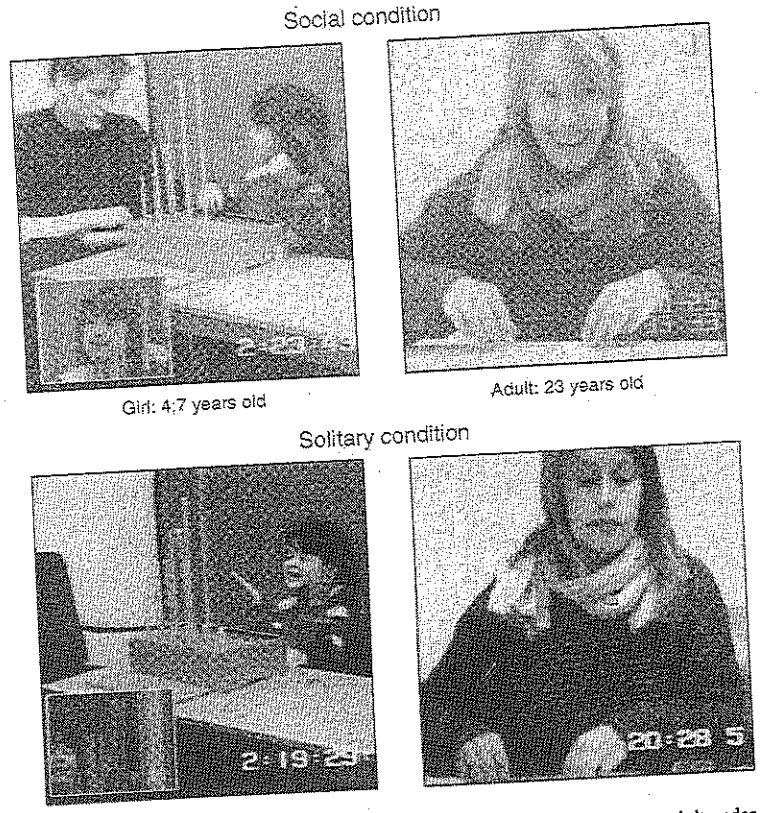

FIGURE 4.6. Prototypical expression of a feeling of joy in a 4-year-old girl and an adult under solitary versus social conditions.

the interpersonal condition. This inverted in the failure episodes. However, the difference between solitary and interpersonal condition was far less pronounced than in adults. This indicates that the children's expression is not, or not so strongly, miniaturized.

This led us to ask at what age expression begins to miniaturize. Chapman (1973) examined a study in 140 8-year-olds in which he systematically varied the social context. The children wore headphones and listened to comic stories that were designed to induce amusement under four conditions, with increasing social reference ranging from listening alone to listening together with another child. The duration of laughing and smiling revealed a linear increase from the first to the fourth condition. Hence, the 8-year-olds already exhibit a clear miniaturization of expression in a solitary compared with an interpersonal condition.

Experiment 2: Cross-sectional study of 6- to 8-year-olds. We carried out a further cross-sectional study to test whether a marked miniaturization of expression

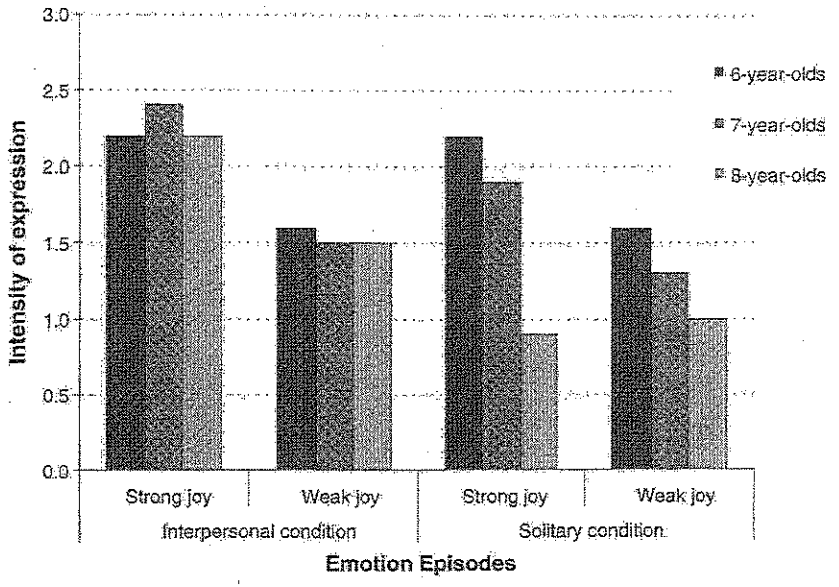

FIGURE 4.7. Mean expression intensities for joyful emotion episodes as a function of age group, emotion intensity (strong vs. weak joy) and context (interpersonal vs. solitary) (scale from 0 to 5 [*very strong expression*]).

emerges in the age range from 6 to 8 years (Holodynski, 2004). Three groups of 20 children (aged, 6, 7, and 8 years) fed two coins into a slot machine in order to purchase boxes of candy. The first box contained candy, and should have triggered weak joy. The second contained nothing although the wrapper suggested that it should contain candy. This should have triggered disappointment. To console them, the experimenter handed over a third coin to put in the slot machine. The third box with a plain wrapper once again contained candy, which should have induced strong joy after the disappointment over the empty box. In the interpersonal condition, an experimenter with whom the child was familiar was once again available to talk to.

After the emotion induction, each child had to rate intensity of feeling on a bipolar 7-point scale ranging from very disappointed (−3) over neutral (0) to very happy (+3). For the empty packet, the children reported a negative feeling valence ($M = -1.13$, $SD = 1.58$); for the full packets, a positive one ($M = 2.54$, $SD = 0.60$).

The strong joy induction triggered a more intensive expression than the weak joy induction, confirming that cause, expression, and feeling covaried. The intensity of expression declined in both the solitary joy and solitary disappointment conditions from the ages of 6 to 8 years, but the intensity of feeling did not change (see Figure 4.7). Furthermore, expression intensity in the interpersonal condition remained constant across age groups. Whereas expression was comparable in

both experimental conditions in the 6-year-olds, in the 8-year-olds, it was already markedly weaker in the solitary compared with the interpersonal condition. These findings clearly confirmed the miniaturization of expression with increasing age posited in the internalization model.

Experiment 3: Longitudinal study of joy and disappointment from the ages of 6 to 10 years. A longitudinal study with a comparable research design was carried out to test how far the increasing miniaturization of expression could also be found in intraindividual development (Hirte, 2003; Holodynski & Upmann, 2003a). We studied children on four occasions when they were 6, 7, 8, and 10 years old. Here as well, they worked the slot machine three times each under both a solitary and an interpersonal condition. However, the emotion inductions were modified slightly to improve control over sequence effects. To trigger weak joy, a single candy was placed in the box; to trigger strong joy, two candies so that the box was completely full. For disappointment, the box remained empty or it contained an empty candy wrapper. The sequence of experimental conditions and the emotion inductions were varied systematically. After the emotion episodes, the children had to rate the intensity of their feeling on a bipolar 7-point scale.

