Ana Alexandra Caldas Osório

Development of social cognition in the early years of life in the context of the child-mother relationship

UMinho | 2010

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Tese de Doutoramento em Psicologia
Área de Conhecimento de Psicologia Clínica

Trabalho efectuado sob a orientação da
Doutora Carla Martins
e da
Doutora Elizabeth Meins

Setembro de 2010

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Número do Bilhete de Identidade: 12170835

Título da Tese de Doutoramento:

Development of social cognition in the early years of life in the context of the child-mother relationship

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Ano de conclusão: 2010

Ramo de Conhecimento do Doutoramento:

Psicologia, Área de Conhecimento em Psicologia Clínica

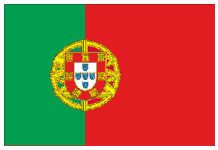
Universidade do Minho, ___ de _____ de _____

Assinatura: _____

This study was financed by the Portuguese Foundation for Science and Technology (grant reference – SFRH/BD/27925/2006) supported by the Ministry of Science, Technology, and Higher Education, in the scope of QREN – POPH – Typology 4.1 – Advanced Training, reimbursed by the European Social Fund and by MSTHE funds.

FCT Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA CIÊNCIA, TECNOLOGIA E ENSINO SUPERIOR

European Union



Portuguese Republic

Acknowledgements

I have been indebted in the preparation of my dissertation to my supervisors Dr. Carla Martins and Dr. Elizabeth Meins, with whom I feel I have grown immensely.

To Dr. Carla Martins, thank you for your consistent and sensitive support and guidance along each step of this work. Thank you for always teaching me what I needed to know and letting me discover what I needed to learn.

To Dr. Elizabeth Meins, I am very grateful for your insightful inputs, for all the facilities provided during my research work in Durham and most of all for the willingness to be involved in this work.

Particular thanks are due to the families who gave me their trust, and without whom this study would not have been possible.

I am also very grateful to everyone who has helped me with data collection and coding: Maria João Carvalho, Mónica Freire, Cláudia Gonçalves, Ana Laúndes, Marta Lopes, Ana Macedo, Vera Mateus, Daniela Monteiro, Maria Emanuel Moreira, Paula Oliveira, Susana Teixeira, Cristiana Torres, Margarida Vale, and all the people I may have forgotten to mention. Special thanks are due to Ana Luísa Barreto and Paula Castiajo.

I would also like to express thanks to Professor Isabel Soares and the colleagues from *Grupo de Estudos da Vinculação* (particularly to Dr Eva Costa Martins) who guided me in my first steps into developmental psychology research.

The informal support and encouragement of my friends has been invaluable, and I would particularly like to acknowledge the following people:

Jane Lidstone and Linda, Liz, Paul and Rebecca Evans, and Emily Squire – Thank you so much for making me feel at home while in Durham.

My classmates and above all, my friends, Ana Freire, Cátia Rocha and Mariana Aguiar – thanks for the endless cathartic conversations and for giving me a much needed sense of perspective.

Ana Oliveira, Raquel Madureira and Sara Pinto, I am very grateful for our long lasting friendship. Thanks for always being there for me.

To my family, especially my parents, for always believing in my worth and for teaching me that my best is always good enough. Thank you for your support and advice every step of the way.

To my parents-in-law, for the beautiful bond we have created, and for their immense availability and emotional support.

To my husband, for his everlasting dedication, companionship, wise words, empathy and above all, love.

DEVELOPMENT OF SOCIAL COGNITION IN THE EARLY YEARS OF LIFE IN THE CONTEXT OF THE CHILD-MOTHER RELATIONSHIP

Abstract

Objective: The aim of this PhD is twofold: 1) To investigate whether infant joint attention at 10 months is developmentally linked to later social symbolic play abilities at 3 years of age, as both are thought to be milestones of social cognition; and 2) To explore individual, relational and contextual contributions to joint attention and social symbolic play. **Method**: Fifty-two infants were assessed at 10 months for joint attention (following and initiating joint attention behaviors) in interaction with their mothers. At 3 years of age, 49 children were re-assessed, this time focusing on their social symbolic play abilities with an experimenter. Information regarding other relevant variables was also gathered at both ages. At 10 months infants' expression of negative emotionality, temperament and developmental level were assessed. Data on mother-infant relationship quality, maternal bids for joint attention (entertaining, teaching and attention directing behaviors) and social-demographic features were also collected. At 3 years, we assessed children's temperament, verbal and non-verbal abilities, as well mothers' and children's mental state talk in a shared pretend play interaction and maternal mind-mindedness is a short interview. Relevant social-demographic information was also collected. **Results**: At 10 months, following joint attention was exclusively predicted by total maternal bids for joint attention, although marginal associations were found with maternal entertaining and attention-directing behaviors (but not teaching strategies). Initiating joint attention was predicted by infants' low expression of negative emotionality and the presence of older siblings, as well as marginally predicted by less maternal teaching behaviors. At age 3, children's social symbolic play abilities were not significantly predicted by infant joint attention. Conversely, social symbolic play was significantly predicted by children's verbal abilities and their use of desire references in a shared pretense interaction with their mothers. Finally, we also found specific associations between children's references to desires and their social symbolic play, and between children's references to cognitions and their general cognitive development. **Conclusion**: Findings highlight the importance of a multilevel approach to the study of social cognition through infancy to preschool years, one that encompasses not only individual variables, but also a variety of social influences.

DESENVOLVIMENTO DA COGNIÇÃO SOCIAL NOS PRIMEIROS ANOS DE VIDA NO CONTEXTO RELACIONAL COM A FIGURA MATERNA

Resumo

Objectivo: Este projecto de doutoramento tem dois objectivos principais: 1) Investigar se a atenção partilhada aos 10 meses está desenvolvimentalmente associada à competência simbólica social aos 3 anos de idade; e 2) Explorar os contributos individuais, relacionais e contextuais para a atenção partilhada e o jogo simbólico social. **Método**: Cinquenta e dois bebés foram avaliados aos 10 meses ao nível da atenção partilhada (comportamentos de seguir e iniciar atenção partilhada) com as suas mães. Aos 3 anos, 49 crianças foram reavaliadas ao nível do seu jogo simbólico social com um experimentador. Foi ainda recolhida informação adicional relevante nas duas idades. Aos 10 meses avaliámos a expressão de emocionalidade negativa, o temperamento e o nível de desenvolvimento dos bebés. Foram igualmente recolhidos dados acerca da qualidade da relação mãe-bebé, das estratégias maternas de atenção partilhada (comportamentos orientados para entreter, ensinar ou dirigir a atenção do bebé) e de características sócio-demográficas. Aos 3 anos avaliámos o temperamento e a capacidade verbal e não-verbal das crianças, assim como o uso de palavras mentais por parte da mãe e da criança no decurso de uma brincadeira de faz-de-conta, e a *mind-mindedness* materna numa pequena entrevista. Foram ainda recolhidos dados relativos a variáveis sócio-demográficas de relevância.

Resultados: Aos 10 meses, apenas o total de estratégias maternas de atenção partilhada foi um preditor significativo do seguimento de atenção partilhada por parte do bebé. No entanto, encontrámos associações marginalmente significativas entre o seguir da atenção partilhada e as estratégias da mãe destinadas a entreter o bebé e a direccionar a sua atenção (mas não estratégias com o objectivo de lhe ensinar algo). O iniciar da atenção partilhada foi significativamente predito pela baixa expressão de emocionalidade negativa do bebé, pela presença de irmãos mais velhos, e marginalmente predito por menos comportamentos maternos com a intenção de ensinar algo ao bebé. Aos 3 anos, verificámos que a atenção partilhada na infância não era um preditor significativo das competências de jogo simbólico social. Em contraste, a capacidade verbal e o uso de palavras relativas a desejos por parte da criança foram preditores significativos do seu jogo simbólico social. Por último, encontrámos associações específicas entre as referências a desejos por parte da criança e o seu jogo simbólico social, e entre as referências a cognições e o seu desenvolvimento cognitivo global.

Conclusão: Os dados sublinham a importância de uma abordagem multinível ao estudo da

cognição social nos primeiros anos de vida, uma abordagem que englobe não apenas variáveis individuais, mas igualmente uma variedade de influências sociais.

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CHAPTER 1

GENERAL INTRODUCTION

Social Cognition in Infancy and Preschool Years

The emergence of social cognition is one of the most defining features of human development (Carpenter, Nagell, & Tomasello, 1998). It regards the gradual acquisition of skills that allow children to acknowledge and interpret one's own and others' social cues and, in turn, to react to them. It is not surprising then, that social cognition brings about particular advantages in everyday social situations (Carpendale & Lewis, 2006). Several empirical studies have shown that better social understanding is associated with superior social skills, including better language (Astington, 2001), less conflict (Dunn & Cutting, 1999) and more cooperative behavior with peers (Astington, 2001; Lalonde & Chandler, 1995), as well as increased popularity (Slaughter, Dennis, & Pritchard, 2002). The importance of social cognition is also evident in the striking interpersonal deficits that result from the social communicative impairments that characterize autism (Baron-Cohen, Leslie, & Frith, 1985).

In recent years developmental researchers have been dedicated to the study of early social cognition from infancy through preschool years, suggesting that *joint attention* and *social symbolic play* may be two essential milestones along which typically developing children advance, culminating in the acquisition of a *theory of mind* in late preschool years (Bretherton & Beeghly, 1982; Carpendale & Lewis, 2006; Leslie, 1987; Rakoczy, 2008; Tomasello, Carpenter, Call, Behne, & Moll, 2005; Trevarthen & Hubley, 1978; Youngblade & Dunn, 1995).

Joint attention.

From very early on infants display preference for human faces and stimuli (Morton & Johnson, 1991; Rochat & Striano, 1999) as well as pro-social behaviors, such as pre-speech movements, which suggest a predisposition for communication and sociability (Trevarthen, 1979). However, it is not until the final quarter of the first year of life that infants participate in triadic interactions, in which they share attention with another person towards an external object or event (Bakeman & Adamson, 1984; Carpenter et al., 1998; Mundy & Acra, 2006).

In their pioneer empirical work, Bakeman and Adamson (1984) described how coordinated joint engagement emerges at around 9 months of age, and expands rapidly thereafter. A key behavior, and *sine qua non* condition, in such episodes is the infant's alternation of gaze between the object and the mother, attesting his/her awareness of the active role they are both playing in that triadic interaction. Carpenter et al. (1998) further contributed to this field of study by defining three major categories of infant joint attention: *sharing*, *following*, and *directing* attention. Sharing attention corresponds to the relatively

extended periods of time during which infant and adult share attention towards an object or event. Following and directing attention, on the other hand, comprise discrete behaviors that can potentially trigger episodes of shared attention. Thus, following attention takes place when the infant redirects his/her attention to the focus indicated by the partner (e.g., by following direction of mother's pointing gesture). Conversely, directing attention entails the infant's use of communicative gestures with the aim of capturing and directing the partner's attention to a new focus (e.g., offering a toy or pointing to a distant one). In the same line of thought, Mundy et al. (2003) outlined two major categories of infant joint attention: *responding to joint attention* (RJA) and *initiating joint attention* (IJA). RJA corresponds to Carpenter and colleagues' following attention and therefore reflects the infant's ability to follow the gaze and conventional gestures (such as pointing) of the social partner. IJA, on the other hand, collapses sharing and directing attention, and indexes the infant's tendency to use gaze and conventional gestures to initiate joint attention with the partner for the purpose of social sharing.

Despite the differences, these behaviors all seem to have one common denominator: the monitoring and sharing of attention with another person towards an object. In the words of Carpenter and colleagues, they represent "the initial meeting of the minds" (1998, p. 2).

In what concerns the transition from dyadic to triadic interactions, joint attention behaviors are believed to be preceded by less sophisticated bouts of *parallel attention* (Gaffan, Martins, Healy, & Murray, 2010) emerging at about 6 months. Parallel attention takes place when infant and partner both attend to the same focus. However, a key distinction from joint attention is that the infant does not alternate gaze between object and partner, therefore either showing no recognition that both are sharing attention towards that object or, at least showing no overt signs that he/she recognizes such sharing.

Social symbolic play.

The development of symbolic play has drawn vast scientific attention because of its unique contribution to several areas of child development, namely social cognition. Two prominent theorists greatly influenced research on this particular field. On the one hand, Vygostky's (1966) pioneer account suggests that symbolic play consists of an exercise of representational thought allowing the child to separate the meanings from the actions and the objects that originated them. Leslie (1987) on the other hand, was among the first to suggest a link between pretend play and subsequent theory of mind, highlighting how both share the ability of metarepresentation. Emerging at around the second year of life, pretend play

involves the conscious and simultaneous representation of reality and its fantasy alternatives – *a banana can be a telephone* (Bornstein, Haynes, O'Reilly, & Painter, 1996). However, it is only in the course of the third year that children acquire a full-fledged ability to pretend as they are now capable of mentally generating symbolic activity in a planned manner, coordinating two or more representational structures (McCune-Nicolich, 1981). Moreover, it is also at this age that symbolic play with a partner, be it a peer or an adult, starts occurring with increasing frequency. Social symbolic play is thought to exercise two distinct levels of social cognition (Lillard, 1998). The first level – *out-of-frame* –consists of the negotiation and assignment of roles and behaviors prior to the pretend play itself. The second level – *within-frame* – regards the pretense activity per se and involves the coordination of the different symbolic perspectives. Shared symbolic experiences can therefore be considered growth opportunities in which children practice and master the ability to articulate their own symbolic perspectives with the views of others, a skill that will be very useful for subsequent social cognition (Leslie, 1987; Meins & Russell, 1997; Youngblade & Dunn, 1995). This view also brings to attention the Vygotskian notion of zone of proximal development (1978), by which interaction with more experienced and able partners could promote higher competence and sophistication in children's symbolic abilities (Dunn & Dale, 1984; Youngblade & Dunn, 1995).

Theory of mind.

At about 4 years of age the development of social cognition is marked by the emergence of theory of mind – an essential milestone that allows children to predict and explain other people's behaviors by taking into account their mental states (Astington & Barriault, 2001; Martins, Osório, & Macedo, 2008). This new understanding of the mental world endows the child with a variety of internal states with which to explain everyday interpersonal and psychological events. Up to the present, children's ability to impute false beliefs received the largest share of research attention as it is widely accepted to reflect the ability to understand mental representations of reality as subjective. In the classical assessment protocol devised by Wimmer and Perner (1983), the child is presented with a story in which a protagonist places an object in a certain location, leaves and does not witness its change to a new location. Upon return, the naïve protagonist will look for the object. By the age of 4, children begin to understand that the protagonist will search for the object where it was initially put. By imputing a false belief to the protagonist, children show they

understand that people can think and act upon expectations that do not reflect reality, the first sign of a mature theory of mind (Hala & Carpendale, 1997).

As theory of mind is out of the scope of this project, we will not refer to it in depth any further.

Joint Attention and Social Symbolic Play: Two Steps on the Pathway Towards a Mature Understanding of the Mind?

Joint attention and social symbolic play have been conceptualized as precursors of theory of mind. On the one hand, some hypothesized that the ability to understand intentions, reflected by joint attention skills, is fundamental to the later understanding of beliefs – the pivotal feature of a mature theory of mind (Colonnesi, Rieffe, Koops, & Perucchini, 2008; Tomasello et al., 2005). Indeed, empirical studies with normative and atypical samples have shown early joint attention skills to be associated with later theory of mind (e.g., Charman et al., 2000; Nelson, Adamson, & Bakeman, 2008). On the other hand, the ability to exchange symbolic perspectives (real world vs. fantasy alternatives) in the context of social pretend play has also been considered to underpin the later developing theory of mind. Once again, empirical support has been found, as children who are more frequently involved in social symbolic play tend to perform better at later theory of mind tasks (e.g., Charman et al., 2000; Youngblade & Dunn, 1995).

However, joint attention in infancy and social symbolic play in early preschool years share among them a relevant similarity that goes beyond the link to theory of mind – both entail the ability to manage the perspective of a social partner. As stated above, infant joint attention regards the ability to coordinate (follow or direct) visual attention with others to external objects or events (Tomasello, 1995), while social symbolic play involves the coordination of one's own and other's symbolic perspectives (Lillard, 1998). We can therefore hypothesize a longitudinal link between these two milestones. Children who displayed more frequent joint attention behaviors in infancy may have had more experiences in dealing with self and other's intentionality (Tomasello, 1995), thus becoming more competent at integrating other people's symbolic play suggestions.

Yet, to date very few empirical studies have confirmed this theoretical premise. In fact, research in autism provides some indirect evidence of a link between joint attention and symbolic play, with severe impairments in both abilities being key elements of a diagnosis of autism in the early years (Baron-Cohen, Allen, & Gillberg, 1992). Conversely, a small-scale

study with typically developing children conducted by Charman et al. (2000) has successfully established a longitudinal association between joint attention at 20 months and later theory of mind at 44 months, as well as concurrent associations between joint attention and solitary symbolic play. However, the possibility of a longitudinal link between joint attention and social symbolic play in typically developing three-year-olds remains untested.

What Predicts Joint Attention and Social Symbolic Play: The Unique Role of Social Experience

Apart from uncovering timings and qualitative aspects of the normative and atypical development of social cognition, as well as to comparing and contrasting them, research on child development has been increasingly concerned with its possible predictors. Because the development of an understanding of mind is essentially an interpersonal process, embedded within a social context, particular emphasis must be placed on social experience as its driving force. Carpendale and Lewis (2004) have contended that "the extent and nature of the social interaction children experience will influence the development of children's social understanding" (p. 79). Indeed, there is ample evidence of the impact of several social factors such as presence of older siblings (Ruffman, Perner, Naito, Parkin, & Clements, 1998), maternal scaffolding of infant's play (Vaughan et al., 2003), and use of mental state talk in mother-child interactions (Ruffman, Slade, & Crowe, 2002) on various milestones of social cognition. Although in this study we have also looked at relevant individual and social-demographic variables, our main focus was on the relations established by the infant/child and the decisive social partner in the first years of life – the mother. Thus, our work was centered on behaviors and speech occurring in the context of mother-child interactions as predictors of joint attention in infancy and social symbolic play at 3 years of age.

Goals of the Present Work

As mentioned earlier, social cognition can be regarded as the understanding of how our minds and behaviors affect the way we (inter)act with others. This understanding, like all other aspects of development, does not emerge at once but most likely evolves from basic to complex forms, being influenced by diverse factors in the process.

In the present PhD project, we aimed at investigating how such evolution comes about from infancy through to age 3 years. Two central questions guided our work:

1. *Is joint attention at 10 months developmentally linked to later social symbolic play abilities at 3 years of age, as both are thought to represent social-cognitive milestones?*

To our knowledge, this study is the first to empirically attempt to validate a longitudinal link between these two accepted milestones of social cognition in first three years of life.

2. *What individual, relational and contextual factors make their unique contribution to joint attention and social symbolic play?*

In our choice of potential explanatory variables we placed particular emphasis on social experiences as the impetus of social cognitive development. Therefore, the developing child's social experiences assume a particular role that must be investigated and clarified as much as possible.

This dissertation is composed of three papers:

Paper 1 was titled ***Individual, Relational and Contextual Contributions to Parallel and Joint Attention in Infancy*** (cf. Chapter 2 of this dissertation). This paper was aimed at characterizing infants' parallel and joint attention, as well as to further the knowledge on the contributions of individual, relational and contextual contributions to individual differences in infants' attention. This study had a cross-sectional design, as outcomes and potential explanatory variables were measured concurrently.

The specific research questions were:

a. Are there individual differences in 10-month-old infants' parallel and joint attention?
b. Is parallel attention associated with joint attention?
c. Are the two types of infant joint attention - following and initiating behaviors – linked?
d. What are the independent contributions of maternal joint attention behaviors, mother-infant relationship quality, and infant temperament and negative emotionality to infants' parallel and joint attention?

Paper 2 was titled ***Testing Joint Attention in Infancy and Mother-Child Mental State Talk in Shared Pretense as Predictors of Children's Social Symbolic Play Abilities at Age 3*** (cf. Chapter 3). We aimed at investigating whether there was a longitudinal link between early joint attention behaviors and later social symbolic play, as well as the potential role of

mothers' and children's mental state talk as concurrent predictors of social symbolic play. This study had a longitudinal design: joint attention behaviors were assessed in infancy (10 months) whereas social symbolic play and mental state talk were assessed at 3 years of age.

This paper's specific research questions were:

a. Do joint attention behaviors in infancy influence later social symbolic play?
b. What aspects of child-mother speech influence social symbolic play?
    i. Does maternal mental state talk have an impact on children's social symbolic play?
    ii. Does children's mental state talk have an impact on children's social symbolic play?

Paper 3 was titled ***"Let's Go to the Beach": Mental State Talk in Mother-Child Shared Pretense and its Relation to Mothers' Mind-Mindedness and Children's Social-Cognitive and Cognitive Outcomes*** (cf. Chapter 4). In this paper we began by exploring the links between mothers' mind-mindedness in a short interview and maternal mental state talk in interaction with the child. A second aim was to investigate individual differences in mothers' as well as children's mental state talk and how they covaried. In addition, we sought to explore the associations between mind-related speech and two developmental outcomes: social-cognitive and cognitive development. This study was cross-sectional.

This paper's aimed at answering the following specific research questions:

a. Are mothers' mentalistic descriptions of their 3-year-olds concurrently related to maternal use of mental state talk when interacting with their children in a shared pretend play task?
b. Are there links between use of mental state talk by mothers and their 3-year-olds in a shared pretend play task?
c. Are mothers' and children's use of mind-related terms associated to children's social symbolic play as well as cognitive development?

A fourth paper was written in the course of this PhD project. Thus, in Appendix I we have included a methodological review paper written in Portuguese titled ***Metodologias de Avaliação do Desenvolvimento da Cognição Social da Infância até à Idade Pré-Escolar.*** The goals of this paper were twofold. On the one hand, we aimed at providing a brief theoretical overview on the development of social cognition from infancy to the preschool years, focusing on three milestones of social development: joint attention, social symbolic

play, and theory of mind. As mentioned before, the latter was not studied in the scope of this PhD dissertation. On the other hand, we proposed some examples of observational assessment protocols and coding schemes. This paper was intended to assist Portuguese speaking researchers interested in the field of social cognition in the early years of life as it associates theoretical perspectives with empirical assessment suggestions.

