

The relationship between maternal reflexive functions and joint attention in neurotypical children.

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Abstract

Joint Attention (JA) can be defined as the coordination of attentional orienting between two persons towards a common object. It develops in typically developing children between 6 and 18 months of age across two phases: Initiating Joint Attention (IJA) and Responding to Joint Attention (RJA). For instance, a parent can initiate JA by pointing to an object and the child can respond by moving her eye gaze towards the parent's pointing. JA represents one of the first precursors of the Theory of Mind (ToM) implying the person's ability to think and reason about own and another person's mental states, inferring thoughts, beliefs, intentions and desires. Less is clear, instead, on the relationship between the development of JA abilities in children and the mentalizing abilities of mothers. In the present study, we aimed at investigating the relationships between the infant's (age range: 15 and 20 months) behaviours relating to IJA and the maternal Reflexive Functions (RF). The results showed a significant correlation between these two skills, thus suggesting that the reflective capacity of mothers can play an important role in development of milestones of the child's social cognition.

Keywords: Joint attention, Reflexive functions, Theory of mind, Infants, Mirroring.

Accepted on March 12th, 2021

Introduction

The construct of Theory of Mind (ToM) refers to a cognitive ability fundamental to social life as it allows the understanding of one's own and others' mental states (intentions, emotions, desires, beliefs) [1-3]. Over the years, several studies investigated ToM both in typical and atypical neurodevelopmental conditions, from both behavioral and neurofunctional perspectives.

One of the most frequently mentioned skills among the precursors of the Theory of Mind (ToM) is Joint Attention (JA) defined as the ability to coordinate one's visual attention with that of another person (usually the caregiver) [4,5]. Baron-Cohen and Leslie hypothesized the existence of a JA mechanism, whose function is to concurrently represent the subject and the interacting partner while looking at the same object [6,7]. The authors suggested that JA behaviors begin to emerge in the first 6 months of life and undergo a progressive refinement across infancy.

JA's capabilities are conceptualized into two types: Initiating Joint Attention (IJA) and Responding to Join Attention (RJA) [8-10]. The RJA reveals in situations when a behavior is initiated by the parent and the child follows an indicated object

with her eye gaze, while IJA manifests when the child spontaneously begins a purposeful behavior to share her experience of an object or an event [10,11] (Figure 1).



Figure 1. Examples of IJA (left image) and RJA (right image) situations.

Early relationships between the child and her caregiver seem to play a vital role in the development of ToM. In particular, an interesting contribution from the socio-contextual matrix takes into account the importance of emotional development in the context of child-mother interactions. Elizabeth Meins proposes the construct of maternal Mind-Mindedness, defined as the propensity to consider one's own child as an active subject, endowed with a mind, and interact by relying on mental states representations [12-14]. Peter Fonagy, on the other hand, introduces mainly in the clinical setting two different terms

designating the ability to understand one's own and others' mental states: reflective function of the self and mentalization [15-18]. Specifically, Fonagy and colleagues coined the expression "emotional mirroring"[18,19]. The authors suggested that the child is instinctively led to express changes in his/her internal states, while the mother is instinctively led to mirror (and mark) these internal states.

Maternal mirroring of the child's affective expressions plays a fundamental role in establishing a conscious representation of the emotion that will lead the child to understand the emotion itself. Starting from the end of the first year of life, thanks to mirroring, the child will become progressively more sensitive to her own internal states, thus being able to identify and mentally represent own emotional dispositional states [19,20]. In this perspective emotional mirroring influences the development of mentalization which is closely linked to the reflexive function referring to a complex of psychological processes underlying the ability to mentalize [15,19].

More in details, the reflexive functions can be described as "the mental function" organizing one's own and others' behaviors in terms of mental states; it concerns the mental representations relating to beliefs, emotions and desires, and contributing to the ability of predicting what is going next during social interactions [15].

Parents who are unable to reflect comprehensively on the internal experience of their children and do not know how to respond properly, tend to deny the child as a central psychological structure essential for building a vital sense of self. Therefore, the parental reflexive function determines the development of mental structures that are decisive for the regulation of the self and affects.

This implies that the quality of the affective states, their recognition and the child's self-regulatory reactions are influenced by the characteristics of the affective and reflective communication of his parents [19]. In the present study, we aimed at specifically investigating the relationships between the development of children's joint attention skills and the mentalization abilities of their mothers). We expected to find that better maternal reflexive functions could favor a more rapid and effective expression of early precursors to ToM in children under 2 years of age. In this regard, we focused on two main precursors to ToM, *i.e.*, IJA and RJA, and aimed at relating them with maternal Reflexive Functions (RF).