The videographed emotion episodes were cut and split in random sequence, and two judges assessed expression intensity from both pictures and sound. The interrater reliability (Cronbach's alpha) was .91 for overall intensity of expression. The longitudinal study produced the following findings (see Table 4.4):

1. The strong joy induction triggered not only a more intensive feeling, $F(1, 24) = 113.47$, $p < .001$, $\eta^2 = .825$, but also a more intensive expression, $F(1, 19) = 49.03$, $p < .001$, $\eta^2 = .721$.
2. Six-year-olds exhibited an intensity of expression in the solitary condition comparable with that in the interpersonal condition for both strong joy and disappointment, but not for weak joy.
3. Expression intensity revealed a linear decline in solitary situations from the ages of 6 to 10 years for strong joy, $F(1, 24) = 10.33$, $p < .004$, $\eta^2 = .301$, and for disappointment, $F(1, 24) = 24.98$, $p < .001$, $\eta^2 = .473$. Weak joy revealed a quadratic trend: Expression intensity declined in the solitary situation from the ages of 6 to 8 years but then rose again at age 10, $F(1, 24) = 10.24$, $p < .004$, $\eta^2 = .299$.
4. At the age of 8–10 years, expression intensity was already significantly weaker in the solitary situation than in the interpersonal situation for all three emotions.
5. Furthermore, it was interesting to note that girls exhibited a greater intensity of expression than boys but the same intensity of feeling.

Results confirm the miniaturization hypothesis from the internalization model for intraindividual development as well, as far as the strong joy and the disappointment inductions are concerned. However, expression intensity does not seem to

TABLE 4.4. Intensity of Expression as a Function of Emotion Quality, Age, and Context[a]

	Context				
	Solitary		Interpersonal		
Age groups	M	SD	M	SD	t
		Strong joy			
6 years	2.51	1.19	2.41	1.22	0.39
7 years	2.15	1.15	2.41	0.99	−0.80
8 years	1.72	1.13	2.97	0.63	−4.64**
10 years	1.65	1.01	2.78	0.86	−4.21**
		Weak joy			
6 years	1.47	1.16	1.98	1.25	−2.30*
7 years	1.04	0.97	1.62	1.27	−2.20*
8 years	0.83	1.21	1.93	0.91	−4.22**
10 years	1.38	0.87	2.29	0.74	−3.90**
		Disappointment			
6 years	2.87	1.50	2.83	1.09	0.18
7 years	2.40	1.47	2.12	0.89	0.89
8 years	1.65	0.90	2.81	1.05	−4.63**
10 years	1.63	1.09	2.47	0.65	−3.52**

[a]Expression scale ranging from 0 to 5 (*very strong expression*). *$p < .05$. **$p < .01$.

decline any further from ages 8 to 10 years but to remain on a miniaturized level. The expression is not (yet?) invisible. Similar results have also been found in studies of adults by Fridlund (1991) and Hess *et al.* (1995). In the weak joy induction, expression seems to be miniaturized already in 6-year-olds. These declines in expression cannot be attributed to a decline in the intensity of feeling. They can be interpreted as a product of an increasing miniaturization of expression.

The assumption that expression signs become miniaturized during the course of development is not just restricted to joy or disappointment. In principle, it applies to all emotions, given the conditions that they exclusively serve an *intra*personal and semiotic regulation function (see Section 3.1.4) and that the child has acquired a sufficiently advanced comprehension of symbols (see Section 4.4.3).

Soussignan and Schaal (1996) performed a cross-sectional study on the expression of disgust and delight triggered by "hedonically contrasted" odors in an alone and a social presence condition (in which, however, an *unfamiliar* experimenter was present). According to the display rule approach, this should lead to an inhibition of the negative emotional expression. Participants were 50 children aged 5–12 years. Unpleasant smells revealed no decrease in expression intensity (disgust) in the alone condition. For pleasant smells, the intensity of expression (delight) was already lower in the alone condition compared with the social presence

condition for the youngest age group, and it did not decrease as a function of increasing age.

These findings initially seem to argue against any increasing miniaturization of expression for disgust and delight, and favor a context effect according to which disgust is displayed in solitary conditions but not in social ones (with unfamiliar persons). However, one can also interpret these findings as indicating that a miniaturization effect has already emerged at preschool age for the expression of delight. The children already showed less expression in the solitary condition. In contrast, the miniaturization effect might emerge only later for disgust. This interpretation is also supported by findings on adults revealing a clear miniaturization effect for pleasant and unpleasant smells in a solitary compared with an interpersonal condition (Jäncke & Kaufmann, 1994; Rolko, 2001).

4.4.2. The Internalization of Speech Signs

We have already mentioned that children require some time to develop the ability to regulate their actions through the meaningful content of speech. Most of the verbally conveyed action regulation in early years occurs within the interaction between the child and others. Nonetheless, by approximately the age of 5 years, children have learned to use speech signs for self-instruction as well and to use them to talk to themselves. This self-instructing speech has also been called private speech (see Diaz & Berk, 1992). Vygotsky (1934/1987) was the first to recognize its importance in volitional self-regulation. This development proceeds analogue to the internalization of expression signs in emotional action regulation.

Here as well, intrapersonal regulation also initially emerges within interpersonal regulation. Children still require the social framework and the idea of mastering a task in interaction with others—even though they actually use speech as self-instruction and already master tasks without the help of others.

Increasing autonomy is also accompanied by a change in the form of speech signs. Audible private speech becomes a silent inner speech that expresses itself at most in slight lip movements. However, in their subjective perception, children are speaking to themselves in their minds. The premise that speech signs become internalized has been proposed many times and also confirmed empirically (see Diaz & Berk, 1992; Fuson, 1979).

4.4.3. The Development of Symbol Comprehension in Reflective Emotion Regulation

When explaining our internalization model in Section 3.3.2, we proposed that the internalization of expression also depends on a further condition: the transformation of expressive reactions into signs that can also be used symbolically. In other words, children have to be able to distinguish consciously between an expression sign and its object—the subjective feeling—and to apply the former independently from the latter.

This condition involves the development of symbol comprehension on the reflective level of emotion regulation. This level is composed, in the broadest sense, of symbolic representations of how one's own and others' minds function as well as procedural knowledge about how one can influence and regulate one's own and others' minds. Hence, these meaning systems cover the entire domain of knowledge about emotions including their causes, functions, forms of expression, regulation strategies, development, and so forth (see Janke, 1999, 2002).

