



Emotional Regulation and Attachment Bonds: A Multifaceted Perspective

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Abstract: - This contribution examines the neurobiological and ontogenetic bases of emotion regulation. It analyzes individual differences in emotional temperament, influenced by both internal factors and early experiences, with particular attention to interactions with the caregiver. It delves into the importance of the concept of attachment in affective development, the consequences of its disruption, the role of parental affective attunement, and the evolution of the mentalization process. It emphasizes how these processes impact brain development and emotion expression, advocating for a multidimensional approach in analyzing emotional phenomena and processes.

Keywords: emotional regulation, attachment, brain.



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Introduction

The human central nervous system has developed a complex network of neural circuits involved in modulating emotional states. The nature of these regulatory mechanisms exhibits significant variability among individuals, influenced by constitutional predispositions and past experiences. It is possible to identify intrinsic traits in each person, introducing the concept of "emotional temperament," which refers to specific response patterns. Some individuals, for example, display a calm and controlled temperament, rarely overwhelmed by intense emotions, while others react vividly to minor environmental variations. These traits of the nervous system can undergo modifications throughout life (D'Alessio & Minichillo, 2010) and are formed during childhood, influenced by multiple variables. In particular, parental behavior can enhance or suppress certain types of emotional responses (Samuelson et al., 2012).

For instance, some individuals exhibit a calm and controlled temperament, rarely overwhelmed by intense emotions, while others react vividly even to minimal environmental variations (Davidson, 1992). These nervous system traits are not static but can undergo significant modifications throughout life (D'Alessio & Minichillo, 2010), forming particularly during childhood and adolescence. This development is influenced by multiple factors, among which parental behavior plays a prominent role, capable of

enhancing or, conversely, suppressing specific types of emotional responses (Samuelson et al., 2012; Eisenberg et al., 1999).

Emotional Processes and Attachment Mechanisms

Emotions represent a fundamental part of human experience, manifesting from birth and developing throughout the lifespan, influenced by both individual and environmental factors. Research on this topic is extensive, with many scholars proposing definitions focused on different aspects (Ellis, 1962; Barnes-Holmes et al., 2004). Currently, emotions can be defined as a complex and multifactorial behavioral system, in which innate and adaptive dimensions interact (Moscone & Vagni, 2013). Emotional states allow humans to respond to environmental challenges; the mode of this response is partially influenced by subjective factors, often linked to lived experiences, thus generating different behavioral models (Caruana and Gallese, 2011).

Various studies have investigated the neural bases underlying emotional expression and affective reactions to events. Emotion processing is based on the activity of evaluation and activation systems, which respond to stimuli with varying levels of intensity. Essentially, the brain can modulate the reaction to an emotional stimulus by varying the number of activated neurons and the quantity of neurotransmitters released. Initial orienting mechanisms that generate low brain and body activation will lead to subsequent reduced evaluative processing and activation responses (Marraffa & Viola, 2017). Several studies have shown

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that individuals treated with drugs to reduce physiological responses and general activation states reacted to stimuli by interpreting them as "insignificant," displaying less intense primary emotions compared to controls (LeDoux et al., 1990; Lyra & Winegar, 1997; Porges et al., 1994). The response to stimuli can be influenced by both constitutional factors and past experiences. For example, shy individuals tend to react intensely to unusual stimuli, exhibiting withdrawal and avoidance behaviors. Some studies suggest a correlation between the intensity of emotional reactions and bilateral frontal activation, unlike their quality, which is associated with asymmetric activations. The right hemisphere is more involved in withdrawal states, while the left is more involved in approach states (Dawson, 1994).

