

The social interactive behaviour of young children with autism spectrum disorder and their mothers: Is there an effect of familiarity of the interaction partner?

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Abstract

In this study the social behaviour of young children with autism spectrum disorder (ASD) and their mothers is compared within two different dyads: a dyad consisting of a mother and her own child and a dyad consisting of a mother and an unfamiliar child. Mothers did not change the frequency of their social initiatives and responsiveness with an unfamiliar child, but they became less directive than with their own child. Children with ASD did not show significantly better social behaviour with their own mother than with an unfamiliar mother. The results suggest that the social behaviour of a child with autism is not significantly enhanced by the familiarity of the social partner, but rather by the partner's autism-adapted interaction style. Clinical implications of these findings have been discussed.

The social behaviour of a young, typically developing (TD) child, spending a substantial proportion of its day in social chat and play with its caregivers, contrasts sharply with the limited, deviant social behaviour often seen in a young child with autism spectrum disorder (ASD) (Grossman, Carter, & Volkmar, 1997). The limitations in social behaviour in autism have been documented extensively. Children with ASD are less socially oriented or engaged (Dawson et al., 2004; van IJzendoorn et al., 2007; Wimpory, Hobson, Williams, & Nash, 2000), less responsive (Jackson et al., 2003; Willemsen-Swinkels, Buitelaar, van Engeland, 1997) and they tend to decline, ignore or reject their mothers' social initiatives more often than TD-children do (Adamson, McArthur, Markov, Dunbar, & Bakeman, 2001). Children with ASD are also clearly impaired in the ability to share attention to an event, object or person of mutual interest with an interaction partner (Stone, Ousley, Yoder, Hogan, & Hepburn, 1997; Wetherby, Watt, Morgan, & Shunway, 2007; for a review see Bruinsma, Koegel, & Koegel, 2004).

The limited social skills of children with ASD have a considerable impact on the daily interaction patterns between parent and child. Developing and maintaining a well-balanced 'to-and-fro' interaction is difficult for the parent of a child with ASD (Spiker, Boyce, & Boyce, 2002). In spite of these limitations, mothers of children with ASD exhibit an equal number of social approaches to their child, and have been shown to be equally sensitive and responsive as mothers of developmentally delayed (DD) and TD-children (Doussard-Roosevelt, Joe, Bazhenova, & Porges, 2003; van IJzendoorn et al., 2007). In order to get a higher engagement and responsiveness from their child, they seem to adapt their interaction style by using more directive strategies (Spiker et al., 2002). They spend more time physically holding their child on a task and they increase their physical proximity more during interaction (Lemanek, Stone, & Fishel, 1993). Compared to parents of DD- and TD-children, parents of children with ASD show more high intensity approach behaviours, i.e. they use

more verbal and nonverbal prompts to get their child's attention (Doussard-Roosevelt, et al., 2003; Lemanek et al., 1993).

In summary, mothers of a child with ASD seem to adopt a somewhat different interaction style in an attempt to compensate for the social limitations of their child (Kasari & Sigman, 1997).

As mother-child interactions are embedded in a long-term, intimate relationship, with a shared history and future (Dawber & Kuczynski, 1999), and are characterised by continuous bidirectional and dynamic influences and adaptations, where both mother and child regulate each other's reactions (Barnard, 1997; Spiker et al., 2002), one can expect the interactions within a well tuned mother-child relationship to be different from those occurring within an unrelated adult-child dyad (Lollis & Kuczynski, 1997). In an unfamiliar interaction, there is a lack of predictability, which asks for a flexible adaptation from both mother and child. The social strategy a mother adopts for her specific child with ASD may not be as effective during interaction with another, unfamiliar child with ASD. It is essential to explore more profoundly the effort mothers put to compensate for the social impairment of their child with ASD, and even more to test the modified interaction style on its applicability to other interactions. The first aim of this study is to evaluate the hypothesis that a mother adopts a compensatory interaction style towards her child with ASD. In addition, we want to assess whether a mother uses a similar interaction style towards an unfamiliar child with ASD.

In typically developing children, it has been hypothesized that familiarity with the interaction partner facilitates emotional perception (Montague & Walker-Andrews, 2002), moderates empathic responding (Hudry & Slaughter, 2009), enhances social interaction and leads to more frequent positive behaviour and a higher responsiveness (Doyle, Connolly, & Rives, 1980; Hartup, 1993, as cited in Lederberg, Ryan, & Robbins, 1986). The scarce

research that compared the social behaviour of children with autism during interaction with their mother and with an adult stranger (often an experimenter) has confirmed the effect of familiarity on the social behaviour of children with ASD. During play interaction, children with ASD preferentially direct social behaviour to their caregiver, rather than to a stranger (Sigman & Mundy, 1989). Dissanayake and Crossley (1996) observed children with ASD, children with Down syndrome and TD-children when both mother and a stranger were present, and confirmed that all groups of children more frequently approached, looked at and faced the own mother compared to the stranger. Like the control children, children with ASD also behaved more responsively to their mother or father than to an unfamiliar experimenter (Kasari & Sigman, 1997). In a study by Warreyn, Roeyers and De Groote (2005) the unexpected, relatively good results on social referencing and symbolic imitation of young children with ASD in comparison with TD-children, were cautiously ascribed to the comforting presence of their mothers. In addition to this familiarity effect, the well documented lack of flexibility, the problems of adapting to new situations and the need for predictability in ASD (e.g. Grossman et al., 1997), will most probably lead to more social difficulties for a child with ASD during an interaction with an unfamiliar adult. Therefore, the second aim of this study is to examine whether children with ASD show better social behaviour during interaction with their own mother than with an unfamiliar mother.