When a sign is used symbolically, its function is not bound to a specific *form*. Any other *form* can serve the same display function for its user. For example, expression signs can be translated into speech signs. In the case of self-regulation, it is not necessary for signs to be perceivable for others; it is enough for them to be represented only in subjective sensation as distinguishable, meaning-carrying signs. This is how physical signs that are objectively perceivable become mental signs that are perceived only subjectively and no longer by others. A subjectively sensed smile does not have to be caused by body feedback on a real smiling reaction; a mental representation that generates a comparable smile sensation is a sufficient form for a sign in self-regulation.

However, how does a symbol comprehension develop for expression signs? We think the decisive developmental step is the transition from a behavioral to a mental understanding of emotion between the ages of 6 and 8 years (see Meerum Terwogt & Olthof, 1989; Selman, 1981).

Selman (1981) has analyzed the development of symbol comprehension in terms of expression signs and broken it down into five stages. The first three of these stages are relevant for our analyses. They are:

1. Expression signs are used exclusively as a symptom.
2. Expression signs can be used as an implicit symbol; that is, children are already able to use them as symbols for emotions in their actions, but they are still unable to reflect on this distinction in their minds.
3. Expression signs can be used as voluntarily applicable symbol; that is, children are able to distinguish consciously between expression and feeling and can conceive that a feeling is possible without an expression and an expression is possible without a feeling.

We assume that the development of the symbol comprehension of expression signs follows the same general trend as that observed in the symbol comprehension of speech signs (see Vygotsky, 1934/1987).

Expression signs as a symptom. In the first phase during infancy, children already use expression signs, but cannot separate them from their objects. Signs have an exclusively symptom character. If a cause-related expression sign is present,

then the corresponding emotion and the corresponding feeling will also be induced (see Section 4.2.1).

Expression signs as an implicitly used symbol. By the age of 12 months, children begin to single out certain expression signs from the stream of interpersonal regulation and assign them a symbol function. This is first seen in social referencing (see Klinnert *et al.*, 1983; Walden, 1991): Children start to interpret their mother's facial expression not as a symptom of their actual feeling but as a symbol that should represent a generalized action tendency. Mother's smile stands for "approach"; an anxious face, for "avoidance."

From the age of 1 and 2 years onward, further situations arise in which children use expression signs as symbols for an emotion. When totally involved in their symbolic play, they do not just act out single *actions* such as cooking or driving an automobile in a pretended manner. Children also act as if they were experiencing single *emotions*. They use the prototypical expression sign of an emotion as a symbol to display this emotion; for example, they act as if they were crying to symbolize sadness (see Dunn, Bretherton, & Munn, 1987; Gottman & Parker, 1986). Other action in which expression signs are used as a symbol for an emotion are teasing and deceiving others (see Bretherton, Zahn-Waxler, Fritz, & Ridgeway, 1986). In all these situations, children play with the expression as a symbol of an emotion that has a distinct appeal character and should generate a specific impression in others that will make them feel obliged to deliver an appropriate reaction.

Nonetheless, this ability to separate the sign from its object reveals one special feature that is characteristic for the second phase of symbol comprehension: When children are questioned during this phase of development, they are still unable to imagine somebody crying without being sad or smiling without being happy. They interpret the expression sign as an inseparable property of the object. Children do not distinguish consciously between expression and feeling, although their symbolic play, for example, already reveals that they use the expression sign as the symbol for a feeling, in other words, that they separate the two in their behavior.

Rottleuthner-Lutter (1987) has carried out an informative study on this. She asked 100 children in five age groups from 5 to 9 years whether it would be possible to be happy without anybody noticing. She repeated this question for the feelings "sad" and "afraid." The responses and accompanying justifications given by the younger children up to 6.6 years basically fall into two categories.

First, the children say that it is not possible, because you can see when somebody is sad in that they cry (or smile when happy). They consider expression to be a necessary property of a feeling. If the expression changes, the feeling changes as well.

Alternatively, the children say that it is possible, because nobody will notice when somebody is sad, fearful, or happy if they are alone or have hidden themselves. Therefore, there has to be a spatial separation to prevent an observer from seeing the person concerned. Rottleuthner-Lutter (1987) calls this response

pattern "local-sensory." Of the twenty 5-year-olds, 18 (90%) replied consistently with this response pattern (2 children continued to use the first response category reported above). Fourteen (70%) of the twenty 6-year-olds but none of the twenty 9-year-olds continued to use this second response pattern.

This particular feature of symbol comprehension seems to be a general characteristic of this phase of development. Vygotsky (1934/1987) has reported that children have comparable difficulties in distinguishing between the names of things and their properties. When asked whether one can replace the name of a thing with another name, they say that this is not possible. The proposal that a dog can also be called a "cow" and a cow can also be called a "dog" is rejected because the dog does not have udders and horns. Likewise, the cow cannot be called a dog because cows do not bark but go "moo." The property of the object is conceived as a property of the sign in speech signs as well.

This inability to discriminate conceptually corresponds with the objective lack of differentiation between the expression and feeling components of an emotion in children of this age. When experiencing emotions in this phase of development, children also display them in observable expression signs even when they do not want to impress another person and can already perform the action to deal with the situation by themselves (see Section 4.4.1; Holodynski, 1997, Study IV and Study V).

Expression signs as a voluntarily applicable symbol. Children generally grow up in a cultural environment that promotes the further development of the symbol comprehension of emotional processes (see below). The shift from the second to the third phase of development in the symbol comprehension of expression signs can be seen very clearly in the study by Rottleuthner-Lutter (1987) reported above. She found that local-sensory response patterns decreased clearly from the age of 7 years onward. They were replaced by an increase in the number of "dualistic" responses revealing that the children discriminated consciously between emotion expression and emotion feeling, for example, "you feel happy inside and nobody notices it." Among the 5- and 6-year-olds, only 1 (5%) of 20 children showed a consistent dualistic response pattern; among the 7-year-olds, this was already 9 (45%) out of 20 children; and in the 9-year-olds, 14 (70%) out of 20.

Hence, the use of expression signs as a voluntarily applicable symbol emerges during the same age range of 6–8 years in which the miniaturization of expression can be observed in intrapersonal regulation (see Section 4.4.1). The ontogenetic internalization of expression signs accordingly corresponds to the conceptual differentiation between expression and feeling.

The cross-sectional study of 6-, 7-, and 8-year-olds already reported above (Holodynski, 2004) also examined emotional concept knowledge on the discrimination between expression and feeling. The degree to which children could distinguish conceptually between expression and feeling correlated with the degree of expression miniaturization in intrapersonal regulation. The more clearly the children could discriminate between expression and feeling in their minds, the weaker

TABLE 4.5. Correlations between the Conceptual Differentiation of Expression and Feeling and the Extent of Miniaturization of Expression as a Function of Age Group

	Age groups (in years)		
Miniaturization effect	6	7	8
Expression (solitary)[a]	−.56**	−.60**	−.37
Difference in expression[b]	.43*	.45*	.21
N	20	20	19

[a]Intensity of expression in the solitary situation.
[b]Difference in intensity of expression between interpersonal situation and solitary situation. *$p < .05$. **$p < .01$.

their emotional expression in solitary situations, $r(57) = .58$. This correlation even remained significant after controlling for age, $r(56) = .51$ (see Table 4.5).