Finally, we would like to mention a methodological consideration regarding this project. One specific feature of the three empirical studies presented here regards the fact that all relied heavily on observational data. From outcomes to potential explanatory variables, nearly all variables included in this study involved extensive coding after data collection, which, in turn, resulted in substantial effort being put into training and inter-rater reliability. Although such methodological choices were particularly time- and resource-consuming, we believed that the resulting variables would provide a more accurate and ecologically valid picture than other methodologies such as questionnaires.

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CHAPTER 2

EMPIRICAL STUDY 1

Individual, Relational, and Contextual Contributions to Parallel and Joint Attention in Infancy

Abstract

Objective: This study examined the contributions of maternal bids for joint attention, relationship quality, infant characteristics, and social-demographic features to individual differences in infants' parallel and joint attention. **Method**: Fifty-two 10-month-olds and their mothers were assessed in order to investigate concurrent predictors of infant parallel attention, following joint attention, and initiating joint attention. **Results**: Parallel attention was predicted by infants' higher mental development, low expression of negative emotionality, and maternal entertaining behaviors. Following joint attention was exclusively predicted by total maternal bids for joint attention, although marginal associations were found with maternal entertaining and maternal attention-directing behaviors (but not teaching strategies). Initiating joint attention was predicted by the infants' low expression of negative emotionality and the presence of older siblings, as well as marginally predicted by less maternal teaching behaviors. **Conclusion**: These results further the understanding of the factors influencing infant parallel as well as joint attention.

In the final quarter of the first year of life infants begin to participate in triadic interactions, in which they share attention towards an object with another person (Bakeman & Adamson, 1984). Joint attention can therefore take place when the infant follows attention towards an object or event indicated by the social partner (e.g., by following direction of mother's pointing gesture), or when it is the own infant who uses communicative gestures to capture and direct the partner's attention (e.g., offering a toy or pointing to a distant one) (Carpenter, Nagell & Tomasello, 1998; Mundy et al., 2003).

Infants' ability to coordinate attention with a social partner has been argued to be important for the development of representational abilities such as language and play (e.g., Adamson, Bakeman, & Deckner, 2004; Carpenter et al., 1998; Delgado et al., 2002; McCune, 1995; Morales, Mundy, & Rojas, 1998). Indeed, problems in engaging in joint attention have been identified as an early marker for subsequent language and social-cognitive impairment in child populations at risk of developmental disorders, namely autism (Dawson et al., 2004; Mundy & Neal, 2001; Sigman & Ruskin, 1999; Ulvund & Smith, 1996; Yoder, Warren, & McCathren, 1998).

While previous research has investigated relations between joint attention and early cognitive development (e.g., Brooks & Meltzoff, 2005; Mundy, Sigman, & Kasari, 2008; Tomasello & Farrar, 1986), few studies have addressed the social-emotional correlates and developmental outcomes of this capacity. Research considering social outcomes of joint attention (e.g., social competence, behavioral regulation, behavior problems, peer interaction) has relied on teacher or parental report during the preschool years (e.g., Sheinkopf, Mundy, Claussen, & Willoughby, 2004; Van Hecke et al., 2007), with little attention paid to how children's earlier or concurrent social-emotional development relates to their joint attention abilities. This neglect is striking for a number of reasons. First, the act of engaging in object-based attention with others is fundamentally an interpersonal process, embedded within a social context (Striano & Reid, 2006). Second, there are clear theoretical arguments for a link between the establishment of the child's first social relationships and object-centered social exchanges. For example, Trevarthen and Hubley (1978) argued that the ability to engage in triadic joint attention (where caregiver and infant both direct their attention to an object) is the "developmental heir" of earlier dyadic social exchanges (where caregiver directs attention to infant while infant directs attention to caregiver). Finally, dyadic social attention is thought to promote the emergence of triadic joint attention as it offers a social context within which the caregiver can scaffold infant attention (Bakeman & Adamson, 1984).

In an early small-scale study, Bakeman and Adamson (1984) found some support for such a longitudinal relation, describing how infants' dyadic attention with a social partner (face-to-face) declines between the ages of 6 and 18 months whereas their coordinated joint engagement (where infant coordinates attention both to a social partner and an object) increases over the same time period. Subsequent research on joint attention has paid little attention to how dyadic social engagement related to more sophisticated forms of object-based joint attention. For example, one of the most well established and widely used assessments of joint attention, the Early Social Communication Scales (ESCS: Mundy et al., 2003; Seibert, Hogan, & Mundy, 1982), assesses only object-focused joint attention, distinguishing between infants' tendency to respond to an experimenter's bid for joint attention, and infants' own initiations of joint attention either for the purpose of social sharing or to help them achieve a goal such a reaching a toy.

One exception to the exclusive focus on object-based joint attention is a recent study by Gaffan, Martins, Healy, and Murray (2010) who coined the term *parallel attention* to describe interactions where both infant's and caregiver's attention is focused on the same object, but the infant displays no explicit recognition that he/she is sharing attention with a social partner. Gaffan et al. (2010) reported that time spent in parallel attention with the mother at 6 months was positively related to shared attention with an experimenter at 9 months, which goes in line with Bakeman and Adamson's suggestion (1984). The first aim of the present study was then to describe parallel attention, following joint attention, and initiating joint attention in a normative sample of 10 month-olds in interaction with their mothers. To date, very few studies have included measures of parallel attention, an index of infant attention thought to be involved in, or even a precursor of joint attention (Bakeman & Adamson, 1984; Gaffan et al., 2010). Therefore, our second aim was to assess whether parallel attention was significantly associated with joint attention - following and initiating.

Different models of joint attention have been put forward, with two major theories leading current efforts in research – a model emphasizing the social-cognitive nature of joint attention (Tomasello, 1995; Tomasello, Carpenter, Call, Behne, & Moll, 2005) and the multiple process model (Mundy, Card, & Fox, 2000). The former proposes that understanding of intentions by infants underpins their ability to share attention with other people. Therefore, measures of different joint attention behaviors (following and initiating) are expected to be intercorrelated, as well as to correlate with similar sets of variables (Tomasello, 1995). This model has received support from various studies that evidenced social cognition as a common source of variance for distinct joint attention skills (Brooks & Meltzoff, 2005; Carpenter et

al., 1998). In contrast, the multiple process model advocates that manifold executive and social motivation processes influence joint attention abilities and later social-cognitive development (Mundy et al., 2007). According to this model, no intercorrelations are expected across the different measures of joint attention, and each should be associated with a specific set of explanatory variables. This model has also received empirical support (Mundy et al., 2007; Vaughan et al., 2003), including research describing different patterns of brain activity associated with different dimensions of joint attention (Caplan et al., 1993; Henderson, Yoder, Yale, & McDuffie, 2002). A third aim of this study was therefore to analyze whether following and initiating joint attention were intercorrelated, given that researchers disagree on this specific aspect (Mundy et al., 2000; Tomasello, 1995).

Empirical research has also focused on identifying correlates and predictors of infant attention skills. Two major lines of evidence provided support for the role of early mother–infant experiences in explaining individual differences in infant attention. One line of evidence comes from studies devoted to the impact of specific maternal behaviors intended to draw infant's attention. For instance, Vaughan et al. (2003) reported that appropriate caregiver scaffolding in toy-play at 9 months was significantly associated with infant joint attention with the experimenter at 12 months. More specifically, Gaffan et al. (2010) found maternal teaching behaviors such as pointing or demonstrating at 6 months to predict shared attention with the mother at 9 months, and less maternal entertaining behaviors such as animating a toy or teasing with contact at 9 months to significantly predict infants' concurrent initiating joint attention behaviors. We sought to expand these recent findings of Gaffan et al. (2010) by also including a measure of following joint attention, therefore analyzing the possible roles of specific maternal behaviors as predictors of infant parallel attention, as well as following and initiating joint attention.

A second line of evidence suggests a link between infant joint attention and more general maternal interactive styles. Maternal sensitivity (Hobson, Patrick, Crandell, Perez, & Lee, 2004) and responsiveness (Landry, Smith, & Swank, 2006) were found to be linked to infants' increased triadic communication. Thus, evidence from both perspectives converges to suggest that mothers who are better able to adapt their behavior to their infants' attentional rhythms may promote infant parallel and joint attention by providing the necessary structure to the infants' developing attention skills. In order to explore the relation between maternal interactive behavior, infant characteristics, and infant joint attention in more detail, the study reported here included a measure of emotional availability, and focused on the period in the first year of life when infants' joint attention abilities begin to emerge. Emotional availability

(Easterbrooks & Biringen, 2005) regards the ability to express a range of positive and negative emotions as well as to attune and respond to the partner's emotionality. We chose emotional availability as an index of quality of interaction as it indexes both infant and mother behaviors. We hypothesized that better relationship quality, reflected by more emotional availability, would relate to higher levels of parallel and joint attention.

However, quite often previous studies did not take into account the influence of the infants' own behaviors which are known to relate to joint attention abilities. For example, Vaughan et al. (2003) reported relations between infant temperamental traits and joint attention. Parental report of smiling and laughter was positively related to 9-month-olds' concurrent initiating joint attention behaviors with an experimenter, and distress was positively related to concurrent initiating behaviors with the caregiver. Infant's tendency to share positive affect with the mother was also associated with infant engagement in joint attention at 12 and 18 months (Adamson & Bakeman, 1985). Additionally, Striano and Rochat (1999) uncovered associations between infants' social initiatives in a dyadic context and joint attention behaviors with an experimenter in a sample of 7- and 10-months-olds. These studies lend empirical support to the notion that individual temperamental characteristics could play a crucial role in infants' involvement in episodes of intersubjectivity (Trevarthen & Aitken, 2001). In the present study we investigated the independent contributions of temperament to infant parallel attention, following and initiating joint attention.

Above and beyond temperament differences, the adaptive value of the infants' emergent ability to regulate negative emotionality may play an important role in their nascent joint attention skills. More specifically, links between infant attention and negative emotion regulation have been uncovered, underscoring how attentional mechanisms can contribute to the regulation of distress. The cross-sectional study by Raver (1996) was among the first to uncover such a link, as toddlers' time spent in joint attention with their mothers was found to relate to their ability for emotion self-regulation. In a recent longitudinal study, infant gaze-following at 6 months was found to predict more self-directed and less comfort seeking emotion regulation strategies at 24 months (Morales, Mundy, Crowson, Neal, & Delgado, 2005). However, it is also conceivable that infants' negative emotionality interferes with their ability to explore the environment (Kopp, 1989), therefore hindering the occurrence of parallel and joint attention. High expression of negative emotionality may be considered a result of less optimal emotion regulation strategies (Raver, 1996), which may in turn have diminished the infant's preceding opportunities to engage in parallel and joint attention.

Indeed, some have suggested that emotional mechanisms are involved in the ability to detect direction of gaze and occurrence of eye contact (Adolphs, 2001; Baron-Cohen et al., 2000; Kawashima et al., 1999). Thus, it may be the case that negative emotionality is a cause rather than an effect of diminished joint attention.

In summary, several hypotheses were examined in this study. Firstly, we expected significant associations to emerge between parallel attention and both indices of joint attention, following and initiating. In contrast, and due to diverging empirical data (e.g., Mundy et al., 2000; Tomasello, 1995) we did not make any specific hypotheses concerning existence and/or direction of links between following and initiating behaviors. Moreover, we expected maternal entertaining, teaching, and attention-directing behaviors to play distinct roles in the prediction of parallel and joint attention abilities. We also hypothesized that better relationship quality, reflected by more emotional availability, would relate to higher levels of parallel and joint attention. In what concerns infant variables, we expected difficult temperament to predict lower parallel and joint attention skills. Finally, with respect to the relation between infant negative emotionality and joint attention behaviors, if negative emotionality plays a causal role in children's joint attention abilities, early in development one would expect high expression of negative emotionality to relate to lower levels of parallel and joint attention. However, if the opposite direction of cause and effect obtains, infant negative emotionality and attention behaviors might be unrelated.

Method

Participants

Participants were 52 mother–infant dyads (31 boys, 59.6%) recruited from child-care centers from a large city in the north of Portugal who were participating in a study on child development. Infants were aged 9 to 11 months (M = 10.38, SD = 0.36). Twenty-six (50%) were singletons and the remainder had one or two older siblings. All infants had 5 min APGAR scores $\geq$ 8, none was diagnosed with a developmental disability, and the mean gestation period was 38.1 weeks (SD = 1.68). Mothers were aged 24 to 45 years (M = 33.45, SD = 4.76), married or cohabiting. Concerning maternal education, the majority (65.4%; n = 34) had higher education qualifications, while the remaining 34.6% (n = 18) had completed between 5 and 12 years of formal education. All participants were White and had Portuguese as their first language.

Procedure

The 52 dyads were visited in their homes when infants were aged around 10 months. During this visit, mother–infant interactions were video recorded and mothers completed a questionnaire regarding infant's temperament. About two weeks after the home visit, a visit to the infant's childcare centre was scheduled and their developmental level was assessed.

The home-based observations had an approximate duration of 40 minutes. In the first 20 minutes, mothers were asked to behave as naturally as possible so that she and the baby became comfortable with the presence of the researcher. Mothers were then asked to play with their infants as they normally would with the baby's favorite toys, allowing for a 10-minute toy-play session to be recorded. Following this period of play, mothers were requested to teach their infants how to play with a shape sorter. This task lasted 10 minutes and the toy was considered to be above the infant's current developmental level.

Parallel and Joint Attention Behaviors.

The 10-minute toy-play interaction was coded using an adaptation of the joint attention scheme designed by Martins (2003). We opted to code the unstructured toy play session as it provided a more naturalistic context for joint attention behaviors to occur. This coding scheme was especially developed for the microanalytic assessment of joint attention in mother–infant play sessions. The original coding scheme included both event- and duration-behavioral codes. However, because the videos were not originally made to assess joint attention, we were unable to reliably code the duration of the episodes as those rely on the microanalytic observation of the direction of infant's and mother's gaze. Therefore, only the frequency of joint attention behaviors was coded. The occurrence of efforts to draw the partner's attention to a target (usually a toy) and the infant's responses to maternal bids for joint attention were the focus of the coding and included the following behaviors:

a) **Mother's bids for joint attention.**

The frequency of seven behaviors was coded: *engaging with contact* (playfully touching the infant with the toy); *animating a toy* (expressive performances to entertain the infant - e.g., rattling or moving the toy); *showing a toy* to the infant; *offering* the toy, *pointing* (index finger extended towards a target); *demonstrating an action* (modeling specific actions for the infant to perform); and *verbal directives* (verbally encouraging the infant to direct the attention towards a target using directives, prompt questions/suggestions or even questions about the location of the toy). These behaviors were thought to reflect three main functions:

Mother entertains, which comprised engaging with contact and animating behaviors; *Mother teaches*, which involved pointing and demonstrating; and *Mother directs attention*, which incorporated showing and offering a toy, as well as verbal directives. We also computed a total score which incorporated the total number of maternal bids for joint attention.

b) **Infant's response to maternal bids for joint attention.**

Immediately after the occurrence of any of the maternal behaviors presented above, the infant's response received one of three possible codings: *Achieves parallel attention* (in accordance to Gaffan and colleagues, by following the mother's action on the toy, but never alternating gaze between mother and toy); *Follows joint attention* (by following the mother's line of gaze and action on the toy, and alternating gaze between mother and toy); *Ignores* (if the infant did not show any signs of being involved with the toy, attested by the fact that he/she did not look at the mother's action). Parallel attention and following joint attention were subsequently scored as the proportion of instances of involvement in parallel attention and in joint attention (respectively), divided by the total number of maternal bids.

c) **Infant initiating joint attention.**

Initiating joint attention was defined as one of three behaviors. With the exception of non-communicative pointing, all required the infant to look at the mother while performing the following actions: *animating a toy* (moving the toy with the purpose of getting the mother's attention); *offering a toy* (holding out a toy to the mother); *pointing* (extending the index finger in a conventional manner). Pointing could be of communicative nature (if the infant looked at the mother's face at some point before, during or after the gesture) or non-communicative nature (if the infant did not look at the mother's face at any time). Infants received a frequency score for each type of behavior. However, due to the low frequency of initiating behaviors and in common with other research groups (e.g., Gaffan et al., 2010; Vaughan et al., 2003) we decided to collapse them into a single overall score.

All the videotapes were independently coded by two trained judges. Mean Cohen's kappa was .74 across all categories (Maternal bids for joint attention = .71; Parallel attention = .73; Following joint attention = .79; Initiating joint attention = .73).

Emotional availability.

The first 30 minutes of filming (20 minutes of free interaction and the following 10 minutes of toy-play interaction) were coded using the *Emotional Availability Scales – 3rd edition* (Biringen, Robinson, & Emde, 1998). This coding system allows for the assessment of

emotional availability based on both maternal and infant behaviors. The maternal scales are: *Sensitivity* (9-point scale indicating maternal characteristics of warmth and emotional connectedness as well as appropriate and contingent responsiveness to infant's signals); *Structuring* (5-point scale reflecting the mother's ability to appropriately scaffold the infant's play, taking into consideration his/her abilities); *Non-intrusiveness* (5-point scale that describes the mother's ability to be available for the infant, without being intrusive or controlling); *Non-hostility* (5-point scale reflecting the absence of any implicit or explicit signs of hostility or impatience towards the infant). The infant scales are comprised of: *Child Responsiveness* (7-point scale indicating the infant's willingness and pleasure in responding to the mother's bids); and *Child Involvement* (7-point scale reflecting the infant's ability to invite the mother into play, while maintaining a good balance between autonomous exploration and involvement of the mother). The summing of the scales for both infant and mother behaviors yielded a total emotional availability score.

All interactions were scored independently by four trained judges. For reliability purposes, 48% of the videotapes were randomly selected and distributed to pairs of raters for double coding. Intraclass correlation coefficients (ICC, one-way random) were calculated for each of the mother and infant dimensions and revealed adequate interrater reliability (Sensitivity, r_i = .88, Structuring, r_i = .92; Non-intrusiveness, r_i = .77, Non-hostility, r_i = .86; Responsiveness, r_i = .85, Involvement, r_i = .80).

Infant's expression of negative emotionality.

In the final 10-minute session the dyads were presented with a shape sorter and mothers were asked to teach their infants to place the shapes in the correct holes (*Shape Sorter Task*, Martins, 2007). Because this task was long and developmentally challenging, negative emotionality was expected to emerge. Infants' behaviors (e.g., back arching) and vocalizations (e.g., fussing, crying) indexed their level of distress. Infants were classified into one of nine categories of negative emotionality (from 9 – No expression of negative emotionality, to 1 – Very frequent expression of negative emotionality). Infants coded from 1 to 5 were later assigned the score of 0 – high expression of negative emotionality; whereas infants coded from 6 to 9 were assigned the score of 1 – low expression of negative emotionality.

All interactions were independently scored by four trained judges. For reliability purposes, 67% of the videotapes were randomly selected and distributed to pairs of raters for double coding. Cohen's kappa was .77 across the sampled interactions.

Infant temperament.

During the home visit, mothers completed the Portuguese version of the *Infant Characteristics Questionnaire* (*ICQ*; Bates, Freeland & Lounsbury, 1979; Portuguese version, Pires, 1994, 1997; Martins, Martins, & Soares, 2006), which assesses maternal perceptions of the infant's difficult temperament. This questionnaire is comprised of 24 items rated on a 7-point *Likert* scale (from very easy – 1 to very difficult – 7) indicating the level of difficulty experienced regarding each of the behaviors. The Portuguese Version organizes the items into three subscales: *Fussy-difficult* (α = .84), *Dull* (α = .67), and *Unpredictable* (α = .60). Internal consistency of the instrument was α = .75. The total score expresses maternal perceptions of infant's difficult temperament.

Infant development.

The infants' mental and motor development was assessed approximately two weeks after the home visit using the *Bayley Scales of Infant Development* (BSID-II; Bayley, 1993). The BSID-II was administered in the child-care context by trained researchers, yielding mental (MDI) and psychomotor (PDI) development indices. The BSID-II has been shown to have good reliability (.83 for the mental scales and .77 for the motor scales).

Results

The descriptive statistics for maternal and infant attention related behaviors are presented in Table 1A.

In what concerns the three dimensions of maternal bids for joint attention (Mother entertains, Mother directs attention, and Mother teaches), these resulted from summing the frequencies of the raw behaviors that comprised them. No proportions were calculated because the interactions lasted 10 minutes for all of the dyads in the sample. Fifty-one (98.1%) mothers showed at least one behavior pertaining to the dimensions Mother entertains and Mother directs attention. Thirty-seven (71.2%) mothers showed at least one behavior of the Mother teaches category.

Regarding infant attention variables, one (1.9%) showed no instances of parallel attention, thirteen (25%) infants showed no following behaviors, and 15 infants (28.8%) displayed no initiating behaviors. Seven infants from the sample (13.5%) showed no following or initiating joint attention behaviors.

Table 1A

Mother and Infant Attention Measures

	Min-Max	Mean	(SD)	Median
Maternal bids for joint attention				
Mother entertains	0-172	47.98	32.74	46.00
Mother teaches	0-38	6.40	8.28	4.00
Mother directs attention	0-74	27.35	16.97	25.00
Infant response to maternal bids for joint attention				
Parallel attention (proportion)	0-.96	.68	.19	.72
Following joint attention (proportion)	0-.21	.05	.05	.05
Infant initiating joint attention	0-14	2.65	2.97	2.00

Preliminary examination showed that only parallel attention presented a normal distribution and could therefore be used as a continuous variable in the analyses. Infants' following and initiating joint attention were positively skewed, thus violating the assumption of normality. Therefore, both were transformed into dichotomous variables. Nevertheless, infants could still be distinguished in two groups: one group of babies displaying no initiating behaviors (scored 0), and another group of babies displaying at least one form of initiating joint attention (scored 1). The same principle was applied to following joint attention. Each infant was classified into one of two categories: 0 if s/he showed no attention following behaviors; 1 if the infant showed one or more such behaviors.

Relations Between Parallel Attention, Following Joint Attention and Initiating Joint Attention

Parallel attention was marginally correlated with infant following, $r_{pb} = .26$, $p = .064$, and unrelated to infant initiating joint attention, $r_{pb} = .15$, $p = .277$. Following and initiating joint attention were significantly associated either using the interval, $r_{sp} = .37$, $p = .007$, or the dichotomous measures, $\chi^2(1) = 5.28$, $p = .022$.

