

My way or your way? Perspective taking during social problem solving

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ABSTRACT

The current study investigated contributors to social perspective taking during social problem solving in younger ($M = 8.20$, $n = 111$) and older ($M = 12.05$, $n = 112$) school-aged children. Results indicated a developmental progression in social perspective taking for different aspects of social problem solving. The findings suggest that social perspective taking is more difficult for some aspects of social problem solving than others. Moreover, syntactic language is important for social perspective taking during middle childhood. The results also highlight that flexibility in considering the self and other perspective is important for social problem solving.

Introduction

As children develop so does their ability to understand that others have thoughts, feelings, and intentions that differ from their own (i.e., theory of mind or social perspective taking). This skill is particularly important during a social conflict; a context that requires differentiating and coordinating the social perspective of the self and other in order to resolve an interpersonal conflict. Social perspective taking during an interpersonal conflict shifts from being able to consider different perspectives to a more complex third person point of view throughout childhood and adolescence (Selman, 1980). As social perspective taking develops, children may place a greater emphasis on getting their way ("my way") than conceding to the other ("your way") or vice versa during a social conflict. Children who are able to consider the self or other social perspective, depending on the situation should be better able to consider both perspectives during social problem solving than children who are not flexible in their perspective orientation (Leadbeater, Hellner, Allen, & Aber, 1989). The present study investigates social perspective taking and perspective orientation in school-aged children during social problem solving. We also examine the role of language given that research suggests an association between language and social perspective taking in the context of resolving social conflict (Cohen et al., 1998; Im-Bolter, Cohen, & Farnia, 2013; Zadeh, Im-Bolter, & Cohen, 2007).

Theory of mind as a social cognitive skill: social perspective taking

Theory of mind (ToM) refers to our ability to attribute beliefs, desires, and intentions to others. The majority of ToM research has

focused on preschoolers, demonstrating that by about age four, children are able to recognize that others may have false beliefs about the world (Astington & Jenkins, 1999). However, ToM continues to develop beyond recognition of false beliefs to more complex higher order mental state understanding, which occurs throughout middle childhood and beyond (Im-Bolter, Agostino, & Owens-Jaffray, 2016). Higher order ToM is typically measured with tasks that assess recursive mental state understanding (e.g., Mary *thinks* that John *thinks*) to explain others' intentions and behaviour (Im-Bolter et al., 2016). While this research is informative for our understanding of the development of higher order ToM, little focus has been directed to understanding ToM in a context that involves interpersonal conflict. This is particularly important, given that children and adolescents who demonstrate poor social competence, including social problem solving, experience a number of negative outcomes (e.g., school failure, delinquency, interpersonal problems; see Merrill, Smith, Cumming & Daunic, 2017).

Social conflicts require utilization of social perspective taking (or ToM) so that the conflict can be resolved in a satisfactory manner. Selman (1980) proposes four distinct levels of social perspective taking during social problem solving that occur between preschool and adolescence. Children between the age of 3 to 6 are typically at the lowest level (0 or physical) and are unable to differentiate between the physical and psychological characteristics of an individual (i.e., confuses acts and feelings). The next level (1 or unilateral) typically emerges between the ages of 5 and 9. At this level the child can distinguish between the physical (behaviour) and the mental (thoughts, feelings, and intent) and ToM is evident. Between the ages of 7 and 12, children reach level 2 (or reciprocal) and are able to consider both the self and other social perspectives during social problem solving and recognize

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that others can do the same. At the highest level (3 or collaborative), the child is able to take a third person perspective of the conflict and can coordinate self-other perspectives in a somewhat impartial manner. Although some children demonstrate collaborative perspective taking between the ages of 8 and 10, it is not fully developed until after age 15 (Selman, 1980). Higher levels of social perspective taking are associated with greater observed social competence (Mischo, 2005), lower rates of externalizing and internalizing problems (Burack et al., 2006; Zadeh et al., 2007), and higher teacher and parents ratings of social competence (Im-Bolter et al., 2013). Children and adults with better social perspective taking have better self-reported prosocial behaviour and lower self-reported peer problems (Tannes et al., 2018).

Social problem solving

A widely used model for investigating social problem solving is one proposed by Dodge (Pettit, Dodge, & Brown, 1988). According to this model, key elements of the social problem solving process include encoding and interpreting social cues, generation and evaluation of strategies, and selection and implementation of a chosen strategy (Pettit et al., 1988). However, this model fails to consider the extent to which an individual must consider and coordinate the social perspectives of the self and other during social problem solving. Building on Dodge's model, Selman and colleagues proposed a functional-structural model that adds another element in the problem solving process (evaluation of solutions) and outlines levels of social perspective taking (from physical to reciprocal; Schultz, Yeates, & Selman, 1989). According to Schultz et al. (1989) there are four distinct aspects of social problem solving: 1) identification of the problem (i.e., problem identification), 2) generation of potential strategies to resolve the conflict (i.e., strategy generation), 3) evaluation of strategies (i.e., strategy evaluation), and 4) understanding that the conflict has been resolved (i.e., solution evaluation).