Materials and Methods

Participants

A sample of 60 children aged between 15 and 20 months was recruited for the study. The exclusion criteria were as follows: a) Nosographically defined psychiatric disorders in parents; b) Mothers over 35 years of age; c) Disadvantaged socio-cultural class in parents; d) Age over 20 months in children; e) Nosographically defined psychiatric and neurodevelopmental disorders in children.

The sample consisting of 60 children had the following characteristics: mean age 17 months (SD=1.41; 44 males and 16 females). The data were collected at the Developmental Psychology Clinic of FINDS (Italian Foundation for Neuroscience and Neurodevelopment Disorders) in collaboration with the Pediatric Neonatology of the Civil Hospital of Caserta, the Developmental Neuropsychology Laboratory and Clinic of Child and Adolescent Neuropsychiatry of the University of Campania Luigi Vanvitelli.

Measures

All children were administered the Early Social Communication Scales-Live (ESCS-L) [21] for measuring IJA and RJA. We subsequently assessed mothers' RF through the administration of the Reflective Functioning Questionnaire (RFQ) [22].

Early Social Communication Scales-Live (ESCS-L)

An *in vivo* observation tool designed to provide a time-efficient quantitative assessment of non-verbal social communication skills: specifically, the ESCS measures Joint Attention Initiative (IJA) and Joint Attention Response (RJA), a critical precursor to the development of social skills and ToM, and the initiative and response to social interaction and demand behaviors, which fall within the global score of the above scale, which we considered for this study.

Reflective Functioning Questionnaire (RFQ)

A self-administered questionnaire for parents aimed at evaluating mentalization, it presents two subscales evaluating the certainty (RFQ_C) and the uncertainty (RFQ_U) on the mental states of oneself and others.

Higher scores on these subscales indicate two distinct RF deficits, respectively, hypomentalization and hypermentalization. Hypomentalizing reflects concrete thinking and poor understanding of mental states of oneself and others, while hypermentalizing describes the person's tendency to interpret events in terms of mental states even when in the absence of empirical support.

Results

Pearson correlations were conducted between the two subscales of the ESCS and the two subscales of the RFQ. We labeled the subscales as follows: RFQ_C the certainty subscale and RFQ_U the uncertainty subscale, ESCS_IJA the JA initiative subscale and ESCS_RJA the JA response subscale. The significance was accepted at the 5% level ($\alpha < 0.05$). Data analyses were performed using SPSS 26.0 [23].

Results showed a significant negative correlation between the RFQ_C and IJA ($r = -0.852$; $p < 0.05$). A significant positive correlation between RFQ_C and RJA ($r = 0.497$; $p < 0.05$) was also found. Furthermore, results showed a significant positive correlation between RFQ_U and IJA ($r = 0.395$; $p < 0.05$).

Finally, results showed a significant negative correlation between RFQ_U and RJA ($r=-0.871$; $p<0.05$) (Table 1).

RFQ_C			RFQ_U		
	r	p		r	p
ESCS_IJA	-0.852	<0.05*	ESCS_IJA	0.395	<0.05*
ESCS_RJA	0.497	<0.05*	ESCS_RJA	-0.871	<0.05*

Table 1. Correlation between RFQ and ESCS subscales. RFQ_C (RF Certainty Subscale); RFQ_U (RF Uncertainty Subscale); ESCS_IJA (Initiating Joint Attention); ESCS_RJA (Responding to JA).

Discussion

Results showed a significant negative correlation between the RFQ_C and IJA indicating that as mothers' certainty about mental states increases, children's IJA behaviors decrease. Certainty represents the parents' ability to understand their own and their child's mental states, implying hypermentalizing when this tendency is excessive. Hypermentalizing thus reflects the parents' inability to scaffold the child's anxieties and fears because they are excessively certain that they can understand their child's mental states. Moreover, results showed a significant positive correlation between RFQ_C and RJA indicating that as mothers' certainty about mental states increases, children's RJA behaviors increase. Uncertainty reflects concrete thinking and poor understanding of the mental states of oneself and others and represents the extreme difficulty in developing complex models of the mind of self and others.

This ability corresponds to hypomentalizing preventing adequate RF in mothers due to their concrete and inflexible way of mentalizing, which in turn makes them unable to consider the complexity in understanding their own or their baby's mind states. Furthermore, results showed a significant positive correlation between RFQ_U and IJA indicating that as the uncertainty of mothers about mental states increases, children's IJA behaviors increase. Finally, results showed a significant negative correlation between RFQ_U and RJA indicating that as the uncertainty about mental states on the part of parent's increases, children's RJA behaviors decrease.