Relations Between Attention Indices and Control Variables

We performed association tests between parallel attention, following joint attention and initiating joint attention behaviors and the subsequent control variables: infant sex, presence of older siblings, Bayley MDI and PDI, and maternal education. Parallel attention

was associated with infants' Bayley MDI, r = .28, p =.046. Infant initiating behaviors were associated with having older siblings, χ^2 (1) = 4.59, p = .032, and marginally associated with being a girl, χ^2 (1) = 3.64, p = .056. No other significant associations emerged.

Relations Between Attention Indices and Potential Explanatory Variables

Table 2A presents the correlations involving the dependent variables (parallel attention, following, and initiating joint attention) and the potential explanatory variables.

Parallel attention was significantly correlated with infants' negative emotionality, r_{pb} = .28, p = .049, low expression of negative emotionality was associated with higher parallel attention scores. In addition, this attention index was positively correlated with maternal entertaining strategies, r = .34, p = .015, as well as total maternal bids for joint attention, r = .30, p = .033, higher frequency of maternal entertaining behaviors as well as total maternal bids were associated with higher parallel attention. Emotional availability also emerged as a significant correlate, r = .30, p = .031, higher mother–infant emotional availability was associated with higher parallel attention. In turn, following joint attention was solely associated with total maternal bids for joint attention, r_{pb} = .30, p = .029, as higher frequency of maternal behaviors intended to draw the infant's attention was related to the occurrence of infant following. The presence of infant following behaviors was also marginally associated with two types of maternal bids for joint attention – Mother entertains, r_{pb} = .25, p = .077, and Mother directs attention, r_{pb} = .24, p = .091, but not Mother teaches, r_{pb} = .01, p = .962.

Initiating joint attention was negatively correlated with Mother teaches category, r_{pb} = -.36, p = .008, as higher frequency of maternal teaching behaviors was associated with the absence of infant initiating joint attention. This attention index was also significantly associated with infant expression of negative emotionality, χ^2 (1) = 6.16, p = .013. In the group showing no initiating behaviors, 53.3% displayed high negative emotionality *versus* 18.9% of infants in the group that had initiated joint attention at least once in the interaction. In addition, initiating joint attention revealed a marginally significant association with infants' sex, χ^2 (1) = 3.64, p=.056. In the group of infants showing no such behaviors, 80% were boys, whereas in the in the group displaying initiating behaviors, that percentage rose to 51.4% of boys.

Table 2A

Simple Correlations Between Infants' Attention Indices and Potential Explanatory Variables

	Parallel attention	Joint attention	
		Following	Initiating
Infant variables			
Difficult temperament	[c]-.14	[b]-.24	[b]-.16
Negative emotionality (high/low)	[b].28*	[a]2.53	[a]6.16*
Maternal bids for joint attention			
Mother entertains	[c].34*	[b].25^{+}	[b]-.18
Mother teaches	[c]-.03	[b].01	[b]-.36**
Mother directs attention	[c].07	[b].24^{+}	[b].003
Total maternal bids for joint attention	[c].30*	[b].30*	[b]-.22
Relationship quality			
Emotional availability	[c].30*	[b].14	[b]-.11

Note. [a] χ^2; [b] r_{pb}; [c] r

$^{+}p < .10$; * $p < .05$; ** $p < .01$

Next, we performed hierarchical regression analyses in order to examine which variables were unique predictors of each of the attention indices. For the sake of parsimony and statistical power, only the associations that reached significance were included in further analyses, which meant that the marginal associations reported above were omitted from subsequent regressions.

Regression Analyses

Hierarchical regression models were performed based on theoretical principles as well as on the significant associations previously described. Variables entered at step 1 concerned the relevant control variables. At step 2 variables regarding infant characteristics were entered, followed by maternal behaviors as well as mother-infant relationship quality at step 3.

Parallel attention.

Five variables had significant correlations with the DV – infants' mental development index, infants' expression of negative emotionality, mother-child emotional availability, maternal entertaining strategies, and total maternal bids for joint attention. However, the variable concerning total maternal bids was not incorporated in the regression models in order

to prevent singularity. We opted to include only the specific maternal strategy (Mother entertains) rather than the more global score. Therefore, at step 1 we entered the scores for infants' MDI, followed at step 2 by infants' negative emotionality, and at step 3 by emotional availability and Mother entertains (Table 3A).

Table 3A

Regression Model for Infant Parallel Attention

Steps and variables	R^2	(Adjusted R^2)	β	*F* change
Step 1 (df 1,50)	.08	(.06)		4.21*
Bayley MDI			.28*	
Step 2 (df 2,50)	.18	(.15)		6.07*
Bayley MDI			.27*	
Negative emotionality			.32*	
Step 3 (df 4,50)	.33	(.27)		4.89*
Bayley MDI			.30*	
Negative emotionality			.26*	
EAS			.17	
Mother entertains			.30*	

* $p < .05$

The regression model was significant at Step 1, F (1,50) = 4.21, p =.046, explaining 8% of variance. Infant's mental developmental index was a significant predictor of parallel attention – higher infant MDI was associated with higher occurrence of parallel attention (β = .28, t = 2.05, p =.046). Furthermore, the regression model was significant at Step 2 (F (2,50) = 5.36, p=.008) and explained 18% of variance. Infants' negative emotionality was a significant predictor of parallel attention – low expression of negative emotions was associated with higher occurrence of parallel attention, β = .32, t = 2.46, p = .017, above and beyond infants' mental development. Finally, the model was significant at Step 3, F (4,50) = 5.56, p = .001, and explained 33% of variance. Maternal entertaining behaviors made a significant and unique contribution to the prediction of parallel attention - mothers who tried to engage the infant's attention by animating a toy and playfully touching the baby with it had infants who engaged in more parallel attention, β = .30, t = 2.36, p =.022. In contrast, emotional availability was not a significant predictor of parallel attention, β = .17, t = 1.38, p = .175.

Following joint attention.

Only one variable correlated significantly with infant following joint attention – total maternal bids for joint attention. In order to further understand its predictive value regarding infant's following skills, a binary logistic regression was performed. As anticipated, the regression model was significant, χ^2 (1) = 5.19, p = .023 (Nagelkerke R square = .14; percentage of correctly predicted cases = 76.9%). Higher frequency of maternal bids for joint attention was associated with higher probability of infants successfully following those bids, *B* =.02, Wald = 4.31, *p* = .038.

Initiating joint attention.

Three variables had significant correlations with the DV – presence of older siblings, infant expression of negative emotionality, and the category Mother teaches. The following analytical strategy was used: Step 1 – presence of older siblings; Step 2 – infant expression of negative emotionality; and Step 3 - Mother teaches (Table 4A).

Table 4A

Binary Logistic Regression Model for Infant Initiating Joint Attention

			95% CI for Odds Ratio		
Steps and variables	χ^2	B(SE)	Lower	Odds ratio	Upper
Step 1 (df 1)	4.73*				
Older siblings		1.40*(.67)	1.08	4.03	15.09
Step 2 (df 2)	8.80**				
Older siblings		2.10*(.87)	1.48	8.14	44.67
Negative emotionality		2.28**(.86)	1.81	9.81	53.26
Step 3 (df 3)	4.51*				
Older siblings		2.11*(.90)	1.43	8.26	47.90
Negative emotionality		2.12*(.90)	1.43	8.33	48.54
Mother teaches		-.09$^+$(.05)	.84	.92	1.002

$^+$ $p < .10$; * $p < .05$; ** $p < .01$

The regression model was significant at Step 1, χ^2 (1) = 4.73, *p* = .030 (Nagelkerke R square =.12; percentage of correctly predicted cases = 71.2%). Having older siblings was associated with higher probability of infant initiating joint attention, *B* = 1.40, Wald = 4.29, *p* = .038. Furthermore, the regression model was significant at Step 2, χ^2 (2) = 8.80, *p* = .003

(Nagelkerke R square =.33; percentage of correctly predicted cases = 82.7%). Low negative emotionality was associated with higher probability of infants displaying attention directing behaviors, $B = 2.28$, Wald = 7.00, $p = .008$). Finally, the regression model was also significant at Step 3, $\chi^2 (3) = 4.51$, $p = .034$ (Nagelkerke R square =.42; percentage of correctly predicted cases = 84.6%). Mother teaches was a marginally significant predictor - fewer maternal teaching strategies were associated with higher probability of infant initiating joint attention, $B = -.09$, Wald = 3.66, $p = .056$.

Discussion

Previous studies have focused on the patterns of emergence and correlates of joint attention. However, very few included measures of parallel attention, an index of infant attention thought to precede joint attention (Bakeman & Adamson, 1984; Gaffan et al., 2010). Our results show a positive marginal association between parallel attention and following joint attention. This result is partially consistent with Bakeman and Adamson's (1984) suggestion of parallel attention as an implicit social context that scaffolds the emergence of more sophisticated infant joint attention. We believe this may be the case because parallel attention and following joint attention (but not initiating) both imply that the infant attends to or follows the focus of attention presented by the social partner. Conversely, parallel attention did not correlate with infant initiating behaviors, suggesting that the former might be involved in the development of the response dimension of joint attention, but not in initiating behaviors. Furthermore, following and initiating joint attention were found to be intercorrelated either using continuous or dichotomous variables. This last result is particularly relevant for the discussion that has been going on in the literature on whether different measures of joint attention reflect common (e.g., Tomasello, 1995) *versus* multiple sources of variance (e.g., Mundy et al., 2000). The positive association between following and initiating joint attention in our study goes in line with the notion that both indices of joint attention can be considered, at least partially, expressions of a common ability to understand intentionality in others (Tomasello, 1995). Still, following and initiating joint attention cannot be seen as redundant, as in our study each displayed a specific set of predictors.

With respect to predictors of the attention indices studied, we found a consistent association of every attention index to categories of maternal bids for joint attention. Furthermore, different maternal behaviors played specific roles in each index. This confirms and expands previous research (e.g. Gaffan et al., 2010; Vaughan et al., 2003), further

clarifying the impact of particular maternal behaviors on individual differences observed in infant parallel and joint attention.

Parallel attention was significantly predicted by maternal entertaining behaviors, meaning that mothers' playful interactions were the most successful in eliciting infants' engagement with the toys. In what concerns infants' following of maternal bids for joint attention, total maternal bids was the only significant predictor. Nevertheless, a specific tendency appeared to emerge. Although marginally, infants' following correlated with two specific categories of maternal behaviors: mother entertains and mother directs attention (but not mother teaches). Thus, mothers who attempted to attract the infants' attention by animating a toy or playfully touching the infant with it, and that showed, offered and verbally encouraged the infant to attend to the toy were more likely to have infants who would follow their bids for joint attention. However, the fact that infants' following did not significantly correlate with any other infant, mother–infant relationship or social-demographic variables, coupled with the modest indicators of the regression model, suggest that much variance remains unexplained. It is conceivable that antecedent, rather than concurrent predictors might have had a stronger impact on this aspect of infant joint attention. Results by Gaffan et al. (2010) support such claim, as they found 9-month shared attention with the mother to be predicted by 6-month, but not 9-month measures. In opposition, initiating joint attention was predicted by less maternal teaching behaviors, but did not correlate with any other of the maternal categories. This result could suggest that different processes operate in this attention index, in contrast with parallel attention and following joint attention. In fact, directing other people's attention is thought to possess a more volitional nature, reflecting the infant's own motivation for intersubjectivity (Mundy & Newell, 2007). In addition, Trevarthen (1979) underscores the infants' high sensitivity to social contingencies, becoming less active when the mother takes the lead in the interaction, and being more active if the mother intervenes less. We can conjecture that more teaching mothers suggest attentional shifts more often, therefore interfering with the infants' initiatives.

In contrast with our initial hypothesis, emotional availability did not make a unique and significant contribution to parallel or joint attention. These results are surprising as we expected mother–infant relationship quality to have an impact on infant's ability and willingness to share attention and emotions. Nevertheless, it is noteworthy that we found an association between emotional availability and parallel attention, but not any of the indices of joint attention. This could mean that such social experiences might only have an impact when the necessary individual capacities are sufficiently developed.

Another key finding of this study resides in the fact that infant expression of negative emotionality played an important role as a significant predictor of parallel attention as well as initiating joint attention, exceeding any possible influences of infant temperament. Previous studies had already found associations between infants and toddlers' ability to engage in joint attention and subsequent emotion regulation strategies (Morales et al., 2005; Raver, 1996). Our study therefore expands these results by showing an association between concurrent expression of negative emotionality and parallel and joint attention. Although we cannot make strong claims regarding direction of causality, our results do seem to support the notion that negative emotionality may influence children's attention abilities. In fact, relevant neurophysiological findings have shown emotional mechanisms to be involved in joint attention related skills such as gaze monitoring (Kawashima et al., 1999). From this perspective, high negative emotionality may disturb behavioral organization, thus hindering the infants' ability to mobilize his/her joint attention skills. Because later developing initiating behaviors are thought to pose more attentional demands on the infant than early developing following joint attention (Mundy & Newell, 2007), it is conceivable that the expression of negative emotionality had a particularly significant impact in the infant's nascent abilities to intentionally direct other's direction of gaze towards a new focus. In contrast, we believe that the influence of negative emotionality may have operated differently for parallel attention. On the one hand, this is a relatively mature skill which is believed to emerge around three months earlier than joint attention. In addition, due to the demands of the task, compliance may be a dimension underlying parallel attention. Indeed, research has found links between infant compliance to mother, and infants' mental development (Lieberman, Padan-Belkin, & Harel, 1995) and expression of negative emotionality (Stifter, Spinrad, & Braungart-Rieker, 1999). Nevertheless, parallel attention is a relatively unexplored index of infant attention, so more studies are needed in order to further clarify its nature and core mechanisms.

Contrary to previous research (Van Hecke et al., 2007; Vaughan et al., 2003) temperament did not significantly correlate with any of the infant attention measures. Nevertheless, there was a general tendency for negative associations across every index of infant parallel as well as joint attention, suggesting a link between less difficult temperament and better infant attention outcomes.

Curiously, our results showed that the presence of older siblings might have made a significant contribution to infants' initiating joint attention. The putative role of older siblings on social cognition is not unequivocal, as research supporting such an influence (Ruffman, Perner, Naito, Parkin, & Clements, 1998) coexist with studies showing that family size (rather

than number of older siblings per se) plays a role on another milestone of social cognition – theory of mind (Lewis, Freeman, Kyriakidou, Maridaki-Kassotaki, & Berridge, 1996). However, to our knowledge, no studies have reported an association between presence of older siblings and infant joint attention. Similarly to what has been proposed for theory of mind, it is conceivable that older siblings provide infants with opportunities to learn and practice joint attention behaviors within their zone of proximal development (Vygotsky, 1978). It may equally be the case that observing older siblings sharing attention and experiences, and consequently receiving social reinforcement for it, further encourages infants to share their own attention with others. Indeed, a study by Corkum and Moore (1998) revealed an important role of social reinforcement to the acquisition of infant joint attention skills. Nevertheless, because we did not collect relevant information regarding family size (i.e., how many people shared the household with the infant), we cannot be sure that our results reflect sibling influence or the impact of belonging to a larger family.

Our study offers a comprehensive approach to the understanding of the factors accounting for differences in infant parallel and joint attention at 10 months. We did so by including measures of maternal behavior, as well as relationship quality, infant characteristics, and social-demographic features. We were able to discern the impact of different categories of maternal bids for joint attention - entertaining, teaching and attention-directing behaviors - to parallel attention, as well as following and initiating joint attention. In addition, results highlight infants' expression of negative emotionality and the presence of older siblings as important predictors of these attention indices in the first year of life.

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CHAPTER 3

EMPIRICAL STUDY 2

Testing Joint Attention in Infancy and Mother-Child Mental State Talk in Shared Pretense as Predictors of Children's Social Symbolic Play Abilities at Age 3 Years.

Abstract

Objective: The aim of this study was to investigate the roles of joint attention in infancy and mother-child mental state talk in a shared pretense interaction in the early preschool years as predictors of children's social symbolic play at age 3. **Method:** Forty-nine children were assessed at 10 months for infant joint attention in interaction with their mothers and again at 3 years for their social symbolic play with an experimenter, as well as mothers' and children's mental state talk in a shared pretense task. **Results:** Social symbolic play was significantly predicted by children's verbal abilities. In addition, their use of desire references in the shared pretense interaction with the mother also uniquely predicted variation in the social cognitive measure of symbolic play, even after the influences of children's verbal ability and mothers' own use of mental state talk had been accounted for. Infant joint attention (following or initiating) as well as maternal mental state talk did not significantly predict social symbolic play. **Conclusion:** These results highlight for the first time a link between children's mental state talk and their performance on social symbolic play at age 3 years – a social cognitive ability thought to precede theory of mind.

The ability to engage in pretense is a major developmental acquisition in the second and third years of life and it is conceived as an important step towards a mature understanding of the mind (Bretherton & Beeghly, 1982; Leslie, 1987; Rakoczy, 2008). Because children's symbolic play involves the conscious and simultaneous representation of reality and its fantasy alternatives (Lillard, 1993) – for instance, a blue napkin can also be a swimming pool or a blanket – it exercises double representation (real world *and* fantasy) thus promoting children's ability for metarepresentation - an important foundation for later theory of mind (Leslie, 1987; Lillard, 2001; Rakokzy, 2008).

Furthermore, *social symbolic play* – that shared with a partner – is considered more sophisticated than solitary symbolic play (Dunn & Dale, 1984; Youngblade & Dunn, 1995), as it involves two distinct levels of social cognition (Bretherton, 1989; Lillard, 1998). The first level occurs even before the symbolic activity takes place and consists in the negotiation and assignment of roles and behaviors between play partners, highlighting contrasting desires and wills. The second level takes place in the pretend play per se and allows children to consider different symbolic perspectives at once. In this social context, symbolic experiences are growth opportunities for children to become increasingly capable of articulating their own perspectives with the views of others, co-constructing a representational context (Leslie, 1987; Meins & Russell, 1997; Youngblade & Dunn, 1995). Empirical studies supported such claims, by showing that children who get more frequently involved in social symbolic play (with peers and adults) perform better on theory of mind tasks. For instance, a cross-sectional study found preschooler's involvement in pretend play with the parent to be correlated with their performance on a battery of false belief tasks (Nielsen & Dissanayake, 2000), while another found longitudinal associations between pretend play with siblings at 33 months and later theory of mind at 40 months (Youngblade & Dunn, 1995).

Conversely, little attention has been addressed to how children come to acquire the ability to engage in pretense. As it is often the case in development, pretense most likely grows out of earlier social-cognitive skills. Interestingly, joint attention and social symbolic play seem to share a relevant similarity – the ability to manage the perspective of a social partner. Joint attention emerges in the last trimester of the first year of life and regards the ability to coordinate (follow or initiate) visual attention with others to external objects or events (Tomasello, 1995). Because it is considered to reflect the emerging ability to view others as representational agents, whose attention focus may not coincide with one's own and therefore needs to be monitored, joint attention is thought to be a precursor of later social-cognitive skills (Bretherton & Beeghly, 1982; Carpendale & Lewis, 2004; Youngblade &

Dunn, 1995). It is then conceivable that children who display more joint attention behaviors in infancy would have more experiences in dealing with self and other's intentionality (Tomasello, 1995), thus becoming more competent at integrating other people's symbolic play suggestions. Indirect evidence of a link between joint attention and symbolic play comes from research in the field of autism. Autism is a developmental disorder characterized by distinctive social-cognitive impairments, namely striking deficits in joint attention and symbolic play (Baron-Cohen, 1993; Charman, 1997; Kasari, Freeman, & Paparella, 2006). On the other hand, studies with typically developing children have already uncovered longitudinal links between joint attention in infancy and theory of mind in the preschool years, as well as concurrent associations between joint attention and solitary symbolic play (Charman et al., 2000). However, no empirical study has yet addressed the possible longitudinal link between joint attention and social symbolic play in typically developing three-year-olds. A first goal of this study was therefore to investigate whether infant's joint attention skills at 10 months significantly predicted children's later social symbolic play abilities. We expected more joint attention in infancy to predict better social symbolic play abilities at 3 years of age.

Apart from uncovering the putative developmental origins of social symbolic play, we were also interested in looking at its concurrent predictors. Considering the unquestionable importance of social experience to the development of the understanding of the mind (for a review, see Carpendale & Lewis, 2004), mental state talk was a relevant candidate. Such an influence may operate in two distinct ways: through mothers' and/or children's discourse. From a Vygotskian perspective (1978), mothers' use of mind-related terms may be pivotal to the development of children's social understanding. As they label their own and their children's mental states, mothers may contribute to the child's internalization of the notion of self and others as distinct mental agents (Symons, 2004). Recent literature provided evidence for this hypothesis by reporting concurrent and longitudinal associations between maternal mental state talk and children's theory of mind (Meins et al., 2002; Ruffman, Slade, & Crowe, 2002; Symons, Fossum, & Collins, 2006). For instance, in a study by Ruffman and colleagues (2002) maternal use of mental state terms was significantly correlated with children's concurrent performance on a battery of theory of mind tasks, as well performance on these tasks one year later, even after controlling for children's earlier theory of mind abilities. In addition, early theory of mind was unrelated to later maternal mental state talk, suggesting the link between maternal discourse about mental states and children's theory of mind to be truly causal. Despite these evidences, it remains unclear whether similar associations will emerge

between maternal mental state talk and an earlier milestone of social cognition – social symbolic play. As a result, a second goal was to test whether the use of mental state talk by the mother would be a concurrent predictor of children's social symbolic abilities. We expected that mothers' use of mental state terms would predict more advanced social symbolic play.

Children's mental state talk can also be hypothesized as playing an important role for the development social symbolic play at age 3. In his theoretical account, Leslie (1987) posits an isomorphism between pretend play and the use of mental state terms, as both depend on the ability to form mental representations. Youngblade and Dunn (1995) take it a step further by suggesting that children's mental state talk (regarding one's own as well as other's mental states) provides them with the necessary representations that facilitate social symbolic play. Indeed, empirical studies have shown children's mental state talk to be related to later theory of mind abilities (e.g., Dunn, Brown, Slomkowski, Tesla, & Youngblade, 1991; Symons, Peterson, Slaughter, Roche, & Doyle, 2005). Therefore, and given the links between social symbolic play and theory of mind (Nielsen & Dissanayake, 2000; Youngblade & Dunn, 1995), it is conceivable that children's mental state talk can also be a predictor of social symbolic play.