According to Schultz and Selman (1990), Selman's model of social perspective taking during social problem solving allows researchers to understand developmental progression of both thought and action since the cognitive processes (e.g., thinking and reasoning) involved when contemplating hypothetical social conflicts is considered action. They developed the Interpersonal Negotiation Strategies (INS) Interview comprised of a series of vignettes depicting a hypothetical interpersonal conflict to assess social perspective taking for each of the four aspects of social problem solving described above. Research with the INS interview shows that this measure distinguishes developmental differences in social perspective taking during social problem solving (Adalbjarnardottir, 1995; Adalbjarnardottir & Selman, 1989; Cohen et al., 1998; Im-Bolter et al., 2013; Selman, Beardslee, Schultz, Krupa, & Podorefsky, 1986; Zadeh et al., 2007), is associated with teacher ratings of interpersonal problem solving skill (Yeates, Schultz, & Selman, 1991) and teacher reports of social behaviour in children (Adalbjarnardottir, 1995; Yeates et al., 2004), and is associated with parent and teacher ratings of social competence (Im-Bolter et al., 2013). Moreover, the INS interview has been used to assess social perspective taking during social problem solving in children and adolescents with typical development (Im-Bolter et al., 2013) and those diagnosed with mental health disorders (Im-Bolter et al., 2013), learning disabilities (Kalyva & Agaliotis, 2009), epilepsy (Bailey & Im-Bolter, 2019), traumatic brain injury (Hanten et al., 2011; Yeates et al., 2004), and language problems (Cohen et al., 1998).

Successful negotiation of a social problem is dependent on the ability to consider and coordinate the self and other social perspective during each aspect of the social problem (Schultz et al., 1989). Current research that considers social perspective taking during social conflict, according to Selman's model, tends to focus on overall social problem solving ability (e.g., Hanten et al., 2011; Marton, Wiener, Rogers, Moore, & Tannock, 2008) rather than the four aspects of social problem solving. This results in a lack of insight regarding potential differences

in social perspective taking for the four aspects of social problem solving that may involve different skills that develop at different times (D'Zurilla, Nezu, & Maydeu-Olivares, 2004). Research investigating social problem solving in children with atypical development (e.g., language impairment, psychiatric disorder) suggests a focus on the different aspects of social problem solving may be important (e.g., Cohen et al., 1998; Im-Bolter et al., 2013). These studies indicate that social perspective taking is at the highest level during the strategy generation aspect of social problem solving and at the lowest during the solution evaluation aspect in children (Cohen et al., 1998) and adolescents (Im-Bolter et al., 2013).

Another vital component of social problem solving is the perspective orientation during strategy generation. According to Schultz et al. (1989) perspective orientation refers to the emphasis placed on the needs of the self-versus the other. Another-transforming perspective orientation reflects strategies that try to transform the other's perspective so that the child gets what they want out of the social conflict (i.e., "my way"). A self-transforming perspective orientation reflects strategies that require the child to transform the self-perspective so that the other individual gets what they want (i.e., "your way"). A collaborative perspective orientation meets the needs of both individuals; the child reflects on the problem from a third person perspective and strategies go beyond compromise, with a focus on maintaining the relationship to the satisfaction of both parties. Thus, a collaborative perspective orientation is consistent with level 3 or collaborative social perspective taking during the social problem solving process.

Little is known about the development of perspective orientation and how it contributes to social perspective taking during social problem solving; understanding this contribution is long overdue. Longitudinal research by Adalbjarnardottir and Selman (1989) suggests that perspective orientation style may shift with age from other- to self-transforming. However, children in this study were asked for a single strategy to solve a social problem, which only addresses the perspective orientation of the first strategy that comes to mind. It does not tell us whether a child can come up multiple strategies that vary in perspective orientation and, therefore, show a flexible perspective orientation (i.e., consideration of both other- and self-transforming strategies). Moreover, a shift from other- to self-transforming strategies over time could be explained by external (e.g., school programs that encourage strategies that focus on the other person) rather than internal (i.e., developmental) circumstances.

Leadbeater et al. (1989) found that perspective orientation was a significant predictor of social problem solving ability even after accounting for the developmental level of social perspective taking. Leadbeater et al. argued that in some social conflicts, a self-transforming perspective orientation may be more effective, whereas others call for a more assertive or other-transforming perspective orientation. Therefore, flexibility in perspective orientation would facilitate social problem solving by providing the child with a repertoire of potential strategies that incorporate self- or other-transforming solutions. If a child can choose between getting his way or allowing the other child to get their way depending on the situation, strategies at a unilateral level of social perspective taking can be conducive to maintaining a relationship (Selman & Schultz, 1989). Thus, children with a flexible perspective orientation during strategy generation should demonstrate a higher developmental level of social problem solving. Although there is research suggesting a positive association between number of strategies generated and overall social problem solving ability (Pettit et al., 1988; Rubin, Daniels-Beirness, & Bream, 1984) there is no research, that we are aware of, that considers whether flexibility in perspective orientation contributes to overall social problem solving ability. The current study addresses this gap in the literature, while also taking into consideration the role of language.

Social perspective taking and language

Language is essential for social cognitive skills (Zadeh et al., 2007). Semantic language (meaning and properties of words and sentences) and syntactic language (knowledge of the rules for sentence formation) are particularly important to social perspective taking. Semantic language allows for the mental representation of views and/or emotions and syntactic language provides a framework for supporting the ability to track changing viewpoints (e.g., “John wants to work on the project but Randy wants to play softball first”) during social problem solving (Zadeh et al., 2007). Certainly, a number of studies establish the importance of semantic and syntactic language for forming and tracking the mental intentions and emotions of others (e.g., Astington & Jenkins, 1999; Im-Bolter et al., 2013; Zadeh et al., 2007). Studies that have considered the relation between language and social perspective taking during social problem solving show that better language ability is associated with better social perspective taking in school aged children (Diazgranados, Selman, & Dionne, 2015), and children and adolescents with typical and atypical development (Im-Bolter et al., 2013; Marton et al., 2008; Zadeh et al., 2007). Studies that include only measures of syntactic language (Zadeh et al., 2007) report higher correlations between language and social perspective taking than studies that include measures of both semantic and syntactic language (Im-Bolter et al., 2013; Marton et al., 2008). Semantic and syntactic language accounts for 18% of the variance in social perspective taking and is predictive of social perspective taking during social problem solving even after controlling for age and working memory in children and adolescents with typical and atypical development (Im-Bolter et al., 2013; Marton et al., 2008). Clearly, these findings demonstrate that language must be considered when examining social perspective taking during social problem solving.

