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Research paper

Theory of Mind and socio-affective abilities in disabled children and adolescents

Théorie de l'esprit et capacités socio-affectives d'enfants et d'adolescents déficients intellectuels

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Abstract

Relations between theory of mind (ToM) and socioaffective abilities perceived by adults in intellectually disabled (ID) children and typically developing (TD) children matched on their developmental age were investigated. Seven tasks assessed ToM abilities; two measures of understanding of emotions and five tasks concerning the perception of self and others' beliefs. Results showed that developmental patterns of ToM were partially similar (emotions) and partially different (beliefs) in ID group in comparison with TD group. Parents' and teachers' perceptions of socioaffective abilities were assessed by a questionnaire. TD children were perceived by their parents and teachers as presenting more socioaffective competences than ID children and adolescents. Differences observed between the two groups in family and school characteristics did not predict participants' abilities in ToM. In addition, teachers' perceptions in specialized schools were the most linked with the understanding of emotions and beliefs displayed by their ID pupils. Methodological aspects of this study and perspectives for psychoeducative intervention are discussed.

Résumé

Cette étude explore les relations entre la théorie de l'esprit (ToM) et les compétences socioaffectives perçues par les parents et enseignants chez des enfants présentant une déficience intellectuelle (DI) et des enfants tout-venant (TV), appariés selon leur âge mental. Sept tâches évaluent les compétences en ToM ; deux concernent l'état mental « émotions » et cinq évaluent la compréhension des croyances. Les résultats montrent des patterns de développement de la ToM partiellement similaires (émotions) et partiellement

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différents (croyances) dans le groupe DI en comparaison au groupe TV. Les compétences socioaffectives sont mesurées par le Questionnaire du Profil Socioaffectif, complété par le père, la mère et l'enseignant. Les enfants TV sont perçus comme disposant de meilleures compétences socioaffectives que les enfants et adolescents DI. Les caractéristiques environnementales familiales et scolaires, bien que différentes pour les deux groupes, ne prédisent pas les compétences en ToM. Par ailleurs, les perceptions des enseignants spécialisés sont positivement liées à la compréhension des émotions et des croyances démontrées par leurs élèves DI. Finalement, certaines spécificités méthodologiques de cette recherche ainsi que des pistes d'intervention psychoéducatives sont discutées.

Keywords: Intellectual disabilities; Theory of mind; Socioaffective profile; Adults' perceptions

Mots clés : Déficience intellectuelle ; Théorie de l'esprit ; Profil socioaffectif ; Parents ; Enseignants

Introduction

Parents and professionals in specialized education are preoccupied by social adjustment and social integration in intellectually disabled (ID) children. In family, in school or in extracurricular contexts, these ID children sometimes display some difficulties in interactions with peers or with adults. The screening of difficulties in pupils' social adjustment constitutes a major concern for teachers in specialized and ordinary schools to adapt their management of the group. Regularly, teachers in specialized education should be able to differentiate ID children from children with social disorders, presenting a developmental delay or learning disabilities related to their social difficulties.

These teachers' concerns emphasize the interest to study the parents' and teachers' perceptions about the social and affective skills in ID children: do these perceptions allow identifying ID children presenting specific difficulties in their social adjustment or in their theory of mind (ToM) abilities? More precisely, do parents and teachers' perceptions allow identifying difficulties in the understanding of self or others' emotions or beliefs in ID children? At present, psychologists in Europe rarely assess children's ToM abilities (Gervais-Comté, 2006). And yet, besides their evaluation of cognition and language, they sometimes assess the adaptive behaviour. In ID children, several individual characteristics (family and school characteristics) may also influence ToM abilities. In practices of assessment, these characteristics, the ToM abilities and the parents' and teachers' perceptions about social adjustment must be taken into account in order to prevent and remedy deficits in ID children' social adjustment.

In the present study, two groups are compared: ID children and adolescents and typically developing (TD) children matched on their developmental age. We investigated several questions:

(1a) What are the differences or similarities in parents' and teachers' perceptions of socioaffective profiles about both groups?

(1b) Do parents' and teachers' perceptions allow identifying specific affective or behavioural deficits or strengths in one group or in both groups?

(2) What are the differences or similarities in ToM abilities (understanding of emotions and beliefs) between the two groups?

(3a) In each group, do links exist between ToM abilities and familiar adults' perceptions about the components of socioaffective profiles?

(3b) Does variability in these links help to discriminate subgroups in ID and TD groups?

(4) Could parents' and teachers' perceptions of socioaffective profiles, family and school characteristics predict ToM abilities in ID and TD groups?

Our study fits into "Vygostky's theoretical conception" of the ToM development (Astington, 1996; Dunn, Brown, Slomkowski, Tesla & Youngblade, 1991; Symons, 2004; Le Sourn-Bissaoui & Deleau, 2001) (for overview of diverse theoretical frameworks, see Deneault & Morin, 2007). In this theory, children do not construct their ToM by themselves. Everyday contacts between children and their environment give opportunities to develop the ToM shared by the members of their human community (or the way in which people of the same culture live interpersonal relationships). So, language and conversations about social world also hold a key position in this conception of the ToM development. Number of siblings and rank in siblings may have an impact on the diversity of interactions between peers and on ToM (Le Sourn-Bissaoui & Deleau, 2001). As interactions between peers and between children and adults implicate different social rules, each relational sphere helps differently to understand others' mind and to develop ToM (Vandell & Muller, 1979 in Blicharski & Strayer, 1993; Cassidy, Werner, Rourke, Zubernis & Balaraman, 2003). Social behaviours may vary also according to the context of interpersonal relations, family or school (Hughes, Soares-Boucaud, Hochmann & Frith, 1998). In our study, the crossing of parental and teachers' perceptions may emphasize similarities or differences in social behaviours encountered in various contexts of interactions (Hughes et al., 1998; Cassidy et al., 2003).

Some links between social adjustment and ToM abilities had already been studied in typical populations (Deneault, Morin, Quintal, Ricard & Gouin-Décarie, 2004), in ID populations (Abbeduto & Murphy, 2004; Charman & Campbell, 2002; Jervis & Baker, 2004; Rojahn, Esbensen & Hoch, 2006) and in populations with autistic disorders (Adrien, Rossignol, Barthélémy, Jose & Sauvage, 1995; Hughes et al., 1998). But the current study compares ID and TD participants in order to explore the links between their ToM abilities in two mental states – emotions and beliefs (Flavell, 1999) – and their socioaffective profiles.

Most frequently, authors studied the links between social competences and "ToM-beliefs" (Adrien et al., 1995; Charman & Campbell, 2002; Jervis & Baker, 2004). Other authors examined the links between social competences and "ToM-emotions" (Denham et al., 2003; Rojahn et al., 2006). Few studies investigated the two mental states – emotions and beliefs – in TD children (Cassidy et al., 2003; Deneault et al., 2004; Denham, 1986). Though, Williams, Wishart, Pitcairn and Willis (2004) specified that "emotions" are more linked with social adjustment than "beliefs" and Denham (1997) demonstrated that the recognition and the understanding of emotions were related to social experiences (interactions in family with mother and siblings and outside the family, with peers and other adults).