Finally, the third aim of this study is to investigate whether there is an association between a mother's interaction style and the specific social behaviour of a child with ASD, both within familiar and unfamiliar mother-child dyads. A bidirectional approach of the social behaviour is clearly relevant as several studies suggest that the social behaviour and later developmental outcome of a child may be linked to the interaction partner's typical approach behaviour (Moore, Saylor, & Boyce, 1998; Siller & Sigman, 2002). This typical approach behaviour, on

the other hand, may be a response of the interaction partner to the child's specific characteristics (Doussard-Roosevelt et al., 2003; Spiker et al., 2002).

To our knowledge, comparisons of both mother's and child's interaction style in two contexts, differing in familiarity, are nonexistent in the ASD-literature. Since it is not clear from former studies comparing mother-child with experimenter-child interactions whether the social behaviour of a child with autism is enhanced by the comforting presence of a familiar interaction partner, i.e., an effect of familiarity, or by the specific interaction style of the familiar partner a new research paradigm is necessary. For this study a specific study design is chosen where the child's social behaviour in interaction with the own mother is compared to the social behaviour in interaction with an unfamiliar mother, i.e., a stranger who is also mother of a child with autism. In the former studies mother and experimenter differed on two points, i.e., being mother of a child with ASD and being familiar with this specific child with ASD. In the current study, by contrast, the familiar and unfamiliar mother only differ in familiarity with this specific child, which makes interpretation of the familiarity effect less ambiguous. With this study, we aim at a deeper understanding of the familiarity effect on the mother-child interaction in children with autism.

Method

Participants

In the present study mother-child interaction was studied in two phases. In phase one, where the social behaviour between child and mother was observed within the familiar dyad, the target group consisted of 21 children with ASD (18 boys; 3 girls, CA=21-56months, M=36.94) and their mothers. They were recruited through a centre for developmental disorders, where they had received a clinical diagnosis of ASD from an experienced

multidisciplinary team. Twenty-one TD-children (13 boys; 8 girls, CA=32-51months, M=40.16) and their mothers, recruited from local nursery classes, served as a comparison group. For both ASD- and TD-children the Autism Diagnostic Observation Schedule–Generic (ADOS-G; Lord, Rutter, Dilavore, & Risi, 1999) was conducted to confirm the presence or absence of ASD. All children in the ASD-group scored above the autism (n=11) or the autism spectrum cut-off (n=10). There were no scores above the ADOS-G cut-offs in the comparison group. In addition, the general development of each child was assessed with the Mullen Scales of Early Learning (MSEL; Mullen, 1995). Language comprehension and production was measured with the Flemish version of the Reynell Developmental Language Scales (RDLS; Schaerlaekens, Zink, & Van Ommeslaeghe, 1993). If children were too young or too delayed in language to be tested with the RDLS, language development was assessed by parent report with the Flemish version of the McArthur Communicative Development Inventory (CDIs; Zink & Lejaegere, 2002).

Two to eight weeks after the first one, a second phase observation was planned, where each child was coupled with an unfamiliar mother, resulting in an unrelated mother-child dyad. To form these unrelated dyads, we invited 2 mother-child dyads at the same time, separated them and paired each child with an unfamiliar mother. Children were matched pairwise on chronological age, sex and expressive language ability. It was, however, difficult to find a suitable moment for both mothers and their child within a time frame of 6 weeks, in particular when one of the children got ill (ASD, n=1;TD, n=6). In some cases mothers chose not to complete the second session because of a busy schedule (ASD, n=2), and sometimes a child refused to play with the unfamiliar mother (ASD, n=2). Consequently, for phase two, we retained 16 dyads in the ASD-group (child CA, M=37.53) and 15 dyads in the TD-group (child CA, M=41.11) out of the 2x21 dyads from phase one. Given the repeated measures

design of our study, the descriptions of ages and assessment evaluations are restricted to the dyads who completed both phases (ASD, n=16;TD, n=15).

A one-way analysis of variance (ANOVA) revealed no significant chronological age differences between the ASD- and TD-children. A chi-square analysis showed no significant difference in sex ratio. Mothers of ASD- and TD-children did not differ in age or social status. The significant differences, however, found between ASD- and TD-children in general development, language comprehension and language production suggest a developmentally delayed ASD-group. Therefore, analyses of covariance with level of general development (MSEL) entered as covariate, will be considered in the results section. See Table 1 for more details.