To date, only two studies have attempted to address this issue. In their pioneer work, Hughes and Dunn (1997) reported a significant association between preschoolers' pretend play and their use of mental state talk in a play session with a peer. Another study conducted by Nielsen and Dissanayake (2000) found preschooler's use of mental state terms during free play with the parents to be concurrently associated with pretend play (as well as theory of mind). However, the former assessed both variables in a single play session, while the latter did not control for the children's verbal ability or the parent's own use of mental state terms, so their conclusions remained tentative. Our study aimed at expanding these previous reports by assessing pretend play and mental state talk in two separate tasks, while taking into account important control variables.

This leads us to the reported links between verbal ability and both children's symbolic play (Bates, Benigni, Bretherton, Camaioni, & Volterra, 1979; McCune-Nicolich, 1981) and mental state talk (Hughes & Dunn, 1997), and how language can contribute to the relation between these two dimensions. In addition, studies have reported that mothers' and children's mental state talk covary (Ruffman et al., 2002; Symons et al., 2006). Therefore, one additional aim was to explore whether the expected associations between social symbolic play and

mental state talk were not solely explained by individual differences in general language ability and maternal mental state talk.

In summary, this study had three major goals:

1. To investigate whether infant's joint attention skills at 10 months significantly predicted children's later social symbolic play abilities. Based on evidence linking joint attention and theory of mind, as well as social symbolic play and theory of mind, we expected more joint attention in infancy to predict better social symbolic play abilities at age 3 years.

2. To test whether the use of mental state talk by the mother would be a concurrent predictor of children's social symbolic abilities. Following empirical findings showing positive associations between maternal mental state talk and children's theory of mind performance, we expected that mothers' use of mental state terms would predict more advanced social symbolic play.

3. To explore whether the children's use of mental state talk was a significant concurrent predictor of social symbolic play. Based on empirical findings linking children's mental state talk and their theory of mind abilities, we expected more mental state terms to predict more sophisticated social symbolic play, even after controlling for the children's verbal ability as well as the mothers' own use of mental state talk.

Method

Participants

Participants were 49 families recruited from child-care centers from a large city in the north of Portugal who were participating in a study on child development. The initial sample consisted of 52 families, however three families did not participate at the second stage of the study and were therefore excluded (one family refused, another could not be traced, and the third one was unable to participate at the time). This broader study also included the fathers, however only data pertaining to mothers and their children were reported here. Children (28 boys, 57.1%) were assessed at two time points: 10 months and 3 years. At Time 1 (T1) infants' joint attention skills were assessed and their mean age was 10.38 months (SD = .36). At Time 2 (T2) children's social symbolic play, verbal ability, and mothers' and children's mental state talk were assessed. Children's mean age was 37.78 months (SD = .99). At T2, 24 children (49%) were singletons or had younger siblings and the remainder had one or two older siblings. Concerning maternal education, at T2 the majority (67.3%; n = 33) had higher

education qualifications, while 32.7% (n = 16) had completed between 5 and 12 years of formal education. All participants were White and had Portuguese as their first language.

Procedure

At T1, the dyads were visited in their homes and 40-minute home-based observations were conducted. In the first 20 minutes, mothers were asked to behave as naturally as possible so that she and her baby became comfortable with the presence of the researcher. Mothers were then asked to play with their infants as they would normally do with his/her favorite toys. This allowed for a 10-minute toy-play session to be video recorded. Following this period of play, an additional 10-minute play period was conducted, but the data obtained were not relevant for the scope of this paper.

At T2 each child-mother dyad attended one session with the approximate duration of 1½ hour, including a 15 minute break. During this visit, child-mother and child-experimenter interactions were video recorded and the assessment of children's cognitive development (including verbal ability) was initiated. Within two weeks of the first visit, the children returned with their fathers, and similar procedures were conducted. In this second session, the assessment of children's cognitive development was completed. Procedures took place in a university laboratory setting composed of two adjacent rooms separated by a floor-to-ceiling bidirectional mirror.

Measures

Joint attention behaviors at T1.

The 10-minute toy-play interaction at 10 months was coded using an adaptation of the joint attention scheme designed by Martins (2003). This coding scheme was especially developed for the microanalytic assessment of joint attention indices in mother–infant play sessions. The original scales included both event- and duration-behavioral codes. However, because the videos were not originally made to assess joint attention, we were unable to reliably code the duration of the episodes as those rely on the microanalytic observation of the direction of infant's and mother's gaze. Therefore, only the frequency of joint attention behaviors was coded. The occurrence of efforts from the infant to direct the mother's attention to a target (usually a toy) and the infant's following of maternal bids for joint attention were the focus of the coding scheme and included the following behaviors:

a) ***Infant initiating joint attention.***

Three specific behaviors were considered, but apart from non-communicative pointing, all required the infant to look at the mother's face at some point while performing the following actions: *animating a toy* (moving or rattling the toy with the purpose of getting the mother's attention); *offering a toy* (holding out a toy to the mother); *pointing* (extending the index finger in a conventional manner). Pointing could be of communicative nature (if the infant looked at the mother's face at some point before, during or after the gesture) or of non-communicative nature (if the infant did not look at the mother's face at any time). Infants received a frequency score for each type of behavior – animating, offering and both types of pointing. However, due to the low frequency of initiating behaviors we decided to collapse them into a single overall score.

b) ***Infant following of maternal bids for joint attention.***

Immediately after the occurrence of any maternal behaviors intended to draw the infant's attention towards an object (e.g., animating a toy; demonstrating how a toy worked; showing a toy), the infant's response received one of two possible codings: *Follows joint attention* (not only by following the mother's line of gaze and action on the toy, but also alternating gaze between mother and toy); *Does not follow joint attention* (the infant may or may not show signs of being involved with the toy, however, the infant never alternates gaze between the mother and the toy). Infant following of maternal bids for joint attention was scored as the proportion of instances of involvement in joint attention, divided by the total number of maternal bids.

All the videotapes were independently coded by two trained judges. Mean Cohen's kappa was .76 (Infant's following of maternal bids for joint attention=.79; Infant's initiating joint attention behaviors =.73).

Children's social symbolic play at T2.

This structured play task was devised by Meins and Russell (1997) in order to assess the social symbolic abilities of preschoolers. This task called upon the child's ability to incorporate the suggestions of an unfamiliar adult into their own symbolic actions. As a result, it was intended to mirror the extent to which the child was capable of attending to and of understanding other people's perspectives in a play context. For this purpose, each child was presented with two sets of objects – two representational toys (doll and toy car) and nine objects with no obvious representational features, such as a toilet roll inner tube or a piece of

aluminum foil. A 5-minute *introductory play session* starting as soon as the child had made the first intentional contact with the objects served the purpose of familiarizing the child with the experimenter as well as the materials. The introductory session was immediately followed by the *structured play session* which involved two conditions – *elicited* and *instructed play*. At that moment, only two objects were left on the table (usually according to the child's preferences): one representational toy and one "junk object" (Meins & Russell, 1997, p. 68). In the elicited condition no specific instructions were given to the child. The experimenter simply asked "What can you do with these?". After the child had carried out some action or given a verbal response (or in the clear absence of either), the experimenter asked the child to perform a specific action (e.g., doll and water bottle lid – "Make the doll eat the dinner off her plate") - instructed condition. The child was then randomly presented with each of the remaining pairs of objects.

The coding for this task was based on Meins and Russell (1997) adaptation of the criteria by Lewis and Boucher (1988). Symbolic actions in the elicited and instructed conditions were rated on a 5-point *Likert* scale (from 0 to 4) with higher scores corresponding to greater symbolic sophistication. In addition, the potential number of stages through which the child could advance to reach the maximum score in the elicited conditions was also recorded. These scores allowed for the calculation of an overall executive capacity score which reflected the child's ability to understand and subsequently integrate the experimenter's symbolic suggestions (Meins & Russell, 1997). In this study, we used this score as an indicator of children's social cognitive abilities. The score was expressed by the following equation:

$$\frac{\text{Average score instructed play} - \text{Average score elicited play}}{\text{Average number of levels remaining above elicited play levels}}$$

According to the authors, the higher the score the more the child was able to benefit from the experimenter's play suggestions by integrating them into his/her symbolic play. This ratio was intended to prevent floor effects, as it controlled for the number of levels above the child's elicited play performance. Nevertheless, ceiling effects were also possible. In order to control for this possibility, we replicated the precaution measure taken by Belsky and colleagues (Belsky, Garduque, & Hrncir, 1984) and correlated the executive capacity score with a score resulting from the absolute difference between instructed play and elicited play. The high positive correlation coefficient, $r = .98$, $p = .000$, ensured us that neither ceiling nor floor effects affected the executive capacity scores for this sample.

Approximately 30% of the tapes were additionally scored by a second rater. Inter-rater agreement (Intraclass Correlation Coefficient, two-way mixed) was considered to be excellent (Mean r_i = .93; min = .92; max = .96).

Mental state talk at T2.

Mothers and children were invited to pretend to spend an afternoon at the beach – a common leisure activity for Portuguese families. A set of toys and props (e.g., toy food and drinks, empty sunscreen bottle, beach towels) were strategically placed along the floor of the room, and mothers were given a script with general guidelines. The task had no time limit, ending with a signal from the mother. This semi-structured shared pretense task was designed to elicit mental state talk from both mothers and children. All the interactions were videotaped and transcribed for subsequent coding.

Following previous studies (Brown & Dunn, 1992; Jenkins, Turrell, Kogushi, Lollis, & Ross, 2003) both children's and mothers' references to mental states were coded into one of the following mutually exclusive categories: a) *Desires and interests*: e.g., like/dislike; love/hate; want; prefer (e.g., "Where would you *like* to go next?"; "This is my *favorite* color!"); b) *Feelings*: e.g., bored; amused; excited; happy (e.g., We're having so much *fun*!"; "Are you *bored*?"); and c) *Cognitions*: e.g., think; decide; know; recognize; remember; realize; expect; understand/solve (e.g., "*Remember* the last time we went to the beach?"; "Do you *know* what this is?").

Each participant received four scores for mental state talk: *mental words* in proportion to the total number of words uttered in the shared pretense interaction; *desire references* in proportion to the total number of mental state words; *feeling references* in proportion to the total number of mental state words; and *cognition references* t in proportion to the total number of mental state words. It could be argued that desire, feeling, and cognition references should be a proportion of the total number of words in the interaction. However, due to the high number of words in the sessions (M = 1217.02, SD = 403.62 for mothers; M = 295.67, SD = 167.78 for children), these proportions were extremely low. Nevertheless, analyses using those alternative indexes produced the same pattern of results as the ones reported here.

A random set of 30% of the tapes was coded by a second trained researcher. Inter-rater agreement was excellent (k = .95 for both mothers' and children's use of mental state terms).

Cognitive development at T2.

In the course of their two visits to the lab (the second visit took place within a maximum of two weeks following the first visit), children's cognitive development was assessed using the *Wechsler Preschool and Primary Scale of Intelligence – Revised* (*WPPSI-R*; Wechsler, 2003). Although this scale yielded three scores: Performance IQ, Verbal IQ and Full Scale IQ – only the first two were used in this study. The WPPSI-R has been shown to have excellent reliability (.93 for the Performance subscale; .94 for the Verbal subscale and .97 for the Full Scale).

Children's temperament at T2.

During the first lab visit, mothers completed the Portuguese version of the *Childhood Personality Scale* (*CPS*; Dibble & Cohen, 1974; Portuguese version, Pinto, 2006), which was intended to assess maternal perceptions of the general temperament characteristics of their preschool aged children. This questionnaire contained 48 items rated on a 7-point *Likert* scale (*Never* - 0 to *Always* – 6) and regarded the mothers' perceptions of the level each statement described the child's behavior in the preceding two months. The total score expressed maternal perceptions of the child's easy temperament. Cronbach's alphas for the Portuguese version of this scale ranged from .80 to .88, reflecting good internal consistency (Pinto, 2006).

Results

After presenting the descriptive measures for all relevant variables at T1 and T2 (Table 1B), we begin by investigating the associations between children's social symbolic play and control variables (Table 2B). Subsequently, we examine the relations between children's social symbolic play and the potential explanatory variables at T1 and T2 (Table 3B), as well as the links between mothers' and children's use of mental state talk (Table 4B). Finally, we test two regression models – one focused on joint attention behaviors as putative antecedent predictors of social symbolic play; and the other model including mothers' and children's mental state talk, as well as children's verbal abilities, as concurrent predictors of social symbolic play (Table 5B).

Descriptive Statistics

The descriptive statistics for all relevant study variables are presented in Table 1B.

Table 1B

Mean (SD) and Range Scores for all Variables

	Mean (SD)	Range
Variables at T1		
Infant joint attention		
Initiating joint attention (raw)	2.65 (2.97)	0 - 14
Following joint attention (percentage)	5.00 (5.00)	0 - 21
Variables at T2		
Social symbolic play	.05 (.04)	-.07 - .11
Children's mental state talk (raw/percentage)		
Total	8.02 (7.47)	0 – 35
Desires	7.00 (6.93)/ 80.12 (30.62)	0 – 35/ 0 – 100
Feelings	.02 (.14)/ .34 (2.38)	0 – 1/ 0 – 16.67
Cognitions	1.00 (1.79)/ 11.38 (19.23)	0 – 7/ 0 – 66.67
Mother's mental state talk (raw/percentage)		
Total	27.59 (16.63)	4 - 81
Desires	18.41 (12.85)/ 65.77 (21.96)	0 – 55/ 0 - 100
Feelings	.43 (1.17)/ 1.19 (2.82)	0 – 7/ 0 - 13
Cognitions	8.76 (6.45)/ 33.04 (22.16)	0 – 24/ 0 - 100
Cognitive Development at 36 months		
Verbal IQ	111.24 (16.55)	71 - 153
Performance IQ	110.65 (13.17)	85 - 143

Regarding the joint attention variables at 10 months, 35 infants (71.4%) displayed one or more behaviors intended to attract the mother's attention to a toy or object. Concerning their responsiveness to maternal attention directing behaviors, 36 infants (73.5%) showed at least one instance of following maternal bids for joint attention. Based on these results, a new variable was created that sought to reflect the level of development of the infant's joint attention skills. Those infants simultaneously displaying one or more instances of initiating as well as following behaviors received the score of 1 - *more advanced joint attention* (n = 29, 59.2%). On the other hand, infants showing no instances of either initiating or following behaviors, or both, received a score of 0 - *less advanced joint attention* (n = 20, 40.8%).

Although significant variation among studies on infant joint attention renders comparisons difficult (e.g., infant-caregiver vs. infant-experimenter paradigms; structured vs. unstructured observations; naturalistic vs. laboratory settings) the descriptive statistics were in accordance with extant literature (e.g., Carpenter, Nagell, & Tomasello, 1998) by reporting the occurrence of joint attention behaviors at age 10 months, coupled with substantial inter-individual variation.

In what concerns social symbolic play, two of the nine pairs were excluded from the total score because of ceiling effects. The social symbolic play scores (computed from seven pairs) varied between -.07 and .11 (M = .05, SD = .04). The mean scores obtained were similar to those reported in previous studies (e.g., Meins & Russell, 1997; Meins, Fernyhough, Russell, & Clark-Carter, 1998).

In the mother-child shared pretense task, 45 children (91.8%) used at least one mind-related term regardless of type (desires, feelings, or cognitions). Forty-five children (91.8%) made at least one reference to desires, whereas 18 (36.7%) made at least one reference to cognitions. Considering that more than 50% of the children did not make any comments regarding cognitive states and that among those who did the mean number of such references was 2.72, we decided to dichotomize this variable. Thus, children received the score of *0* if they had not made one cognitive comment or *1* if they had made at least one comment pertaining to this category. In addition, because only one child (2%) made any references to feelings, we decided to exclude this category as it did not differentiate among the children. Comparing with similar studies (e.g., Hughes & Dunn, 1997; Nielsen & Dissanayake, 2000) the mean values obtained for the frequency of mind-related terms were slightly higher. However, in the study by Hughes and Dunn (1997), the sample was composed of pairs of preschoolers while in Nielsen and Dissanayake's study (2000) data were gathered in the context of child-parent free-play. In our study, children and their mothers were invited to engage in a semi-structured play task specifically designed to elicit pretense, possibly resulting in more mental state talk.

In what concerns maternal mental state talk, all 49 mothers used one or more mind-related terms regardless of type, whereas 47 mothers (95.9%) made at least one reference to desires, 46 (93.9%) made at least one reference to cognitions, and 10 made at least one reference to feelings (20.4%). Again, because over 50% of the mothers did not make any comments regarding feeling states (and the average number of references for those who did was 2.10) this variable was dichotomized. Thus, mothers were scored *0* if they had not made one feeling comment or *1* if they had made at least one comment pertaining to this category.

Finally, children's age was not significantly correlated with any of the study variables and was therefore excluded from subsequent analyses.

Relations Between Children's Social Symbolic Play and Control Variables

Table 2B presents the correlation matrix between children's social symbolic play scores and children's sex, presence of older siblings, and at T2, temperament, verbal IQ, performance IQ, and maternal education.

As shown, the significant correlation between social symbolic play and children's verbal ability was the only one to emerge, $r = .37$, $p = .009$. For this reason, all subsequent analyses were performed taking this variable into account.

Table 2B

Correlations Between Children's Social Symbolic Play and Control Variables at 36 Months

	Social symbolic play
Sex (M/F)[a]	-.02
Older siblings (N/Y)[a]	-.17
Easy temperament[b]	.14
Verbal IQ[b]	.37**
Performance IQ[b]	.16
Maternal education (without/with college education)[a]	.02

** $p < .01$

[a] r_{pb}; [b] r

Relations Between Children's Social Symbolic Play and T1 and T2 Potential Explanatory Variables

Table 3B presents the full and verbal IQ-partialled correlations between children's social symbolic play scores and several relevant variables at both time points.

No significant associations emerged between any of the joint attention measures at age 10 months and later performance on the social symbolic play task. The lack of a significant association persisted even after controlling for children's verbal IQ. Therefore, infants who had displayed more initiating or following joint attention behaviors with their mothers at 10 months, or that had been classified as more developed in terms of joint attention, did not go on to being more able to integrate the symbolic suggestions of an experimenter at 3 years of

age. On the other hand, children's social symbolic play was correlated with the proportion of desire references made by the child, $r = .33$, $p = .020$, but not with any of the two remaining child mental state talk variables. The size of this effect was strengthened after we controlled for the influence of children's verbal IQ, $r\ (46) = .40$, $p = .006$. Therefore, children who made more references to desire states in interaction with their mothers were more likely to better incorporate the experimenter's suggestions into their symbolic play. No variable concerning maternal use of mind-related comments was associated with better performance on the social symbolic play task.

Table 3B

Full/Verbal IQ-Partialled Correlations Between Children's Social Symbolic Play and T1 and T2 Potential Explanatory Variables

	Social symbolic play
Infant variables (at 10 months)	
Initiating joint attention	-.14/-.15
Following joint attention	.04/-.06
Development of joint attention[a]	.03/-.02[b]
Child variables (at 3 years)	
Mental state talk – total	.19/.25[+]
Mental state talk – desires	.33*/.40**
Mental state talk – cognitions[a]	-.10/-.22[b]
Maternal variables (at 3 years)	
Mental state talk – total	-.18/-.18
Mental state talk – desires	.05/.14
Mental state talk – feelings[a]	-.11/-.07[b]
Mental state talk – cognitions	-.04/-.14

Note. All Pearson correlation coefficients unless otherwise specified.

[a]Dichotomous variables (No – 0; Yes – 1); [b]r_{pb}

[+] $p < .10$; * $p < .05$; ** $p < .01$

Relations Between Mothers' and Children's Use of Mental State Talk

As shown in Table 4B, mothers' and children's use of mind related terms were positively associated. Mothers who made more references to mental states were more likely to have children who employed mental state terms in their speech, regardless of type, $r = .28$, $p = .048$. This correlation remained marginally significant after controlling for the children's verbal IQ, $r\ (46) = .28$, $p = .051$. In particular, maternal references to desires and cognitions were both associated with children's references to desires, although in opposite directions. More maternal references to desires were associated with more child references to desires, $r = .36$, $p = .010$. In contrast, more maternal references to cognitions were associated with less child references to desires, $r = -.36$, $p = .011$. Finally, mother's total proportion of mind-related comments was associated with more child references to cognitions, $r = .34$, $p = .016$. The reported associations held even after partialling out the effects of verbal IQ. Because of these associations, we controlled for mothers' use of mental state talk in subsequent analyses.

Table 4B

Full/Verbal IQ-Partialled Correlations Between Children's Mental State Talk and Mother's Mental State Talk

	Children's mental state talk		
	Total	Desires	Cognitions[a]
Mother's mental state talk			
Total	.28*/28^{+}	-.14/-.15	.34*/ .36*
Desires	.25/.23	.36**/.35*	-.27^{+}/-.23
Feelings[a]	-.03/.04	-.07	.95[b]
Cognitions	-.23/-.21	-.36*/-.35*	.26^{+}/.22

Note. All Pearson correlation coefficients unless otherwise specified.

[a]Dichotomous variables (No – 0; Yes – 1); [b]χ^2

$^{+}$ $p < .10$; * $p < .05$; ** $p < .01$

Regression Analyses

We performed two hierarchical regression analyses (Models A and B) in order to examine which variables were significant predictors of children's ability to incorporate the experimenter's symbolic play suggestions at T2. Our choice of predictors was both based on theoretical principles as well as the significant associations previously described.

In Model A, we sought to uncover whether joint attention behaviors in infancy significantly predicted social symbolic play. In addition, because children's verbal IQ was significantly related with their social symbolic play, we also included this variable in the model. Consequently, at step 1 we entered children's verbal IQ scores and at step 2 we entered attention following and initiating behaviors in infancy (Table 5B).

The regression model was significant at step 1, F (1,47) = 7.47, p =.009, explaining 14% of variance. Verbal IQ was a significant predictor of children's social symbolic play – children with higher verbal IQ scores tended to be more willing and able to incorporate the experimenter's symbolic play suggestions, β = .37, t = 2.73, p =.009. In contrast, the regression model was only marginally significant at step 2, F (3,45) = 2.64, p =.061, explaining 15% of variance. Initiating, β = -.11, t = -.77, p = .446 or following joint attention behaviors, β = -.02, t = -.12, p = .906, did not significantly predict children's social symbolic play abilities.