We refer to the debate in ToM literature about the direction of the links between social adjustment and ToM abilities. It could be that the understanding of emotions and/or beliefs (ToM abilities) facilitates some forms of social abilities (Adrien et al., 1995); ToM may be a process underlying the social competences (Abbeduto & Murphy, 2004; Barisnikov, Van der Linden, & Detraux, 2002). It could also be that social adjusted behaviours may lead to a change in ToM abilities. Actually, some adjusted behaviours are already presented by two three-year-old children in response to emotions displayed by peers (Denham, 1986). Or it could be that the link goes both ways (Jervis & Baker, 2004).

Method

Participants

Participants were 34 ID children and adolescents (14 males, 20 females) and 34 TD children (16 males, 18 females). The Table 1 presents their characteristics.

The mean chronological age (CA) was significantly higher in ID group than in TD group but the mean global developmental age (GDA) did not differ between both groups. Aetiologies of mental retardation were genetic aetiology in 14 participants and non-genetic aetiology in 20 participants. Participants were mainly recruited from Belgian French-speaking schools. Specifically, ID participants were in specialized schools, only one ID child was in an ordinary school and three participants were recruited through the Belgian association of parents of children with fragile-X syndrome. Teachers identified pupils meeting the study inclusion criteria: elementary comprehension and production of French language; no bilingual children; in ID group, no autistic disorder confirmed by psychologists in PsychoMedicoSocial Centres. Information letters and consent form for the child's participation and videotape record were then sent to these children's parents.

Instruments

Differential Scales of Intellectual Efficiency – Revised edition

Differential Scales of Intellectual Efficiency – Revised edition (EDEI-R, Perron-Borelli, 1996). These scales were elaborated for atypical populations, their applicability to ID participants was confirmed (Tourrette, 2006). They were used for matching the participants of both groups on their global developmental age (GDA). They allow to distinguish a verbal developmental age (VDA) and a non-verbal developmental age (NVDA) composing the global developmental age (GDA). The verbal developmental age was calculated by means of the scores obtained on the five following scales: vocabulary as pictures denomination; vocabulary as word definition, knowledge, social understanding and conceptualisation. The non-verbal developmental age was calculated by means of the scores obtained on the four following scales: classification of couples of pictures, classification of three pictures, categorial analysis and practical adaptation. These developmental variables must be measured in order to appreciate the impact of them on the ToM in each group.

Table 1
Characteristics of sample

	TD ($n = 34$) M(SD)	ID ($n = 34$) M(SD)	Mann–Whitney U value
Chronological age (years)	4.1(0.8)	10(2.3)	$U = 0.0$, $p < 0.001$
Global developmental age (GDA, years)	4.5(0.8)	4.5(0.9)	$U = 566$, ns
Aetiologies of ID (n)			
Down syndrome	None ID	$n = 9$	
Fragile-X syndrome		$n = 3$	
Turner syndrome		$n = 1$	
Williams syndrome		$n = 1$	
Non-genetic aetiology (perinatal anoxia, metabolic disease, unknown aetiology)		$n = 20$	

Note: M = mean, SD = standard deviation, n = numbers of people.

Test of Syntactical and Semantics Comprehension

Test of Syntactical and Semantics Comprehension (ECOSSE, Lecocq, 1996), the French version of the Test for Reception of Grammar (TROG, Bishop, 1983), assessed the participants' linguistic comprehension. The score obtained on 92 items is transformed in percentage of success.

Socioaffective profile

Socioaffective profile (*Profil SocioAffectif*, PSA, Dumas, Lafrenière, Capuano, & Durning, 1997, the French version of the Social Competence and Behavior Evaluation – SCBE, Lafrenière & Dumas, 1995) assessed the social and affective abilities of children from 2,5- to 6-year-old (period corresponding to the ToM development) throughout 80 items. Some examples of items are: "laughs easily", "hard to console", "participates easily in group", "is not interested when another child invites him or her to play", "asks adult permission to", "defies the adult when he or she is reprimanded". The questionnaire includes eight basis subscales:

(1) depressive–happy;
(2) anxious–secure;
(3) isolated–integrated;
(4) dependent–autonomous;
(5) angry–tolerant;
(6) aggressive–controlled;
(7) egocentric–prosocial;
(8) resistant–cooperative.

They compose four summary dimensions: social competence (positive socioaffective behaviour in eight scales), internalizing problems (presence of affective difficulties in scales 1, 2, 3, 4), externalizing problems (presence of behavioural difficulties in scales 5, 6, 7, 8) and general adaptation (all basis scales). Three composite scores have been calculated: emotional and affective adaptation, interactions with peers, child–adults interactions. Furthermore, two subscales (angry–tolerant and egocentric–prosocial) concerned social competences reflecting the consideration of others' feelings and needs and formed an additional composite score (mean of scores in two subscales). In order to calculate these four summary scales and four composite scores, the frequencies of 80 behaviours (long form) were noted on a six point Likert scale (from "never" to "always"), by the mother, the father and the teacher about each participant. A mean score for maternal and paternal answers was calculated after verification of a high interjudges agreement. All results were converted in T scores in order to homogenize the results diverging from the sex and the participant's GDA (less or more than four years). The extent of T scores varies from 30 to 70 points. Scores lower than 38 attested to disorders, scores higher than 62 attested to specific strengths in socioaffective development.

Information questionnaire about family

Information questionnaire about family was completed by the father and the mother. Sociodemographic information was collected: participant's rank in sibling, number of children in family, mother and father's level of instruction measured on a scale from 1 (elementary school non-achieved) to 7 (university degree). Each parent also completed questions about the frequency of their conversations about four emotions (joy, fear, sadness and anger) toward his or her child. The Likert scale of frequency is: 0 (never), 1 (sometimes), 2 (often), 3 (frequently), 4 (daily).

Information questionnaire about classroom

Information questionnaire about classroom was completed by the participant's teacher: number of children/pupils. Teacher also completed questions about the frequency of their conversations about four emotions (joy, fear, sadness and anger) toward the pupils. The Likert scale of frequency is: 0 (never), 1 (sometimes), 2 (often), 3 (frequently), 4 (daily).

Temporal structuring test

Temporal structuring test (NBTL, Anglade, Ravard, & Ravard, 1993). It assessed the participants' capacity to organise several pictures to develop a script. As temporal structuring ability was involved in ToM tasks, it was interesting to verify if this ability was acquired by all participants. This test was scored on a total of 13 points.

ToM tasks

Before the two ToM-emotion tasks, a task of facial emotional expression (FEE) recognition was presented. This preliminary task concerned four basic emotions (joy, sadness, anger and fear). Correct recognition was a necessary condition in order to propose ToM-emotion tasks. All TD and ID selected participants succeeded this task.

Seven ToM tasks and scoring are presented in appendix.

ToM-emotion tasks

Two tasks were adapted from the tasks proposed by Quintal (2001) in order to meet European cultural context and chronological age of both groups (TD children and ID children and adolescents). Two ToM-emotion tasks were scored from a total of twelve points (six points for each task):

(1) causes of emotions task (Nader-Grosbois, Thirion-Marissiaux, & Grosbois, 2003);
(2) consequences of emotions task (Nader-Grosbois et al., 2003).