The current study

The present study evaluates: 1) social perspective taking within the context of social problem solving in younger and older school-aged children; 2) the importance of flexibility in perspective orientation during strategy generation; and 3) the role of language for social perspective taking during social problem solving. A group of 7- and 8-year-olds was selected since, according to Selman (1980), children at this age are most likely to demonstrate unilateral or reciprocal social perspective taking. In addition, we included a group of 11- and 12-year-olds who should be at the reciprocal or (potentially) collaborative stage of social perspective taking.

Methodology

Participants

Participants included two groups of English-speaking children where English was the first or only language; a younger group ($n = 111$; 58% female) of 7- and 8-year-olds ($M = 8;2$, $SD = 0;6$) and an older group ($n = 112$, 47% female) of 11- and 12-year-olds ($M = 12;1$, $SD = 0;6$). All children had no known neurological or pervasive developmental disorders and were not receiving any services in the school as determined by interviews with school personnel.

Procedure

Participants were recruited from a large urban school board as part of a larger study investigating the relation between language and literacy in school aged children. Parents provided written consent and children provided verbal assent for participation. Children were tested

by a research assistant in a quiet room within their school, during regular school hours. Breaks were provided as needed.

Measures

Socioeconomic status (SES)

Parents were asked to provide occupation information with their written consent. This information was coded with *The Blishen Socioeconomic Index for Occupations in Canada* (Blishen, Carroll, & Moore, 1987) to measure SES. The Blishen scale converts different occupations to a numerical score (17.81 for newspaper carriers/vendors to 101 for physicians/surgeons), which provides a classification of SES that takes into account income level and education. The higher numerical score between the mother and father ($M = 51.44$, $SD = 12.25$; $Range = 21.53$ – 78.34) was used as an indicator of SES.

Nonverbal intelligence

The Matrix Analogies subtest of the *Wechsler Abbreviated Scale of Intelligence* (Wechsler, 1999) provided an estimate of nonverbal intelligence.

Language

The Clinical Evaluation Language Fundamentals-Fourth Edition-Formulated Sentences subtest (Semel, Wiig, & Secord, 2003) and the Test for the Reception of Grammar-Second Edition (Bishop, 1982) were used to measure syntactic language. Semantic language ability was measured using the Peabody Picture Vocabulary Test-Fourth Edition (Dunn & Dunn, 2007) and the Expressive Vocabulary Test-Second Edition (Williams, 2007). A z-score was calculated for each of the language standard scores in order to create a composite score for syntactic (mean of both syntactic language z-scores), semantic (mean of both semantic language z-scores), and general language (mean of all language z-scores).

Social problem solving

The Interpersonal Negotiation Strategies (INS) interview (Schultz et al., 1989) was administered to assess social perspective taking during social problem solving. The INS interview includes vignettes or dilemmas that outline an interpersonal conflict between two individuals who have different relationships and differing familiarity with each other (e.g., two friends, two peers who are not friends, a child and their teacher, a child and unfamiliar adult). The INS interview shows high inter-rater reliability (Adalbjarnardottir, 1995; Adalbjarnardottir & Selman, 1989; Zadeh et al., 2007), good test-retest reliability ($r = 0.80$; Adalbjarnardottir, 1995), and internal consistency ($r = 0.63$ to $r = 0.92$; Selman et al., 1986). The INS interview is correlated with age (Adalbjarnardottir, 1995; Zadeh et al., 2007).

The use of hypothetical vignettes to study social cognitive processes including social perspective taking is a common practice in the literature and provides an important assessment of the child's viewpoints and intentions that behaviour observations do not allow (see Merrill et al., 2017). Social perspective taking as assessed with vignettes are correlated with observed child social competence as rated by teachers (Yeates et al., 2004) and parent reports of child social behaviour (O'Connor & Evans, 2019). Children and adults with better social perspective taking also have higher scores on self-report measures of prosocial behaviour and lower scores of reported peer problems (Tamnes et al., 2018). Moreover, vignettes are often used in clinical settings for treatment and assessment and, as such, are an important research tool.

Given that studies show there are no differences in scores when using vignettes that include individuals with different relationships (e.g., child and teacher vs. child and friend) or differing familiarity

(e.g., unfamiliar peer vs. friend; Cohen et al., 1998; Im-Bolter et al., 2013), one dilemma was selected to assess social problem solving. The dilemma chosen for the current study (a social conflict between friends) has been shown to be effective on its own as a measure of social perspective taking (Bailey & Im-Bolter, 2019; Mischo, 2005) and anecdotally as a situation that children are familiar with. The dilemma selected for the current study depicts a social conflict between two friends (one who wants to start work on a science project that is due in two days, but their friend and project partner wants to play softball instead). The text was left in front of the child while the dilemma was read to them. Children were asked eight questions that assessed the four aspects of social problem solving as outlined by Selman: 1) problem identification (*What is the problem here? How do you think Randy and Tom feel?*), 2) strategy generation (*What are all the things you can think of that Randy can do to solve the problem with Tom?*), 3) strategy evaluation (*What would be the best way for Randy to solve his problem with Tom? What could go wrong with Randy's solution? What would Randy do next if that happened?*), and 4) solution evaluation (*How would Randy and Tom feel if Randy did that? How would Randy know if he had really solved the problem?*).