In Model B we investigated whether mothers' and children's mental state talk concurrently predicted children's social symbolic play at T2. Two variables significantly correlated with the social symbolic play scores – children's verbal IQ and children's references to desires in a pretense interaction with the mother – and were thus included in the regression model. We also decided to take into account two maternal discourse variables that were both theoretically relevant and that had been shown to correlate with the children's desire references – maternal references to desires, r = .36, p = .010, and to cognitions, r = -.36, p = .011. Therefore we entered children's verbal IQ scores as well as mother's desire and cognition references at step 1. Children's references to desires were entered at step 2 (Table 5B).

The regression model was significant at step 1, F (3,47) = 2.82, p =.050, explaining 16% of variance. Verbal IQ was the only significant predictor of children's social symbolic play – children with higher verbal IQ scores tended to be more willing and able to incorporate the experimenter's symbolic play suggestions, β = .38, t = 2.63, p =.012. In contrast, mother's desire references, β = -.03, t = -.16, p = .871, and cognition references, β = -.06, t = -.42, p = .679, did not significantly predict children's social symbolic play abilities.

Furthermore, the regression model was significant at step 2, F (4,47) = 4.16, p = .006, explaining 27% of variance. Children's references to desires in a pretend play task with the mother made a significant and unique contribution to the prediction of their ability to integrate the experimenter's play suggestions – more references to desires with the mother were associated with better social symbolic play with the experimenter, β = .39, t = 2.65, p = .011.

This association was independent of the children's verbal IQ as well as the mother's own desire and cognition comments in the pretense interaction.

Table 5B

Regression Models for Children's Social Symbolic Play

	Steps and variables	R^2	(Adjusted R^2)	β	*F* change
Model A					
	Step 1 (df 3,47)	.14	(.12)		7.47**
	Verbal IQ			.37**	
	Step 2 (df 4,47)	.27	(.21)		2.64^{+}
	Verbal IQ			.38**	
	Infant initiating			-.02	
	Infant following			-.11	
Model B					
	Step 1 (df 3,47)	.16	(.10)		2.82*
	Verbal IQ			.38*	
	Maternal desires			.16	
	Maternal cognitions			.07	
	Step 2 (df 4,47)	.27	(.21)		7.04*
	Verbal IQ			.42**	
	Maternal desires			-.03	
	Maternal cognitions			-.06	
	Child desires			.39*	

$^{+}p < .10$; * $p < .05$; ** $p < .01$

Discussion

Several theoretical accounts emphasize the key role of joint attention and symbolic play towards the acquisition of a theory of mind, in both typical and atypical development (e.g., Baron-Cohen, 1993; Bretherton & Beeghly, 1982; Kasari et al., 2006; Leslie, 1987). Furthermore, joint attention and social symbolic play seem to share a defining feature - the ability to coordinate social perspectives. These accounts guided our first hypothesis that joint attention skills at the end of the first year of life would predict social symbolic play abilities at age 3. This study was the first to attempt to trace the longitudinal origins of social symbolic play back to joint attention in a sample of typically developing 3-year-olds. However, the

results did not support our first hypothesis, as no significant associations emerged between any of the joint attention measures in infancy and later performance on the social symbolic play task, even after accounting for children's verbal development. Infants that had shown more initiating or following behaviors in free play interaction with their mothers, as well as infants that had been generally classified as more developed in terms of joint attention, were not in advantage in terms of later social symbolic play. There are a number of alternative explanations for these results. The most immediate one is that early joint attention skills at 10 months – following and initiating - may not forecast later social symbolic play. Such interpretation is consistent with the suggestion put forward by some researchers (e.g., Brooks & Meltzoff, 2002; Van Hecke & Mundy, 2007) that only in the second year of life do these joint attention skills truly begin to reflect children's awareness of other people's mental states. Therefore, for the purpose of establishing a longitudinal link between joint attention and social symbolic play, 10 months might have been just too early. Alternatively, Harris (1989; 1993) argued that only certain types of pretense are related to the ability to metarepresent. For instance, children with autism are able, if appropriately prompted, to engage in simple pretense acts like object substitution. However, they are not able to impute pretend mental states to objects or other people (e.g., doll is happy). The social symbolic play task used in this study did not include the latter condition, so Harris' proposition remains untested. Yet another explanation regards possible differences in symbolic play dependent on the social partner. Youngblade and Dunn (1995) found important quantitative and qualitative differences in pretend play at 33 months with either mother or a sibling. As preschoolers' pretend play may differ across relationships, we do not know whether any associations could have emerged had we studied social pretend play with the mother, a sibling, or a friend instead of an adult experimenter. With this in mind, in future studies it could be worthwhile to code acts of pretense occurring in a mother-child interaction. Methodological aspects may have also partly contributed to the lack of associations, namely the nature of longitudinal studies, as links between variables may only hold for limited periods of time, disappearing when new forces gain relevance in development (Ruffman et al., 2002). Indeed, the range of results obtained for the social symbolic play task was narrower than one would theoretically expect, suggesting that individual differences may not have been at their maximum at age 3.

Our second prediction regarded the possible influence of maternal mental state talk on children's concurrent social symbolic play abilities at age 3. Contrary to our expectations supported by previous research (Meins et al., 2003; Ruffman, Slade, Devitt, & Crowe, 2006; Symons et al., 2006) no measure of maternal mental state talk, either general (total proportion

of mental terms) or specific (references to desires, feelings or cognitions) was significantly associated with children's concurrent willingness and ability to incorporate the experimenter's play suggestions into their symbolic play. The regression analysis confirmed such results, as maternal references to desires and cognitions did not predict children's social symbolic play. These results can be interpreted in various ways. Firstly, we can conjecture that maternal mental state talk may have exerted its role in the development of children's social symbolic play at an earlier stage and that concurrent mental state talk may in turn influence later milestones of social cognition. Such an interpretation is plausible if we consider Meins' results of a direct effect of mind-mindedness at 6 months on children's theory of mind about 3 ½ years later (Meins et al., 2003). Another possible explanation for the apparent lack of significant associations may have stemmed from the level of elaboration that mothers invested in their mental state talk. Previous studies on the impact of maternal talk about feelings have shown that causal and elaborate explanations accompanying such mental terms, rather than their simple use, were linked to better emotion understanding (Denham, Zoller, & Couchoud, 1994; Garner, Jones, Gaddy, & Rennie, 1997). We cannot rule out a similar effect in our sample, as we did not assess the level of elaboration of maternal mental state terms. This aspect leads us to the argument that accuracy of mind related comments might have also played an important role. In their study on maternal mind-mindedness, Meins et al (2003) found that mother's use of mind-related terms that appropriately commented on their infant's mental states at age 6 months significantly predicted theory of mind in the preschool years. Although this approach could have been conducted in our study, we opted not to do so. Making appropriate comments regarding an infant's supposed mental states at 6 months involves a great deal of interpretation from the mother. On the contrary, at age 3 children are generally verbally fluent and increasingly able to communicate desires, emotions and thoughts (Bretherton & Beeghly, 1982). Therefore, a measure of appropriateness based solely on children's affirmative responses to maternal suggestions and comments might not be suitable, as it would likely reflect other aspects such as children's easier temperament or maternal sensitivity. Finally, it is conceivable that mothers' proclivity to use mental state terms is not a stable trait, but rather a dimension of maternal verbal behavior that can be influenced by individual, relational and contextual aspects of mothers' own lives. Accordingly, studies have found aspects such as maternal psychopathology (e.g., Murray, Kempton, Woolgar, & Hooper, 1993; Wan et al., 2007) or perceived marital conflict (e.g., Pancsofar, Vernon-Feagans, Odom, & Roe, 2008; Pratt, Kerig, Cowan, & Cowan, 1992) to interfere with mothers' verbalizations towards their children.

Another set of results that also deserves discussion concerns the associations between mothers' and children's references to mental states. When mothers used more mental state talk (regardless of type), their children were also more likely to use mental terms in general, as well as more cognition words in particular, even after controlling for children's verbal ability. One of the strongest links emerged between mothers' and children's references to desires – the more desire words used by the mother, the more the child tended to employ desire references. Such results are consistent with previous data (Symons et al., 2006), as well as Ruffman and colleagues' (2002) proposition that mothers match their use of mental state talk to the child's developmental level. It may also be argued that by using mental state language that the child can readily understand, the mother is providing the "appropriate framework for mental activity within a conversation" (Symons et al., 2006, p. 687). In contrast, maternal references to cognitions were inversely related to children's use of desire terms. A possible reason for these surprising results may be that in the course of the interactions, mothers often used the phrase "let's pretend (…)" to prompt children to engage in the pretense interaction. It is possible that children needed more coaxing when they were more off-task and thus produced less talk about desires (the most common type of mental state talk in our sample).

Regarding our final prediction, we found support for the hypothesis that children's mental state talk plays an important role in their social symbolic play abilities. In our study, children's proportional use of desire terms significantly predicted their social symbolic play abilities, above and beyond the influences of verbal ability as well as mother's own mental state talk. These results bring further weight to the idea put forward by Ruffman et al. (2002) that children's talk about desires may be a training ground for their social-cognitive development. According to Wellman (1990) desires and beliefs are essential for children's understanding of the mind and how it guides behavior. As children in our sample are still too young to possess a mature knowledge about beliefs, their explanations of human behavior rely on their attributions of desires. In fact, empirical studies have confirmed that children develop their understanding of desires before they understand beliefs and that the former assist them in the development of a mature theory of mind (Ruffman et al., 2002; Wellman & Liu, 2004). Our results therefore expand such accounts, by showing a similar pattern of results between children's desire talk and their concurrent performance on social symbolic play – a milestone of social cognition in the early preschool years. Nevertheless, we need to acknowledge that the cross-sectional nature of the associations between social symbolic play and mental state talk does not allow us to make strong inferences of causality. However, research confirms that

this may be an appropriate interpretation of the data. Similar to our study, others have provided links between children's mental state talk and both concurrent and longitudinal social cognitive outcomes (e.g., Dunn et al., 1991; Hughes & Dunn, 1997; Nielsen & Dissanayake, 2000; Symons et al., 2005). Specifically, an influential study by Hughes and Dunn (1998) focusing on the impact of discourse among preschool aged children and their peers, found that mental state talk at 3 years of age predicted theory of mind a year later, but not the opposite. These results support the notion of a true causal link between children's mental state talk and their social cognitive development. Talk about desires may therefore have promoted the understanding of subjective stances, an ability required for social symbolic play. Interestingly, we did not find similar associations for children's references to feelings and cognitions. Regarding the former, associations between children's talk about feelings in the context of disputes at 33 months and later false belief have been reported in previous literature (Dunn & Brown, 1994), suggesting that not only the social partner, but also the context in which the interaction takes place, may modulate the influence of certain types of mental state talk to social cognition. It is feasible that in the particular context of pretense, desires and cognitions might have assumed the leading role. In our study however, more than half of the children did not make any references to cognition states, and for that reason related individual differences in social play might not have emerged. This particular set of results highlights the need to consider different types of mental state talk, and not just mind-related references in general, when investigating the role of children's talk about the mind on development.

Finally, it is noteworthy that children's verbal abilities were a predictor of their social symbolic play. Previous studies (e.g., Astington & Baird, 2005; Meins, Fernyhough, Johnson, & Lidstone, 2006) had already documented an association between the children's verbal abilities and theory of mind, but to our knowledge only Charman and colleagues (2000) found concurrent associations between (solitary) symbolic play and expressive language in a small sample of infants aged 20 months (N = 13). Our study expanded these results by reporting an association between verbal abilities and social symbolic play in a sample of 49 3-year-olds. Additionally, we found no associations between easier temperament and better social symbolic play abilities, which suggested that performance on this social-cognitive task was not merely a question of a more sociable or outgoing personality.

The findings reported expand previous research by focusing on a less well-studied milestone of social cognition – social symbolic play. We have explored the associations (or the lack thereof) between joint attention, mothers' and children's mental state talk and

children's social symbolic play abilities. Our results highlight, for the first time, a link between early preschool children's references to desires in shared pretense with the mother and their social cognitive competence in a social symbolic play task with an adult experimenter. This result has particular implications for subsequent research as it suggests the need to consider the role of different types of mental state talk, namely children's references to desires, feelings and cognitions, when studying the development of social cognition.

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CHAPTER 4

EMPIRICAL STUDY 3

"Let's go to the beach": Mental State Talk in Mother-Child Shared Pretense and its Relation to Mothers' Mind-Mindedness and Children's Social-Cognitive and Cognitive Outcomes

Abstract

Objective: The main aim of this study was to assess the relations between mothers' and their three-year-olds' mental state talk in a shared pretense play task, and children's social-cognitive and cognitive outcomes. We also looked at concurrent links between mothers' mental state talk and their off-line mind-mindedness. **Method:** Forty-nine mother-child pairs were invited to come to a laboratory in order to participate in a pretense play task. Videos were subsequently transcribed and coded for mental state talk. In addition, mothers were asked to describe their children, so their mind-mindedness could be assessed. Children's social symbolic play abilities as well as full scale IQ and verbal ability were assessed by an experimenter. **Results:** Maternal off-line mind-mindedness was unrelated to mothers' use of mental state talk during the shared pretense task. Children's references to desires, but not cognitions, were concurrently associated with those of mothers', even after partialling out children's verbal ability. Whereas children's references to desires were significantly associated with their social symbolic play sophistication, full scale IQ was positively correlated with their references to cognitions. **Conclusion:** Our results contribute to further the understanding of mothers' and children's mental state talk and their impact on children's cognitive and social cognitive development in the early preschool years.

In recent decades, much attention has been given to children's social-cognitive development from infancy through the preschool years. Two lines of research stand out in this literature. On the one hand, researchers have been focusing on developmental milestones of children's growing social-cognitive abilities, such as joint attention at the end of the first year of life (Bakeman & Adamson, 1984; Carpenter, Nagell, & Tomasello, 1998), social symbolic play at age 3 (Lillard, 1993; Meins, Fernyhough, Russell, & Clark-Carter, 1998), and theory of mind around the fourth birthday (Hughes et al., 2005; Wellman, Cross, & Watson, 2001). On the other hand, empirical studies have focused on children's mental state talk within the context of familial interactions (Beeghly, Bretherton, & Mervis, 1986; Brown & Dunn, 1991; Dunn, Bretherton, & Munn, 1987). However, only in the past decade did those two lines of research become definitely intertwined (Ruffman, Slade, & Crowe, 2002; Slaughter, Peterson, & Carpenter, 2008; Symons, Peterson, Slaughter, Roche, & Doyle, 2005), under the assumption that both are part of "a growing sophistication in children's understanding of mind" (Jenkins, Turrell, Kogushi, Lollis, & Ross, 2003, p. 905). The concept of *mind-mindedness* was particularly successful in bridging these two research areas (Meins et al., 2002). Mind-mindedness refers to the caregiver's tendency to treat one's infant as an individual with a mind expressed either by the proclivity to describe one's child in terms of mental attributes (versus their behavioral tendencies or physical appearance - off-line mind-mindedness), or by the use of appropriate mind-related comments in interaction with the infant (on-line mind-mindedness) (Meins et al., 2003). This maternal characteristic is therefore conceptualized as representing a particular type of maternal sensitivity, one that is related to the infant's or child's mental states. Previous research already demonstrated longitudinal links between earlier on-line mind-mindedness with one's 6-month-old infant and later off-line mind-mindedness when children were aged 48 months (Meins et al., 2003) but not concurrent associations between both during preschool years. Thus, the first goal of this study was to assess whether mothers' mentalistic descriptions of their 3-year-olds were related to their concurrent use of mental state talk when interacting with them during a shared pretense task.

Mothers' mental state talk has been investigated with relation to their children's own mental state talk in the context of daily family life (Jenkins et al., 2003; Ruffman et al., 2002; Symons, Fossum, & Collins, 2006). For instance, two-year-olds' mental state talk mirrors that of their mothers' in terms of desires and cognitions in play situations (Symons et al., 2006). Likewise, associations between mothers' and their 2 to 4-year-olds' mental state talk during descriptions of pictures have been reported (Ruffman et al., 2002). These findings are quite

impressive as children's use of terms for desires, feelings, and cognitions emerges in the second year of life, thriving rapidly during the third year (Bretherton & Beeghly, 1982; Bretherton, McNew, & Beeghly-Smith, 1981). However, links between mothers' and children's mental state talk during shared pretense play have not yet been investigated, even though research has shown that: a) individual differences in children's mental state talk are significantly correlated to pretend play among preschool friends; and b) mental state talk is significantly more frequent within pretend play rather than in non-pretend play (Hughes & Dunn, 1997). Given that pretense provides children with opportunities to "(…) (1) manage multiple roles as playwrights and actors, (2) invent novel plots, and (3) deliberately blur the boundary between reality and pretense." (Bretherton, 1989, p. 383), looking at the interrelations between mothers' and children's mental state talk in this particular context seems relevant. Moreover, preschoolers' ability to engage in pretense is linked to the development and elaboration of mental state terms (Leslie, 1987). Therefore, the second goal of this study was to investigate associations between mothers' and their three-year-olds' use of mental state terms while interacting in a semi-structured shared pretense play task.

Both mothers' and children's mental state talk have also been linked to children's social-cognitive outcomes in both experimental and observation studies (de Rosnay & Hughes, 2006). For instance, Meins and colleagues (2002) found that individual differences in appropriate maternal mental state talk assessed during dyadic free play interactions at 6 months of infants' life predicted children's subsequent performance on theory of mind tasks at 45 and 48 months (Meins et al., 2002). In the same line, Ruffman's team (2002) found that mothers' earlier use of mental state utterances during descriptions of pictures was correlated with later success in theory of mind. On the other hand, children's mental state discourse during story-telling tasks has been found to be concurrently associated with theory of mind performance (Symons et al., 2005). Similarly, children's internal-state language in conversations with friends has been found to be related to later and concurrent theory of mind performance (Hughes & Dunn, 1998). Whereas there is a wealth of empirical findings relating mental state talk and concurrent or later theory of mind performance, the same does not apply to the relation between the former and social symbolic play, an ability thought to be a precursor of theory of mind (Leslie, 1987). Social symbolic play regards the child's ability to coordinate their symbolic perspective in play (e.g. "this banana is a telephone") with that of a social partner (e.g., "this banana is a sword"), therefore involving the capability to attend to and understand the representational viewpoint of others. In addition, because it highlights the dissociation between mental world and reality, social symbolic play has been considered an

important milestone of social cognition in the preschool years (Bretherton & Beeghly, 1982; Leslie, 1987; Rakoczy, 2008). The third goal of this research paper was to investigate whether mothers' and/or children's mental state talk were related to children's performance on a social symbolic play task assessed with an experimenter.

Finally, a fourth and final goal of our investigation was to assess if children's emotional mental state talk (i.e., desires and feelings) was uniquely associated with their social-cognitive development, and in turn whether their cognitive mental state talk (i.e., cognitions) was uniquely associated with their cognitive development. This goal derived from a recent suggestion that to date, research has not looked at whether specific types of mental state talk are related to specific outcomes (de Rosnay & Hughes, 2006).

A closing note regarding the relation between children's language and their understanding of mind. Research has consistently found a close link between language abilities and theory of mind, independent of age (Astington & Baird, 2005; Milligan, Astington, & Dack, 2007). However, the nature of this complex relationship is very much in debate (Astington & Baird, 2005). As it was not our goal to tap into this specific territory, in the case of children's social-cognitive outcome, we opted to present full as well as verbal IQ-partialled correlations.

In summary, this study had four major goals:

1. To assess whether mothers' offline mind-mindedness was related to their concurrent use of mental state talk when interacting with their three-year-olds during a shared pretense play task. Based on previous results longitudinally linking those two dimensions, it was expected that more mind-minded mothers would use more mental state talk while interacting with their three-year-old children.

2. To investigate associations between mothers' and children's use of mental state terms during a pretense play interaction. Given that previous research has found associations between mothers' and children's mental state talk in a variety of situations as well as positive correlations between mental state talk among preschoolers in pretense contexts, positive associations were expected between mothers' and children's use of mental state terms in a shared pretense play task.

3. To examine whether mothers' and/or children's mental state talk were related to children's performance on a social symbolic play task assessed with an experimenter, either with or without controlling for verbal ability. Based on empirical findings showing positive associations between mental state talk and children's theory of mind performance, mothers'

and children's mental state talk were expected to be associated with children's social symbolic sophistication, even after accounting for children's verbal ability.

4. To explore if references to desires and feelings were related to social symbolic play sophistication and cognition references to cognitive development. Following de Rosnay and Hughes' (2006) remark, it was hypothesized that more references to desires and feelings would be positively associated with better social-cognitive development. On the other hand, more references to cognitions would be positively associated to cognitive development.

Method

Participants

Forty-nine child-mother dyads were assessed when the children (28 boys, 57.1%) were aged between 36 and 40 months (M = 37.78, SD = .99). Most of the mothers had higher education qualifications, while the remainder 32.7% (n = 16) had completed 5 to 12 years of formal education. All dyads were participating in a larger longitudinal study on children's social-cognitive development since the children were 10 months-old. The initial sample consisted of 52 intact families (infant and both parents) recruited from childcare centers from a large city in the North of Portugal. However, three of the families did not participate at the third year assessment for various reasons (one family refused, another could not be traced, and the third one was unable to participate at the time). All participants were White and had Portuguese as their first language.

Procedure

Each child-mother dyad attended one session with the approximate duration of 1½ hour, including a 15 minute break. During this visit, child-mother and child-experimenter interactions were video recorded and the assessment of children's cognitive development (including verbal ability) was initiated. Within a maximum of two weeks of the first visit, children returned with their fathers, and the assessment of their cognitive development was completed. Procedures took place in a university laboratory setting composed of two adjacent rooms separated by a floor-to-ceiling bidirectional mirror.

Measures

Mothers' mind-mindedness.