ToM-belief tasks

Five tasks (see appendix for description) estimate the understanding of epistemic mental state "belief". The two last tasks were the most frequently presented in studies about ToM. The five ToM-belief tasks were scored from a total of five points (one point for each task):

(3) deception skills test (Oswald & Ollendick, 1989);
(4) change of representation task (Flavell, Everett, Croft, & Flavell, 1981);
(5) appearance–reality task (Flavell, 1986);
(6) unexpected-content task (Perner, Leekam & Wimmer, 1987);
(7) change of location task (Wimmer & Perner, 1983).

Procedure

To complete all the tasks of the current study (EDEI-R, ECOSSE, NBTL and seven ToM tasks), ID and TD children were tested during four sessions (one session lasted 20 to 45 min). ToM tasks were always presented after cognitive, linguistic and temporal structuring measures. "Deception skill test" was presented in the first place in ToM assessment because this task created a play climate. We did not counterbalance the order of presentation of other ToM tasks because no order effect was found in previous studies with ID children (for example, Charman & Campbell, 2002).

PSA and information questionnaires were completed by parents and teacher during the period of participant's testing (usually, one month). The testing was led by the female experimenter in a quiet and familiar room (at school or at home). In order to proceed to the scoring of ToM tasks, these sessions were filmed. A synthesis of cognitive, linguistic, temporal structuring and ToM abilities was sent to each participant's parents and teacher.

Results

Preliminary analyses

The normality of our data was first analysed (Kolmogorov–Smirnov tests) to establish whether parametric/non-parametric analysis was needed. Based on this initial screening (several ToM measures and socioaffective scores in PSA were not normally distributed), non-parametric tests were used for all results.

Cognitive and linguistic characteristics

The developmental characteristics of participants are detailed in Table 2. The participants of the two groups presented no significant difference in their verbal developmental age (VDA), their non-verbal developmental age (NVDA), their temporal structuring ability and their linguistic comprehension in spite of the higher chronological age (CA) in ID group than TD group. These results showed that the participants were well-matched concerning several cognitive and linguistic developmental characteristics; so, they have at their disposal similar developmental resources that would be mobilized to solve the ToM tasks.

Socioaffective profiles perceived by parents and teachers in both groups: similarities vs differences? weaknesses vs strengths?

High correlations between paternal and maternal perceptions led us to group these measures in order to compose the "parental perception" of socioaffective profiles (PSA). For ten participants (two TD and eight ID), the maternal or paternal PSA questionnaire was missing, we took into account the completed PSA. Table 3 summarizes parental perception and teachers' perception of socioaffective profiles for each group and Mann–Whitney tests are presented in order to compare these perceptions between groups.

Table 2
Cognitive and linguistic characteristics of sample

	TD ($n = 34$)		ID ($n = 34$)		Mann–Whitney
	M(SD)	Mdn	*M*(SD)	Mdn	*U* value ns
Verbal and non-verbal cognition (EDEI-R)					
VDA (years)	4.6(0.9)	4.4	4.5(1.3)	4.2	511.5
NVDA (years)	4.3(0.8)	4.3	4.4(0.9)	4.2	567.5
Temporal structuring (max. 13)	5.3(4.1)	4	4.7(3.8)	5	514.5
Linguistic comprehension (success %)	67.4(13.7)	67.3	61.2(14.7)	58.6	397

Note: *M* = mean, Mdn = median, SD = standard deviation, *U* values calculated on medians (non-parametric test), ns = non-significant.

Table 3
Adults' perceptions of children's socioaffective profiles (PSA) in each group (scores from 30 to 70)

	TD ($n = 34$)		ID ($n = 34$)		Mann–Whitney
	M(SD)	Mdn	*M*(SD)	Mdn	*U* value
Parental perceptions					
Summary scales					
Social competences	53.9(6.5)	53.3	47.8(7.3)	48.3	318.5***
Presence or absence of internalizing problems (affective competences)	50.7(5.3)	50.8	45.8(5.7)	46.5	301.5***
Presence or absence of externalizing problems (behavioural competences)	45.9(6)	46.8	45.5(5.5)	46.3	562 *ns*
General adaptation	52(6.7)	51	46(6.8)	46.8	315.5***
Composite scores					
Social competences reflecting the consideration of others' feelings and needs	48.3(7.2)	48.3	46.4(6.3)	46.8	497 ns
Expression of emotions	51.1(5)	50.8	46(4.9)	47.3	300.5***
Interactions with peers	51.3(5.6)	51.3	49.3(5.1)	49	464 ns
Interactions with adults	49.2(6)	47.5	45.2(5.8)	44.1	381*
Teachers' perceptions					
Summary scales					
Social competences	51.9(6.8)	51.5	47.6(8.2)	48	400*
Presence or absence of internalizing problems (affective competences)	53.3(7.5)	51.5	45.2(6.6)	45	218.5****
Presence or absence of externalizing problems (behavioural competences)	54.1(6.6)	55.5	45.7(8.5)	45.5	254****
General adaptation	53.8(6.9)	53.5	45.6(8.6)	45	271.5****
Composite scores					
Social competences reflecting the consideration of others' feelings and needs	53.2(7.1)	54	46.9(9.4)	47	341***
Expression of emotions	52.1(5.6)	51.8	46.7(6.8)	46.3	317.5***
Interactions with peers	52.9(5.7)	52.7	47.7(7.6)	47.8	340***
Interactions with adults	51.5(4.6)	51	44.6(6.5)	44.3	240.5****

Note: M = mean, Mdn = median, SD = standard deviation, U values calculated on medians (non-parametric test), ns = non-significant, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.005$, $^{****}p < 0.001$.

Firstly, significant differences in parental perceptions were observed between the two groups for three summary scales and for two composites scores; these differences were in favour of TD group. Significant differences between TD and ID groups were also observed for all components of teachers' socioaffective profiles and all these differences were again in favour of TD children. So, TD children were perceived by parents and by teachers as displaying more social and affective competences than ID children and adolescents (with similar global developmental age). So, concerning our first question (1a), these results showed that ID group displays less adaptation in their socioaffective behaviour and competences, than TD group, according to their respective parents and teachers.