The ability to consciously discriminate the expression and feeling components on the reflective level of regulation covaries with the transition from externally perceivable expression signs to miniaturized and mental expression signs.

This may be a first indication that the internalization of expression signs is not just bound to the emergence of intrapersonal regulation as an independent entity alongside interpersonal regulation. It is also bound to a mature symbol comprehension in which expression signs are recognized as voluntarily applicable symbols that can be distinguished from subjective feelings. This makes it possible to transfer the meaning of externally perceivable expression signs to expression signs that can now be perceived only internally.

Socialization of symbol comprehension. Two socialization processes encourage the development of symbol comprehension for expression signs:

1. Children are told that they should comply with cultural display rules for expression (see Cole, 1986; Josephs, 1993, 1999; Saarni, 1984, 1988; 1993; Saarni & von Salisch 1993): Parents and childrearers increasingly demand that children should display defined, conventionalized expression signs as a function of context, person, and cause, for example, to say thank you for a present with a *friendly* smile even when one is disappointed in it. Complying with display rules confronts children with the task of inhibiting the spontaneously triggered expression sign of the induced emotion and replacing it with the expression sign required by the display rule. This grants children the experience that expression and feeling can contradict each other and that the feeling still remains even when another expression is displayed.
2. Parents promote their children's development by talking to them about emotions and playing with emotion expression in, for example, role-play or teasing. With the help of speech signs, children build up a second, more comprehensive sign system to supplement expression signs, and they use this to learn to understand the meaning of the single components and relationships in the emotion system (see Bretherton *et al.*, 1986; Dunn, 1994; Harris, 1992; Janke, 1999, 2002; Manstead, 1993; Meerum Terwogt & Olthof, 1989; Russell, 1989). Speech signs are the signs that constitute the volitional and reflective levels of regulation. Talking about emotions with parents draws children's attention to the difference between expression and feeling, that is, to the difference between externally perceivable expression signs and the proprioceptive and interoceptive feeling indicators accompanying an emotion (Selman, 1981). Children start to acquire that which they already practice in their behavior on the reflective regulation level as well: The expression sign can be separated from the feeling. It can be applied voluntarily as a symbol in order to give the impression that one is feeling an emotion.

4.5. MENTAL EMOTIONS AND ADULT EMOTION REGULATION

Up to now, there are very few theories and studies dealing explicitly with the development of emotional action regulation from early to late adulthood (see Carstensen, 1993; Fischer, 1988; Magai & McFadden, 1996). These studies have examined how the frequency, intensity, and expression of emotions as well as their reflective regulation change as a function of age. However, they have not considered how far any internalization of expression signs can be observed in adults, and, hence, whether the so-called "as-if" feelings actually exist—in the extreme case, as purely mental emotions without any discernable expression and body reactions.

Hence, the first aspect of this section will be to pursue this issue and present our own and other researchers' studies that can be used to test the hypotheses of the internalization model for adults. The second aspect will be to look at how reflective emotion regulation develops further in adulthood. For example, Carstensen (1993) and her team have formulated a theory of socioemotional selectivity according to which emotion regulation is continuously optimized with increasing age.

4.5.1. Support for Miniaturized and Internalized Expression Signs

Because of the small number of developmental studies on adults, it might seem tempting to draw on emotion research in general psychology as it deals explicitly with adult emotions. However, it does not adopt a process-oriented perspective on how adult emotions differ from those of children and on how they may continue to develop in adulthood. Emotion research in general psychology analyzes emotions essentially from a structure-oriented perspective on how emotions as mental

systems function in the actual genesis, and assume that its system structure is no longer subject to change.

The internalization model to the extent that it has been formulated so far also does not assume any further fundamental change in the system structure of emotions in adulthood. However, it does assume that those trends already considered in Section 4.4 continue. This means particularly the internalization of expression signs and the accompanying formation of a mental level of emotion regulation as well. We assume that a major proportion of the low- to medium-intensity emotions in intrapersonal regulation take place as "as-if" feelings; that is, they are accompanied by weakened objectively observable expression and body reactions. This is because with advanced symbol comprehension—according to the internalization hypothesis—miniaturized or even completely mental expression signs suffice for an efficient emotional regulation of one's actions. Mental feeling sensations suffice for the selection of coping actions to serve one's motives. It becomes unnecessary to stage the emotion in intensive expression and body reactions—unless this is something that one wants to do. Relatively intense expression and body reactions should continue to be observable only for intensive emotions, indicating a completely unexpected motive-relevant event for which no rehearsed coping actions are available. However, we also assume that there are major interindividual differences in the extent of expression miniaturization and internalization.

In the following, we shall report further evidence from studies on adults supporting the miniaturization hypothesis of the internalization model, that is, a decrease in expression intensity during intrapersonal regulation. We shall refer not only to studies on emotion in general psychology but also our own work.

In addition, we have also carried out studies with adults to test the previously unexamined internalization hypothesis of the model—whether an internalization of expression signs occurs with the consequence that a person continues to sense clear expression and body sensations subjectively, which serve as a somatic marker for an emotion, although external observers can see no or only very slight expression and body reactions.

Studies on the miniaturization hypothesis. The miniaturization hypothesis states that the intensity of emotional expression in adults will be weaker in situations in which regulation is intrapersonal compared with situations in which feelings are shared with an interaction partner. Generally, being alone is considered to be the prototypical situation for intrapersonal regulation.

A series of studies has shown that the intensity of expression is weaker when social involvement is low (Brightman, Segal, Werther, & Steiner, 1975, 1977; Kraut & Johnston, 1979). Fridlund (1991) asked participants to watch amusing film clips either alone or together with a friend. Although participants reported comparable intensities of feeling, expression was clearly weaker in the solitary condition (see also Dale, Hudak, & Wasikowski, 1991). However, when formulating his ecobehavioral theory, Fridlund (1994) favored the extreme position that expression does not covary with emotional intensity but depends exclusively on this degree of social involvement.

Hess *et al.* (1995) along with Jakobs, Manstead, and Fischer (1999) tested this claim by replicating Fridlund's research design (Fridlund, 1991) but additionally varying the intensity of the cause of the emotion. They showed college students two film clips that differed in how amusing they were. They managed to replicate the miniaturization effect, showing that expression in the solitary situation was weaker than in the social situation despite the same intensity of feeling. In addition, when watching the more amusing film clip, participants were not only more amused but also displayed a stronger expression. In other words, expression and feeling covaried in direct contradiction to Fridlund's ecobehavioral explanation of expression miniaturization. Our studies also produced comparable results for adults (Holodynski, 1995) and 8- to 10-year-olds (Hirte, 2003; Holodynski, 2004).