Maternal mind-mindedness was assessed using the "Describe your Child" semi-structured interview (Meins et al., 1998), aimed at evaluating the mothers' proclivity to describe their children in mentalistic terms. Mothers' answers to the open-ended invitation: "Could you describe (child's name) for me?" were audio taped and subsequently transcribed. Transcripts were then coded for mind-mindedness using an adaptation of the coding schemes devised by Elizabeth Meins and colleagues (Meins et al., 1998; Meins, Harris-Waller, & Lloyd, 2008), whereby each attribute mentioned was classified into one of the following exhaustive and mutually exclusive categories: a) *Mental* - any reference to the child's mental life including mind, will and wishes, intellect, interests, imagination, and metacognition; b) *Behavioral* - any reference to behaviors, such as games or activities enjoyed by the child, as well as behavioral interactions with others; c) *Physical* - any physical attributes as well as references to the child's age or position in the family; d) *Self-referential* – any comments that were self-focused, therefore indirectly describing the child through an effect on the mother; and e) *General* - any general comment about the child that did not fit the above categories. Mind-mindedness was reflected by the mental category. In order to control for different levels of verbosity among the mothers, the mental category was expressed as a proportion of the number of mental attributes divided by the total number of characteristics mentioned (mental, behavioral, physical, self-references, and general).

All the interviews were independently coded by the principal investigator as well as a graduate student previously trained for this purpose. Inter-rater agreement was excellent (k = .94).

Mothers' and Children's Mental State Talk.

Mothers' and children's mental state talk were assessed during a semi-structured shared pretense interaction where mothers and children were asked to imagine to be spending an afternoon at the beach – a common leisure activity for Portuguese families. A set of toys and props (e.g. toy food and drinks, sunscreen, beach towels) were strategically placed along the floor, and mothers were given a script with general guidelines. The task had no time limit, ending with a signal from the mother. This semi-structured shared pretend play task was designed to elicit mental state talk from both mothers and children. All interactions were videotaped and later transcribed.

Coding of mental state talk was based on previous studies (Brown & Dunn, 1991; Jenkins et al., 2003) and both children's and mothers' mental state terms were coded into one of the following mutually exclusive categories: a) *Desires*: e.g. like/dislike; love/hate; want;

prefer (e.g. "Where would you *like* to go next?"; "This is my *favorite* color!"); b) *Feelings*: e.g. bored; amused; excited; happy (e.g. We're having so much *fun*!"; "Are you *bored*?"); and c) *Cognitions*: e.g. think; decide; know; recognize; remember; realize; expect; understand/solve (e.g. "*Remember* the last time we went to the beach?"; "Do you *know* what this is?"). Each participant received four scores for mental state talk: *mental words* in proportion to the total number of words uttered in the shared pretense interaction; *desire references* in proportion to the total number of mental state words; *feeling references* in proportion to the total number of mental state words; and *cognition references* in proportion to the total number of mental state words. It could be argued that desire, feeling, and cognition references should be a proportion of the total number of words in the interaction. However, due to the high number of words in the interactions (M = 1217.02, SD = 403.62 for mothers; M = 295.67, SD = 167.78 for children), these proportions were extremely low. Nevertheless, analyses using those alternative indexes produced the same pattern of results as the ones reported here.

A set of randomly selected 30% of the tapes was independently coded by a second trained researcher. Inter-rater agreement was excellent (k = .95 for both mothers' and children's use of mental state terms).

Social Symbolic Play.

This structured play task aimed at accessing children's social-cognitive development by assessing the extent to which the child was capable of attending to and of understanding other people's perspectives in a symbolic play context (Meins & Russell, 1997). More specifically, it called upon the child's ability to incorporate the suggestions of an unfamiliar adult into their own symbolic actions. For this purpose, each child was presented with two sets of objects – two representational toys (doll and toy car) and nine objects with no obvious representational features, such as a toilet roll inner tube or a piece of aluminum foil. A 5-minute *introductory play session* starting as soon as the child had made the first intentional contact with the objects served the purpose of familiarizing the child with the experimenter as well as the materials. This was immediately followed by the *structured play session* which involved two conditions – *elicited* and *instructed play*. At that moment, only two objects were left on the table (usually according to the child's preferences): one representational toy and one "junk object" (Meins & Russell, 1997, p. 68). In the elicited condition no specific instructions were given to the child. The experimenter simply asked "What can you do with these?". After the child had carried out some action or given a verbal response (or in the clear

absence of either), the experimenter asked the child to perform a specific action (e.g. doll and water bottle lid – "Make the doll eat the dinner off her plate") - instructed condition. The child was then randomly presented with each of the remaining pairs.

Symbolic actions in the elicited and instructed conditions were rated on a 5-point *Likert* scale (from 0 to 4) with higher scores corresponding to greater symbolic sophistication. In addition, the potential number of stages through which the child could advance to reach the maximum score in the elicited conditions was also recorded. These scores allowed for the calculation of an overall *executive capacity* score which reflected the child's ability to understand and subsequently integrate the experimenter's symbolic suggestions (Meins & Russell, 1997). In this study, we used this score as an indicator of children's social cognitive abilities. The score was expressed by the following equation:

$$\frac{\text{Average score instructed play} - \text{Average score elicited play}}{\text{Average number of levels remaining above elicited play levels}}$$

According to the authors, the higher the score the more the child was able to benefit from the experimenter's play suggestions by integrating them into his/her symbolic play. This ratio was intended to prevent floor effects, as it controlled for the number of levels above the child's elicited play performance. Nevertheless, ceiling effects were also possible. In order to control for this possibility, we replicated the precaution measure taken by Belsky and colleagues (Belsky, Garduque, & Hrncir, 1984) and correlated the executive capacity score with a score resulting from the absolute difference between instructed play and elicited play. The high positive correlation coefficient, $r = .98$, $p = .000$, ensured us that neither ceiling nor floor effects affected the executive capacity scores for this sample.

Approximately 30% of the tapes were independently scored by a second rater. Inter-rater agreement (Intraclass Correlation Coefficient, two-way mixed) was considered to be excellent (Mean $r_i = .93$; min = .92; max = .96).

Verbal Ability and Cognitive Development.

Children's Verbal IQ and Full Scale IQ were assessed using the *Wechsler Preschool and Primary Scale of Intelligence – Revised* (*WPPSI-R*; Wechsler, 2003), which was administered by a trained researcher. Although the WPPSI-R yields three scores - Performance IQ, Verbal IQ, and Full Scale IQ – only the last two were used in this study. The Full Scale IQ was considered an index of children's cognitive development, whereas Verbal IQ was used as an index of children's verbal abilities. The WPPSI-R has been shown to have

excellent reliability (.93 for the Performance subscale; .94 for the Verbal subscale and .97 for the Full Scale).

Results

We begin by presenting the descriptive measures for mothers' and children's speech variables as well as children's social symbolic play and full scale IQ (Table 1C).

Table 1C

Descriptive Statistics for Mind-Mindedness, Mental State Talk, and Children's Outcomes

	M (SD)	Median	Range	Yes (1+)
Mothers' Mind-Mindedness				
Total number of words	223.55 (186.69)	193	51-1027	---
Total number of attributes	21.08 (13.89)	18	8-73	49 (100%)
Mental terms	6.59 (4.73)	5	0-22	48 (98.0%)
Behavioral terms	11.24 (8.89)	9	2-49	49 (100%)
Physical terms	.49 (1.04)	0	0-5	14 (28.6%)
Self-references	.88 (1.13)	1	0-5	26 (53.1%)
General terms	1.88 (1.98)	1	0-11	37 (75.5%)
Number of categories used	3.57 (.89)	4	2-5	49 (100%)
Mothers' Mental State Talk				
Total number of words	1217.02 (403.62)	1195	375-2760	---
Total number of mental words	27.59 (16.63)	23	4-81	49 (100%)
Desires	18.41 (12.85)	14	0-55	47 (95.9%)
Feelings	.43 (1.17)	0	0-7	10 (20.4%)
Cognitions	8.76 (6.45)	7	0-24	46 (93.9%)
Children's Mental State Talk				
Total number of words	295.67 (167.78)	297	1-826	---
Total number of mental words	8.02 (7.47)	6	0-35	45 (91.8%)
Desires	7.00 (6.93)	5	0-35	45 (91.8%)
Feelings	.02 (.14)	0	0-1	1 (2.0%)
Cognitions	1.00 (1.79)	0	0-7	18 (36.7%)
Children's Outcomes				
Social Symbolic Play	.05 (.04)	.06	-.07 - .11	---
Full scale IQ	112.82 (16.87)	113	78-158	---

We then tested the association between maternal mind-mindedness during the "Describe your Child Interview" and her use of mental-state talk while in interaction with her child in a shared pretense task (Table 2C). Next, we proceeded to the associations between maternal mental state talk and their children's mental state talk and outcomes (Table 3C).

Finally, we report the associations between children's mental state talk and developmental outcomes (Table 4C). The last two steps were done both without controlling for children's verbal ability, and controlling for it. All significant levels reported are two-tailed. Table 1C presents the descriptive measures for mothers' and children's speech variables, as well as children's outcomes.

Mothers used more frequently behavioral terms, followed by mental and general attributes in their children's descriptions. The use of physical attributes as well as self-references were quite low. Given the medians for these last two categories, and the fact that less than half the sample used them, it was decided to dichotomize those two variables.

With respect to mental state talk, desires were the most common terms used by both mothers and children. Children did not make much use of feeling or cognition terms during the shared pretend play task with their mothers.

No associations were found between any of the maternal variables and mothers' educational level, so this variable was discarded from further analyses.

In what concerns social symbolic play, two of the nine pairs were excluded from the total score because of ceiling effects. Therefore, the reported descriptive statistics concern the total score computed from the seven remaining pairs.

Table 2C

Mothers' Mind-Mindedness and Mental State Talk While Interacting with Their Children

	Mental State Talk			
	Mental words	Desires	Feelings[a, b]	Cognitions
Mind-mindedness				
Mental	-.09	.02	-.02	-.02
Behavioral	.10	.07	.16	-.08
Physical[a, b]	.15	-.19	.45[c]	.19
Self-References[a, b]	.04	-.05	.05[c]	.04
General	-.11	-.10	-.21[b]	.12

Note. All Pearson correlation coefficients unless otherwise specified.

[a] Dichotomous variables (No – 0; Yes – 1); [b] Point-biserial correlation coefficient; [c] χ^2

Table 2C presents the intercorrelations between mothers' mind-mindedness and their mental state talk while in a shared pretend play task with their children.

Maternal mind-minded attributes about their children were unrelated with their use of mental state talk during shared pretense with their three-year-olds. Therefore, we decided to investigate any possible associations between mothers' mind-mindedness and mental state talk and their children's mental state talk and outcomes. Two sets of associations were carried out: correlations without controlling for children's verbal ability and partial correlations accounting for such variable (Table 3C).

Table 3C

Full/Verbal IQ-Partialled Correlations Between Mothers' Mind-Mindedness and Mental State Talk and Children's Mental State Talk and Outcomes

	Children's Mental State Talk		Children's Outcomes		
	Desires	Cognitions[a, b]	Social Symbolic Play	Full Scale IQ	Verbal IQ
Mind-mindedness					
Mental	.16/.17	-.07/-.10	.13/.10	.12	.10
Mental State Talk					
Desires	.36**/.35*	-.27^{+}/-.23	.05/.14	-.15	-.22
Feelings[a, b]	-.08/-.08	.95[c]/.97[d]	-.11/-.07	-.08	-.10
Cognitions	-.36*/-.35*	.26^{+}/.22	-.04/-.14	.15	.22

Note. All Pearson correlation coefficients and partial correlations unless otherwise specified.

[a] Dichotomous variables (No – 0; Yes – 1); [b] Point-biserial correlation coefficient; [c] χ^2; [d] B from Hierarchical Logistic Regression

$^{+}$ $p < .10$; * $p < .05$; ** $p < .01$

Mothers' use of mentalistic descriptions of their children, off-line mind-mindedness, was not related with children's mental state talk or outcomes.

With respect to mothers' and children' mental state talk, the more mothers used desire references during the shared pretense task, the more children did so too, $r = .36$, $p = .010$, even after controlling for their verbal ability, r (46) = .35, $p = .014$. There was also a marginally positive significant association between mothers' and children's reference to cognitions, $r_{pb} = .26$, $p = .068$, which did not hold after controlling for verbal ability, r (46) =

.22, p = .14. Finally, more desire references on the children's part were negatively related to mothers' use of cognitive references during their pretense interaction, r = -.36, p = .011.

Mothers' mental state talk was not related with either children's social symbolic play sophistication, their full scale IQ or verbal IQ.

Finally, Table 4C presents the results concerning associations between children's mental state talk and outcomes.

Table 4C

Full/Verbal IQ-Partialled Correlations Between Children's Mental State Talk and Outcomes

	Children's Mental State Talk	
	Desires	Cognitions[a]
Children's Outcomes		
Social Symbolic Play	.33*/.40**	-.10/-.22
Full Scale IQ	-.13	.30*
Verbal IQ	-.09	.26[+]

[+] $p < .10$; * $p < .05$; ** $p < .01$

Children's references to desires was significantly associated with their social symbolic play sophistication, both before, r = .33, p = .020, and after, r (46) = .40, p = .006, controlling for their verbal ability.

Conversely, children's full scale IQ was positively correlated with children's references to cognitions, r_{pb} = .30, p = .040.

Discussion

This study is premised on the assumption that mother-child discourse about desires, feelings, and thoughts is fundamental for children's evolving mentalizing abilities during preschool years.

Our first aim was to explore whether mothers' mentalistic descriptions of their three-year-olds were associated with their mental state talk while in interaction with them. No significant results were found, which challenged our first hypothesis. Two sets of results from Meins' research team lead us to expect concurrent links between off-line mind-mindedness and interactional mental state talk. First, interactional appropriate maternal mind-minded comments at 6 months of infants' age have been longitudinally (although not concurrently)

linked to later off-line mind-mindedness (Meins et al., 2003). Second, a high degree of consistency has been found between mind-mindedness in two non-interactional tasks, even if in a sample of school aged children (Meins, Fernyhough, Johnson, & Lidstone, 2006). Why is it then that no concurrent associations were found between off-line mental comments about her child and her use of interactional mental state talk during a dyadic pretense task? A possible explanation is the fact that the nature of mothers' speech observed in each task is different. When assessing off-line mind-mindedness, mothers were asked to describe their child to the researcher. In compliance to this request, mothers used indirect speech in a non-interactional context, and could therefore reflectively select which attributes to use. In addition, we cannot disregard some effect of social desirability, as mothers' tended to give the best descriptions of their children, which in the context of a psychological study could have resulted in more mental attributes that did not accurately reflect mother's representations of their children, nor their daily speech when talking to their children. On the other hand, during the shared pretense task, mothers and their children were involved in an interaction, where direct speech was at play. It could be that mothers' and children's mental state talk influenced each other, leading mothers to adopt a type of discourse different from the one displayed while describing their offspring on their own. As we have not yet carried out sequential analyses (Bakeman & Gottman, 1997) on our interaction verbal data, this hypothesis remains unanswered. This explanation does not conflict with either empirical findings mentioned, as in the first study mothers' appropriate mental state talk was very much one-sided as they were interacting with preverbal infants (Meins et al., 2003), and, in the second study, the consistency found was between two non-interactional tasks (Meins et al., 2006). Another possibility is that mothers who were more mind-minded when thinking and describing their children were also more sensitive to their children's speech when interacting with them. In turn, that sensitivity could be expressed by following their children's type of speech instead of taking the initiative of using mental state terms that the children were not spontaneously using. Future studies that include an independent measure of maternal sensitivity could test this hypothesis.

Our study also aimed at exploring links between mothers' and children's mental state talk during shared pretense. Mental state terms start emerging in children's speech from the second birthday onwards. However, not all types of terms emerge simultaneously. References to desires and feelings are the first mental state terms to surface in children's vocabulary around the second year of life, increasing quickly in frequency thereafter (Bretherton & Beeghly, 1982; Bretherton et al., 1981). Cognitions, on the other hand, are considered the

most advanced mental state terms, and tend to appear toward the middle of the third year, gradually increasing until the age of five (Hughes & Dunn, 1998; Shatz, Wellman, & Silber, 1983). Concurrently, children's mentalizing capacities are rapidly evolving. At about two years of age, toddlers start displaying symbolic play, which will grow into more sophisticated capacities such as social symbolic play around the third birthday, and theory of mind about a year later (Astington & Barriault, 2001; Lillard, 1993). It is not surprising then that a privileged context for the emergence of mental state talk among preschool peers is pretense (Hughes & Dunn, 1997). Yet, no study has tried to establish whether mothers' and children's mental state talk is associated in this particular context. That was the second aim of this investigation. Initial descriptive analyses revealed that desire references were the most common terms used by both mothers and children. Conversely, children did not make much use of cognition terms during the shared pretense play task with their mothers, and only one child made reference to feeling terms. These descriptive results are interesting in themselves, as they seem to contradict the expected "natural" order described by earlier empirical studies. As to our specific hypothesis, our initial prediction was partially supported. On the one hand, mothers' and children's desire references during a pretend day at the beach were positively correlated, even after controlling for children's verbal ability, which is in line with previous empirical findings (Symons et al., 2006) and a suggestion by Ruffman et al (2002) that mothers tend to match their use of mental state talk to the child's developmental level. It may also be argued that by using mental state language that the child can readily understand, the mother is providing the "appropriate framework for mental activity within a conversation" (Symons et al., 2006, p. 687), which contributes to a Vygotskian approach to social-cognitive development. On the other hand, mothers' and children's cognition references were not related once children's verbal ability was partialled out (being only marginally correlated before). This result contrasted with Symons and colleagues' study who found that two-year-olds' cognitive state language was associated with that of mothers (Symons et al., 2006). We advance two possible explanations for this. Firstly, the fact that children made considerably less cognition references than anticipated (comparing to similar studies) may suggest an effect of the particular context of pretense. Although one might expect this context to promote the use of all types of mental state words, including cognitions, this speculation has not been tested to date. Therefore, future research could investigate whether the associations between mothers' and children's use of mental state talk may vary according to context. An alternative explanation for these unexpected results may regard the fact that often mothers made a specific reference to cognition "let's pretend (…)" to prompt children to engage in the

pretense interaction. Therefore, the use of this mental state term might have been associated with attempts to initiate, or even control, the child's actions, and not so much to mirror a cognitive state. This explanation is also consistent with the quite surprising result of maternal references to cognitions being inversely related to children's use of desire terms. If some mothers' used this cognitive reference to encourage children to engage in play, then it is possible that these children had been more off-task and thus produced less talk about desires (the most common type of mental state talk in our children). However, our conclusions about this particular result are rather tentative.

A third goal was to assess whether mothers' and/or children's mental state talk were related to children's concurrent performance on a social symbolic play task assessed with an experimenter.

Contrary to our expectations, maternal off-line mind-mindedness and interactional mental state talk were not related to children's social symbolic play abilities assessed by a researcher in an independent task. In what concerns the null results between non-interactional mind-mindedness and children's social-cognitive outcomes, these are congruent with that previously reported on the absence of correlations between mothers' mentalistic descriptions of their children and concurrent performance on a battery of theory of mind tasks at 48 months of age (Meins et al., 2003). Meins et al. (2003) suggest that the reflective nature of this measure may not be a true barometer of the mother's proclivity to engage with her child on a mental level. It could then be hypothesized that maternal references to mental states in interaction with the child would more likely be associated with the child's enhanced social cognitive skills. Again, and contrary to our expectations based on earlier research linking maternal online mind-mindedness at age 6 months and theory of mind in the preschool years (Meins et al., 2003), interactional mental state talk was not correlated with children's social symbolic play abilities. There are a number of alternative interpretations for this finding. First, it is possible that the use of mental state terms is not a stable maternal characteristic, being sensitive to changes related to other individual, relational and contextual aspects of the mothers' own lives. For example, aspects like maternal psychopathology (e.g., Murray, Kempton, Woolgar, & Hooper, 1993; Wan et al., 2007) and perceived marital conflict (e.g., Pancsofar, Vernon-Feagans, Odom, & Roe, 2008; Pratt, Kerig, Cowan, & Cowan, 1992) were found to influence maternal verbal behavior towards their children. Second, we can hypothesize that maternal mental state talk may have an impact in later socio-cognitive milestones. Thus, it is possible that earlier (but not concurrent) mental state talk may explain individual differences in children's social symbolic play. Such an interpretation is congruent

with Meins' results of a direct effect of mind-mindedness at 6 months on children's theory of mind about 3 ½ years later (Meins et al., 2003). Yet, another possible explanation for the apparent lack of significant associations between maternal mental state talk and children's social symbolic abilities may have its roots on the level of maternal mental state talk elaboration. Previous investigations on the impact of maternal talk about feelings have shown that it is not their simple use that accounts for children's emotional competence. Instead, individual differences on children's emotional outcomes are better explained by mothers' causal and elaborate explanations associated with their talk about feelings (Garner, Jones, Gaddy, & Rennie, 1997). With our data and results, we are not in a position to discard a similar effect in our sample, as we did not assess the level of elaboration of maternal mental state terms. This aspect leads us to a final argument on the potential role of the accuracy of the mind related comments. In their study on maternal mind-mindedness, Meins et al. (2003) found that mother's use of mental terms that appropriately commented on their infant's mental states at age 6 months significantly predicted preschoolers' theory-of-mind abilities. Although this approach could have been adopted, we opted not to do so. Making appropriate comments regarding the infant's supposed mental states at 6 months involves a great deal of interpretation from the mother. On the contrary, three-year-olds are generally verbally fluent and increasingly able to communicate desires, emotions and thoughts (Bretherton & Beeghly, 1982). In addition, this was a pretend play situation, which, we argue, renders validity to all desires, emotions, and cognitions. Therefore, a measure of appropriateness based on children's affirmative responses to maternal suggestions and comments might not be suitable.

Finally, children's references to desires, but not to cognitions, were related to the level of sophistication of their social symbolic play. This finding can be read in light of the 'desire psychology' theoretical position (Wellman, 1990; Wellman & Woolley, 1990). In early preschool years, children are able to understand and predict others' behavior based on their desires (versus more advanced and later emerging 'belief-desire psychology'). Based on this framework, the children in our sample are still considered to be too young to possess a mature knowledge about beliefs, so their explanations of human behavior must rely on their attributions of desires. In fact, empirical studies have confirmed that children develop their understanding of desires before they understand beliefs, which, in turn, will pave the ground for the emergence of a mature theory of mind in later preschool years (Ruffman et al., 2002; Wellman & Liu, 2004). Although the cross-sectional and correlational nature of this study prevents us from making claims of causality between the mental state talk and social symbolic play abilities, research suggest that this could be an appropriate interpretation of the data.