[insert Table 1 about here]

Procedure

First, mother and child were visited at home, where the RDLS was administered. Mothers signed an informed consent document and provided some demographic information on their family. Next, both parent and child were invited for the first phase play-session. This session started with an observation of mother and child during 7 minutes of free-play-interaction, in a play room with a set of traditional toys available. Mother was instructed to play with her child the way she preferred. The free-play was followed by 13 minutes of interaction with a still-face manipulation. These results are reported elsewhere. After a short break, the MSEL assessment of the child was administered.

The second phase play-session consisted of an ADOS-G observation for each child and 2 mother-child play-interactions, similar to those in phase one (free-play and interaction with still-face) but this time within an unrelated mother-child dyad. For practical reasons, half of the children started with an ADOS-G, followed by the 2 play interactions. For the other half of the children the sequence was reversed.

Coding procedure, - behaviours and interobserver agreement

All mother-child interactions were recorded digitally. Only the middle 5 of the total 7 minutes of free-play interaction were coded. Two research assistants, blind to the diagnosis of the children and to the nature of the mother-child dyad (familiar or unfamiliar), coded the social and play behaviour of mother and child using the observer XT, version 6.1 (Noldus, 2005). The following elements were interval-coded: the highest level of play by the child (no play, low-level play (manipulative or relational), high-level play (functional or symbolic play) or play indefinable) and the play-stimulation by mother (into a higher-, the same- or lower-level of play). For the following elements the frequency was counted: the social initiatives (with their content (declarative, imperative, or neutral)) and responses (with their content (confirming, denying or neutral)) of both mother and child. Details of the operational coding definitions can be found in the Appendix. One research assistant coded all free-play fragments and about 14% were double-coded by a second research assistant for purpose of interobserver agreement. Kappa was 0.87 for child's level of play and 0.81 for mother's play stimulation. Kappa was 0.69 and 0.70 for child's social initiatives (frequency + content) and responses (frequency + content), respectively. For mother's social initiatives (frequency + content) and responses (frequency + content) kappa was 0.72 and 0.77, respectively.

Results

Mother's and child's behaviour was analyzed by means of ANOVA's repeated measures, with group as between-subjects factor and session as within-subjects factor. Since the assumptions for parametric analyses were not met for the mother-variable content of responses and for the child-variables content of initiatives and content of responses, non-parametric Mann-Whitney U-tests were performed for the group-comparisons and Wilcoxon

W tests for the session-comparisons. To explore the possible association between mother's interaction style and a child's specific social behaviour, several Pearson correlations were conducted. Firstly, we computed the correlations for each group separately, and compared them using formula 2.8.11 from Cohen and Cohen (2003, p 49). If no significant differences between the groups were found, correlations were computed on the entire group (n=31).

Mother's interaction strategy in a familiar versus unfamiliar dyad

Social initiatives. For the total frequency of initiatives, no effects of session or session*group were found, but there was an effect of group; ASD-mothers took significantly more social initiatives than TD-mothers. The ANOVA for the content of initiatives revealed that ASD-mothers' initiatives were significantly more imperative and less declarative than in TD-mothers. With an unfamiliar child, mothers of both groups used significantly more declarative and less imperative initiatives. ASD-mothers also used more neutral initiatives like 'there' or 'ok' (initiatives without an explicit declarative or imperative meaning) with an unfamiliar child, whereas TD-mothers used them less. The results are presented in Table 2.

[Insert Table 2 here]

Responsiveness. As a measure for mother's responsiveness, we calculated the probability that a child's social initiative was followed by a reaction of the mother (within 3 s). We found no effects of session or session*group, as can be seen in Table 2. Furthermore, ASD- and TD-mothers reached similar responsiveness rates. A nonparametric group-comparison for content of responses revealed, however, that ASD mothers were significantly more denying in interaction with their child than TD mothers. Furthermore, both mothers of ASD and TD children were significantly less denying in their responses to an unfamiliar child than to their own, but only ASD-mothers also responded significantly more confirming.

The social behaviour of a child in a familiar versus unfamiliar dyad

Social initiatives. As can be seen in Table 3, there were no effects of session or session*group, but the frequency of initiatives in the TD-group was about twice the frequency in the ASD-group. For the content of initiatives, nonparametric analyses showed that ASD-children used significantly less declarative initiatives than TD-children, and this during both the familiar and unfamiliar interaction. Only in the unfamiliar dyad, children with ASD used significantly more neutral initiatives than TD children. Imperative initiatives rarely occurred in the TD-group. Children with ASD used significantly less imperative initiatives in the unfamiliar dyad than in the familiar dyad. Finally, in the ASD-group the frequency of neutral initiatives tended to increase from the familiar to the unfamiliar dyad, while in the TD-group it remained about unchanged.