Secondly, in TD group, within group analyses showed a significant difference inside parental perceptions between some socioaffective components: TD children were seen as presenting more affective competence than behavioural competence (Sign test = -3.2, $p < 0.005$). No significant

Table 4
Between-group analyses: children's ToM abilities

	TD ($n = 34$)		ID ($n = 34$)		Mann–Whitney
	M(SD)	Mdn	*M*(*SD*)	Mdn	*U* value
ToM-emotion tasks					
Causes of emotions (max. 6)	4.1 (1.3)	4.3	3.6 (1.7)	4	477.5 ns
Consequences of emotions (max. 6)	3.4 (1.8)	3.5	3.4 (1.8)	3.5	567.5 ns
Total ToM-emotion (max. 12)	7.5 (2.7)	8	7 (3.2)	7.5	532.5 ns
ToM-belief tasks					
Deception skills test (max. 1)	0.9 (0.4)	1	0.5 (0.5)	1	391***
Change of representation task (max. 1)	0.8 (0.3)	1	0.6 (0.3)	0.5	389*
Appearance/reality task (max. 1)	0.5 (0.4)	0.5	0.3 (0.4)	0	404*
Unexpected-content task (max. 1)	0.6 (0.4)	0.8	0.6 (0.4)	0.5	553 ns
Change of location task (max. 1)	0.3 (0.4)	0	0.3 (0.5)	0	561 ns
Total ToM-belief (max. 5)	3.1 (1.2)	3	2.3 (1.4)	2	389*

Note: *M* = mean, Mdn = median, SD = standard deviation, *U* values calculated on medians (non-parametric test), ns = non-significant, $*p < 0.05$, $**p < 0.01$, $***p < 0.005$, $****p < 0.001$.

difference was obtained in ID children between affective and behavioural competences (Sign test = −0.2, ns). There was no significant difference in teachers' perception between affective and behavioural competences neither in TD group (Sign test = −0.5, ns), nor in ID group (Sign test = 0, ns). We noted that all means and medians (parental and teachers' perceptions in both groups) were situated in the normality (from 38 to 62). So, concerning our first question (1b), these results showed that no specific weakness or strength in socioaffective profiles specifically in ID or TD participants was emphasized by parents and/or teachers.

ToM abilities in both groups: similarities vs differences?

Table 4 presents the participants' mean and median scores in the seven ToM tasks.

Between-groups analysis showed no significant difference in the medians of all scores in ToM-emotion: causes of emotions task, consequences of emotions task and total ToM-emotion task. Conversely, a significant difference was obtained in the median of the total of ToM-belief tasks: TD children better understood beliefs than ID children and adolescents. Significant differences between groups were obtained in three belief tasks (deception skills, change of representation, appearance/reality) but not in the two false-belief tasks (unexpected-content and change of location). So, concerning our second question, these results showed similarities in the development of ToM-emotion and of some abilities in ToM-belief in both groups; only some partial differences appeared in two abilities of false belief, in disfavour of ID group.

Links between ToM abilities and socioaffective profiles: subgroups in TD and ID groups

Hierarchical clusters of cases analyses using the Ward's method were carried out within groups in order to subtype children. Each summary scale and composite score of parental perceptions of socioaffective profiles (PSA) served as the input of these eight clusters analyses in each group. Two or three subgroups were distinguished for each component. The means and medians of these subgroups are presented in the first column of Table 5 (TD group) and of Table 6 (ID group). Results of Mann–Whitney tests (comparison between two subgroups) or of Kruskal–Wallis tests (com-

parison between three subgroups) were always significant. After the composition of significantly different subgroups, we characterised each subgroup ("postclusters analyses"). Mann–Whitney or Kruskal–Wallis tests between subgroups were made on all ToM measures (seven ToM task, total of ToM-emotion and of ToM-belief).

Table 5 shows clusters analyses results in TD group.

Teachers' perceptions in TD group allow to distinguish subgroups (in one summary scale and one composite score) that differ significantly in the total of ToM-belief: their perception of low social or affective abilities in subgroups corresponded to high ToM abilities displayed by TD participants. Parents' perceptions in TD group distinguished subgroups (two or three) in two summary scales and three composite scores of socioaffective profiles. Subgroups composed on parents' perceptions presented significant different levels in ToM tasks. However, their ToM abilities were systematically at opposite to their levels of socioaffective abilities: subgroups perceived as presenting low social or affective abilities demonstrated high ToM abilities.

Table 6 presents the clusters cases analyses results in ID group: only clusters analyses distinguishing significant differences in ToM abilities ("postclusters analyses") are shown.

Teachers' perceptions of socioaffective profiles (one summary scale and four composite scores) in ID group distinguished different subgroups presenting significant differences in ToM abilities in a positive direction: the lowest ID subgroup in social competences (perceived by teachers) also obtained the lowest levels in the total of ToM-belief and in the appearance/reality task. The ID subgroup, with the lowest abilities in expression of emotions, perceived by teachers, also had the lowest levels in the unexpected-content task. The ID subgroup presenting the lowest abilities in interactions with peers according to their teachers also presented the lowest total of ToM abilities. Their lowest abilities in interactions with adults according to their teachers corresponded with their lowest abilities in the total of ToM-belief and in change of representation. Finally, the subgroup with the lowest social competence reflecting the consideration of others' feelings and needs (perceived by ID's teachers) also obtained the lowest abilities in change of representation.

Parents' perceptions of socioaffective profiles (four summary scales and three composite scores) in ID group allow to distinguish subgroups also presenting differences in ToM abilities. So, parents' perceptions of social competences divided the ID group into three subgroups: a significant difference was obtained in the understanding of causes of emotions between the two lowest subgroups and the highest one according to their social competence (summary scale). Parents' perceptions of interactions with adults also divided the ID group into three subgroups: a significant difference was observed between the three subgroups, in the total of ToM-emotions, of ToM-beliefs and in two belief tasks. The intermediate subgroup is better in these ToM abilities than the low and high subgroups. However, the subgroups composed by the following input variables, affective competences, behavioural competences, general adaptation and interactions with peers, differed significantly in ToM-belief abilities but in reverse direction: the highest subgroups in input variables (parents' perceptions) obtained the lowest ToM-belief abilities.

So, concerning our third question, these results showed that, specifically about ID group, the subgroups composed on basis of their competences in ToM, were also well-identified, by their teachers, as displaying different socioaffective profiles. But surprisingly, the parents' perceptions about their ID children's socioaffective abilities did not help to discriminate their distinct ToM abilities and even they overvalued or underestimated their children's socioaffective abilities; that may implicate certain negative links between their reported assessment and observed ToM abilities in their children. Moreover, about TD group, the subgroups defined on basis of their ToM abilities, were not well-discriminated throughout their parents and teachers' perceptions socioaffective profiles; it needs to be discussed.

Table 5
Cases clusters on adults' perceptions (teachers, parents) of socioaffective profiles in TD group

(*n*)	*M*(SD)	Mdn	min.	max.	Tot. ToM	Tot. Em.	Cau.	Csq	Tot Bel	D.S.	Ch. R.	A/R	UnCo	Ch. of L
Teachers' PSA														
General adaptation														
1 (14)	47.4(2.5)	48	43	51					High					
2 (14)	55.4(2.6)	54.5	52	60					Low					
3 (6)	65(3)	64.5	62	70										
Interactions with adults														
1 (29)	50(2.7)	50	44.5	54.5					High					
2 (5)	60.5(1.1)	60.5	59	61.5					Low					
Parents' PSA														
Affective competences														
1 (7)	43(1.9)	43	40.5	45.5	High				High			High		High
2 (12)	49.5(1.5)	50	47	51.5	Low				Mod			High		
3 (15)	55.2(3)	54	52.5	63.5	Low				Low			Low		Low
General adaptation														
1 (19)	47.2(2.8)	47	43	51.5					High					
2 (15)	58(5)	56	53	70					Low					
Expression of emotions														
1 (18)	47.3(2.6)	47.8	39.7	50.8	High				High					
2 (16)	55.4(3.3)	55.3	51.3	63	Low				Low					
Interactions with peers														
1 (9)	44.7(2.4)	45.2	40.7	47.5					High			High		High
2 (15)	50.8(1.7)	51.2	48.5	53.3										
3 (10)	58.1(3.2)	57.4	54.8	65					Low			Low		Low
Interactions with adults														
1 (8)	42(1.4)	42	40	44	High	High			High			High		
2 (15)	47.7(1.6)	47.3	45.3	50.8	Low	Low			Low					
3 (11)	56.4(3.7)	55.5	51.5	62.8	Low				Low			Low		

Note: *M* = mean, Mdn = median, SD = standard deviation, Tot ToM = total of ToM tasks, Tot Em. = total of ToM-emotion tasks, cau. = causes of emotions task, csq. = consequences of emotions task, Tot Bel. = total of ToM-belief tasks, D.S. = deception skills test, Ch. R. = change of representation task, A/R = appearance/reality task, Un.Co. = unexpected-content test, Ch. of L. = change of location task, mod. = moderate.