Moreover, the studies of Fridlund (1991), Hess *et al.* (1995), and Jakobs *et al.* (1999) clearly demonstrate the social origins of expression reactions in solitary situations. All three studies introduced further research conditions varying the degree of social involvement: (1) Participants viewed the film alone; (2) alone, but a friend was present in the next room working on a different task; (3) alone, but a friend was present in the next room watching the same film; (4) with a friend together in the same room. Results showed that expression intensity increased as a function of the degree of social involvement from Conditions 1 to 4, although all participants watched the same film clips and reported comparable intensities of feeling (see also Chovil, 1991).

These experiments show clearly that persons also do not completely abandon or lose the social reference of actions when engaged in intrapersonal regulation in a solitary situation. Even if other persons are not really present one does not completely stop acting as if others were present. An imaginary social context can then, in turn, reduce the degree of expression miniaturization, as the two experiments above have shown.

Fridlund (1994, pp. 160–168) proposed five possible ways in which individuals may act as if they were in an imaginary social context even when they are physically alone:

1. They may treat themselves in the same way that they treat others.
2. In solitary situations, they may act as if others were also present.
3. They may imagine that others are present.
4. They may prepare themselves for the possibility of being joined by others (see Goffman, 1958, 1967).

5. They may attribute life or consciousness to an inanimate object and thus turn a nonsocial situation into a social one (e.g., shouting at our word-processing program when it doesn't do what we want it to do).

One criticism of the experimental studies reported above is that they address only a single emotion, namely, amusement. It has to be asked whether such a miniaturization of expression can also be observed in other emotions. We were able to show this for the emotion joy (not amusement) and disappointment in the study of adults reported in Section 4.4 (Holodynski, 1995). In a study in which participants watched sadness-inducing film clips, Jakobs, Manstead, and Fischer (2001), in contrast, found that they displayed more intensive negative expression signs in solitary situations than when they watched the film clips together with a friend. Evidently, negative expression signs may be masked in social situations.

Another criticism is that all studies—including those just reported above—were carried out in the artificial context of a psychological laboratory. The laboratory atmosphere might intimidate participants so much that they suppress their expression when alone, and feel confident about showing their feelings again only when reassured by the presence of familiar persons.

Hence, we tested whether the miniaturization of expression is not just a laboratory effect but will also occur in everyday situations when adults are alone and generalize to a variety of emotions. We carried out a diary study with 38 women and 42 men aged 20–44 years (M = 25.76, SD = 4.00) (Wüllner, 1997). They used a standardized diary to protocol every feeling they had in terms of the intensity and duration of the feeling, the intensity and duration of expression, situational context (alone, interpersonal, alone in the company of strangers), and expression control (authentic vs. nonauthentic expression). They completed this diary from getting up until going to bed for 4 days within a single week. It should be noted that the participants in this study rated their emotional expression by themselves.

However, this seems acceptable, because Barr and Kleck (1995) showed that such self-ratings and other ratings of the videographed expression correlate sufficiently. Their participants watched humorous film clips under a solitary (Experiment 1) and an interpersonal condition (Experiment 2). They had to self-rate the intensity of their facial expressions on an 11-point scale. At the same time, their facial expression was videotaped and its intensity was assessed by external raters. Mean expression intensity had a self- versus other-rating correlation of $r = .55$ in Experiment 1 and $r = .59$ in Experiment 2. However, mean expression intensity was rated as being more intensive in the self-rating (Experiment 1: M = 4.73) than in the other rating (M = 3.58) when participants were alone. In the interpersonal situation (Experiment 2), self-rating (M = 4.29) did not differ from other rating (M = 4.12). Our own research has confirmed this as well (Holodynski, 1997, Study III): Self-rating had a correlation with the mean other rating of $r = .56$

and had higher expression intensities. Such an intensity bias in self-ratings may well distort findings and cover up any miniaturization of expression. However, should expression nonetheless continue to be rated as being weaker in solitary situations than in interpersonal situations, this would be a robust support for the assumed miniaturization of expression.

This is exactly what we found: Comparing situations in which participants reported that they had not controlled their expression (i.e., authentic expression), expression was rated as being weaker in solitary situations (M = 3.5, SD = 2.3) than in interpersonal situations (M = 4.8, SD = 2.0), even when controlling for intensity of feeling as covariate. Ten naïve raters ranked reports on feeling quality to the 16 categories of the EMO16 Emotion Scale (Schmidt-Atzert & Hüppe, 1996). An analysis based on these categories revealed a miniaturization effect for joy, anger, sadness, affection, surprise, pride, and restlessness, but not for fear and aversion/disgust (see Table 4.6). The emotions boredom, sympathy, shame/embarrassment, guilt, sexual arousal, longing, and envy were not observed frequently enough to permit any meaningful analysis.

In all, the studies reported here support the miniaturization hypothesis predicted by the internalization model. Expression becomes weaker in situations in which emotions possess an intrapersonal regulation function, which is predominantly the case when persons are alone.

Studies on the internalization hypothesis. The internalization hypothesis states that expression signs do not disappear, but become *internalized*. In other words, individuals can continue to experience their expression sensations in their

TABLE 4.6. Expression Intensity in Everyday Emotion Episodes without Expression Control as a Function of Emotion Quality and Context[a]

	Context							
	Solitary			Interpersonal				
	M	SD	n^b	M	SD	n^b	p	η^c
Affection	2.88	2.21	26	5.36	1.82	192	***	.45
Pride	3.00	2.35	21	4.04	2.01	26	**	.43
Joy	3.64	2.12	310	4.71	1.90	774	***	.35
Sadness	3.73	2.36	118	5.03	1.93	78	***	.32
Anger	3.51	2.29	152	4.81	1.98	129	***	.28
Restlessness	3.63	2.23	137	4.66	1.87	71	***	.26
Disgust/aversion	4.44	2.92	9	5.54	2.26	13	ns	.22
Surprise	4.26	2.92	23	5.13	1.86	68	†	.18
Fear	4.00	2.47	66	4.73	2.12	30	ns	.17

[a]Expression scale from 0 to 9 (*extremely strong*). Each test controls for the intensity of feeling as covariate.
[b]Number of emotion episodes.
[c]Effect sizes. †$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

subjective feelings even though external observers can no longer detect any expressive reactions at all.

Accordingly, the qualitative change in the form of expression signs is that objectively observable expression signs can become miniaturized and, finally, purely mental expression signs. These continue to exist only as mental representations of specific expression signs. An observable frown becomes an internal sensation of frowning. Nonetheless, this inner frown can still be traced as micromomentary movements with the help of electromyographic (EMG) recordings.