[Insert Table 3 here]

Responsiveness. No significant effect of session or session*group was found for the children's responsiveness. A group difference was found, as children with ASD reacted significantly less responsively to the social attempts of a mother than TD-children. The Wilcoxon nonparametric test revealed no effect of session for the content of responses, but there was a group difference: In interaction with an unfamiliar mother, children with ASD responded significantly less denying than TD children. See Table 3 for more details.

An additional non-parametric Wilcoxon W test was performed, to examine if the content of a mother's initiative had an effect on a child's responsiveness. The results show that the responsiveness of children with ASD to a declarative initiative ($M(sd) = .22 (.16)$) was significantly higher than to an imperative initiative ($M(sd) = .15 (.12)$; $Z = -2.48$, $p = .01$). By contrast, TD children made no difference in responsiveness to declarative ($M(sd) = .34 (.15)$) or imperative initiatives ($M(sd) = .31 (.25)$; $Z = -.96$, $p = ns$).

General developmental level and language skills as covariates. To test the effect of the child's general developmental level and language skills on the mother-child interaction,

covariance analysis was considered. According to Chapman and Chapman (1973, as cited in Miller & Chapman, 2001), however, analysis of covariance is only appropriate to remove noise variance unrelated to the grouping variable. Since a preliminary analysis of our data showed that language and developmental delay were meaningful characteristics of our ASD-group, inclusion of MSEL and language scores as covariates would remove the variance associated with those measures (Reichardt & Bormann, 1994). Moreover, removal of variance in those skills would remove considerable variance associated with autism, leaving an undercharacterised grouping variable and making the relationship with the dependent variables meaningless (Miller & Chapman, 2001). Accordingly, after a covariance analysis on our data some group-differences disappeared and some were replaced by MSEL main-effects. A summary of the results of the analysis of covariance is provided in the footnote.² Following the argumentation of Chapman and Chapman, only the ANOVA repeated measures results have been reported in the results section. It will, however, be important to bear in mind the effect of developmental and language delay in the interpretation of the findings.

Child's level of play and mother's play-stimulation

Some relevant play variables have been analysed since the social behaviour of mother and child was observed during play interaction.

Child's level of play. Although inspection of Table 4 reveals that ASD-children showed more high-level play and less low-level play with their own than with an unfamiliar mother, the session*group effect was not significant. Neither was there an effect of session. Children

² The group differences for the following variables were no longer significant after ANCOVA analyses with MSEL and language skills entered as covariates: frequency of mother's social initiatives and neutral initiatives, frequency of child's social initiatives, probability of child's responsiveness, frequency of child's low and high level play, and frequency of mother's higher and same level stimulation.

For the following variables, there were no changes in significances after ANCOVA: frequency of mother's declarative and imperative initiatives, probability of mother's responsiveness, and frequency of mother's low level play stimulation. For the non-parametrically analysed variables - mother's confirming and denying responses and child's declarative, imperative and neutral initiatives and child's confirming and denying responses- covariance analysis was not possible.

with ASD showed significantly more low- and less high-level play compared to TD-children.

[Insert Table 4 here]

Mother's play-stimulation. There were no interaction effects and no effects of session for higher-, same- or lower-level play-stimulation. ASD-mothers, however, stimulated their child significantly more into a higher-level of play, while TD-mothers showed more same-level stimulation. (See also Table 4.)

Association between the social behaviour of mother and child

Mother's play- stimulation and child's low- and high-level play. In the ASD-group, low-level play by the child was positively correlated with both the familiar and unfamiliar mother's higher-level play-stimulation ($r=.51$, $p<.05$; $r=.70$, $p<.01$, respectively) and was negatively correlated with mother's same-level play-stimulation ($r=-.62$, $p<.05$; $r=-.69$, $p=.01$, respectively). The child's high-level play was, in both familiar and unfamiliar ASD-dyads, negatively correlated with higher-level play-stimulation by the mother ($r=-.63$, $p<.01$; $r=-.69$, $p<.01$, respectively) and positively correlated with mother's same-level play-stimulation ($r=.71$, $p<.01$; $r=.69$, $p<.01$, respectively). By contrast, in the TD-group, there were no significant correlations for the familiar mother-child dyad. Only within the unfamiliar dyad, the child's high-level play was positively correlated ($r=.52$, $p<.05$) and the child's low-level play was negatively correlated ($r=-.63$, $p<.05$) with mother's same-level stimulation. Finally, the unfamiliar mother's lower-level stimulation was positively correlated with the TD-child playing on a low level ($r=.64$, $p=.01$) and negatively with high-level play ($r=-.67$, $p<.01$).

Mother's social initiatives and child's responses. For the entire group ($n=31$) a positive correlation was found between the frequencies of a child's responses to the own and to an unfamiliar mother ($r=.44$, $p<.05$). Similarly, the frequencies of the social initiatives a mother directed to her own and to an unfamiliar child were positively correlated ($r=.65$, $p<.001$).

Finally, there was a negative correlation between the responses of a child and the initiatives of an unfamiliar mother ($r = -.46$, $p < .01$), but not within the familiar dyad ($r = -.23$, $p = ns$).