All INS interviews were audio recorded, transcribed verbatim, and double checked for accuracy. A sample of INS interview transcripts not used in the current study were scored for social perspective taking and perspective orientation until interrater reliabilities of at least 0.8 were achieved prior to scoring of the current study data (kappa coefficients ranged from 0.97 to 1.00 for social perspective taking and $\kappa = 0.92$ for perspective orientation; all $p < .0001$). Fixed interval checks were completed on 20% of the interviews to maintain reliability. Disagreements were resolved through discussion.

Scoring for social perspective taking. Coders blind to study hypotheses and age of the child coded responses using a detailed scoring manual (Schultz et al., 1989). Responses for each question were scored on a 4 point scale ranging from 0 to 3 (0: egocentric responses with a focus on the physical aspects of the problem to 3: third person, collaborative, and impartial consideration of both social perspectives that consider the long-term relationship). For example, Level 0 reflects physical or impulsive behaviour (e.g., Tom went to play without Randy) and Level 1 reflects a single perspective (e.g., Randy would just play softball with Tom). At Level 2, responses reflect both perspectives (e.g., Tom wants to work with him and they argue about if Randy's going to get another partner. Tom would want to have some say in what happens to him). At the highest level (Level 3), responses reflect a third person perspective, go beyond compromise, and show a sense of caring about the future of the relationship (e.g., They should talk about it with each other. After the science project is all finished they can see how they did with their grades and see that they made a good compromise and if they're still getting along, or if they are still good friends). The eight questions provided scores for each aspect of social problem solving: 1) problem identification, 2) strategy generation, 3) strategy evaluation, 4) solution evaluation, and a mean overall INS interview score for five scores in total.

Scoring for perspective orientation. During the strategy generation aspect of the INS interview, children were asked to provide an exhaustive list of strategies to resolve the interpersonal conflict and explain how each strategy would solve the problem. Strategies where the child gets his way (e.g., the children work on the project) were coded as other-transforming (OT), strategies where the friend gets their way (e.g., the children play softball) were coded as self-transforming (ST), and strategies reflecting mutual consideration of needs (e.g., strategy is mutually satisfying, considers consequences for and preserves the friendship) were coded as collaborative (C). Strategies without

enough information to code for perspective orientation were coded as indeterminate (I) and excluded from relevant analyses.

It is important to note that although social perspective taking and perspective orientation are distinct constructs, development of both converge at the highest level (Level 3; Brion-Meisels & Selman, 1984). A higher level of social perspective taking reflects the ability to coordinate the self and other perspective, which is necessary for the development of a collaborative interpersonal orientation style. As such, Level 3 strategies are always collaborative in interpersonal orientation since this level reflects a third person perspective of mutual understanding of the needs of both individuals and are neither self- nor other-transforming.

No strategies in the current study represented a collaborative perspective orientation, thus every strategy included was coded as ST, OT, or I.

Results

Data screening

All data were assessed for missing data and normality. Missing value analysis indicated two patterns of missing data that accounted for more than 1% of the cases; eight (four of which were in the younger group) cases that were missing SES only and 10 cases (in the younger group) that had no codeable response for question 7 of the INS interview (because the child responded, "I don't know" to an antecedent question). A univariate outlier was found for one composite syntactic language score and one general language composite score in the younger group. Neither score exceeded 2 standard deviations of the population mean and were retained. Mahalanobis distance calculations indicated no multivariate outliers in either group.

Descriptive statistics

Consistent with other research in the field (e.g., Im-Bolter et al., 2016) analyses were conducted to ascertain any group differences in sex, SES, estimated nonverbal IQ, or language that would need to be controlled for in subsequent analysis (see Table 1). A 2 (age group) \times 2 (sex) analysis of variance (ANOVA) and Chi-square test for independence analysis indicated that boys showed poorer performance for estimated nonverbal IQ ($F(1, 221) = 12.81, p < .000, \eta^2 = 0.05$) and syntax ($F(1, 221) = 5.68, p < .05, \eta^2 = 0.02$). There were no interactions, thus it was unnecessary to control for these variables in

Table 1
Group differences for sex, age, SES, estimated nonverbal IQ, and language.

Variable	Younger group		Older group		F/X ²	
	n = 111		n = 112		(df = 1, 221)	d
	N		N			
Boys (%)	47 (42%)		60 (54%)		2.82	
	M	SD	M	SD		
Age in years	8.20	0.49	12.05	0.52		
SES	51.74	11.22	51.14	13.24	0.13	0.05
Estimated nonverbal IQ	102.98	13.62	102.46	9.88	0.11	0.04
Semantic language	105.72	8.36	105.96	9.45	0.04	0.03
Syntactic language	103.46	7.21	103.96	6.91	0.28	0.07
General language	104.59	6.66	104.96	6.92	0.16	0.06

Note: SES = Socioeconomic status. Estimated nonverbal IQ and language scores are standard scores.