In the extreme case, these expression signs can become so miniaturized that they exist only as mental representations and can no longer be traced in EMG recordings or other objective measures. In that case, they are, strictly speaking, not expression signs any more, but feelings that can be assessed only through self-report. On the other hand, in subjective feelings, they continue to possess—according to the internalization hypothesis—a similarity to their original, objectively observable forms. This justifies calling them expression signs with the qualification that they are directed exclusively toward the individual himself or herself. This is why we call them mental expression signs.

Hence, the internalization hypothesis states that the proprioceptive and interoceptive feedback on expression and body reactions serves as a subjective indicator, and it remains such even when no expression reactions are observable objectively.*

Cacioppo, Bush, and Tassinary (1992) were able to show that even with such miniaturized expression signs that can no longer be perceived by external observers, the valence and the intensity of the feeling covaried with the valence and the intensity of the micromomentary facial movements measured with EMG (see also Tassinary & Cacioppo, 1992). Nonetheless, this finding does not tell us whether they are used as feeling indicators in subjective experience.

Two conditions have to be met when testing the internalization hypothesis: First, one has to induce an emotion under those circumstances in which a miniaturization of expression can be observed, in other words, in which no (or only very weak) expression reactions occur. Second, one has to ask participants how far they have experienced a feeling and which indicators they have used to reach this feeling judgment.

We used two empirical studies to examine this in our laboratory. In the first study, we used a stimulus recall technique (von Olberg, 1999) to induce the emotion joy at reunion and—after a 1-week interval—pride in 16 men and 15 women in a relaxed state. This sequence of inductions was reversed for one half of the

*It is plausible for an internalization to also occur for body reactions when the necessary preconditions are met, namely, exclusively intrapsychological and semiotic regulation functions along with a mature comprehension of symbols for body signs. However, it should be noted that the instrumental regulation function will be more pronounced in body reactions than in expression reactions.

participants. The second study induced only joy at reunion in 13 men and 13 women (Upmann, 2000; see also Holodynski, von Olberg, & Upmann, 2001).

We started off by (1) asking participants to recall an intensive episode of joy at reunion and an intensive episode of pride in which they had displayed the authentic expression on both occasions. (2) From each of these episodes, we asked them to name two key stimuli: one characterizing the situation and the other characterizing the cause of the emotion. (3) An imaginary journey was used to induce a progressive muscle relaxation. Taking participants on such imaginary journeys not only activates mental images but also lowers participants' muscle tone and, hence, their expression reactions as well (see Bower, 1981; Schmidt-Atzert, 1996; Schultz, 1979; Vrana, 1993). (4) Then—unexpectedly for the participants—the emotional key stimuli were spoken out loud to reactivate the emotion. (5) After 15 s, participants were distracted from this induced emotion episode by an unexpected question ("Which is the fourth letter in the alphabet?"). (6) This was followed by a detailed interview on what the participants had felt, if they had *felt* the emotion episode once again and not just recalled it, and which feeling signs had they used to conclude this. This procedure produced a time window in which the videotaped expression behavior of the participants could be compared with their reports on the feeling signs they had experienced at the same time.

The videotaped expression scenes in which the participants felt pride or joy at reunion were spliced together in random sequence with scenes in which they were in a relaxed state when expression should be broadly neutral. This rating tape was given to 10 naïve judges who assessed emotion quality and expression intensity. The chance of correctly rating emotion quality was 33% for each choice (joy, pride, or neutral). If correct ratings of emotion quality were no higher than chance and expression intensity were close to zero, it could be assumed that participants had not shown any emotion-discriminating expression reactions. Both studies revealed the existence of mental expression signs. In Upmann's study, 20 (77%) of the 26 participants reported that they had reexperienced the joy at reunion relatively intensively (Upmann, 2000; see Table 4.7).

None of them produced audible verbal or vocal utterances during the relaxation and emotion episodes. The 10 naïve judges also rated all joy episodes as relaxation episodes on the basis of body posture and gestural expression. However, the performance of 9 (45%) out of 20 participants was above chance when rating joy episodes on the basis of facial expression—these participants had smiled. In contrast, 11 participants felt joy at reunion without this being identifiable to outsiders in their expression. Participants without expression also reported having felt potentially observable expression signs (such as smiling, turning to the other person, inner speech in the form of utterances of greeting or joy) and not just body signs (see Table 4.7).

In the study of von Olberg (1999), 24 out of the 31 participants reported having clearly reexperienced both feelings of joy at reunion and pride. Observers

TABLE 4.7. Intersubjectively Observable Expression Quality and Intersubjectively Experienced Expression and Body Signs when Reactualizing Joy at Reunion[a]

Perceived feeling during joy induction (Self-rating)[b]	Joy at reunion ($n = 20$)	
	Joy ($n = 9$)	Neutral ($n = 11$)
Deduced feeling (other ratings by 10 observers)[c]	M = 7.00	M = 6.27
Intensity of feeling (self-rating)	M = 2.03	M = 0.16
Intensity of expression (other ratings by 10 observers)		
Subjectively felt expression signs	89%	54%
Smiling	56%	54%
Vocal sound or verbal utterance of joy	89%	64%
Action impulse of turning toward other person		
Subjectively felt body signs	44%	18%
Potentially visible body sign (shallow, deep breathing, moist eyes, swallowing)	56%	36%
Warmth	33%	27%
Arousal	33%	27%
Tension	44%	9%
Relaxation		

[a]Scale of intensity of expression and feeling from 0 to 9 (*extremely strong*).
[b]Twenty out of 26 participants reported feelings of joy.
[c]At least 7 out of 10 observers classified feeling accordingly on the basis of facial expression.

correctly identified joy episodes at above chance in only 9 of the 24 participants. Observers seemed to identify joy episodes on the basis of a slight smile. Pride episodes were identified correctly in only 1 of the 24 participants; for three participants, their pride episode was classified incorrectly as joy. The other participants who experienced feelings reported subjectively sensed expression movements and speech signs, even though the observers were unable to ascertain any identifiable emotion expression (see Table 4.8). Hence, individuals no longer just draw on proprioceptive perceptions of real expression processes as feeling signs but also possess mental representations of such expression signs that are brought to mind when feeling an emotion. Damasio's "as-if feelings" seem to exist not only for body sensations but also for expression signs (Damasio, 1994).

Moreover, the analysis on the level of single feeling signs showed that it is particularly mental expression signs that contribute to the differentiation of emotions. Mental expression signs and sensed action impulses seem to make a far greater contribution to differentiating between emotions of equal valence, in this case, joy at reunion versus pride, than do body sensations. As Figure 4.8 shows, inner smiles occurred during both pride and joy at reunion. On the one hand, this may mean that smiling is only valence-specific but not emotion-specific. However, it may also mean that the participants felt both pride and joy. In this case, smiling could also be emotion-specific.