Table 6
Cases clusters on adults' perceptions (teachers, parents) of socioaffective profiles in ID group

(*n*)	*M*(SD)	Mdn	min.	max.	Tot. ToM	Tot. Em.	Cau.	Csq	Tot. Bel.	D.S.	Ch. of R.	A/R	Un. Co	Ch. of L
Teachers' PSA														
Social competences														
1 (6)	34.7(3.4)	34	30	39					Low			Low		
2 (22)	47.7(3.2)	48	42	53					High			High		
3 (6)	59.8(2.5)	59.5	57	63										
Expression of emotions														
1 (23)	42.9(4.3)	44.3	32	48.3									Low	
2 (11)	54.7(3.1)	53.3	50	60									High	
Interactions with peers														
1 (15)	40.8(3.5)	42.3	33.7	45.3	Low									
2 (19)	53.1(5.1)	51.6	47.7	65.3	High									
Interactions with adults														
1 (14)	38.2(3.1)	38.8	32.5	42					Low		Low			
2 (20)	49.1(3.8)	48.8	43.5	57					High		High			
Social competences reflecting the consideration of others' feeling and needs														
1 (27)	43.4(6.7)	45	30	52							Low			
2 (7)	60.6(3.8)	59	56.5	66.5							High			
Parents' PSA														
Social competences														
1 (10)	38.7(2.8)	40	33	42			Low							
2 (11)	47.6(1.5)	48	45.5	49.5			Low							
3 (13)	54.9(3.6)	54	51	63			High							
Affective competences														
1 (7)	37.1(2)	38	33.5	39										
2 (14)	45.1(2)	46	41.5	47							High			
3 (13)	51.3(2.8)	50	48.5	58							Low			
Behavioural competences														
1 (14)	41(3.8)	42.3	30	44									High	
2 (18)	49.5(3.2)	48.5	46	56									Low	

Table 6 (*Continued*)

(*n*)	*M*(SD)	Mdn	min.	max.	Tot. ToM	Tot. Em.	Cau.	Csq	Tot. Bel.	D.S.	Ch. of R.	A/R	Un. Co	Ch. of L
General adaptation														
1 (25)	43(5.1)	44	32	49					High				High	
2 (9)	54.3(2.4)	54	51	58.5					Low				Low	
Interactions with peers														
1 (5)	41.1(1.2)	41.3	39.7	42.8										High
2 (18)	48(2)	48	44.2	51.2									High	Low
3 (11)	55(2.5)	54.2	51.8	59.5									Low	
Interactions with adults														
1 (8)	38.3(3.1)	38.8	32.5	41.8		Low				Low				
2 (14)	43.8(1.2)	43.6	42.3	46.3		High			High	High	High			
3 (12)	51.6(3.2)	50.5	47.5	57		Low			Low		Low			
Social competences reflecting the consideration of others' feeling and needs														
1 (21)	42.8(4.8)	43.5	30	48.8									High	
2 (13)	52.7(2)	52.5	50	56.5									Low	

Note: *M* = mean, Mdn = median, *SD* = standard deviation, Tot ToM = total of ToM tasks, Tot Em. = total of ToM-emotion tasks, cau. = causes of emotions task, csq. = consequences of emotions task, Tot Bel. = total of ToM-belief tasks, D.S. = deception skills test, Ch. of R. = change of representation task, A/R = appearance/reality task, Un.Co. = unexpected-content test, Ch. of L. = change of location task.

Family and school characteristics

About the questionnaire completed by the parents, the fathers' level of instruction was significantly higher in the TD group ($M = 5.4$, SD = 1.4) than in the ID group ($M = 4.3$, SD = 2), $U = 336$, $p < 0.05$. The mothers' level of instruction was also significantly higher in the TD group ($M = 6$, SD = 1.1) than in the ID group ($M = 4$, SD = 1.8), $U = 213.5$, $p < 0.001$. No significant difference was obtained between the two groups in the frequency of small families and of families with more than two children (dichotomous variable "family size" $\chi_1^2 = 1.8$, ns). The variable "rank in the sibling (the eldest or not the eldest)" presented similar distribution of frequency in both groups. The parental frequency of conversations about emotions (mean score of mother's and father's perceptions) toward the participants was significantly higher in the TD group ($M = 2.3$, SD = 0.7) than in the ID group ($M = 1.8$, SD = 0.8), $U = 377.5$, $p < 0.05$. The influence of the rank in the sibling (the eldest or not the eldest) on maternal and paternal conversations about emotions was studied in each group. In TD group only, mothers' perceptions of the frequency of conversations with eldest TD children ($M = 2.8$, SD = 0.7) was significantly higher than with no-eldest TD children ($M = 2.1$, SD = 0.6), $U = 54$, $p < 0.05$.

About the questionnaire completed by teachers, there were more children in ordinary classrooms ($M = 22.5$, SD = 3.3) than in specialized classrooms ($M = 9.5$, SD = 2.9), $U = 10$, $p < 0.001$. The teachers' frequency of conversations about emotions towards participants was significantly lower in TD group ($M = 1.1$, SD = 0.7) than in ID group ($M = 2.3$, SD = 1.2), $U = 143$, $p < 0.001$.

Predictors of ToM abilities: socioaffective profile, family and school characteristics

Multiple regressions were applied in order to verify in which measure the components of the socioaffective profiles perceived by parents and teachers (four summary scales in first regression analysis and four composite scores in second regression analysis), family size, rank in sibling (the eldest or not the eldest) and parental and teachers' conversations about emotions, could predict the variance of the total of ToM-emotion and the variance of the total of ToM-belief reached by the participants in the two groups.

Results of regression analyses are presented in Table 7.

In ID group, internalizing problems in socioaffective profiles (PSA) perceived by teachers explained 11% of the variance of ToM-emotion tasks (positive B coefficient). Thirty6nine percent of the variance of ToM-belief tasks were explained by two components of PSA entered in the model regression: the presence or absence of externalizing problems in socioaffective profiles (PSA) perceived by parents (negative B coefficient) and the social competences perceived by teachers (positive B coefficient).