Research highlights that children with clinically depressed mothers show a significant impairment in their ability to experience joy and excitement, especially when the depression persists beyond the first year of life (Grussu & Quatraro, 2006). Experiences can therefore profoundly influence the intensity and valence of emotional activations in children. In particular, children with depressed parents may lack experiences of sharing positive emotions, which normally allow the parent-child bond to amplify pleasant emotions and intense feelings of mutual affection (Field, 1994; Hirschman & Stern, 1999). The absence of this shared amplification can compromise the development of the ability to tolerate and appreciate intense emotions: interactive experiences allow the child to experience high levels of emotional "tension" (Sroufe, 1979) and to "train" brain circuits to manage them (Shores & Jack, 1996). The intensity of emotional responses can be masked when it coincides with moments of greater vulnerability, making it difficult to express one's feelings. This difficulty is amplified by unsatisfactory interpersonal communication experiences and can generate a sense of shame due to a lack of affective attunement (Shore, 1994). This continually evolving and sometimes unconscious process allows the child, as early as 8 months, to establish a deep connection with the affective states of those around them. The child aligns their emotional responses with those of the caregiver, who becomes the model for future behavioral patterns in interpersonal relationships.

The caregiver's behavior is crucial for the child. Entering a significant affective relationship contributes to the development of a coherent and positive self-image, promoting secure and functional emotional patterns (Cavanna, 2011). From the first days of life, emotions serve as both tools and content in parent-child communications. The child learns to experience, communicate, and regulate emotions through the relationship with their parents. A positive relationship with the adult facilitates healthier processing of events, actions, and emotions (Stern, 1987). In simple terms, the child perceives their internal state, the parents attune to it, and the child in turn perceives the parents' response, establishing a reciprocal affective agreement. Subsequently, parents can use language to define the child's emotions, helping them identify and share their emotional state. These early forms of communication foster the development of the awareness that emotional life can be shared within relationships that offer security and comfort.

Good emotional attunement and the caregivers' ability to respond sensitively to the child's needs for closeness, protection, and contact foster the construction of primary intersubjectivity (Trevarthen, 1998), in which the caregiver, through intuitive communication, provides the child with the messages necessary to

structure proto-dialogues with the adult, which will then be used in future interactions. In this reciprocal exchange process, the child learns to send specific social messages, and the adult is expected to respond. By the second year of life, culture and the family environment play a central role in learning the conventions that regulate emotional expression, defined by some as "display rules" (Malatesta & Magai, 1991). Numerous studies across different populations and cultures show that children and adults express their emotions differently when alone or in the presence of strangers. Ekman's research (1989) highlighted cultural and contextual differences in how individuals manifest basic emotions. Although these emotions are universal, they are influenced by shared sociocultural norms that establish which emotions are appropriate to express in certain circumstances.

However, if cultural norms prevent us from expressing emotions, can this have repercussions on our awareness of emotional responses? It seems so; our brain creates representations of bodily reactions and uses them to determine "how we feel" (Etcoff & Magee, 1992). It is plausible to assume that these representations are initially communicated within the core of social relationships, such as the family, and particularly in the bond between child and caregiver. Therefore, positive attunement between caregiver and child is fundamental for the development of attachment and predictive of the child's own emotional regulation capacity (Klaus and Kennell, 1979). Attachment is the behavior of an individual seeking to remain close to another person identified as capable of dealing with the world. This behavior is particularly evident in the first years of life but also manifests in emergency situations throughout the lifespan (Holmes, 2017). According to this theory, there is a genetic predisposition to establish intimate relationships. The attachment bond between mother and child in the first months of life derives from this predisposition. The function of the attachment system is the search for physical proximity to the caregiver. This system is composed of behavioral patterns aimed at maintaining contact with the mother, such as crying, smiling, and calling, through which the child communicates their needs. Availability, care, emotional warmth, protection, and the ability to comfort are the most significant caregiver behaviors for attachment development, correlated with security, trust, affective regulation, and the search for comfort in times of distress (Bost et al., 2006).