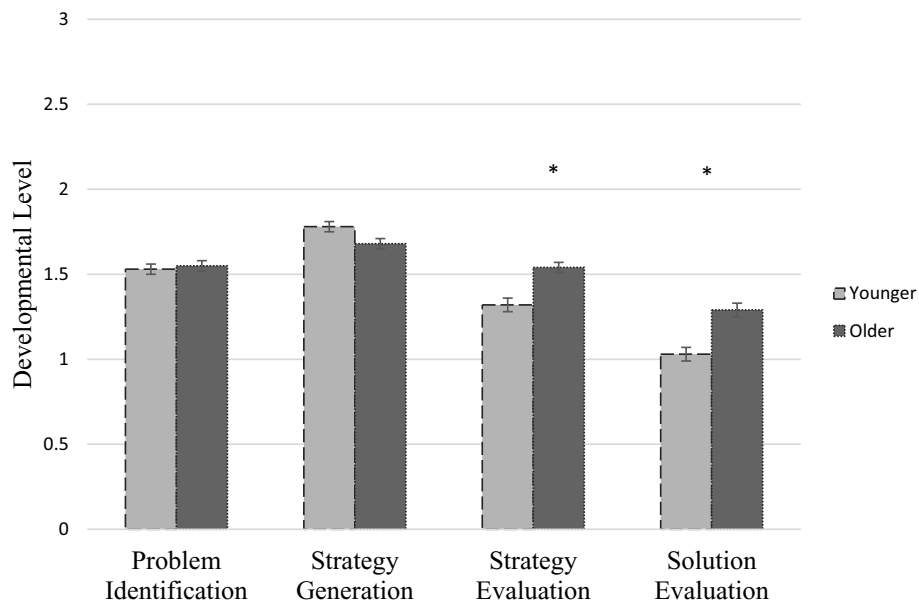


Fig. 1. Mean scores for each INS interview aspect for younger and older groups. **p* < .05 between groups.

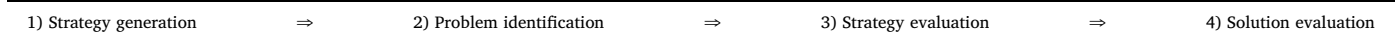
Table 2 Scalogram patterns of social perspective taking for the different aspects of the INS interview.

INS aspect	Predicted patterns				
	1	2	3	4	5
Strategy generation	-	+	+	+	+
Problem identification	-	-	+	+	+
Strategy evaluation	-	-	-	+	+
Solution evaluation	-	-	-	-	+

additional analysis.

Social perspective taking during social problem solving in younger and older school-aged children

Social perspective taking scores for each of the four aspects of the social problem solving process from the INS interview were analyzed to address the first goal of the study. The variable sex was also included to examine potential moderator effects. A 2 (age group) × 2 (sex) × 4 (INS interview aspect) ANOVA with repeated measures on the last factor for the INS interview showed no significant main effects or in-



teractions involving sex so the group variable of sex was removed. A 2 (age group) × 4 (INS interview aspect) ANOVA with repeated measures on the second factor for the INS interview resulted in a significant main effect for age group ($F(1, 221) = 18.96, p < .0001, \eta^2 = 0.08$) and INS interview aspect ($F(3, 663) = 138.35, p < .0001, \eta^2 = 0.39$), and a significant interaction ($F(3, 663) = 15.50, p < .0001, \eta^2 = 0.07$). *t*-tests showed no differences between the younger and older groups for problem identification or strategy generation (see Fig. 1). However, the younger group showed less differentiation of self-other perspectives than the older group on strategy evaluation ($t(221) = 5.08, p < .0001, \eta^2 = 0.11$) and solution evaluation ($t(221) = 5.49, p < .0001, \eta^2 = 0.12$). Within group comparisons indicated significant

differences in social perspective taking between all aspects of problem solving in the younger group, whereby the pattern of scores were as follows: strategy generation > problem identification > strategy evaluation > solution evaluation. The older group demonstrated a similar pattern of responses, with one exception: there was no significant difference between problem identification and strategy evaluation.

To further address the first goal of the current study we examined how differentiation of social perspectives differed across the four aspects of social problem solving. Analyses were conducted to determine if the scores for the four aspects of social problem solving were dependent and sequential in nature or independent, based on the pattern of means reported in previous research (Cohen et al., 1998). Dependent and sequential scores (e.g., achieving a score of 2 [reciprocal] on strategy evaluation was dependent on first achieving a score of 2 on strategy generation and problem identification) would indicate that the different aspects of social problem solving can be graded in terms of level of difficulty for perspective taking. Independence on the other hand, would show that achieving a score on one aspect of social problem solving was independent (or not related) to the score achieved on other aspects.

First, the INS interview aspect scores were ranked from highest to lowest with respect to social perspective taking consistent with the mean values reported by Cohen et al. (1998):

A pattern of responses can then be determined so that if a particular score is achieved on one aspect then the same score should be achieved on the aspects that are ranked lower in difficulty. There are five potential patterns of responses (see Table 2) based on the ranking of INS interview aspects described above. Pattern 1 indicates that the minimum score was not achieved on any aspect of social problem solving. Pattern 2 indicates that a minimum score for strategy generation is achieved but not for any of the remaining aspects. Pattern 3 indicates a minimum score is achieved for strategy generation and problem identification but not strategy evaluation or solution evaluation. Pattern 4 occurs when a minimum score is achieved for all aspects except solution evaluation. Pattern 5 is evident when a minimum score is

Table 3
Frequency count of each of the five predicted scalogram patterns.

Perspective taking level	Predicted pattern						Total N
	1	2	3	4	5	Other	
Level 1 score	0	0	6	29	177	11	223
Level 2 score	98	72	12	9	0	32	223

achieved on all aspects.