In TD group, no variable entered in the regression model (22 independent variables) was explicative of the variance of the total of ToM-emotion tasks. Parents' perception of internalizing problems in socioaffective profiles (PSA) was the only predictor of a little part of the variance of the total of ToM-belief tasks (16%). We note that the slope of the regression straight line is negative (B coefficient = −1.1).

So, concerning our fourth question, these results still confirmed the good prediction of ToM-emotion abilities in ID children throughout their teachers' perception of their socioaffective profiles. It showed also that family variables taken into account did not contribute to predict ToM abilities in both groups.

Table 7
Summary of multiple regression analyses: predictors of children's abilities of ToM-emotion and of ToM-belief

Dependant variables	Total ToM-emotion					Total ToM-belief				
	B	SE/B	Beta	$R^2_{adj.}$	*F*	B	SE/B	Beta	$R^2_{adj.}$	*F*
TD ($n = 34$)										
Predictors[a]										
Parents PSA: presence or absence of internalizing problems (affective competences)						−0.11	0.04	−0.44	0.16	6.1*
ID ($n = 34$)										
Predictors										
Teacher PSA: presence or absence of internalizing problems (affective competences)	0.18	0.08	0.38	0.11	4.7*					
Teacher PSA: social competences						0.09	0.03	0.5	0.23	10.2***
Parents PSA: presence or absence of externalizing problems (behaviour competences)						−0.11	0.04	−0.43	0.16	6.3*

Note: B = regression coefficient, SE/B = standard deviation of B, Beta = standardized regression coefficient, $R^2_{adj.}$ = multiple regression coefficient (percentage of explained variance)
Note: * $p < 0.05$, ** $p < 0.01$, ***$p < 0.005$.

[a] Two regression analyses: (1) variables entered = summary scales of PSA completed by parents and by teachers, rank in sibling, family size, communication about emotions between parents and participant and between teacher and participant, (2) four composite scores of PSA completed by parents and by teachers, rank in sibling (eldest or no-eldest), family size, communication about emotions between parents and participant and between teacher and participant.

Discussion

Briefly, this study showed the following findings. Firstly, ID participants were perceived by their teachers and parents as displaying less socioaffective abilities than TD participants. Secondly, toward each group of children, familiar adults' perceptions didn't identify specific internalized vs externalized problems; specific weaknesses vs strengths in: social, affective, behavioural competences, general adaptation, expression of emotion, interactions with peers or with adults. It may be due to intra- and interindividual variability in socioaffective profiles in each group of children. Thirdly, on the one hand, similar levels in ToM-emotion abilities (understanding of causes and consequences of emotions) were obtained in both groups but on the other hand, ID children and adolescents presented lower abilities in ToM-belief than TD children matched on their global developmental age. Fourthly, teachers' perceptions of social competences in ID participants corresponded to their levels in ToM-belief and teachers' perceptions of affective competences in ID participants corresponded to their levels in ToM-emotion abilities. These results contrast with a lack of coherence between teachers' perceptions of social and affective competences in TD children and respectively their ToM-belief abilities and their ToM-emotion abilities. Fifthly, in each group, parents' perceptions of socioaffective profiles were not coherent with respective children's

abilities in ToM-belief or in ToM-emotion. These results need to be discussed with regards to each initial questions of research and it implies the discussion of some methodological aspects.

Even if parents and teachers perceived less social and affective abilities in ID group than in TD group, matched on their global developmental age, their respective perceptions did not permit to identify specific weaknesses vs strengths in any component of socioaffective profiles in both groups. Parents or teachers may perceive low socioaffective abilities in ID participants, when they refer to their representations of adjusted behaviour according to the chronological age to assess some socioaffective behaviour; and they may perceive good socioaffective abilities in them, when they refer to their representations of adjusted behaviour according to their developmental age to evaluate some other socioaffective behaviour. In our study, the PSA questionnaire was chosen on the basis of participants' global developmental age. Qualitative analyses of individual socioaffective profiles (perceived by parents and teachers) could highlight specific weaknesses or strengths in some ID and/or TD participants, as suggested by Thirion-Marissiaux and Nader-Grosbois (2006) and Deneault and Morin (2007).

Considering the understanding of two distinct mental states, "emotion" and "belief", implies to postulate different processes implicated in the development of ToM or social cognition (Cassidy et al., 2003; Deneault et al., 2004). In our study, the levels in ToM-emotion abilities (understanding of causes and consequences of emotions) were similar in both groups: so, the "delay hypothesis" in the development of ToM in ID group is confirmed (Zigler, 1969 in Nader-Grosbois, 2006). At the contrary, ID children and adolescents presented lower abilities in ToM-belief than TD children (matched on their global developmental age): so, the "difference hypothesis" of the development of ToM-belief in ID group is emphasized in comparison with TD group (Zigler, 1969 in Nader-Grosbois, 2006). These results show that developmental patterns of ToM are partially similar in ID children and adolescents and in TD children matched on their global developmental age. Some individual and developmental characteristics may help to explain this observation; and it was examined by Thirion-Marissiaux and Nader-Grosbois (2007a, 2007b).

In this study, clusters analyses showed that teachers' perceptions of social competences[1] of their ID pupils at school were consistent with their ToM abilities, demonstrated in testing situation: a low level in social competence perceived by teachers corresponds to a low level in ToM-belief (total and appearance/reality task). Jervis and Baker (2004) also found that ID children with high scores in ToM-beliefs showed greater social adaptation (reported by teachers) than ID children with low ToM scores. However, in our TD group, a low level in social competences perceived by teachers corresponds to a high level in the total of ToM-belief. In order to complete the socioaffective profiles questionnaire (PSA), an accurate knowledge of pupil's social and affective abilities is required. We suggest that ID participants' teachers assessed more easily the frequency of interactions with peers and with adults because they observed a smaller number of pupils in their classrooms than teachers in TD classrooms. Smaller groups of pupils in specialized schools are more likely to offer to teacher opportunities to promote conversations about emotions and to observe how pupils are able to consider others' needs and feelings, others' perspectives, others' beliefs, than greater groups. Moreover, teachers' training in specialized schools, the differential pedagogy they implement and the reports about their pupils (from psychologists) help them to discriminate their social and affective abilities. These teachers also aim at the support of

[1] The summary scale "social competence" is the PSA scale which allows the best distinction between clinical and ordinary populations. The score in "social competence" scale is the best indicator of the participant's social adjustment (Dumas et al., 1997).

autonomy and social adjustment, particularly in ID adolescents. These objectives of social learning are usually based on the assessment of their deficits versus abilities in socioaffective area. In our study, amongst the components of socioaffective profiles perceived by ID participants' teachers, interactions with peers are consistent with the total of ToM abilities, while interactions with adults are particularly consistent with the understanding of beliefs. These results in ID group support the interest to investigate different spheres of interactions (Vandell and Muller, 1979 in Blicharski & Strayer, 1993; Cassidy et al., 2003). Concerning the TD group, the inconsistent relation between socioaffective profile perceived by teachers and the ToM abilities may be explained by the type of interactions varying according to the chronological age in preschoolers (Pons, Lawson, Harris, & de Rosnay, 2003). Actually, Cassidy et al. (2003) postulated that ToM abilities would be first linked – in young TD preschoolers – to social abilities particularly important in the interactions with peers and would be later linked – in older TD preschoolers – to the interactions with peers and with adults. We also note that teachers in ordinary schools rarely receive individual reports about their pupils from psychologists and have fewer opportunities of continued educational training concerning social disorders than teachers in specialized schools. Concerning the parents' perceptions of their TD or ID children's socioaffective profiles, it is possible that they don't have enough opportunities in their family context to observe precisely and shrewdly their children in various interactions with peers and with different adults. This may explain the lack of link between their reported assessment on their children's socioaffective competences and ToM abilities.