TABLE 4.8. Intersubjectively Observable Facial Expression and Intersubjectively Experienced Feeling during the Reactualization of a Joy and Pride Episode[a]

Perceived feeling (Self-rating)	Joy at reunion ($n = 24$)		Pride over a success ($n = 24$)		
Deduced feeling (Other rating by 10 observers)[b]	Joy ($n = 9$)	Neutral ($n = 15$)	Pride ($n = 1$)	Joy ($n = 3$)	Neutral ($n = 20$)
Intensity of expression (other rating)	M = 2.1	M = 0.3	M = 2.5	M = 2.5	M = 0.4
Intensity of feeling (self-rating)	M = 6.1	M = 5.9	M = 7.0	M = 6.3	M = 6.3

[a]Scale of intensity of expression and feeling from 0 to 9 (*extremely strong*).
[b]At least 7 out of 10 observers classified feeling accordingly on the basis of facial expression.

In all, the results indicate that mental expression signs and action impulses tend to signalize the emotion specificity, whereas body sensations, in contrast, seem to signalize whether any emotion has been brought to mind at all.

It seems as if the emotional feeling as a whole is retained in the form of an internally sensed configuration of expression signs, action readinesses, and body reactions even when no expression signs or actions can (still) be observed in external behavior. We view these findings as providing initial support for the hypothesis that expression signs do not disappear but become internalized, as predicted by the internalization model of emotional development.

4.5.2. The Development of Reflective Emotion Regulation

Carstensen (1993) claims that a further optimization of reflective emotion regulation occurs during the course of adulthood. The aged seem to experience fewer negative emotions and more positive ones. Carstensen, Pasupathi, and Mayr (1998) report this finding from a study in which participants aged 18–94 years were asked to record the quality and intensity of their feelings for a complete week. As in Larson and Lampman-Petraitis' study of juveniles (Larson & Lampman-Petraitis, 1989), an electronic pager was used at random to tell participants when to complete their protocols.

In addition, Carstensen, Gottman, and Levenson (1995) showed that when older persons engaged in a discussion on conflict-prone topics, they were better at regulating the negative emotions arising from the conflict topic than younger persons. The former showed less negative expression in general, also interspersed the interaction with positive expression signs, and expressed their liking for the interaction partner. They exhibited an effective regulation pattern that successfully dispersed the induced negative emotions. This capability is attributed to two developmental phenomena that emerge in late adulthood.

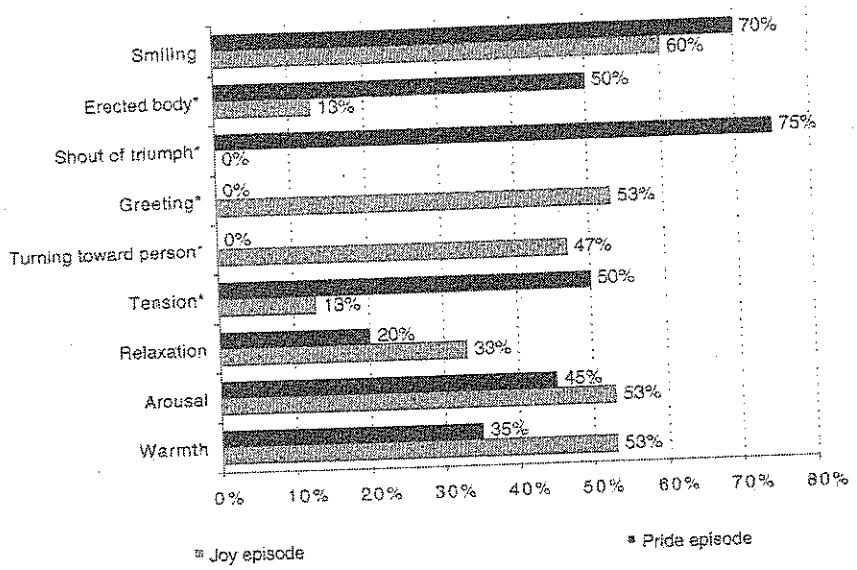

FIGURE 4.8. Percentage of participants with no joy (n = 15) and pride expression (n = 20) who had experienced the given expression and body signs during the reactualized joy and pride episodes. * $p < .05$.

Shift in ranking social motives. Carstensen and Frederickson (1998) assume that the priorities assigned to different motives change in the aged. The authors distinguish between two classes of social motive that follow different developmental trajectories: those in the knowledge trajectory (e.g., power, performance) and those in the emotion trajectory (e.g., affiliation). Although all motives involve emotions, social motives in the emotion trajectory focus on positive ones directly: feeling good in the presence of others or establishing intimacy. For motives belonging to the knowledge trajectory, the goal is to obtain information, to perform social comparisons, and to achieve. When social contacts serve these motives, they are also sustained, even when they are linked to negative emotions.

Childhood is dominated by motives on the emotion trajectory. From school age to middle adulthood, the dominant motives are on the knowledge trajectory. In this long life phase, individuals focus more strongly on acquiring knowledge and succeeding in their careers. Social contacts are also sustained when they are linked to negative emotions as long as they serve the goals of the knowledge trajectory. In late adulthood, there is once again a shift toward a dominance of the emotion trajectory of social motives. Emotions take the stage again, and the time perspective also changes. Social motives focus more on the here and now rather than

the future. Persons in late adulthood are concerned and motivated to promote the emotional climate (Carstensen & Charles, 1998). In sum, this differentiation of the two trajectories of social motives explains the finding that emotions are more salient in the mental representations of aged persons than in those of the middle aged (Carstensen & Frederickson, 1998).

Shift in control orientation. In their life-span theory of control, Heckhausen and co-workers (Heckhausen, 1997; Heckhausen & Schulz, 1995) distinguish between two major types of regulation affordances that individuals need to orient their actions and their development appropriately during the life course: the maintenance of selection (i.e., making an appropriate choice among the variety of options that can also ensure long-term satisfaction of one's motives) and the compensation of failure and loss (i.e., being able to compensate for inevitable failures and losses through appropriate countermeasures).

How far these two affordances can be mastered successfully depends not only on biological and sociostructural conditions along with the vagrancies of life but also on one's personal mental regulation competence. This consists of, first, primary control strategies that are directed toward the external world and with which the individual tries to generate motive-serving effects in the environment such as learning for an examination or seeking support. Second, it consists of secondary control strategies that are directed toward one's own internal world and with which the individual tries to influence his or her own goals, motives, emotions, and expectations. In the terminology of the internalization model, these secondary controls correspond to reflective emotion regulation.