The effect of mother's play-stimulation on the child's level of play. A preliminary one-way ANOVA revealed that mother's stimulation into higher-level play tended to result more often in high-level play in the familiar TD-dyad ($M(sd) = 76.77(31.36)$) than in the familiar ASD-dyad ($M(sd) = 52.36(33.53)$) ($F(1,27) = 3.8$, $p = .06$). When comparing the successes of mothers' stimulation between the familiar and unfamiliar dyad, no effect of group ($F(1,27) = 1.32$, $p = ns$) or group*session ($F(1,27) = 1.45$, $p = ns$) was detected, but both ASD- and TD-mothers' successful stimulations decreased significantly with an unfamiliar child ($F(1,27) = 6.12$, $p < .05$).

Discussion

The first aim of this study was to explore the effort mothers put to compensate for the social impairment of their child with ASD and to evaluate if there is an effect of familiarity on mother's interaction style. As expected, ASD-mothers adopted a compensatory interaction style. They addressed more social initiatives, more imperative and less declarative initiatives and more denying responses towards their child in comparison to TD-mothers towards their child. Furthermore, ASD-mothers more frequently stimulated their child into higher-level play, while in a typical dyad, mothers more frequently supported their child in the level the child was playing.

The comparison of mothers' social behaviour within two different contexts revealed that mothers of a child with ASD used just as much social initiatives and reacted just as responsively with an unfamiliar child as with their own child. Besides, the frequency of mothers' higher-, same- or lower-level play-stimulation did not differ significantly between the familiar and unfamiliar dyads. Identical results were found for the TD-mothers.

There were, however, some differences in mothers' social behaviour. Firstly, mothers of both ASD- and TD-groups displayed more declarative and less imperative initiatives with an unfamiliar child. Secondly, mothers were less denying in their responses than with their own child. ASD-mothers also responded significantly more confirming in the unfamiliar dyad, while TD-mothers did not make such a clear distinction. Finally, concerning the use of neutral initiatives, the results of ASD- and TD-mothers were opposite: The frequency of neutral initiatives with an unfamiliar child increased for mothers in the ASD-group, while it decreased for TD-mothers.

Altogether, it seems as if the social style of ASD- and TD-mothers with an unfamiliar child does not differ in frequency, i.e., in social initiatives and responsiveness, from the social style with their own child. The differences we detected in mothers' social behaviour during interaction with an unfamiliar child, i.e., the decline in imperative initiatives and in denying responses, have more to do with the function of their social behaviour. These 'functional' adaptations in social behaviour may be a reaction of the mother to the loss of background information, and thus to the less predictable interaction with an unfamiliar child. Mothers become less directive and more expectant, possibly with the intention not to upset the unfamiliar child. This reaction was even more pronounced in mothers of a child with ASD, as they were also significantly more confirming in their responses to the unfamiliar child.

A second possible explanation is that mothers use more imperatives to direct play with their own child than they do with an unfamiliar child, because with their own child they find it more important to show the full potential of the child's ability.

With regard to the second study question, it was hypothesised that children would show better social behaviour within a familiar interaction than within an unfamiliar interaction. Contrary to expectations, children with ASD did not show significantly more high-level play with the own mother than with an unfamiliar mother. Furthermore, our results did not fit in

with Kasari and Sigman's finding (1997) that children with ASD and TD-children behaved more responsively to their own mother. Neither did we find support for the preference of children to direct social behaviour to their own mother, as was concluded in earlier studies (Dissanayake & Crossley, 1996; Sigman & Mundy, 1989). Concerning the latter finding, it is, however, important to mention that the Dissanayake and Crossley's study (1996) had a different design. In that study, children preferred their mother above the adult stranger, when both were simultaneously present, whereas in our study, children seemed to address just as much social initiatives towards their own as to the unfamiliar mother, possibly because there was only one mother present at the time.

Although children did not show better social behaviour with their own mother, they made some distinction between their own and an unfamiliar mother, i.e. in the content of their initiatives. Children with ASD tended to use more neutral initiatives during interaction with an unfamiliar mother than with their own mother, while TD-children behaved the same. This finding can be explained by the fact that initiatives were coded as neutral, if their content was not clearly declarative or imperative, but rather difficult to interpret. Given the limited or ambiguous social signals, common in children with ASD, neutral initiatives were more coded in the ASD-group, and more specifically during interaction with an unfamiliar mother. In other words, children with ASD seemed to show more autistic-like behaviour in an unfamiliar interaction. Furthermore, this difference in neutral initiatives may be reinforced by the general developmental delay, found in our ASD-group.

We also observed significantly less imperative attempts with an unfamiliar mother, but only for children with ASD. There was, however, a very small proportion of imperative initiatives in the TD-group, which may be due to the fact that TD-children perhaps do not use many imperatives, because they have enough other strategies to get their mothers' attention during a one-to-one contact. Children with ASD, on the other hand, are limited in their social

behaviour, and thus depend on more primitive, imperative strategies. Again, these results may have been affected by the developmental delay in our ASD-group.