Family and school characteristics did not predict ToM abilities in both groups. But, differences between teachers of both groups in the perception of their pupils' socioaffective profiles are confirmed by regression analyses. In the ID group, affective competences perceived by teachers are the only predictor of a part of variance of ToM-emotions abilities. This accurate assessment of affective skills in the ID group by their teachers may be the reflection of psychoeducative interventions in specialized schools in order to develop the expression of emotions (Pfefferlé, 2006; Bellefleur & Messier, 2003). Two positive regression straight lines characterise the relation between ToM-belief abilities and teachers' perceptions. At the contrary, in TD group, teachers' perceptions did allow to predict neither ToM-emotions nor ToM-belief abilities.

Previous studies – in children with autism (Hughes et al., 1998) and in TD preschoolers (Cassidy et al., 2003) – emphasized the more accurate perceptions about social competences in teachers than in parents. In our study, we compared both groups concerning parents' perceptions of socioaffective profiles. Why do parents' perceptions of socioaffective profiles identify subgroups inconsistent with the ToM abilities in both groups (except for the causes of emotions in ID group)? Why did we observe two negative regression straight lines characterising the relation between ToM abilities and parents' perceptions? Does a bias exist in parents' perceptions in both groups? Perhaps, parents have less opportunity to observe their child in interactions with peers than teachers while they easily assess his or her abilities in interactions with adults (Hughes et al., 1998). The parents – in both groups – completed PSA in reference to their perceptions of their child's social and affective abilities in the family and they may infer these perceptions about how their son or daughter interacts with peers at school. In the ID group, parental PSA may reflect positive observations about affective and social abilities of their child or their adolescent emphasized in reports from psychologists. In the TD group, the lack of predictability of ToM-emotion throughout parents and teachers perceptions of socioaffective components does not confirm the results of Deneault et al. (2004), who found a positive relation between social adjustment perceived by mothers and caregivers and the understanding of "emotions" but not of "beliefs". We explain

this lack of predictability as follows: TD children may go through one stage of ToM-emotion development to another stage[2] in a shorter time than ID children who develop their ToM-emotion more slowly. Thus, the discrimination of change in social and affective abilities related to each ToM stage is easier in the ID group than in the TD group and may clarify the knowledge of ToM development in TD children (Charman & Campbell, 2002; Mellier & Courbois, 2005; Tourrette, 2006). Hughes et al. (1998) and Pons et al. (2003) also emphasized the fast increasing of social competences in TD preschoolers.

Some differences between both groups refer more specifically to the "Vygotsky approach". Variability in conversations between ID and TD families may be influenced by parents' characteristics – as a personality trait (like alexithymia, Luminet & Lenoir, 2006) or instruction – and also by child's characteristics as chronological age (Brown & Dunn, 1992 cited in Luminet & Lenoir, 2006; Pons et al., 2003) or ID (Thirion, 1998) or intelligence quotient (Pons et al., 2003).

Finally, some methodological aspects must be discussed.

To study the relation between the ToM development and the social adjustment in ID populations, the majority of researches use reported measures completed by teachers or educators. Most frequently, the sociability domain of the Vineland Adaptive Behavior Scales (VABS, Sparrow, Balla, & Cicchetti, 1984) is chosen (Charman & Campbell, 2002; Jervis & Baker, 2004; Rojahn et al., 2006). Other reported measures were sometimes added to assess socioadaptive abilities in everyday live abilities. For example, Charman and Campbell (2002) used the VABS and items of the Frith's Scale (Frith, Happé, & Siddons, 1994), Rojahn et al. (2006) added the Social Performance Survey Schedule (Matson, Helsel, Bellack, & Senatore, 1983). However, none of these ToM researches compared the perceptions of different adults in order to take into account the influence of life context on social and affective abilities demonstrated by children, adolescents or adults with intellectual disabilities; only teachers or educators completed the questionnaires. It is important to take parents' and teachers' perceptions into account in a real partnership. Some parents complain that their ID or TD child presents unadjusted behaviour in family context when the teachers of these children do not observe similar difficulties at school (and vice versa); thus children vary their behaviour in diverse life contexts (Roskam, Meunier, & Hughes, 2006). The socioaffective profile (PSA) completed by different familiar adults helps parents and/or teachers to perceive difficulties in TD or ID children. However, to complete the PSA, it requests an accurate knowledge about the child/pupil and some items could be reformulated in order to correspond with the ID people's chronological age. We regret that this instrument does not supply with an affective and social maturity level estimated by parents and by teachers (socioaffective developmental age). Actually, the level of adaptive maturity (variable estimated by reported measure in the VABS) must allow to analyse the distance between this variable and the global developmental age in order to determine eventual bias of overestimation in parental and/or teachers' perceptions (Hughes et al., 1998). Moreover, direct observation of affective and social competences displayed by participants at home and at school (Cassidy et al., 2003; Denham, 1986; Van der Eecken, 2005) allows to study if the observation corresponds to parents' and teachers' perceptions and may clarify the impact of each sphere of interactions (with peers and with adults) on ToM development. Similarly, the direct observation of participants' ToM abilities at home or at school (observation of interactions between siblings or between peers) would be more linked to adults' perceptions of socioaffective profiles than the assessment of ToM abilities in testing

[2] This conception of the ToM-emotion development – with different stages/levels of acquisition – is opposite to a discontinuous conception (acquisition or no acquisition of ToM-emotion without intermediary hierarchical stages) (Charman & Campbell, 1997 in Jervis & Baker, 2004).

situation (Kasari et al., 2003). So, Cassidy et al. (2003) emphasized the abstract and impoverished aspects of ToM tasks used in research in comparison with real-life situations in which children respond in the moment. Do these ToM tasks assess abilities less relevant to real-life situations observed by familiar adults? Do these tasks fail to capture the full richness of social reasoning in actual social situations (Barisnikov et al., 2002)? In order to reduce the distance between the assessment of ToM abilities (ToM tasks in testing situation) and the perception of socioaffective abilities in real situation (reported measure), the EASE scale (*Échelle d'Adaptation Sociale pour Enfant*s, Hughes, Soares-Boucaud, Hochman & Frith, 1997) constitutes an interesting instrument because it proposes a reported assessment of social abilities with a focus on the abilities in ToM displayed in everyday life. This instrument[3] – created for autistic populations – is completed by parents and distinguishes social behaviour implicating ToM abilities and social behaviour without implication of ToM abilities (Gervais-Comté, 2006). The use of EASE scale would facilitate future comparative researches about relations between socioaffective abilities and ToM development.