The mother, as an environmental stimulus, creates the conditions for the child's growth and development. In this delicate process, social and cultural factors influence how the mother, or caregiver, establishes the relationship with the child. The mother's affective attitude, i.e., the expressed feelings, offers the child a range of experiences that determine the quality of the latter. The mother-child relationship represents the core of future interpersonal relationships; the early absence or alteration of this bond can generate deficiency states that negatively and often irreversibly influence the child's psychophysical development (Spitz, 2010). Two key elements of the attachment relationship, especially in the early stages, are the bidirectionality and interdependence of exchanges between mother and child. It is not an asymmetric relationship, but a circular interaction in which the responses of one influence those of the other (Cavanna, 2011).

Simultaneously, the surrounding environment offers the child stimuli and experiences to develop increasingly higher abilities: imagination, tactile, olfactory, and gustatory sensations, visual exploration are all elements that contribute to cognitive growth.

The stimuli provided by parents and the environment during childhood are crucial for neuronal development. The lack of fundamental sensory experiences, such as auditory, visual, and tactile stimulation, can compromise neuronal development and, in general, the child's psycho-physical well-being (D'Alessio, Minchillo, 2010). At the end of the first year of life, protest reactions to the mother's departure indicate the formation of a stable attachment bond. During this period, the concept of a "secure base" (Bowlby, 1979) also emerges, expressed through exploration and play behaviors based on trust in the caregiver's emotional and physical availability. In this same period, the child begins to organize affective experience into "internal working models," creating a representation of themselves and the environment represented by the attachment figure (Cena et al., 2012).

Research on non-human primates regarding the consequences of the disruption of bonds with caregivers offers a new perspective on the importance of attachment in human development. When care ceases, children, like other primates, go through a protest phase, showing agitation and increasing activation. After a few hours or days, children go through what Bowlby calls "despair" (Bowlby, 1979; Spitz, 2010). In this phase, motor and emotional expression is limited, REM sleep decreases, and automatic behaviors manifest in place of normal conduct (Hollenbeck et al., 1980; Caretti et al., 2001; Ammaniti, 2015). The presence and appropriate responses of caregivers are necessary to restore optimal levels of behavior and psychological activation. In the absence of such responses, distress activates the fight-or-flight system. However, children have limits in their ability to fight or flee and are therefore constrained to a relatively narrow repertoire of actions to modulate agitation and hyperarousal: aversion, body part sucking, and dissociation. Through dissociation, the child can enter a trance-like state and may even ignore dysphoric or excessive stimuli, including internal sensations (Gläscher & Adolphs, 2003). Perry suggests that repeated failures of the caregiver to respond to distress signals organize brain development in such a way as to favor rapid activation of the fight-or-flight system, particularly the dissociative component (Perry, 1997).

In modulating the child's emotional regulation abilities, affective attunement between mother and child is fundamental, meaning the caregiver's ability to intuitively perceive the child's internal states (hunger, agitation, satisfaction, and joy) and to respond in a way that communicates: "I have received your message and I can take care of it" (Cavanna, 2008). During these interactions, the heartbeats and other physiological parameters of mothers and children synchronize. When caregivers consider their children as beings endowed with intentions, the child discovers that the behavior of others is also intentional. This discovery anticipates the development of a biologically predisposed ability to interpret one's own and others' behavior based on presumed internal states (Trevarthen & Aitken, 2001). Evolutionists define this acquisition as mentalization or reflective function (Fonagy et al., 1991), or as the infant's theory of mind (Baron-Cohen et al., 1985). Several studies have shown that a distinctive characteristic of autism is a deficiency in the development of the reflective function (Baron-Cohen, 1995; Hobson, 1993). The reflective function appears to be anchored already in the analysis of face-to-face affective exchanges in the first five months of life (Bernabei et al., 1997). In-depth analyses of these interactions show that both the caregiver and the child are sensitive to the other's state and regulate their

expressions based on anticipated reactions. This form of reciprocal indication is not possible in autistic children, due to their feeling of estrangement and the lack of reciprocity reported by their caregivers.