As recalled above, mentalizing refers to the ability of perceiving oneself and others in terms of mental states (desires, emotions, beliefs and needs) and interpreting one's own and others' behavior as a consequence of the latter [15,19]. This ability develops in the context of the attachment relationships between caregiver and infant, favoring the development of the ability to understand one's own and other people's mental states and development of the structure of a cohesive, coherent and flexible self. Fonagy et al. [19] demonstrated that, in the face of adverse life experiences, a good reflective functioning represents a protective factor against possible maladaptive outcomes. Specifically, mentalizing would allow both children and adults to perceive and name different emotions throughout challenging life experiences [24,25].

Emotional mirroring have two main characteristics: it needs to be "contingent" with respect to the expressive manifestations of the emotional state [15], and needs to be "marked", in order to allow a change in the person's representational quality of internal states. Infants perceive and express their every experience through the body, so the presence of adequate parental care, congruent affective mirroring, the containment function and the establishment of a secure attachment become fundamental for the birth of the psychological self and the acquisition of the emotional self-regulation [15,19]. Reaching this goal allows the person to understand and predict others' behaviors and to reflect on own internal states. Failure in acquiring mentalization can in fact lead to an experience made up of incomprehensible emotional experiences, difficult to manage and with marked difficulties in controlling the impulsive responses that would dominate the more reflective ones. Based on Fonagy [15], the determining factor is the mother's ability to mentally contain the child and to respond to her behaviors [26-29]. Indeed, the first relational environment is fundamental, since the security of mother's attachment is a predictor of the child's reflective capacity [15].

Repeated dysfunctional interactions between child and caregiver can give rise to marked difficulties in the ability to tolerate and regulate emotions independently and to acquire mentalizing skills. The present results showing that a hypomentalizing was related to high IJA and less RJA, suggest that the child is molded on a caregiver who accepts all his attempts at IJA while it seems less attentive to what is the joint initiative initiated by the caregiver. On the other hand, hypermentalizing, describing mothers who appear more confident in the interpretation of the emotional and mental states of the other, imply a reduced ability to follow the IJA attempts of their own child. In this case the child shows less IJA but appears more alert and responsive in response to the attempts initiated by the caregiver himself.

Hence, we can confirm the key interaction between parental reflexive functions and child's JA's abilities. Some authors found that children's JA abilities play a fundamental role in the successive social development [30-33]. Other authors have also found that the lack of RF seems to be strongly linked to the child's difficulties in building a reflective self, thus being more prone to develop avoidance and aggression [34]. Therefore, mentalizing and JA can be conceived as developmental acquisitions allowing the child to respond not only to the behavior of others, but also to his own representation of own feelings, beliefs and expectations. By attributing mental states, the child makes the behavior of others meaningful and predictable and will be able to respond in a flexible and adaptive way to complex interpersonal exchanges.

Conclusion

Results showed a significant correlation between mothers' mentalization capacity (ToM) and the development of key communicative markers, such as JA. These findings suggest that the reflective capacity of mothers plays an important role in providing assistance and comfort to the child. In particular, a hypomentalizing educational style might imply higher child's

JA initiatives and a lower maternal JA response; conversely, a hypermentalizing style might imply lower child's initiative JA and a greater maternal JA response. Thus, the present findings would highlight the importance of interventions focused on improving parents' mentalizing skills, and in particular of RF, especially in the context of atypical neurodevelopmental conditions as Autism Spectrum Disorders. Future studies are warranted to confirm the present results on larger samples and to test the development of the correspondence between maternal mentalization and child's mentalization in a longitudinal perspective.