Many empirical studies have found concurrent and longitudinal links between children's mental state talk and social cognitive outcomes (Dunn, Brown, & Beardsall, 1991; Hughes & Dunn, 1997; Nielsen & Dissanayake, 2000; Symons et al., 2005). Of particular relevance is the finding that mental state talk among three-year-olds and their peers predicted their theory of mind a year later. Convincingly, the opposite was not true, which lent support to a true causal link between children's mental state talk and their social cognitive development (Hughes & Dunn, 1998). Talk about desires may therefore have promoted the understanding of subjective stances required for social symbolic play.

Finally, we aimed at exploring whether specific children' mental state terms would be differentially associated with distinct outcomes, namely social-cognitive and cognitive ones.

In fact, our fourth prediction was confirmed in that whereas children's references to desires were significantly associated with their social symbolic play sophistication, full scale IQ was positively correlated with their references to cognitions. This pattern of differential associations could add weight to the view of domain specificity, with emotion discourse (desire and feeling references) promoting social-cognitive development and non-emotional mental state talk (cognition references) facilitating cognitive development (de Rosnay & Hughes, 2006). Nevertheless, further research is needed in order to generalize the associations we obtained.

We chose to focus on earlier social symbolic play abilities, in contrast with most literature which tends to be biased towards the study of theory of mind, for two distinct reasons. Firstly, pretense is a context where children tend to exhibit a level of social cognition that is above their performance in non-pretense contexts, functioning as a zone of proximal development (Vygotsky, 1987). We believe this, in itself, warrants pretense an important place in developmental research, from a social-cognitive point of view. In addition, this milestone is relatively unexplored in terms of its associations to mothers' and children's mental state talk. Our results contribute to further the understanding of mothers' and children's mental state talk and their impact on children's cognitive and social cognitive development in the early preschool years.

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CHAPTER 5

CONCLUSION

Social Cognition in Infancy and Preschool Years: State of the Art and Unanswered Research Questions

Social cognition is one of the areas of child development that has received most attention in the last decades. Yet, as in any lively research field, many questions remain unanswered, and new ones keep emerging. We sought to address some of those gaps in the literature by focusing on two important milestones of social cognition: joint attention in infancy and social symbolic play in the early preschool years. Regarding the former, we described parallel and joint attention in a normative sample of 10-month-olds, and made a contribution towards the clarification of individual, relational and contextual influences to individual differences in infants' attention skills. In what concerns the latter, one major question regarded whether joint attention at 10 months was a predictor of social symbolic play at 3 years. In addition, were mothers' and children's mental state talk concurrent predictors of social symbolic play? This also led us to analyze individual differences in mothers' as well as children's mental state talk. Do these covary? Finally, we investigated the associations between mind-related speech and two important child outcomes: social-cognitive and cognitive development.

In the next paragraphs we shall summarize our main empirical findings.

Summary of Empirical Findings

Paper 1 investigated the individual, relational and contextual predictors of infant parallel and joint attention (following and initiating behaviors) at 10 months. Results showed that parallel attention was marginally associated with infant's ability to follow the mother's bids for joint attention, but not to initiate joint attention him/herself. In addition, we found initiating and following joint attention behaviors to be significantly intercorrelated. Results suggested that these different dimensions of infant attention can be considered, albeit partially, expressions of a common underlying social cognitive ability (Tomasello, 1995). Yet, these indices are not redundant, as each presented a specific set of predictors. Concerning parallel attention, this attention index was significantly predicted by infant's higher mental development, low negative emotionality, and more maternal entertaining behaviors. Following joint attention, on the other hand, was predicted only by total maternal bids for joint attention. However, a closer look indicated that his attention index was marginally correlated with maternal entertaining and attention-directing strategies, but not teaching behaviors. Nonetheless, much variation underlying infant's ability to follow a social partner's

bids for joint attention remains unexplained. We suggested that earlier influences might have played a stronger role than concurrent ones. Finally, infant's ability to initiate joint attention was significantly predicted by the presence of older siblings, infant's low negative emotionality, and less maternal teaching strategies (marginal).

Paper 1 provided three important main findings. On the one hand, the consistent association of every attention index to categories of maternal bids for joint attention, and on the other hand, different maternal behaviors played specific roles in each index. The third finding regards the relevance of infant's expression of negative emotionality for parallel attention and infant's bids for joint attention. Although we proposed different processes for each attention index, still this study expanded previous research by showing an association between concurrent expression of negative emotionality and parallel and joint attention.

In paper 2, we tested infant's joint attention with the mother at 10 months and mother-child mental state talk in pretense at age 3 as predictors of children's social symbolic play abilities with an experimenter. Contrary to expected, infant joint attention was not a significant predictor of children's social symbolic play. Therefore, our study failed to demonstrate a longitudinal link between two supposed milestones of the development of social cognition in infancy and early preschool years. One question that can be raised is whether they are really part of the same developmental path. However, we argued that at 10 months, joint attention could have been in its inception, and therefore longitudinal links with social symbolic play might have not yet been discernible (Brooks & Meltzoff, 2005; Van Hecke & Mundy, 2007). On the other hand, because performance on social cognitive tasks is likely to be influenced by the social partner involved (Youngblade & Dunn, 1995), we cannot rule out the possibility of uncovering longitudinal links between joint attention and social symbolic play had we assessed both with the same interlocutor (e.g., the mother). Furthermore, and contrary to our initial hypothesis, maternal use of mind-related words during a dyadic pretense interaction was unrelated to children's social symbolic play. We posited different explanations for this result. Considering previous research highlighting the impact of maternal mental state talk, we hypothesized that, in our sample, maternal talk about mental states may have exerted its role in the development of children's social symbolic play at an earlier stage and that concurrent mental state talk may in turn influence later milestones of social cognition. We also suggested that the level of elaboration (e.g., causal explanations) and the appropriateness of mental references – aspects that were not assessed in this study – might have been of importance. Finally, we raised the possibility that mothers' tendency to

use mental state talk may not be a stable trait, but rather a dimension of maternal verbal behavior that can be influenced by individual, relational and contextual aspects of mothers' own lives. Our final hypothesis was partially confirmed, as children's references to desires (but not feelings or cognitions) were a significant concurrent predictor of their ability to incorporate the experimenter's play suggestions into their symbolic play, over and above the influences of verbal ability as well as mother's own mental state talk. These results corroborate the notion that children's understanding of desires assists them in the development of social symbolic play, an earlier milestone of social cognition (Ruffman, Slade, & Crowe, 2002; Wellman & Liu, 2004).

Overall, results in paper 2 underlined the need to consider different types of mental state talk, as well as mutual influences between children's and mothers' references to mental states, and not just the presence of such references in general, when investigating the development of social cognition in early preschool years.

In Paper 3 we sought to further investigate such links, as well as to explore the impact of mother-child mental state talk to both children's social cognitive and cognitive development. In addition, we aimed at assessing whether maternal off-line mind-mindedness was related to both her own and her child's mental state talk. With respect to the former, we found that mothers' mental state talk in shared pretense was not related to their concurrent mentalistic descriptions of their 3-year-olds. We conjectured that the nature of mothers' speech observed in each task was different. Mental descriptions were collected in an interview, therefore mothers could be more reflective and selective about which attributes to use. Mental state talk on the other hand, was subject to less "filtering", as well as to the influences of the child's own speech and behavior. Furthermore, we hypothesized that this lack of association might be due to a higher attunement of mothers describing their children with mental attributes, as these mothers would be more able to adapt their speech to the child's own use of mental state talk. Indeed, this paper provided some support to this hypothesis, as mothers' and children's references to desires were positively associated, even after taking into account children's verbal ability. Considering that references to desires are among the first to spontaneously emerge in children's vocabularies (Bretherton & Beeghly, 1982; Bretherton, McNew, & Beeghly-Smith, 1981), this result is in line with the suggestion put forward by Ruffman and colleagues (2002) that mothers tend to match their use of mental state talk to the child's developmental level. On the other hand, maternal and children's references to cognitions were only marginally associated, becoming non-significant once

children's verbal abilities were partialled out. In addition, maternal references to cognitions were inversely related to children's desire references. We hypothesized that mothers' use of "pretend" (the most common reference to cognition) might have served the purpose of coaxing the child into play, rather than truly reflect a cognitive state. Finally, we found children's mental state talk to significantly relate to two important developmental outcomes. Children's references to desires were related to the level of sophistication of their social symbolic play, whereas their references to cognitions were associated with their full-scale IQ. This pattern of differential associations supports the view of domain specificity, where emotion discourse (desire and feeling references) could promote social-cognitive development and non-emotional mental state talk (cognition references) might play a role in facilitating cognitive development (de Rosnay & Hughes, 2006).

Limitations

In conclusion, some limitations are worthy of mention. One is the limited aspects of joint attention measured, namely the fact that duration of episodes was not included – an aspect that could be of great importance, above and beyond the simples occurrence of joint attention behaviors. However, the videos were not originally made to assess this aspect of social cognition, so we were unable to reliably code the duration of parallel and joint attention episodes, only the frequency of attention behaviors.

Second, our sample consisted mainly of White mothers of middle to upper-middle social economic status. If this can be an advantage from the viewpoint of having a sample virtually free of severe risk factors, allowing us to be as close as possible to a normative sample, on the other hand, there are obvious limits to the generalization of these results. In addition, although we have collected data regarding mothers' recent life experiences and psychopathology, aspects which are known to affect maternal interactive behaviors, we did not have the opportunity to analyze those data yet.

Implications for Future Research

The findings reported in this study raise a number of interesting questions for further research. First, is joint attention in the second year of life, rather than at the end of the first year, a predictor of later social symbolic play? Second, we have only addressed the possibility that infant's joint attention with the mother is a predictor of later social symbolic play with an experimenter. However, links may be relationship specific. It is important to conduct assessments of these milestones with the same partner (e.g., mother, experimenter, sibling or

peer) in order to further explore this possibility. A partner that is also of interest is the father. Which contributions do fathers bring to their children's social-cognitive development? In what concerns symbolic play, future studies may address other relevant features, such as solitary symbolic play, attribution of pretend mental states, or role playing.

Another challenge for future research is to investigate whether other qualitative characteristics of maternal speech, such as causal elaboration and appropriateness of maternal mental state talk, or how each maternal utterance is semantically related to the children's previous utterance – a term coined *connectedness* (Ensor & Hughes, 2008) – can impact on children's social understanding.

Finally, this study has found differential links between children's desire references and social symbolic play, and cognitive references and cognitive development. Further research is needed to replicate these results as well as to explore if they expand to other social cognitive or cognitive measures such as theory of mind or non-verbal measures of intelligence, respectively.

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APPENDIX I

Metodologias de Avaliação do Desenvolvimento da Cognição Social da Infância até à Idade Pré-Escolar

Resumo

Nas últimas décadas, a Psicologia do Desenvolvimento tem vindo a delinear o percurso do desenvolvimento sócio-cognitivo na procura de respostas a uma questão essencial – Como evoluem as capacidades de mentalização das crianças? O interesse em conhecer as fases que marcam o desenvolvimento da cognição social, desde as idades mais precoces até à consolidação da compreensão das causas psicológicas dos comportamentos, é legitimado pela importância vital com que estas fases se revestem ao nível da compreensão e comportamento sociais. Neste sentido, os objectivos do presente trabalho são: (a) descrever os três marcos sócio-cognitivos comummente descritos na literatura desde a infância até à idade pré-escolar; e (b) apresentar exemplos de metodologias que permitam a sua avaliação em amostras com desenvolvimento típico e atípico.

Marcos do Desenvolvimento da Cognição Social

Vários autores têm identificado marcos sócio-cognitivos desde a infância até ao final da idade pré-escolar, salientando-se, entre eles, a *atenção partilhada* no final do primeiro ano de vida (Bakeman & Adamson, 1984; Carpenter, Nagell, & Tomasello, 1998; Gaffan, Martins, Healy, & Murray, 2010); o *jogo simbólico social* emergente cerca dos 3 anos (Bretherton & Beeghly, 1982; Rakoczy, 2008; Youngblade & Dunn, 1995); e a *teoria da mente* que se consolida entre os 4 e 5 anos de idade (Hughes et al., 2005; Wimmer, & Perner, 1983; Wellman, Cross, & Watson, 2001).

Num esforço construtivo de compreensão de *como* e *quando* começamos a entender os outros enquanto agentes intencionais, este campo de estudo tem registado sucessivas evoluções. Estudos pioneiros na área tiveram como principal foco de interesse a determinação das idades típicas de emergência destas competências (Bakeman & Adamson, 1984; Flavell, Flavell, & Green, 1987; Lillard, 1994; Ungerer, Zelazo, Kearsley, & O'Leary, 1981; Wellman et al., 2001). Ao longo dos últimos anos, no entanto, assiste-se a um entusiasmo crescente na procura de diferenças individuais ao nível das competências sócio-cognitivas, com a atenção científica a dedicar-se ao impacto de factores relacionais como a qualidade da relação mãe-criança (Meins, Fernyhough, Russell, & Clark-Carter, 1998), a existência de irmãos (Dunn, Brown, & Beardsall, 1991; Ruffman, Perner, Naito, Parkin, & Clements, 1998) e das relações entre pares (Cutting & Dunn, 2006), bem como ao estudo dos seus correlatos neuronais (German, Niehaus, Roarty, Giesbrecht, & Miller, 2004; Striano, Reid, & Hoehl, 2006; Siegal & Varley, 2002). Por outro lado, tem-se gerado uma maior controvérsia em torno de variáveis como as funções executivas (Carlson, Mandell, & Williams, 2004; Fine, Lumsden, & Blair, 2001) e a linguagem (Astington & Jenkins, 1999), na medida em que a literatura não é ainda conclusiva no que se refere aos seus papéis enquanto correlatos ou preditores do desenvolvimento sócio-cognitivo. Numa outra linha, os investigadores têm vindo a debruçar-se sobre a possibilidade de existirem associações longitudinais entre os marcos sócio-cognitivos precoces, como a atenção partilhada e o jogo simbólico social, e a posterior aquisição da teoria da mente (Colonnesi, Rieffe, Koops & Perucchini, 2008; Youngblade & Dunn, 1995).

De seguida, apresentam-se de uma forma concisa as características de cada um destes marcos sócio-cognitivos.

Atenção partilhada.

Desde muito cedo, os bebés evidenciam comportamentos pro-sociais que incluem a imitação de expressões faciais (Meltzoff & Moore, 2002) e a preferência por faces e estímulos humanos (Rochat & Striano, 1999). Na mesma linha, Trevarthen (1979) e colaboradores (Trevarthen & Aitken, 2001; Trevarthen & Hubley, 1978) descreveram um conjunto de comportamentos do bebé indiciadores de uma predisposição inata para a comunicação e para a sociabilidade. Mais ainda, por volta dos 9 meses de idade, os bebés entram numa nova fase do desenvolvimento da cognição social – a intersubjectividade secundária (Trevarthen & Hubley, 1978). Se até então as interacções se baseavam essencialmente em trocas face-a-face entre o bebé e a mãe (intersubjectividade primária) ou em interacções bebé-objecto, a partir deste momento, os bebés tornam-se progressivamente capazes de participar em interacções triádicas, nas quais a atenção em relação a um objecto é partilhada com uma segunda pessoa (Bakeman & Adamson, 1984; Martins, 2003). Desta forma, os bebés são agora capazes de levar a cabo um conjunto de comportamentos com a finalidade de partilhar, seguir e direccionar o interesse face a objectos ou actividades com as pessoas com quem interagem (Bosa, 2002; Carpenter et al., 1998; Martins, 2003).

Os investigadores são unânimes em enfatizar o aparecimento simultâneo de um conjunto de competências inter-relacionadas (cerca dos 9-12 meses), enquanto índices de intersubjectividade secundária, nomeadamente: (a) a *partilha da atenção*, que corresponde aos períodos de tempo em que mãe e bebé se centram num mesmo objecto e, simultaneamente, o bebé monitoriza a atenção da mãe, alternando o seu olhar entre a face desta e o objecto em causa, (Bakeman & Adamson, 1984; Carpenter et al., 1998); (b) a capacidade do bebé de *seguir a atenção*, presenciada quando este procura o foco de interesse da mãe, utilizando como pista a sua linha de visão ou o seu gesto de apontar (Corkum & Moore, 1995; Scaife & Bruner, 1975); e (c) o *direccionar da atenção* de outrem, verificada quando o bebé procura deliberadamente dirigir a atenção da mãe através de gestos como apontar, oferecer ou mostrar um brinquedo (Bates, Camaioni, & Volterra, 1975; Carpenter et al., 1998). Os episódios descritos pelos vários investigadores citados possuem um importante denominador comum: a monitorização e a partilha da atenção do bebé com o outro em relação a um objecto exterior à díade – evidenciando, nas palavras de Carpenter e colaboradores, "the initial *meeting of the minds"* (1998, p. 2).

Jogo simbólico social.

O jogo simbólico tem sido amplamente estudado no seio da Psicologia do Desenvolvimento dados os seus importantes contributos para diferentes dimensões do desenvolvimento infantil, nomeadamente no que diz respeito à emergência da compreensão da mente. Na perspectiva de Vygotsky (1966), o jogo simbólico é considerado um exercício do pensamento representacional, através do qual a criança se torna capaz de separar os significados dos actos e dos objectos que os originam. O jogo de "faz-de-conta", que surge por volta do segundo ano de vida (Bornstein, Haynes, O'Reilly, & Painter, 1996), envolve, assim, a representação consciente e simultânea da realidade e das suas alternativas de fantasia (ex. um guardanapo azul pode ser também uma "piscina" ou um "cobertor").

Relativamente à evolução da capacidade simbólica, McCune-Nicholich (1981) refere a existência de diferentes fases, sendo que, cerca dos 3 anos, as crianças atingem o nível mais elevado. Tal manifesta-se na sua capacidade de gerar actividade simbólica ao nível mental e de forma planeada, bem como de coordenar simultaneamente duas ou mais estruturas representacionais. Paralelamente, tem também lugar um alargamento significativo da rede social das crianças, aspecto que fomenta a complexificação em termos do pensamento simbólico, evidente na emergência do jogo simbólico social. Partindo da noção de *zona de desenvolvimento proximal* de Vygotsky (1978), a interacção com parceiros mais experientes e capazes promove uma maior competência e sofisticação da capacidade simbólica nas crianças (Dunn & Dale, 1984; Youngblade & Dunn, 1995). Por outro lado, o jogo simbólico social exercita dois níveis distintos do pensamento sócio-cognitivo (Lillard, 1998a). O primeiro nível, *out-of-frame*, ocorre antes mesmo da actividade simbólica, durante a negociação dos papéis e acções por parte da criança e dos seus companheiros de brincadeira, tornando salientes vontades e desejos contraditórios. O segundo nível, *within-frame*, ocorre durante o jogo propriamente dito, caracterizando-se, essencialmente, por um exercício de descentração que permite à criança considerar em simultâneo as várias perspectivas simbólicas. Neste contexto, as experiências de jogo simbólico social constituem-se como oportunidades de desenvolvimento, permitindo à criança tornar-se progressivamente capaz de articular as próprias perspectivas com as dos outros, co-construindo um contexto representacional (Leslie, 1987; Lillard, 2002; Meins & Russell, 1997; Youngblade & Dunn, 1995).

Teoria da mente.

Entre os 4 e os 5 anos de idade, assiste-se a uma evolução assinalável em termos sócio-cognitivos que é representada pela aquisição da teoria da mente. Esta recém-adquirida

competência possibilitará, pela primeira vez, a previsão e a explicação do comportamento e do pensamento dos outros, tendo como referencial os seus estados mentais (Astington & Barriault, 2001; Martins, Osório, & Macedo, 2008). O uso do constructo "teoria" não pretende sugerir que as crianças pensem acerca do mundo mental como "pequenos cientistas". No entanto, estas recorrem efectivamente a um sistema de inferências sócio-cognitivo (Lillard, 1998b) apoiado numa estrutura coerente de conceitos que as auxiliam na compreensão de como a mente se traduz na acção humana (Wellman et al., 2001).

Desde a sua emergência, o tópico da teoria da mente tem suscitado o interesse científico de investigadores provenientes de diferentes abordagens teóricas e com distintas posturas empíricas, aspecto que tem contribuído para o acumular de um vasto corpo de evidências. Não obstante, uma recente meta-análise (Wellman et al., 2001) encontrou evidências a favor da hipótese de um padrão desenvolvimental relativamente universal. Neste sentido, apesar dos diferentes países de origem e da variedade de tarefas utilizadas pelos estudos analisados, parece existir um período de transição durante a idade pré-escolar, caracterizado pela aquisição da noção da natureza subjectiva do conhecimento. Esta nova compreensão do mundo mental permite à criança recorrer a uma multiplicidade de estados internos (para além de desejos, também crenças e expectativas), extraordinariamente úteis para as explicações psicológicas quotidianas.

Metodologias de Avaliação do Desenvolvimento da Cognição Social

A exposição das características centrais dos marcos da cognição social permite, a partir deste momento, uma melhor compreensão dos objectivos que norteiam as metodologias de avaliação da atenção partilhada, do jogo simbólico e da teoria da mente. Foi tomada a opção de explicitar duas metodologias por marco, cujos objectivos, idades de aplicação, intervenientes e durações distintas de alguma forma reflectissem a diversidade de alternativas disponíveis aos investigadores.

Avaliação da atenção partilhada.

Escalas de Comunicação Social Precoce (Mundy et al., 2003).

Objectivo principal e características gerais.

O objectivo principal da metodologia desenvolvida por Mundy e colaboradores (2003) é avaliar a capacidade de comunicação não verbal do bebé com um experimentador, incluindo-se aqui comportamentos indiciadores de atenção partilhada. Trata-se de uma

medida de observação estruturada, com a duração aproximada de 20 minutos, aplicável a bebés e crianças entre os 8 e os 30 meses de idade.

Material e procedimento.