Conclusions

The attachment bond defines the patterns of emotional response that the child will adopt in future social and relational contexts. The stronger and more secure this bond, the greater the child's ability to develop autonomy and security in exploring the world. In other words, the attachment relationship allows for the creation of a stable core that facilitates exploration of the world, with the awareness of being able to return to a secure base, and psychologically it is crucial to know whether or not one has a secure base (Speranza, 2002). Communication patterns between children and parents reflect the security of the attachment bond (Etzion-Carasso, Oppenheim, 2000).

Emotions, as highlighted, constitute a complex and multifactorial phenomenon; therefore, it is essential to adopt a multifaceted approach that illuminates their complexity and interconnection. Understanding the neuronal roots and the mental schemas that form, taking into account primary interactions with the caregiver, provides significant insights into the role of the environment in neuronal development processes. The emotional response is the result of a mediation between multimodal experiential knowledge of emotions (activation of biochemical processes, neural connections, and motor activation) and the experience of others. A shared intentionality is founded in mirror neurons and the primordial mother-child attachment bond (Gallese, 2006). Consequently, in individuals with autism spectrum disorder, social interaction and empathy are compromised, lacking the prerequisites for emotional attunement and intentional consonance, which are fundamental for any social interaction and the development of an empathic process (Baron-Cohen, 2005). Analyzing psychic phenomena also through the lens of neurosciences is crucial for regulating any psychological or psychotherapeutic intervention.

References

1. Ammaniti, M. (2015). Abuso e trascuratezza nell'infanzia: implicazioni cliniche. *Infanzia e Adolescenza*, 14(1), 2-21.
2. Barnes-Holmes D., Barnes-Holmes Y., Power P., Hayden E., Milne R. e Stewart I. (2006), Do you really know what you believe? Developing the Implicit Relational Assessment Procedure (IRAP) as a direct measure of implicit beliefs, *The Irish Psychologist*, 32(7), 169-177.
3. Barnes-Holmes D., Staunton C., Barnes-Holmes Y., Whelan R., Stewart I., Commis S. & Dymond S. (2004), Interfacing relational frame theory with cognitive neuroscience: Semantic priming, the implicit association test, and event related potentials, *Journal of Psychology and Psychological Therapy*, 4(2), 215-240.
4. Baron-Cohen S. (1995). *Mindblindness: an essay on autism and theory of mind*. London: The MIT Press, England.
5. Baron-Cohen, S. (2005). The empathizing system. Origins of the social mind: Evolutionary psychology and child development, 468-492.