References

1. Premack D, Woodruff G. Does the chimpanzee have a theory of mind? *Behav Brain Sci.* 1978;1(4):515-526.
2. Tomasello M. *The cultural origins of human cognition.* Harvard university press.2009.
3. Frolli A, La Penna I, Cavallaro A, et al. Theory of mind: Autism and typical development. *Acad J Ped Neonatol.* 2019;8(4):555799.
4. Mundy P, Jarrold W. Infant joint attention, neural networks and social cognition. *Neural Networks.*2010;23(8-9): 985-997.
5. Mundy PC. *Autism and joint attention: Development, neuroscience, and clinical fundamentals.* Guilford Publications. (2016).
6. Baron-Cohen S. *Mindblindness: An essay on autism and theory of mind,* Cambridge, Mass., Mit Press, trad.it. *L'autismo e la lettura della mente,* Roma, Astrolabio, 1997.
7. Leslie AM. Pretense and representation: The origins of "theory of mind". *Psychological review.* 1987;94(4):412.
8. Corkum V, Moore C. Development of joint visual attention in infants. *Joint attention: Its origins and role in development.* Lawrence Erlbaum Associates. 1995;61-83.
9. Vaughan A, Mundy P, Block J, et al. Child, caregiver, and temperament contributions to infant joint attention. *Infancy.* 2003;4(4):603-616.
10. Mundy P, Block J, Delgado C, et al. Individual differences and the development of joint attention in infancy. *Child development.* 2007;78(3):938-954.
11. Frolli A, Lombardi A, Bosco A, et al. Temperamental patterns and infant joint attention in typical development. *Curr Pediatr Res.* 2021; 25(1):336-340.
12. Meins E. Security of attachment and maternal tutoring strategies: Interaction within the zone of proximal development. *British Journal of Developmental Psychology.* 1997;15: 129-144.
13. Meins E, Fernyhough C, Wainwright R, et al. Maternal mind-mindedness and attachment security as predictors of theory of mind understanding. *Child development.* 2002;73(6):1715-1726.
14. Meins E, Fernyhough C, Arnott B et al. Mind mindedness and theory of mind: Mediating roles of language and perspectival symbolic play. *Child development.* 2013;84(5): 1777-1790.
15. Fonagy P, Target M. *Attaccamento e funzione riflessiva.* Raffaello Cortina, Milano. 2001.
16. Slade A, Grienenberger J, Bernbach E, et al. Maternal reflective functioning, attachment, and the transmission gap: A preliminary study. *Attachment & Human Development.* 2005;7(3):283-298.
17. Bateman A, Fonagy P. Mentalization based treatment for borderline personality disorder. *World Psychiatry.* 2010;9(1):11.
18. Fonagy P, Gergely G, Jurist EL. *Affect regulation, mentalization and the development of the self.* Routledge. 2018.
19. Fonagy P, Target M. *Regolazione affettiva, mentalizzazione e sviluppo del sé.* Raffaello Cortina Editore. 2005.
20. Fonagy P. The mentalization-focused approach to social development. *The handbook of mentalization-based treatment.* 2006;53-99.
21. Fonagy P, Luyten P, Moulton-Perkins A, et al. Development and validation of a self-report measure of mentalizing: The reflective functioning questionnaire. 2016;11(7):e0158678.
22. Mundy P, Delgado C, Block J et al. *Early social communication scales (ESCS).* Coral Gables, FL: University of Miami. 2003.
23. Slade A. The move from categories to process: Attachment phenomena and clinical evaluation. *Infant Mental Health Journal.* 2004;25(4):269-283.
24. Slade A, Zavattini GC, Zaccagnini C. *Relazione genitoriale e funzione riflessiva: teoria, clinica e intervento sociale.* Astrolabio. 2010.
25. Borelli JL, St John HK, Cho E, et al. Reflective functioning in parents of school-aged children. *American Journal of Orthopsychiatry.* 2016;86(1):24.
26. Camoirano A. Mentalizing makes parenting work: A review about parental reflective functioning and clinical interventions to improve it. *Frontiers in psychology.* 2017;8:14.
27. Borelli JL, Vazquez L, Rasmussen HF, et al. Attachment and maternal sensitivity in middle childhood. *Journal of Social and Personal Relationships.* 2016;33(8):1031-1053.
28. Adkins T, Luyten P, Fonagy P. Development and preliminary evaluation of family minds: a mentalization-based psychoeducation program for foster parents. *J Child Fam Stud.* 2018;27(8):2519-2532.
29. Brooks R, Meltzoff AN. The importance of eyes: how infants interpret adult looking behavior. *Developmental psychology.* 2002;38(6):958.
30. Phillips AT, Wellman HM, Spelke ES. Infants' ability to connect gaze and emotional expression to intentional action. *Cognition.* 2002;85(1):53-78.
31. Call J, Tomasello M. Does the chimpanzee have a theory of mind? 30 years later. *Human Nature and Self Design.* 2011.83-96.
32. Fonagy P, Gergely G, Target M. The parent-infant dyad and the construction of the subjective self. *Journal of child psychology and psychiatry.* 2007;48(4):288-328.

33. Baldoni F. Alle origini del trauma: confusione delle lingue e fallimento della funzione riflessiva. Crocetti G., Zarri A. (a cura di), "Gli dei della notte sulle sorgenti della vita, il trauma precoce della coppia madre-bambino", Pedragon, Bologna. 2008.
34. Concato G. Manuale di Psicologia Dinamica, AlefBet, Firenze. 2006.

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