Conclusion

The present study takes a glimpse into the structural model of the ToM development (Barisnikov et al., 2002) and proposes a complex model of the relation between ToM development (understanding of emotions and beliefs) and socioaffective abilities perceived by familiar adults. In this model, the presence of intellectual disabilities plays a great part as well as the life context. The Belgian organisation of specialized schools offers to ID children and adolescents a favourable situation to discriminate specific weaknesses or strengths in their social and affective skills. Teachers may define the individual objectives of social learning on the basis of their pupils' skills (Kasari, Freeman, & Bass, 2003) in order to increase their social cognition (Barisnikov et al., 2002). Our comparative study also emphasizes the interest to develop psychoeducative interventions in ordinary schools in order to support and stimulate the TD children's social adjustment and ToM development. We do not favour a relation of cause–effect between psychoaffective interventions and ToM development (Deneault et al., 2004). We postulate an interaction model where the interventions support the understanding of self and others' mental states and vice versa (the ToM development is enhanced by psychoeducative interventions).

Finally, if the language has not been specifically observed in this study, we do not forget that this factor plays a main role in the ToM development (as attested by a profuse ToM literature). Cassidy et al. (2003) postulated that linguistic abilities facilitate the understanding of emotions and beliefs and the development of prosocial behaviour. Astington (2003) mentioned that the use of metacognitive terms makes children appear competent to teachers. Relations between cognition, linguistic competences and ToM development in ID and TD groups were studied in other papers (Thirion-Marissiaux & Nader-Grosbois, 2006, 2007a, 2007b).

Acknowledgements

This research was carried out within the framework of the "Chaire Baron-Frère in special education" that aims to give a priority to links between research and intervention toward people with special needs.

[3] In the beginning of our research, the validity of this interesting French scale was not confirmed (Gervais-Comté, 2006).

Appendix A

(1) *Causes of emotions task* (Nader-Grosbois, Thirion-Marissiaux & Grosbois, 2003) includes four similar beginnings of scripts ("three friends go on a picnic in the forest" illustrated by two pictures). The end of each script (a third picture) varies in order to elicit an appropriate response according to emotional coloration in the script: joy script (friends eat picnic); sadness script (picnic cancelled because of rain); fear script (threatening dog is approaching the picnic); anger script (picnic is ruined by two friends). For each script, the participant was asked to infer the protagonist's emotion and to identify one among four FEE pictures (by pointing). The response to each emotional script is scored between 0 and 1.5 point according to the participant's justification (0 = false FEE, non-justified or incoherent justification; 0.5 = false FEE, coherent justification; 1 = correct FEE, non-justified or incoherent justification; 1.5 = correct FEE, coherent justification). The maximal score is 6 points in this task.

(2) *Consequences of emotions task* (Nader-Grosbois, Thirion-Marissiaux & Grosbois, 2003) includes four different scripts. Each script was made up of two pictures: joy script (to get a gift); sadness script (pet's death); fear script (to imagine monsters in bedroom at night); anger script (conflict between friends). For each script, the participant was asked to infer the protagonist's behaviour and to finish the script, in choosing one picture between three: pictures of social adjusted behaviour or of social maladjusted behaviour or of neutral behaviour. The response to each emotional script was scored between 0 and 1.5 point according to the participant's justification (0 = social maladjusted or neutral behaviour, non-justified or incoherent justification; 0.5 = social maladjusted or neutral behaviour, coherent justification; 1 = social adjusted behaviour, non-justified or incoherent justification; 1.5 = social adjusted behaviour, coherent justification). The maximal score is 6 points in this task.

(3) *Deception skills test* (Oswald & Ollendick, 1989). Firstly, the participant took pleasure in looking for a hidden object in the experimenter's hands and secondly participant hid the object him/herself in his/her hands. The experimenter noted if the participant had hidden the object by holding his/her hands in his/her back, if he/she showed both fists closed and if the object was really hidden. The game was repeated three times. The test was successful (1 point) if the three criteria were fulfilled for at least two out of three trials.

(4) *Change of representation task* (Flavell et al., 1981) was based on two concrete supports. At task 1, a cat drawn on a cardboard side and a dog drawn on the other side were presented to the participant. At task 2, a turtle drawn on a sheet placed between the experimenter and the participant. For each level, two questions were asked to the participant *"what do you see?"* and *"what do I* (the experimenter set opposite the participant) *see*?" The participant obtained 0.5 point if he/she answered correctly to two questions of one task and 1 point for the correct answers in two tasks.

(5) *Appearance–Reality task* (Flavell, 1986). Three substitute objects – (a) a flashlight in the shape of a mobile phone, (b) an eraser in the shape of a peanut in its shell and (c) a telescope looking like a glue stick – were presented to reduce the risk of misreading the object (real or visible) and to appreciate the stability of the participants' performances. Two questions were asked to the participant about each substitute object: *"If you look at this object and you don't touch it, what does it look like?"* and *"What is it, in reality?"* The answers could be given by verbalization or by pointing at a picture amongst two (for (a): a picture of a flashlight and a picture of a mobile phone). Some young TD or ID participants with low VDA mimed their answers (with a conventional gesture – for ex., gesture of calling – as reference to the functional aspect of the object). The participant obtained 0.5 point if he/she answered

correctly to two questions about one substitute object and 1 point for the two correct answers about two or three substitute objects.

(6) *Unexpected–content task* (Perner et al., 1987). This task assessed the participant's ability to predict the false belief given the situation. Participant was shown a Smarties box and the experimenter asked: *"what is it inside the box?"* (The expected response is: Smarties, sweets, chocolates). The participant then opened the box and found that there were pencils inside the Smarties box. The pencils were returned to the box and the participant was then asked: *"what did you think was in the box before the box was opened?*" (question about self false belief) and *"what will your mother/teacher think was in the box, your mother/teacher had not seen inside the box?"* (question about other's false belief). The participant obtained 0.5 point if he/she answered correctly to one question and 1 point for the correct answers to both.

(7) *Change of location task* (with methodological adaptations from Wimmer & Perner, 1983). The task assessed the participant's ability to predict the doll's behaviour given the false belief of the doll. The experimenter placed a doll's house on the table and presented the story of "Max and the transfer of chocolate" to the participant with the help of three dolls. Theses represented members of the participant's family (correspondence between the hair colour of dolls and hair colour of members of the participant's family): his/her mother (mother doll), his/her older brother, sister or his/her older first cousin (child doll) and the participant him/herself (participant doll). The participant doll didn't participate in the story but was hold by the participant and the final questions were asked to the participant doll. The story presented mother doll and child doll at home. The child doll ranged chocolate in the green cupboard in the living-room. While child doll was outside the home, mother doll took chocolate, cooked a chocolate cake and ranged chocolate in white cupboard in the kitchen. After, child doll returned to inside the home, he/she was hungry and would like to eat some chocolate. The final ToM-belief question was: *"where will X [child doll] look for the chocolate?"* Two control questions were asked: "*where was the chocolate at first?*" (memory question) and *"where is the chocolate now?"* (reality question). The participant obtained 1 point if he/she answered correctly to the ToM question. The answers to control-questions are used for qualitative analyses.

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