6. Baron-Cohen, S., Leslie, A. M., & Frith, U. (1985). Does the autistic child have a "theory of mind"? *Cognition*, 21(1), 37-46.
7. Bernabei, P., Camaioni, L., Levi, G., Di Falco, M., & Paolesse, C. (1997). Lo sviluppo socio-comunicativo nei primi due anni di vita di bambini con autismo: possibilità di una diagnosi precoce. *Psicologia clinica dello sviluppo*, 1(2), 245-260.
8. Bost, K. K., Shin, N., McBride, B. A., Brown, G. L., Vaughn, B. E., Coppola, G., Verissimo, M., Monteiro, L. & Korth, B. (2006). Maternal secure base scripts, children's attachment security, and mother-child narrative styles. *Attachment & Human Development*, 8(3), 241-260.
9. Bowlby, J. (1979). The bowlby-ainsworth attachment theory. *Behavioral and brain sciences*, 2(4), 637-638.
10. Caretti, V., Craparo, G., Ragonese, N., & Schimmenti, A. (2005). Disregolazione affettiva, trauma e dissociazione in un gruppo non clinico di adolescenti. Una prospettiva evolutiva. *Infanzia e adolescenza*, 3, 170-178.
11. Caruana, F., & Gallese, V. (2011). Sentire, esprimere, comprendere le emozioni: una nuova prospettiva neuroscientifica. *Sistemi intelligenti*, 23(2), 223-234.
12. Cavanna, D. (2008). Teoria dell'attaccamento, intersoggettività e regolazione emotiva. *Giornale di neuropsichiatria dell'età evolutiva*, 28(2), 231-243.
13. Cavanna, D. (2011). L'attaccamento e la dimensione interpersonale. *Giornale italiano di psicologia*, 38(4), 783-788.
14. Cena, L., Baldoni, F., Imbasciati, A., Baldoni, F., Minghetti, M., & Facondini, E. (2012). Trasmissione dell'attaccamento e Modello Dinamico-Maturativo. *Prendersi cura dei bambini e dei loro genitori: La ricerca clinica per l'intervento*, 183-196.
15. D'Alessio, C., Minichillo, I. (2010). *Le neuroscienze e l'educazione*. Lecce: Pensa Editore.
16. Dawson, G. (1994). Development of emotional expression and emotion regulation in infancy: contributions of the frontal lobe, in *Human behavior and the Developing Brain*, eds G. Dawson and K. W. Fischer (New York, NY: Guilford Press), pp. 346-379.
17. Davidson, R. J. (1992). Emotion and Affective Style: Hemispheric Asymmetry and Individual Differences. *Psychological Science*, 3(1), 39-43.
18. Eisenberg, N., Fabes, R. A., & Spinrad, T. L. (1999). Prosocial development in childhood: A longitudinal study. *Developmental Psychology*, 35(5), 1332-1345.
19. Ekman, P. (1989). The argument and evidence about universals in facial expressions. *Handbook of social psychophysiology*, 143, 164.
20. Ellis A. (1962), *Reason and emotion in psychotherapy*, Oxford, Lyle Stuart.
21. Etcoff, N. L., & Magee, J. J. (1992). Categorical perception of facial expressions. *Cognition*, 44(3), 227-240.
22. Etzion-Carasso, A., & Oppenheim, D. (2000). Open mother-pre-schooler communication: Relations with early secure attachment. *Attachment & human development*, 2(3), 347-370.
23. Field, T. (1994). The effects of mother's physical and emotional unavailability on emotion regulation. *Monographs of the Society for Research in Child Development*, 59(2-3), 208-227.
24. Fonagy, P., Steele, M., Steele, H., Moran, G. S., & Higgitt, A. C. (1991). The capacity for understanding mental states: The reflective self in parent and child and its significance for security of attachment. *Infant mental health journal*, 12(3), 201-218.
25. Formisano, M.A. (2019). *Osservazione e guida all'apprendimento: tra psicoeducazione e neuroscienze*. Salerno: Area Blu Edizioni.
26. Formisano, M. A., Oliva, M., Caivano, M., & Vicinanza, C. (2023). Ecologia integrale e relazioni educative efficaci: traiettorie psicoeducative. *IUSVEDUCATION*, (21), 73-87.
27. Gallese, V. (2006). La consonanza intenzionale. Una prospettiva neurofisiologica sull'intersoggettività e sulle sue alterazioni nell'autismo infantile. *Neuroni che sentono. Cervello, azione, empatia*. Dedalus, 18-29.
28. Gläscher, J., & Adolphs, R. (2003). Processing of the arousal of subliminal and supraliminal emotional stimuli by the human amygdala. *Journal of Neuroscience*, 23(32), 10274-10282.
29. Grussu, P., & Quatraro, R. M. (2006). Depressione materna del dopo parto e salute psicologica del bambino: contributi sperimentali e analisi critica della letteratura. *Psicologia clinica dello sviluppo*, 10(2), 187-208.
30. Hirschman, E. C., & Stern, B. B. (1999). The roles of emotion in consumer research. *Advances in consumer research*, 26, 4-11.
31. Hobson, R. P. (1993). The emotional origins of social understanding. *Philosophical psychology*, 6(3), 227-249.
32. Hollenbeck, A. R., Susman, E. J., Nannis, E. D., Strobe, B. E., Hersh, S. P., Levine, A. S., & Pizzo, P. A. (1980). Children with serious illness: Behavioral correlates of separation and isolation. *Child Psychiatry and Human Development*, 11, 3-11.
33. Holmes, J. (1994). *La teoria dell'attaccamento*. John Bolwby e la sua scuola. Milano: Raffaello Cortina Editore.
34. Kennell, J. H., & Klaus, M. H. (1979). Early mother-infant contact: Effects on the mother and the infant. *Bulletin of the Menninger Clinic*, 43(1), 69.
35. LeDoux, J. E., Cicchetti, P., Xagoraris, A., & Romanski, L. M. (1990). The lateral amygdaloid nucleus: sensory interface of the amygdala in fear conditioning. *Journal of neuroscience*, 10(4), 1062-1069.
36. Lyra, M. C., & Winegar, L. T. (1997). Processual dynamics of interaction through time: adult-child interactions and process