Thus far, it appears that neither ASD- nor TD-children showed better social behaviour towards their own mother than to an unfamiliar mother. The small differences we found between interaction partners rather have to do with the function of their social behaviour. Children with ASD and TD-children seemed to adopt a somewhat expectant and more compliant attitude with a stranger, although not as explicitly as their mothers. This finding was more pronounced for the children with ASD.

For the third and final question of this study we focused on the possible linkage between the interaction style of mother and the social behaviour of a child. The results reflect the complex bidirectional processes, active between mother and child. We observed more high-level stimulation in mothers when their own or an unfamiliar child with ASD was playing on a low level. Similarly, ASD-mothers' play-stimulation was on the same level of their child's play when this was the more 'adjusted' high-level play. The latter associations all fit in the idea of a mother encouraging her child, when necessary, to show the full potential of his/her ability. It is, however, hard to explain why we found similar correlations in the unfamiliar TD-dyad, but not in the familiar TD-dyad.

Interestingly, analysis showed that whereas mothers of a child with ASD used significantly more high-level stimulation, their chance to succeed and reach a higher level of play in their child was smaller than for a TD-mother. However, when both ASD- and TD-mothers interacted with an unfamiliar child, this group-difference disappeared, as both mothers' successes decreased significantly. Accordingly, it seems plausible to associate this decrease in success in an unfamiliar dyad with the less directive interaction style we observed in mothers during an unfamiliar interaction. With an unfamiliar child, mothers adopted a less directive interaction style, possibly because they did not want to upset the child and

additionally, because they were less motivated to make the child perform at his/her utmost best, than with their own child. As a result, mothers' chances to success decreased significantly.

However, apart from a higher success in play-stimulation, the more social-active or directive interaction style a mother used in a familiar dyad did not result in significantly better social behaviour for her child. The negative correlation we found between the responsiveness of a child with ASD and the social initiatives of an unfamiliar mother, neither supports a highly social-active or directive interaction style. This correlation tends to suggest that a more social-active unfamiliar mother made a child with ASD to clam up, whereas a more reserved mother stimulated the child into higher responsiveness. Alternatively, the negative correlation can also be interpreted as mother making more social attempts to encourage an unresponsive unfamiliar child and similarly, mother initiating less when the child was already highly responsive. With respect to a child's responsiveness, an additional analysis was performed to compare the responsiveness to mother's declarative versus imperative initiatives. The results confirm the previous argumentation against a mainly directive interaction style as children with ASD were significantly more responsive to declarative than to imperative initiatives.

As stated earlier, ASD-mothers' typical directive interaction style is constructed through several dynamic interactions of behaviour stimulation and restraint between mother and child (Barnard, 1997; Spiker et al., 2002). It is not difficult to see mothers' high-intense interaction strategy as a result of their child's low sustained engagement and unresponsive attitude in interaction. The fast development and continuous change of the play and social skills of a TD-child makes interaction challenging and attractive. Children with ASD, by contrast, often get stuck in a lower developmental stage (Spiker et al., 2002) and are slower and less flexible in learning new play- and social skills. For this reason, it is not very rewarding for mothers of a

child with ASD to experiment with their social strategies or to refine them. Consequently, they get rooted in a mainly directive interaction style.

Unlike previous studies (e.g., Kahana-Kalman & Goldman, 2008; Kasari & Sigman, 1997; Sigman & Mundy, 1989), we did not find clear evidence for a familiarity effect in children with ASD. The presence of a familiar partner, i.e., their mother, did not result in better social behaviour in children with ASD. By contrast, they showed very similar behaviour in the unfamiliar and familiar interaction. However, the specific design of this study may help explain these findings: While in the former studies, an experimenter acted as unfamiliar partner, the unfamiliar partner in the current study was also mother of a child with ASD. We believe that, since both familiar and unfamiliar mothers have a child with ASD, both have learned to adapt their interaction style to the specific characteristics of a child with ASD, and thus both elicited similar social behaviour in the child. These findings suggest that the social behaviour of a child with autism is not in the first place affected by the familiarity of the social partner, but rather by the compensatory interaction style adopted by this social partner.

Based on these results, we would like to make a recommendation for clinical practice: It may be useful for therapists and teachers to make themselves familiar with this parental compensatory interaction style and adopt this style in the early intervention for children with autism.

In this respect, our results raise another important clinical consideration. Since it was found that children with ASD reacted more responsively to mother's declarative initiatives than to her imperative initiatives and secondly, that a more reserved mother got a higher responsiveness from an unfamiliar child with ASD, it can be assumed that an alternated directive-awaiting approach will be more facilitative for the social development of a child with ASD than a mainly directive approach.