Next, each aspect of the INS interview was coded to represent a dichotomous variable for level 1 (unilateral) and level 2 (reciprocal) scores. For level 1, responses were coded 1 if the child achieved a minimum score of 1, otherwise they were coded 0. A scalogram pattern was assigned for each participant as outlined in Table 2. The same procedure was followed for level 2. Level 3 (collaborative) was not achieved by any children in this study, therefore no coding was necessary for this level. The frequency of occurrence for the scalogram patterns that reached a score of 1 or 2 were analyzed to determine the accuracy of the scale (see Table 3). Scales are considered to be perfect if 85% of cases correspond with the predicted patterns (Guttman, 1944). The data here yielded a higher percentage of cases that fit the predicted patterns necessary to establish a perfect scale for both level 1 (95%) and 2 (86%), providing strong evidence for the dependent and sequential nature of the four aspects of social problem solving in the current study. This means the different aspects of social problem solving can be ranked in terms of difficulty of social perspective taking. If a child achieves a perspective taking score of 2 on solution evaluation then they should achieve a perspective taking score of 2 on all the other aspects of social problem solving because they are less difficult.

Flexibility in perspective orientation

An independent *t*-test showed younger children ($M = 2.31$, $SD = 0.94$) produced fewer strategies than older children ($M = 2.74$, $SD = 0.96$; $t(221) = -3.42$, $p = .001$, $\eta^2 = 0.05$). To examine differences in perspective orientation style, a 2 (age group) \times 2 (OT/ST perspective orientation) ANOVA with repeated measures on the second factor was performed. There was a significant main effect for age ($F(1, 210) = 7.47$, $p = .007$, $\eta^2 = 0.03$) and orientation ($F(1, 210) = 21.00$, $p = .0001$, $\eta^2 = 0.09$), but no interaction ($F(1, 210) = 1.28$, $p = .259$, $\eta^2 = 0.01$). The older children ($M = 2.34$, $SD = 0.94$) came up with more strategies than the younger children ($M = 2.78$, $SD = 0.96$), and both groups gave more strategies with an OT perspective orientation ($M = 1.30$, $SD = 0.82$) than ST perspective orientation ($M = 0.90$, $SD = 0.73$).

To assess importance of quantity of strategies, Pearson product-moment correlation coefficients were calculated for total number of strategies and overall INS score. There was no significant correlation in either the younger ($r(111) = 0.06$, $p = .52$) or older group ($r(112) = -0.04$, $p = .67$).

To investigate flexibility in perspective orientation of strategies all children were assigned to one of two groups (regardless of age): 1) children who were inflexible (produced strategies with the same perspective orientation, i.e., all OT or all ST), and 2) children who were flexible (produced strategies that varied in perspective orientation, i.e., at least one each of OT and ST). A 2 (age group) \times 2 (inflexible/flexible group) ANOVA for overall INS score demonstrated a significant main effect for age ($F(1, 208) = 11.68$, $p = .001$, $\eta^2 = 0.05$) and flexibility ($F(1, 208) = 12.25$, $p = .001$, $\eta^2 = 0.06$; see Fig. 1) but no interaction. Older children had higher scores ($M = 1.53$, $SD = 0.23$) than younger children ($M = 1.41$, $SD = 0.20$) and children who were flexible ($M = 1.52$, $SD = 0.20$) in perspective orientation outperformed children who were inflexible ($M = 1.40$, $SD = 0.20$).

A chi-square test for independence showed that the inflexible

orientation group had more younger children (59% vs. 41%) whereas more older children were in the flexible group (57% vs. 43%; $\chi^2(1) = 4.92$, $p = .027$).

Language and social perspective taking during social problem solving

To assess the role of language for social perspective taking during social problem solving correlations between the three language scores (semantic, syntactic, and general language) and the INS interview scores (problem identification, strategy generation, strategy evaluation, solution evaluation, total INS) for the younger and older groups were calculated (see Table 4). General language and syntactic language were correlated with solution evaluation and the total INS interview score in both groups. Syntactic language was correlated with strategy evaluation in the older group whereas semantic language was correlated with solution evaluation in both groups.

Semantic and syntactic languages were correlated with the aspect of the INS interview that both groups showed the lowest social perspective taking score: solution evaluation. Hierarchical regression analyses indicated syntactic language was a significant predictor of solution evaluation after semantic language had been accounted for in the younger but not older group (see Table 5).

Discussion

Our results indicate that children between the age of 7 and 12 years tend to focus on one social perspective during social problem and that there are differences in children's ability to take different social perspectives depending on the aspect of social problem solving. In addition, we find that flexibility in perspective orientation of strategies is a better predictor of social problem solving than number of strategies produced and, consistent with other research (Diazgranados et al., 2015; Im-Bolter et al., 2013; Zadeh et al., 2007), language competence is related to the ability to differentiate self-other social perspectives during social problem solving.

Social perspective taking during social problem solving in younger and older school-aged children

Although 79% of children in the current study were able to consider at least one perspective for all aspects of social problem solving, no child was able to take a collaborative perspective for any of these aspects. This is consistent with past research that suggests social perspective taking during social problem solving may not reach a collaborative level until after late adolescence (Im-Bolter et al., 2013). Our findings indicate that social perspective taking is easier for two aspects of social problem solving: problem identification and strategy generation. The two age groups did not differ in the scores they achieved for these two aspects. Moreover, 32% of all children were able to show reciprocal social perspective taking for problem identification and 76% of children were able to do the same for strategy generation. Less than 1% showed reciprocal social perspective taking for the other two aspects of social problem solving (strategy evaluation and solution evaluation). This may be due to the fact that during an interpersonal conflict, parents and teachers often intervene by asking children about the nature of the conflict and they consistently instruct children (from a very young age) about sharing or taking turns, which can be applied to a variety of social problems (e.g., conflicts regarding toys). Less emphasis, however, is placed on teaching children to evaluate the potential outcome of a given strategy (i.e., strategy evaluation) and how it might impact the thoughts and feelings of those involved, as well as the future of the relationship (i.e., solution evaluation).