- of development. Dynamics and Indeterminism in Developmental and Social Processes, 93.
37. Malatesta-Magai, C. (1991). Development of emotion expression during infancy: General course and patterns of individual difference. In J. Garber & K. A. Dodge (Eds.), *Development of emotion regulation and dysregulation* (pp. 49–68). New York: Cambridge University Press.
38. Marraffa, M., & Viola, M. (2017). Quale mappa per il dominio delle emozioni?. *Sistemi intelligenti*, 29(1), 85-108.
39. Moscone, D., & Vagni, D. (2013). L'educazione cognitivo-affettiva e le condizioni dello Spettro Autistico ad Alto funzionamento. *Autismo e Disturbi dello sviluppo*, 11(1), 39-71.
40. Perry, B. (1997). Incubated in terror: Neurodevelopmental factors in the "cycle of violence". In J. Osofsky (Ed.), *Children in a violent society*. New York: Guilford.
41. Porges, S. W., Doussard-Roosevelt, J. A., & Maiti, A. K. (1994). Vagal tone and the physiological regulation of emotion. *Monographs of the society for research in child development*, 167-186.
42. Samuelson, K. W., Krueger, C. E., & Wilson, C. (2012). Relationships between maternal emotion regulation, parenting, and children's executive functioning in families exposed to intimate partner violence. *Journal of interpersonal violence*, 27(17), 3532-3550.
43. Shore, A.N. (1994). *Affect regulation and the origin of the Self: The neurobiology of emotional development*. Hillsdale: Erlbaum
44. Shores, R. E., & Jack, S. L. (1996). Special issue on research needs and issues in education for students with emotional and behavioral disorders. *Behavioral Disorders*, 22(1), 5-7.
45. Spitz, R.A. (2010). *Il primo anno di vita del bambino. Genesi delle prime relazioni oggettuali*, trad. it. G. Galli & A. Arfelli-Galli, Firenze: Giunti editore.
46. Sroufe, L. A. (1979). The coherence of individual development: Early care, attachment, and subsequent developmental issues. *American psychologist*, 34(10), 834.
47. Stern, D.N. (1987). *Il mondo interpersonale del bambino*. Torino: Bollati Boringhieri.
48. Trevarthen, C., & Aitken, K. J. (2001). Infant intersubjectivity: Research, theory, and clinical applications. *The Journal of Child Psychology and Psychiatry and Allied Disciplines*, 42(1), 3-48.
49. Trevarthen, C., & Aitken, K. J. (2001). Infant intersubjectivity: Research, theory, and clinical applications. *The Journal of Child Psychology and Psychiatry and Allied Disciplines*, 42(1), 3-48.
50. Trevarthen, C. (1998). The concept and foundations of infant intersubjectivity. In: *Intersubjective Communication and Emotion in Early Ontogeny*, ed. S. Braten. Cambridge: Cambridge University Press, pp. 15–46.
51. Formisano, M. A., Felaco, R., (2025). The construction of Emotions: a neuroscientific approach. *ISAR Journal of Multidisciplinary Research and Studies*, 3(3), 31-35.
52. Formisano, M. A., (2024). Psychological Dimensions of School Space Design. *ISAR Journal of Arts, Humanities and Social Sciences*, 2(11), 78-81.