O bebé deve estar sentado no colo do cuidador ou numa cadeira encostada a uma mesa, com o experimentador do lado oposto. Este deve colocar um conjunto de brinquedos na mesa e à vista da criança, embora fora do seu alcance. Nas paredes da sala devem estar expostos quatro posters coloridos (60 x 90), colocados de forma estratégica: dois deles a 60º, um à esquerda e outro à direita do bebé, e os restantes colocados a 150º do bebé, respectivamente atrás do seu ombro direito e esquerdo. O experimentador deve dar início à actividade apresentando os brinquedos ao bebé dizendo "Com o que queres brincar?" enquanto faz um gesto convidativo com as mãos. Os materiais disponíveis consistem em três brinquedos de corda e três brinquedos animados pelo experimentador. O bebé deve ser igualmente convidado a participar em brincadeiras de cócegas bem como em actividades lúdicas com recursos a brinquedos (por exemplo, um carrinho de brincar, um chapéu ou um livro de imagens). O experimentador deve ainda procurar direccionar a atenção do bebé para os posters na parede, usando a direcção do próprio olhar bem como do seu apontar. Todo o procedimento deve ser gravado em vídeo, captando simultaneamente a face do bebé bem como o perfil do experimentador.

Cotação.

O presente instrumento permite a avaliação de comportamentos de atenção partilhada, do cumprimento de pedidos comportamentais e do nível de interacção social. No caso específico da atenção partilhada, esta é avaliada mediante a ocorrência de dois tipos de comportamentos por parte do bebé: (a) *iniciação de atenção partilhada* (*Initiating Joint Attention*, IJA); e (b) *resposta a sugestões de atenção partilhada* (*Responding to Joint Attention*, RJA). Relativamente à iniciação de atenção partilhada, esta é caracterizada por comportamentos como alternar o olhar entre um brinquedo que manipula e a face do experimentador ou mostrar um brinquedo enquanto mantém contacto ocular. O nível de IJA do bebé é reflectido pela frequência com que os comportamentos acima descritos ocorrem ao longo de todo o procedimento.

Relativamente às reacções do bebé às sugestões do experimentador, pretende avaliar-se até que ponto o bebé centra o seu interesse no novo foco introduzido. Os comportamentos incluem seguir o apontar ou a linha de olhar do experimentador em direcção a um poster ou

brinquedo. Desta forma, o nível de RJA é definido pelo número de vezes que o bebé orienta o seu foco visual na direcção do olhar ou apontar do experimentador, dividido pelo número total de ensaios. No caso dos posters, o bebé deverá desviar o seu olhar em pelo menos 45º para a direita ou para a esquerda, ou mais de 90º nos ensaios relativos aos posters colocados atrás.

Sistema de Cotação da Atenção Partilhada (Martins, 2003).

Objectivo principal e características gerais.

O objectivo principal da metodologia desenvolvida por Martins (2003) reside na avaliação da ocorrência de diversos comportamentos de partilha de atenção entre o bebé e um adulto no último trimestre do primeiro ano de vida. Trata-se de um sistema de cotação aplicado a uma interacção lúdica semi-estruturada de 10 minutos de duração.

Material e procedimento.

O bebé deve estar sentado numa cadeira em frente a uma mesa ao nível da sua cintura e com o adulto à sua esquerda. Para que seja possível captar os movimentos e expressões faciais do adulto ao longo da interacção, deve colocar-se um espelho à direita do bebé. Este reflectirá a face do adulto. Em seguida, apresenta-se à díade um brinquedo que seja simultaneamente interessante e desafiante para o bebé (i.e., um pouco acima do seu nível desenvolvimental), o que potencialmente elicitará orientações e/ou demonstrações por parte do adulto. Por exemplo, nos seus trabalhos, Martins (2003) usou um camião de madeira com três encaixes para três bonecos coloridos. Relativamente às instruções, estas devem ser claras mas não demasiado directivas: "Brinque com o(a) [nome da criança] usando este brinquedo. Tente ver o que ele(a) consegue fazer." De seguida, e durante 10 minutos, o adulto e o bebé são deixados sozinhos com a câmara a filmar a partir do interior da sala.

Cotação.

A atenção partilhada é avaliada mediante a ocorrência de três situações: (a) *episódios de atenção partilhada* (duração); (b) *reacções do bebé às estratégias do adulto para direccionar a sua atenção* (frequência); e (c) *estratégias do bebé para direccionar a atenção do adulto* (frequência).

Relativamente aos episódios de atenção partilhada, estes ocorrem quando existe coordenação da atenção de ambos os elementos da díade para um objecto externo. Para que tal se verifique, são necessárias três condições *sine qua non*: presença de atenção coordenada

(isto é, ambos olham para o mesmo objecto), troca de olhares entre o bebé e o adulto em algum momento, e o episódio ser de valência emocional positiva ou neutra (pois episódios de conflito evidenciam um desencontro de intenções). Deve registar-se o período de tempo durante o qual a díade partilha a atenção, terminando assim que um dos elementos quebrar o episódio, por exemplo, focando a sua atenção num outro objecto. As duas restantes categorias são cotadas em termos da sua frequência. À semelhança do que foi descrito para a categoria anterior, é essencial que em algum momento antes, durante, ou após cada uma das situações abaixo apresentadas, o bebé alterne o olhar entre a face do adulto e o foco da atenção em comum. Ao nível das reacções do bebé às estratégias do adulto, pretende avaliar-se até que ponto o bebé partilha o seu interesse no novo foco introduzido por este, ou se, pelo contrário, ignora os seus esforços ou atende unicamente ao objecto (não alternando o olhar). Habitualmente, as estratégias dos adultos passam por criar envolvimento através do contacto (ex. cócegas e toques com o brinquedo); animar um brinquedo (ex. bater, agitar ou mexer o brinquedo para criar interesse no bebé; jogos de "dá-e-tira" ou "esconde-esconde" com o brinquedo); mostrar ou apontar; e demonstrar ou sugerir uma acção com o brinquedo. Finalmente, em termos de estratégias do bebé para direccionar a atenção do adulto, o intento será detectar três tipos de comportamentos: animar o brinquedo (ex. quando o bebé agita brinquedos no ar ou bate com brinquedos na mesa); oferecer o brinquedo ao adulto; e apontar para o brinquedo (natureza comunicativa ou não-comunicativa). Tal como anteriormente, todos estes comportamentos implicam que, a dada altura, o bebé olhe para a face do adulto. A única excepção será a ocorrência do apontar não comunicativo, em que o gesto convencional de apontar (dedo indicador esticado) não é acompanhado de troca de olhares.

Avaliação do Jogo Simbólico Social.

Tarefa de Jogo Simbólico (Meins & Russell, 1997).

Objectivo principal e características gerais.

Meins e Russell (1997) desenvolveram uma interacção lúdica estruturada entre a criança e o experimentador cujo objectivo é avaliar a capacidade da criança de adaptar o seu jogo simbólico de acordo com as sugestões de um adulto. A tarefa tem a duração aproximada de 15 minutos e é apropriada para crianças entre os 2 ½ aos 3 ½ anos de idade.

Material e procedimento.

O experimentador começa por apresentar à criança um conjunto de objectos, dois deles representacionais (uma boneca e um carrinho) e nove não representacionais (ex. um rolo

interior de papel higiénico, uma tampa de garrafa de água, um guardanapo azul). A partir do momento em que a criança demonstrar estar já familiarizada com os objectos (ou cerca de 5 minutos depois), retiram-se os objectos da mesa para, seguidamente, serem apresentados sequencialmente e em pares compostos por um brinquedo representacional (ex. carro) e um objecto não representacional (ex. rolo). É então pedido à criança que realize actividades com cada par de objectos de acordo com a sequência seguinte: (a) "O que podes fazer com isto?" (condição elicitada). Após a resposta da criança, ou na sua evidente ausência, o experimentador coloca a seguinte questão (sem apontar para os objectos e sem modelar qualquer acção): (b) "Faz o carro andar no túnel" (exemplo de condição instruída para o par carro e rolo). A apresentação dos pares é sequencial e aleatória.

Cotação.

As tarefas realizadas pela criança dão origem a uma pontuação denominada de *capacidade executiva* (Belsky, Garduque, & Hrncir, 1984). Meins e Russell (1997) adaptaram este conceito enquanto medida quantitativa que permite avaliar a capacidade da criança de incorporar as sugestões de outrem no seu jogo simbólico. Para o seu cálculo, é atribuída uma classificação de 0 (*menor sofisticação*) a 4 (*maior sofisticação*) para as actividades que a criança realizar com cada par, em ambas as condições (elicitada e instruída). No exemplo apresentado, a criança recebe uma pontuação de 0 se brincar apenas com o carrinho; obtém 2 pontos se segurar o tubo na vertical (90º com a mesa) e deixar o carro cair para dentro; e poderá alcançar a pontuação máxima de 4 se colocar o tubo na posição horizontal, empurrar o carro para dentro do "túnel" e o fizer sair do outro lado. A capacidade executiva é então calculada a partir da diferença entre a média das pontuações relativas às condições instruídas e elicitadas, em função de um valor que expressa a média dos níveis acima dos obtidos pela criança em cada condição elicitada:

$$\frac{\text{Média condições instruídas} - \text{Média condições elicitadas}}{\text{Média níveis acima dos obtidos nas condições elicitadas}}$$

De acordo com Meins e Russel (1997), valores mais elevados de capacidade executiva traduzem uma maior capacidade da criança de integrar as sugestões de um experimentador em sequências mais sofisticadas do jogo simbólico.

Sistema de Cotação do Jogo Simbólico (Nielsen & Dissanayake, 2000).

Objectivo principal e características gerais.

Nielsen & Dissanayake (2000) desenvolveram um sistema de cotação que avalia a ocorrência bem como a duração de comportamentos de jogo simbólico. Trata-se de uma grelha aplicável a uma sessão de interacção não estruturada entre criança e mãe ou pai. A tarefa utilizada originalmente pelos autores teve a duração de 30 minutos e foi administrada a crianças entre os 3 e os 4 ½ anos de idade.

Material e procedimento.

O experimentador convida a criança e a mãe ou o pai a brincarem com um conjunto de brinquedos que encorajem o jogo simbólico (ex. bonecos de ambos os géneros, serviço de chá de brincar, telefone de brincar, comidas de plástico, entre outros). Esta actividade foi originalmente administrada em contexto laboratorial, numa sala equipada apenas com o cesto contendo os brinquedos. Todo o procedimento deve ser gravado em vídeo, de forma a captar as acções e verbalizações tanto da criança como do adulto.

Cotação.

Cada instância de jogo simbólico levada a cabo pela criança é cotada de acordo com seis categorias definidas com base na literatura (Astington & Jenkins, 1995; Lillard, 1993; Ungerer & Sigman, 1981; Youngblade & Dunn, 1995): (a) *Substituição de objecto*, na qual a criança designa um objecto como sendo outro (ex. pega num lápis e diz "Isto é uma espada") ou usa um objecto de uma forma não convencional (ex. usa uma chávena como telefone); (b) *Jogo imaginário*, em que a criança cria objectos ou pessoas sem que estes tenham uma representação física no meio imediato (ex. a criança finge estar a beber "chá" com a mãe/pai, e deita o chá imaginário; a criança tem uma conversa telefónica imaginária com um amigo ausente); (c) *Atribuição de características animadas*, a criança atribui vida própria a objectos inanimados (ex. falar pela boneca ou falar com a boneca como que esperando que esta responda); (d) *Atribuição de papéis*, na qual a criança atribui verbalmente, e de forma explícita, um papel de faz-de-conta a si, a um objecto (ex. boneca) ou à mãe/pai (ex. "Agora tu fazes de Senhor Doutor"). No entanto, não é necessário que a criança participe na actividade nem que o papel seja cumprido; (e) *Role Play*, a criança encena o papel atribuído (ex. fazendo de conta que é uma mãe que está a alimentar o seu bebé). Nesta categoria não é necessário que a criança verbalize o papel que está a adoptar; (f) *Propostas conjuntas*, esta categoria é cotada quando a criança faz referência a si e ao adulto na mesma frase (ex. "Tens

que me deitar o chá na minha chávena"; "Agora vamos jantar"). De salientar que esta categoria apenas poderá ser cotada durante as situações de jogo simbólico, e não quando a criança faz sugestões não simbólicas (ex. "Vamos brincar para ali").

As categorias (b), (c) e (e) são cotadas de acordo com a sua frequência e duração, enquanto as categorias (a), (d) e (f) são cotadas apenas em termos de frequência. De salientar que as categorias não são mutuamente exclusivas, podendo uma categoria ser cotada em simultâneo com outra (por exemplo, fazer de conta que toma "chá" enquanto finge ser a "mãe").

Avaliação da Teoria da Mente.

Considerações metodológicas prévias.

A noção de que as pessoas podem pensar e agir com base em expectativas que diferem da realidade (*crenças falsas*) tem sido considerada como o primeiro sinal da aquisição consolidada de uma teoria da mente (Hala & Carpendale, 1997). Embora as tarefas que avaliam a crença falsa constituam uma prova fundamental e informativa sobre a compreensão da representação mental por parte das crianças, este não constitui o único tipo de tarefa que avalia esta capacidade. Ao longo dos últimos anos têm sido desenvolvidas metodologias que se centram na avaliação de outros aspectos também relevantes para a teoria da mente, como, por exemplo, a compreensão de desejos (Wellman & Liu, 2004), emoções (Parker, MacDonald, & Miller, 2007), ou conhecimento de outrem (Wellman & Liu, 2004).

Contudo, por se tratar de um tipo de prova relativamente consensual entre os investigadores, optamos por apresentar dois exemplos clássicos de provas de avaliação da compreensão da crença falsa que têm sido largamente usados na investigação na área do desenvolvimento sócio-cognitivo na idade pré-escolar.

Salientamos ainda três questões metodológicas a reter a propósito da avaliação da teoria da mente: (i) na medida em que estamos perante testes de resposta dicotómica, é aconselhável a administração de múltiplas tarefas. A vantagem de usar uma bateria de provas reside na diminuição do impacto de eventuais respostas ao acaso, servindo ainda para aumentar a diferenciação entre as crianças (Wellman et al., 2001); (ii) sugerimos igualmente a inclusão de provas prévias de controlo da memória e de linguagem, pois tais factores influenciam o desempenho nestas tarefas (Astington, 2001; Carlson, Moses, & Breton, 2002). Kerr e Durkin (2004) propõem uma metodologia relativamente rápida e simples que, quando aplicada antes das provas de avaliação da teoria da mente, permite ao examinador perceber se a criança detém os níveis adequados de linguagem e de memória para que seja capaz de

acompanhar as narrativas apresentadas. Outros autores optam por incluir questões de controlo na própria tarefa da crença falsa (e.g., Meins et al., 1998; Perner, Leekam, & Wimmer, 1987) com o mesmo objectivo de assegurar que eventuais insucessos sejam, efectivamente, fruto de imaturidade sócio-cognitiva; (iii) a par de uma avaliação experimental da teoria da mente, é conveniente efectuar avaliações naturalistas da mesma, na medida em que o desempenho de uma criança em contexto experimental nem sempre nos revela a sua total capacidade sócio-cognitiva. Por vezes, as crianças demonstram melhor a sua compreensão a nível mental em contexto familiar (Astington & Barriault, 2001).

Tarefa da Transferência Inesperada (adaptado de Wimmer & Perner, 1983).

Objectivo principal e características gerais.

No seu estudo pioneiro, Heinz Wimmer e Josef Perner (1983) debruçaram-se sobre o desenvolvimento de um paradigma que testasse a presença da compreensão da crença falsa em crianças dos 3 aos 9 anos. A tarefa apresentada em seguida é uma versão abreviada da original, tendo a sua aplicação uma duração aproximada de 10 minutos e cuja estrutura tem sido amplamente utilizada em investigação.

Material e procedimento.

Para a sua administração são necessários dois pequenos bonecos com características humanas (representando uma mãe e o seu filho), duas caixas opacas de cores diferentes e um chocolate de brincar. O experimentador, utilizando os materiais, encena a seguinte situação: um menino coloca o seu chocolate numa caixa (A) e sai para a escola. Posteriormente, a mãe tira o chocolate da caixa A, usa algum para um bolo e guarda-o na caixa B. Informa-se a criança de que o menino, ao regressar, vai querer comer o chocolate. Exposto este cenário, são introduzidas as seguintes questões de controlo: "Onde é que estava o chocolate no início?" (questão de memória); "Onde é que está o chocolate agora?" (questão da realidade). De salientar que apenas se a criança responder correctamente às questões de controlo é que poderá ser considerada a resposta à questão de teste, caso contrário o investigador não pode ter a certeza de que está efectivamente a avaliar a crença falsa. Por fim, é colocada a questão de teste: "Onde é que o menino vai procurar o chocolate dele?" (questão de teste)

Cotação.

Relativamente à questão de teste, caso a criança responda que o menino vai procurar o chocolate onde o deixou (porque não sabe da transferência) considera-se que teve sucesso na

tarefa. Se, pelo contrário, a criança responder que o menino irá procurar o chocolate onde este se encontra actualmente, deverá considerar-se como insucesso, na medida em que a criança ainda não revela a noção de que o comportamento humano é balizado pelo conhecimento que possuímos acerca da realidade.

Tarefa do Conteúdo Inesperado (adaptado de Perner, Leekam, & Wimmer, 1987).

Objectivo principal e características gerais.

Visando o mesmo objectivo de avaliar a compreensão dos estados mentais representacionais através da crença falsa, Perner e colaboradores (1987) desenvolveram, com base no trabalho prévio de Hogrefe, Wimmer e Perner (1986), a *tarefa do conteúdo inesperado*. Em contraste com o anterior, o presente procedimento avalia a crença falsa que será induzida na própria criança em avaliação, o que permite também avaliar a noção que esta tem acerca dos próprios estados mentais. O tempo de administração é de cerca de 10 minutos.

Material e procedimento.

O material comporta apenas um recipiente, tipicamente associado a um determinado conteúdo e facilmente identificável por crianças em idade pré-escolar (ex. um tubo de chocolates – "Pintarolas"), no qual deverá colocar-se algo de inesperado (ex. lápis). O experimentador começa por mostrar à criança o tubo de chocolates fechado e a questioná-la sobre o que ela pensa estar no interior do mesmo. Após resposta de acordo com o conteúdo típico ("chocolates" ou "Pintarolas"), o experimentador abre o tubo e a criança descobre que, na realidade, este contém lápis. Depois de o voltar a fechar, a criança tem de responder a uma questão de controlo: "Lembras-te do que está aqui dentro?". Segue-se a primeira questão de teste, sobre o que a própria criança pensava estar no tubo inicialmente. Para terminar a tarefa é colocada uma última situação: chamando uma pessoa ausente, o que pensará ela estar dentro do tubo? As respostas são elucidativas do nível de consolidação da teoria da mente, visto reflectirem a (in)capacidade das crianças de recordarem as suas crenças falsas prévias, bem como de perceber que os outros podem ter crenças falsas acerca da realidade (i.e., sobre o verdadeiro conteúdo da caixa de chocolates).

Cotação.

Relativamente à cotação, para a primeira questão (própria crença falsa) considera-se como sucesso o reconhecimento, por parte da criança, de que inicialmente acreditou que o recipiente continha chocolates. Pelo contrário, uma resposta que indique que a criança

acreditava desde o início que o recipiente continha lápis deve ser cotada como insucesso. A resposta à segunda questão (crença falsa do outro) é cotada de forma semelhante: sucesso se a criança atribuir ao outro a crença de que o recipiente contém chocolates e insucesso caso ela não seja capaz de imputar-lhe uma crença falsa. Perner e colaboradores (1987) consideram as seguintes contingências de resposta: ambas as respostas correctas; apenas correcta a questão relativa à própria crença falsa; apenas correcta a questão relativa à crença falsa do outro; ambas incorrectas.

A Tabela 1 resume as principais características das metodologias descritas.

Tabela 1

Metodologias de Avaliação da Cognição Social da Infância à Idade Pré-escolar

	Atenção Partilhada		**Jogo Simbólico Social**		**Teoria da Mente**	
Designação	*Escalas de Comunicação Social Precoce* (Mundy et al., 2003)	*Sistema de Cotação da Atenção Partilhada (Martins, 2003)*	*Tarefa de Jogo Simbólico* (Meins & Russell, 1997)	*Sistema de Cotação do Jogo Simbólico (Nielsen & Dissanayake, 2000)*	*Tarefa da Transferência Inesperada* (Wimmer & Perner, 1983)	*Tarefa do Conteúdo Inesperado* (Perner, Leekam & Wimmer, 1987)
Idade	8-30 Meses	A Partir dos 9 Meses	2 ½ - 3 ½ Anos	3 – 4 ½ Anos	4-5 Anos	4-5 Anos
Objectivo	Avaliação dos comportamentos de atenção partilhada numa tarefa estruturada	Avaliação dos comportamentos de atenção partilhada numa tarefa semi-estruturada	Avaliação da capacidade de integração das sugestões simbólicas de um experimentador	Avaliação dos comportamentos simbólicos em interacção com o progenitor	Avaliação da noção da crença falsa alheia – indicadora da presença da Teoria da Mente	Avaliação da noção da crença falsa própria e alheia – indicadoras da presença da Teoria da Mente
Intervenientes	Bebé Experimentador	Bebé Progenitor	Criança Experimentador	Criança Progenitor	Criança Experimentador	Criança Experimentador
Duração	20 Minutos	10 Minutos	15 Minutos	30 Minutos	10 Minutos	10 Minutos

Conclusão

O desenvolvimento da cognição social tem sido, nas últimas décadas, mote para a publicação de uma extensa e variada gama de estudos. A emergência de trabalhos empíricos, associada ao esforço crítico de inúmeros trabalhos de revisão teórica, incluindo várias meta-análises, oferece um conhecimento cada vez mais aprofundado de uma temática tão relevante e complexa. Em particular, a literatura tem esclarecido quais as fases do desenvolvimento sócio-cognitivo normativo, salientando de forma consistente três marcos: a atenção partilhada (último trimestre do primeiro ano de vida); o jogo simbólico social (por volta dos 3 anos de idade); e a teoria da mente (entre os 4 e os 5 anos de idade).

O presente trabalho teve, como ponto de partida, um duplo objectivo. Por um lado, procurou dotar o leitor de uma breve descrição teórica acerca do desenvolvimento da compreensão da mente e do comportamento humano da infância à idade pré-escolar, aludindo aos três marcos desenvolvimentais descritos. Por outro lado, e numa vertente mais prática, pretendeu disponibilizar exemplos de metodologias de avaliação com objectivos, idades de aplicação, intervenientes e durações distintas. Assim, julgamos que este artigo poder-se-á constituir como um apoio à investigação na área, na medida em que alia perspectivas teóricas e sugestões de avaliação prática dos marcos normativos da cognição social nos primeiros anos de vida.

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