In the current study, the older children showed better perspective taking on the strategy evaluation and solution evaluation aspects of social problem solving compared to the younger children. When evaluating potential strategies, obstacles that might arise with the use of

Table 4

Summary of intercorrelations, means, and standard deviations for language and INS interview variables for the younger (top part of diagonal) (n = 111) and older (bottom part of the diagonal) (n = 112) groups.

Variable	1	2	3	4	5	6	7	8	9	M	SD	95% CI	
												Lower	Upper
1) Syntactic Language	–	0.46**	0.83**	0.06	0.02	0.16	0.32**	0.25**	0.21*	103.46	7.21	102.11	104.82
2) Semantic Language	0.42**	–	0.88**	0.08	–0.02	0.10	0.23*	0.18	0.14	105.72	8.36	104.15	107.29
3) General Language	0.78**	0.89**	–	0.08	0.00	0.15	0.32**	0.25**	0.20*	104.59	6.66	103.34	105.84
4) Problem Identification	0.01	0.03	0.02	–	0.09	0.10	0.00	0.43**	0.05	1.52	0.30	1.47	1.58
5) Strategy Generation	0.10	–0.04	0.02	0.25**	–	0.37**	0.13	0.64**	0.23*	1.76	0.33	1.70	1.82
6) Strategy Evaluation	0.24*	0.17	0.23*	0.21*	0.56**	–	0.16	0.70**	0.17	1.31	0.38	1.24	1.38
7) Solution Evaluation	0.23*	0.20*	0.25**	0.23*	0.11	0.25**	–	0.60**	0.01	1.01	0.41	0.94	1.08
8) Total INS Interview	0.22*	0.14	0.20*	0.62**	0.70**	0.74**	0.62**	–	0.19	1.40	0.21	1.36	1.44
9) Perspective Orientation Flexibility	0.25*	0.05	0.16	0.10	0.29**	0.31**	0.06	0.28**	–	0.49	0.50	0.40	0.60
M	103.46	105.72	104.59	1.56	1.70	1.55	1.29	1.53	0.64				
SD	7.21	8.36	6.66	0.32	0.32	0.33	0.37	0.22	0.48				
95% CI Lower	102.67	104.18	103.66	1.51	1.64	1.49	1.22	1.49	0.55				
95% CI Upper	105.26	107.25	106.26	1.62	1.76	1.62	1.36	1.57	0.73				

* p < .05.
** p < .05.

Table 5

Hierarchical multiple regression analysis predicting solution evaluation and overall INS score in the younger (n = 111) and older groups (n = 112).

	Younger group				Older group			
	β	R ²	ΔR ²	F	β	R ²	ΔR ²	F
Predicting solution evaluation								
Step 1:								
Semantic Language	0.01	0.05*	0.05	6.08*	0.008	0.04*	0.04	4.51*
Step 2:								
Syntactic Language	0.02	0.11*	0.06	6.87*	0.009	0.07	0.03	2.95*
Total R ²	0.16			0.11				

* p < .05.

any given strategy must be considered. This requires the coordination of all relevant information (e.g., nature of the problem, impact of the chosen strategy) and additional resources available to older but not younger children, like practice or experience and inductive logic (e.g., noting consistent patterns in strategy use) which would be useful for social perspective taking. The most difficult aspect of social problem solving, in terms of perspective taking, appears to be solution evaluation. Solution evaluation requires the ability to consider different perspectives in the context of maintaining the relationship, which includes future thinking. Explicit consideration of the long-term consequences of a particular solution likely requires processes such as inhibition (e.g., of personal gain or short-term goals) and the ability to shift between the self and other perspective. As a result, this aspect of social problem solving might require the greatest degree of executive function, a process that continues to develop into young adulthood (Brocki & Bohlin, 2004; Zelazo, 2004). Executive function has been shown to be important for higher order ToM (Im-Bolter et al., 2016). Clearly, research that examines the role of executive function for social perspective taking during the different aspects of social problem solving is required.

We find that children experience increasing difficulty in social perspective taking between different aspects of social problem solving with strategy generation being the easiest, followed by problem identification. Once a child is able to achieve unilateral or reciprocal perspective taking for those two aspects of social problem solving they are better able to do so for strategy evaluation followed by solution evaluation. Research to date (Hanten et al., 2011; Im-Bolter et al., 2013) does not contradict our findings; however, no study, that we are aware of, has considered this line of inquiry. It is important to highlight that we are not suggesting that the ability to generate strategies develops

before being able to identify the nature of a social problem, but that it may be harder to differentiate between self and other perspective for some aspects of the social problem solving process compared to others. This has implications for social skills interventions. Social skills interventions might be more successful if easier aspects of the social problem solving process, such as strategy generation, are focused on before other more difficult aspects, in a sequential manner. Support for this idea is evident in research that shows discussing responses to a hypothetical conflict resulted in increased levels of social perspective taking during the strategy generation and strategy evaluation aspects of social problem solving in a group of grade 6 and 7 students (Mischo, 2005). Ideally, social skills programs should be designed in a phase like manner to scaffold social perspective taking by targeting a specific aspect of social problem solving (i.e., strategy generation) until mastery has occurred before moving on to the next, more difficult aspect, of social problem solving (i.e., problem identification then strategy evaluation and finally, solution evaluation).