This interpretation is consistent with research on communication development in children with ASD. The study by Siller and Sigman (2002) provides evidence for a less directive or less demanding interaction style towards children with ASD. According to them the best predictor for language gain in children with ASD is the amount of parents' utterances which are well synchronized with the child's focus of attention, but undemanding in quality. Undemanding utterances do not only match the child's focus of attention, but they also match the focus-related activity in which the child is engaged in at that moment. Demanding, directive utterances suggest an activity that is different from the child's ongoing activity, and this shifting-in-attention has been proven difficult for a child with ASD (Landry & Bryson, 2004). Similar findings emerged from a recent study by Aldred and colleagues (Aldred, Green, & McConachie, 2008). They concluded that a reduction in communication acts by the parent was related to an improvement in the communication of their child with ASD. Obviously, more research is needed to determine if a more alternated directive-awaiting style is more effective in interaction with children with ASD.

Unfortunately, the set up of this study does not allow us to differentiate maternal and child contributions to the mother-child interaction. Furthermore, a limitation of this study is the lack of a second control group. In addition to a control group of typically developing children, a control group of children with a general developmental delay but without an ASD-diagnosis would be very useful. Preliminary analyses showed that our ASD-group was significantly developmentally delayed. Therefore, a delayed control group could give insight on the impact of a developmental delay on social interaction. There is indeed some research on parents' directiveness, showing higher directivity rates when children have lower developmental levels (Marfo, 1992). The quantitative analysis of social behaviour within an interaction is, however, a very time-consuming process. We therefore restricted our study set up to one, typical control group. As an alternative solution, we considered matching clinical- and control group

on mental age, instead of matching on chronological age. However, this would have resulted in a social experience-gap between both groups.

Despite its limitation, the current study allows for a valuable bidirectional approach of the social behaviour of both mother and child and provides in a strong operationalization of 'familiarity' by comparing social behaviour within a familiar versus unfamiliar social context. This study reveals that the social behaviour of a child with autism is not significantly enhanced by the familiarity of the social partner, but rather by the partner's autism-adapted interaction style. A promising line of study would be to explore the mother-child interaction longitudinally in the ASD-population. This way, one could not only study the long term effect of mothers' interaction style on their child's behaviour and development, but one could also teach mothers to vary their style, and one could sort out if there is a positive effect of an alternated directive-awaiting approach for children with ASD.

Appendix I - Operational definitions

In the first run of the video the following elements were interval-coded (20 intervals of 15 s = 5 minutes): *What is the highest level of play shown by the child?* Four categories were included: **no play**, **low-level play**; consisting of manipulative play (manipulating and/or moving an object, to explore the possibilities of the object and/or the own body, e.g., putting an object in their mouth) and combinatorial play (combining two or more objects during play, e.g., putting a ball in a cup), **high-level play**; consisting of functional play (functional use of an object during play, e.g., placing a toy telephone to the ear) and symbolic play (use of actions on objects to represent real life or imagined objects, characters, and actions, e.g., pretend drinking tea from an empty cup; putting a bowl on your head to represent a hat) and **indefinable play** (when level of play was indefinable because of poor camera position).

Does mother stimulate the child's play into a lower, the same or a higher level than the level the child is already performing? Stimulation of play includes verbal and/or non-verbal encouragement of the child's play.

In a second run of the video the total frequency of *the social initiatives and responses of the mother* was coded (5 minutes interval). A **social initiative** is defined as an attempt to interact with someone. It can be verbal and/or non-verbal and is always addressed to a person with the intention to get a response from that person. For each social initiative the content must be defined. This can be **declarative** (or social, to share interest in something with someone), **imperative** (or instrumental, to request something from someone), or **neutral** (no clear declarative or imperative intention).

A **social response** is always a reaction to a social initiative or response and follows the preceding attempt within 3 s. It can be verbal and/or non-verbal and is always addressed to the other person. For each social response the content must be defined. This can be **confirming** (when the response confirms the preceding initiative or response, e.g., 'I'll feed the doll' (declarative initiative) - 'Yes, good idea!' (confirming response)), **denying** (when the response denies the preceding initiative or response, e.g., 'I'll feed the doll (declarative initiative) - 'No, she is not hungry' (denying response)) or **neutral** (when the response is not clearly confirming or denying, e.g., 'I'll feed the doll' - 'mmh' (neutral response)).

In the third and last run of the video *the total frequency of the child's social initiatives and responses* was coded for the 5 minutes interval, in exactly the same way as for mother's initiatives and responses.