Heckhausen and Schulz (1995) found that primary control strategies decrease whereas secondary strategies increase from early to late adulthood, because, among others, primary controls can no longer be applied so effectively owing to age-related changes in the life course, such as retirement, age-related processes of deterioration, and so forth. It seems as if these age-related experiences of loss are compensated by emotion regulation strategies of reevaluation and reinterpretation so that they do not impact negatively on emotional well-being and the motivational resources of aging individuals.

As a result, it is particularly *symbolic strategies of reinterpretation* that are applied in emotion episodes. These either reinterpret negative events retrospectively in a positive way or trivialize them (it could have been worse). Downward social comparisons are preferred (others have it far worse than I do), and the aged reduce the discrepancy between the ideal self and the real self. Such strategies serve to neutralize the impact of stressors and the negative emotions they trigger. In addition, the aged increasingly apply *antecedent regulation strategies*. For example, social partners are chosen more selectively. Above all, the aged prefer close friendships and they cultivate them more intensively than middle-aged adults.

The outcome of these shifts is to reduce the proportion of negative feelings while maintaining or even increasing the proportion of positive feelings in comparison with early and middle adulthood.

4.6. SUMMARY

The ontogenesis chapter concentrated on how children develop their emotions and learn to regulate them. We based this on the following systematic definition of emotion: An emotion is a self-organizing psychic system that assesses the meaning of internal or external, context-related causes for one's own motive satisfaction, that triggers adaptive, emotion-specific expression and body reactions that are perceived subjectively as feelings through body feedback and brought into a relation with the cause of the emotion, so that motive-serving actions are (can be) triggered either by the individual himself or herself or by an interaction partner.

In the present chapter, we have concentrated on the prototypical course of development, and considered interindividual differences only marginally in the development of temperament and attachment. For the single phases, we have named the developmental tasks that children have to master during their emotional development, and we have described the developmental mechanisms that drive forward the development of emotions and emotion regulation within the interaction process between children and their fellow human beings.

1. *The precursor emotions in neonates.* Neonates do not enter our world with fully functioning emotion systems, but with precursor emotions. These are triggered by preadapted stimulus configurations and not by the particular relational meaning of the perceived causes of the emotion. Likewise, the triggered expression and body reactions are not yet oriented toward the cause of the emotion and the caregiver.

2. *The emergence of sign-mediated levels of regulation in infancy.* The precursor emotions only develop into functioning emotion systems that can guide actions in a motive-serving way within interpersonal regulation with sensitive caregivers. We have identified the interplay between the affect mirroring of infant emotion expression by caregivers and their motive-serving responses on the one side and the motor mimicry of the emotion expression by the child and his or her learning through experience on the other side as the decisive developmental mechanism through which fully functioning emotions evolve. It is only when the caregiver provides an appropriate interpretation to the still unfocused infant expression and body reactions, mirrors this in his or her own expression in the form of exaggerated expression signs, and responds promptly with motive-serving coping actions, that the infant's precursor emotions are augmented to form completely

functional motive-serving emotions. The infant emotion process is accordingly initially shared between child and caregiver. They act together as a coregulative system.

We consider that this developmental mechanism can be used to explain how starting with a few precursor emotions (distress, interest, endogenous pleasure, disgust, and fright), a range of new emotion qualities emerge, such as pleasure, joy, affection, amusement, frustration, anger, defiance, fear, surprise, sorrow, sadness, and embarrassment. We assume that this developmental mechanism is not just restricted to infancy, but underlies the genesis of new emotion qualities in general. We have tried to illustrate this through the emergence of the self-evaluative emotions of pride and shame.

3. *The emergence of intrapersonal levels of regulation in toddlerhood and preschool age.* It is only at the end of infancy that *intra*personal regulation emerges from *inter*personal regulation. Children become increasingly able to perform motive-serving actions by themselves without social support, and coordinate the satisfaction of their motives with their social environment and situational demands. This is the context in which the self-evaluative emotions emerge in the form of pride, shame, and guilt that children use to assess their actions and themselves in light of social norms.

A further development of volitional action regulation by means of speech signs leads to the ability to engage in reflective emotion regulation. Children acquire strategies to regulate their emotions, enabling them to modify the intensity and quality of their emotions in line with social norms and situational demands. The self as an integrative system of activity regulation forms through which the emotional, volitional, and the reflective levels of regulation are coordinated with each other in a more or less successful way.

Infants whose activities are still guided almost exclusively by emotions become children who, as they grow older, are increasingly able to understand that they should no longer just follow their emotions but also regulate them if they want to satisfy a higher motive. The increase in volitional and reflective parts of regulation during the course of development also explains the developmental trend according to which the frequency and intensity of emotions decrease during ontogenesis, as we have claimed in our introductory chapter.

4. *The internalization of mental means of regulation after the sixth year of life.* In the form of expression and body reactions, each emotion system contains an objective component that can be perceived by others. Under certain conditions—they have an exclusively intrapersonal semiotic function in action regulation—expression and body reactions can become internalized and transformed into mental expression signs. Then—in the extreme case—they are no longer objectively measurable, but can be assessed only subjectively as expression and body sensations. A mental level of expression, speech, and action emerges. This permits

subjective feelings that no longer relate to body feedback on real expression and body reactions but to their somatosensory representations.

We have identified the developmental mechanism here as the development of symbol comprehension that permits a change in the form of expression and body signs and allows mental expression signs to emerge. In this way, we can also explain why in many of the emotion episodes in adults, no equally directed changes in the expression, body, and feeling components can still be observed. This is because the internalization process makes it possible for the wholeness of the emotional expression and body reactions to be retained in subjective feeling in the form of mental expression and body sensations.

CHAPTER 5

CULTURE AND EMOTIONAL DEVELOPMENT

When describing ontogenesis in the last chapter, we deliberately limited ourselves to the development of emotions in western cultures alone. Nearly all the studies cited came from an Anglo-American or German context. Such an explicit limitation means that we have proceeded as if one major condition underlying human development were a constant. This is the human-made culture-historical context in which individual development takes place. We have already pointed this out in our third look at emotional development in Chapter 1.

Therefore, the central issues in the present chapter are how far the prototypical course of emotional development and the underlying developmental mechanisms are universal, and how far we can use the internalization model to explain what may be culture-specific differences in the development of emotions and their regulation.

Section 5.1 examines how far emotions are shaped by culture, and which specific components of the cultural context may impact on emotional development. Culture embraces the domain of artifacts: the objects and signs created by human beings along with their instrumental and semiotic functions (Section 5.1.1). Culture is itself an outcome of evolution. Emotions also have a phylogenetic inheritance; all mammals seem to possess them. Therefore, we start to describe the contribution of culture to emotional development by sketching phylogenetic development (Section 5.1.2). Human beings start to create systems of meaning—also called ethnotheories—by reflecting on their daily lives and social activities. Such ethnotheories are important in our context when they refer either directly or indirectly to emotions (Section 5.1.3). Ethnotheories are handed down through interactions, and a child's socialization partners orient their childrearing behavior