Flexibility in perspective orientation

We find that flexibility in perspective orientation of strategies is a better predictor of solving problem solving than number of strategies produced, which has historically been viewed as reflecting better social problem solving ability (e.g., Pettit et al., 1988; Rubin et al., 1984). Our results support the idea that flexibility in perspective orientation is important for social problem solving (Leadbeater et al., 1989) and suggests more advanced social perspective taking (Schultz et al., 1989). According to Selman's model, as a child's ability to differentiate between the self and other perspective develops, they should move toward a more collaborative perspective orientation (Brion-Meisels & Selman, 1984). If a child is able to flexibly consider the self and other perspective when resolving a conflict and then reflect on how each strategy will impact both parties and the friendship, then a foundation for consideration of collaborative strategies can be built. Social skills programs that encourage children to consider strategies for social problem solving that reflect the other perspective might make it more likely that children consistently view a social conflict from the other child's social perspective. Thus, we can teach children the value of flexibility and that sometimes it makes sense to give in (e.g., giving up a toy to a child who has no other toys to play with), but other times it does not (e.g., refusing to give a toy to a child who already possesses all the other toys in the room).

Our findings indicate that older children are more likely to show flexible perspective orientation compared to younger children; however, a number of younger children also demonstrate flexible

perspective orientation. Although age and experience may contribute to the ability to differentiate self and other social perspectives during social problem solving, flexibility in shifting from one perspective to another may also facilitate more collaborative perspective taking. Future research is needed to examine factors known to be associated with social perspective taking (e.g., number of siblings, executive function) and that may explain why some children are more flexible than others when it comes to taking on different perspectives. This will help determine whether environmental or developmental processes facilitate earlier development of flexible perspective orientation.

The current study may be limited in that only one vignette was used to measure social perspective taking and perspective orientation. Previous research showed differentiation of social perspectives was comparable across a variety of social contexts (e.g., close friends vs. acquaintances, Cohen et al., 1998; peer vs. employer, Im-Bolter et al., 2013). However, perspective orientation style was not examined in these studies. It is possible that some social contexts (e.g., school) encourage children to consider strategies that focus on the self versus other perspective. Future research should investigate perspective orientation style in order to determine if different contexts encourage strategies with a particular orientation style (i.e., “my way” vs. “your way”).

Language and social perspective taking during social problem solving

Consistent with research that shows that language is important for social perspective taking during social problem solving (Diazgranados et al., 2015; Im-Bolter et al., 2013; Zadeh et al., 2007), we find that language competence is related to the ability to differentiate self-other social perspectives during social problem solving as a whole, as well as to the strategy evaluation and solution evaluation aspects of social problem solving. There is a well-established literature in ToM that shows the importance of language for understanding the social perspectives of others (Milligan et al., 2007). The role of language makes sense when we consider the semantic and syntactic complexity of representations needed for differentiated social perspective taking during social problem solving. For example, the mental representations in the statement, “Tom thinks that Randy is deserting him” are more complex than those in the statement, “Tom’s not going to help Randy”. Sentential complements (i.e., a statement with an embedded clause [Randy is deserting him] that may be false if stated on its own) aid in the representation of the mental states in the first statement but are not required in the second, which has a basic syntactic construction.

It is not surprising that language is unrelated to the strategy generation and problem identification aspects of problem solving, which we propose are likely learned via rote learning. The younger group demonstrates less differentiation of social perspectives for strategy evaluation, which may involve holding in mind all the different strategies that can be used and testing hypotheses about the effectiveness of each. Younger children may not have developed this skill set and better syntactic language skill may not help. However, syntactic language could be critical for the shift toward better differentiation of social perspectives that we see in the older group. Older children are more likely to have the cognitive skill set needed to hold in mind multiple strategies and test hypotheses; better syntactic language would assist in the tracking and systematic evaluation of the different strategies.

In contrast, both semantic and syntactic languages are associated with differentiation of social perspectives during solution evaluation in both the younger and older children. Recall that perspective taking is the most difficult for this aspect of social problem solving for all children. We propose that semantic and syntactic language are needed for solution evaluation because this aspect of social problem solving requires the most active consideration of the self and other perspective in order to assess the potential impact of a chosen solution to both parties and the future of the relationship. Compared to the other aspects of problem solving, solution evaluation is unique in this regard.

Overall, our findings with respect to language suggest that when considering social skills interventions, it is important to take into consideration language competence. If an assessment of children’s language skills is not possible then examining the language demands of the intervention would be worthwhile. Also useful would be the integration of an intervention for semantic language (e.g., mental state terms such as *know* vs. *believe* or relative terms such as *certainly* vs. *maybe*) and syntactic language (e.g., sentential complements such as “She *thinks* that Sally definitely won’t go for it”) within the context of the social skills program.

We acknowledge that we must be careful in making causal claims regarding the association between language and social perspective taking during social problem solving in children between the age of 7 and 12 since the current study was cross-sectional in nature. Assessing social perspective taking during social problem solving and its association with language across the lifespan, using longitudinal methods, would further our understanding of the contribution of language to the growth of differentiation in social perspectives in a social context. A longitudinal study would also provide definitive evidence regarding how social perspective taking progresses across the four aspects of social problem solving.

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