Table 1

Participant characteristics

	ASD-group (n = 16)	TD-group (n = 15)	
Child			
CA (months)			
M (sd)	38.43 (10.90)	41.11 (5.23)	$F(1,29)=.75$
Range	22.50 – 57.17	32.00-49.00	
MSEL			
M (sd)	65.13 (19.43)	107.07 (11.12)	$F(1,29)=53.41***$
Range	49 – 109	82 – 122	
RDLS (n = 21)/ CDIs (n = 10) (percentile)			
Language comprehension			
M (sd)	14.44 (28.20)	55.60 (26.59)	$F(1,29)=17.43***$
Range	0 – 97	25 – 97	
Language production			
M (sd)	12.25 (24.92)	58.20 (27.39)	$F(1,29)=23.93***$
Range	0 – 80	3 – 90	
Sex ratio (M:F)	13:3	10:5	$\chi^2(2)=.86$
Mother			
CA (years)			
M (sd)	33.58 (3.76)	35.17 (5.13)	$F(1,29)=.91$
Range	26.43 – 38.60	27.90 – 44.51	
Social status (Hollingshead)			
M (sd)	41.27 (12.91)	46.64 (11.24)	$F(1,29)=1.42$
Range	17 – 66	17 – 61	

Note. CA = Chronological age, MSEL = Mullen Scales of Early Learning, RDLS = Reynell Developmental Language Scales, CDIs = McArthur Communicative Development Inventory, * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$.

Table 2

Means (standard deviations) for mother's initiatives and content of initiatives, and responsiveness and content of responses

Mother	ASD		TD		F group (1,29)	F session (1,29)	F session*group (1,29)		
	Familiar	Unfamiliar	Familiar	Unfamiliar				Z Group familiar	Z Group unfamiliar
<i>Frequency</i>									
Initiatives (I)	77.94 (23.19)	87.81 (33.22)	62.47 (16.7)	63.47 (13.18)	7.33*	1.99	1.32		
<i>Proportion</i>									
Declarative I	.65 (.11)	.80 (.08)	.77 (.12)	.89 (.05)	19.82***	31.98***	.08		
Imperative I	.23 (.12)	.06 (.04)	.11 (.11)	.03 (.03)	13.30**	27.54***	3.5		
Neutral I	.11 (.07)	.14 (.07)	.11 (.06)	.06 (.05)	6.95*	.27	4.59*		
<i>Probability</i>									
Responsiveness	0.61 (0.22)	0.58 (0.24)	0.54 (0.18)	0.66 (0.18)	0.001	0.785	1.974		
<i>Proportion</i>									
Confirming responses (R)	.80 (.14)	.94 (.13)	.89 (.09)	.91 (.08)	-1.96	-1.60	-2.73**	-0.63	
Denying R	.19 (.13)	.05 (.12)	.10 (.09)	.02 (.04)	-2.12*	-0.30	-3.11**	-2.43*	

Note. * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$. Variables with a mean proportion or frequency < 0.05 in both groups have been removed from the table.

Table 3

Means (standard deviations) for child's initiatives and content of initiatives, and responsiveness and content of responses

Child	ASD		TD		F group (1,29)	F session (1,29)	F session*group (1,29)	
	Familiar	Unfamiliar	Familiar	Unfamiliar				
<i>Frequency</i>								
Initiatives (I)	20.69 (14.34)	21.5 (15.59)	41.33 (12.74)	40.40 (9.45)	22.97***	.001	.13	
<i>Proportion</i>								
Declarative I	.54 (.36)	.49 (.33)	.83 (.10)	.87 (.08)	-2.27*	-3.32***	-0.36	-0.91
Imperative I	.13 (.22)	.02 (.08)	.03 (.05)	.01 (.03)	-0.39	-1.43	-2.20*	-1.07
Neutral I	.27 (.28)	.45 (.33)	.13 (.10)	.11 (.09)	-1.29	-2.81**	-1.66 ⁺	-0.51
<i>Probability</i>								
Responsiveness	.20 (.17)	.19 (.12)	.34 (.12)	.34 (.13)	14.27**	.026	.002	
<i>Proportion</i>								
Confirming responses (R)	.75 (.24)	.67 (.42)	.83 (.14)	.77 (.16)	-0.56	-0.70	-0.40	-1.31
Denying R	.17 (.25)	.15 (.32)	.16 (.13)	.20 (.16)	-1.02	-2.55*	-0.71	-0.85

Note. ⁺ $p \leq 0.10$, * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$. Variables with a mean proportion = 1.00 in both groups have been removed from the table.

Table 4

Means (standard deviations) for level of play and play-stimulation

Child	ASD		TD		F group (1,29)	F session (1,29)	F session*group (1,29)
	Familiar	Unfamiliar	Familiar	Unfamiliar			
<i>Frequency of play (proportion)</i>							
Low level play	34.06 (28.06)	46.25 (28.37)	23.00 (17.4)	23.00 (20.25)	8.85**	.88	.88
High level play	58.75 (31.54)	45.94 (35.18)	73.67 (17.06)	74 (20.89)	8.23**	.95	1.05
<i>Mother</i>							
<i>Frequency of play- stimulation (proportion)</i>							
Higher level	.31 (.26)	.34 (.22)	.13 (.09)	.16 (.15)	9.13**	.45	.004
Same level	.64 (.24)	.60 (.19)	.80 (.09)	.79 (.18)	10.95**	.37	.12
Lower level	.05 (.08)	.06 (.07)	.06 (.07)	.05 (.09)	.003	.01	.43

Note. * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$. Variables with a mean proportion or frequency < 0.05 in both groups have been removed from the table.

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