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The Role of Language Games in Children's Understanding of Mental States: A Training Study

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In this study the authors investigated whether training preschool children in the use of mental state lexicon plays a significant role in bringing about advanced conceptual understanding of mental terms and improved performance on theory-of-mind tasks. A total of 70 participants belonging to two age groups (3 and 4 years old) were randomly assigned to experimental and control conditions. All participants were pretested and posttested with linguistic and cognitive measures. Analyses of pretest data did not show any significant differences between experimental and control groups. During a 2-month period of intervention, children were read stories enriched with mental lexicon. After listening to a story, the experimental group took part in language games and conversations aimed at stimulating children to use mental terms. In contrast, the control group did not participate in any special linguistic activities. The results show that training had a significant effect on emotion understanding and metacognitive vocabulary comprehension in the 3-year-old group and on false-belief understanding and metacognitive vocabulary comprehension in the 4-year-old group.

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INTRODUCTION

The training study reported here investigates whether preschoolers' understanding of mental state language and their performance on theory-of-mind tasks may be affected by conversational use of mental state terms. An extensive literature defines theory of mind as the ability to comprehend one's own and others' inner states such as desires, emotions, and beliefs (Perner, 1991; Premack & Woodruff, 1978). Understanding mental states requires the awareness that each person holds a subjective view of the world, which governs his or her behavior and which may or may not be shared by others. Furthermore, the understanding of false beliefs has been shown to play a pivotal role within theory-of-mind development.

A growing corpus of research has reported correlations between the development of a theory of mind and other factors such as family relations (Perner, Ruffman, & Leekman, 1994; Ruffman, Perner, Naito, Parkin, & Clements, 1998), social competence (Capage & Watson, 2001; Cassidy, Werner, Rourke, Zubernis, & Balaraman, 2003), emotion understanding (Harris, 1989, 2008), affective relationships (Meins, Fernyhough, Russel, & Clark-Carter, 1998), and language competence (Astington & Jenkins, 1999). This article focuses in particular on the relationship between theory of mind and language.

Evidence that language plays a crucial role in theory-of-mind development, especially false-belief understanding, has come from correlational (Astington & Baird, 2005; de Villiers & de Villiers, 2000; Moore, Pure, & Furrow, 1990) and training studies (Hale & Tager-Flusberg, 2003; Lohmann & Tomasello, 2003). Although the direction of this relationship is still hotly debated (Milligan, Astington, & Dack, 2007) and the effect of language on theory of mind seems to be stronger than the other way around, recent findings support the hypothesis of a bidirectional relationship between theory of mind and language (Slade & Ruffman, 2005). In addition, different aspects of language (semantic, syntactic, and pragmatic) all seem to be related to theory of mind, although each of them plays a specific role (Antonietti, Liverta Sempio, & Marchetti, 2006).

The relationship between language and theory of mind is well embedded in one particular kind of language: *mental state talk*, also referred to as metacognitive language, inner state talk, or talk with a strong mental lexicon. This type of language consists of metacognitive terms referring to unobservable entities such as desires, thoughts, and beliefs. These terms are clearly related to a conceptual understanding of inner states (Astington & Peskin, 2004; Bartsch & Wellman, 1995; Bretherton & Beeghly, 1982). Therefore, mental state talk is generally considered a precursor of children's theory-of-mind development (Dunn & Brown, 1993). Numerous studies

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have investigated different aspects of the relationship between children's use of mental state terms in spontaneous conversations with parents, siblings, and peers and their performance on theory-of-mind tasks (Hughes, Lecce, & Wilson, 2007; LaBounty, Wellman, Olson, Lagattuta, & Liu, 2008; Symons, 2004). All these studies support the *conversational hypothesis* (Hutto, 2007; Siegal, 1999, 2008), which postulates that conversation promotes theory-of-mind development. In this view, discussing and explaining mental states, such as desires, emotions, and beliefs, in social interaction and conversation with other people facilitates children's understanding of the mind (Turnbull & Carpendale, 1999). In fact, in line with a Wittgensteinian approach to mind and language, we argue that linguistic interaction is an essential factor here, in that people extract the meanings of words and expressions from their pragmatic use in conversations and other language games (Levy & Nelson, 1994; Montgomery, 2005; Nelson, 2007; Wittgenstein, 1953).

Following this hypothesis, other researchers have investigated the role of discourse interactions and participation in conversations on children's understanding of mental states and false beliefs (de Rosnay & Hughes, 2006; Ensor & Hughes, 2008; Peterson & Siegal, 2000; Turnbull, Carpendale, & Racine, 2009). A recent strand of this research has used training study methods to show that children's performances on theory-of-mind tasks improve, relative to untrained groups, if they are engaged in conversations about one another's inner states (Appleton & Reddy, 1996; Lohmann & Tomasello, 2003; Ornaghi & Grazzani Gavazzi, 2008; Tenenbaum, Alfieri, Brooks, & Dunne, 2008; Veneziano, Hudelot, Albert, & Veyrier, 2008).

Key findings supporting the conversational hypothesis emerged from a training study by Peskin and Astington (2004) in which the authors examined whether exposing 4-year-old children to explicit metacognitive terms in story texts resulted in advanced conceptual understanding of their own and other people's beliefs, as well as in improved comprehension and production of such language. During a 4-week training period, the children listened both at home and at school to stories containing dramatically increased numbers of terms referring to mental states. The control group received the same books with no enrichment of mental states language but with most stories requiring the children to think about alternative perspectives. Although the children in the training group displayed significantly higher metacognitive verb production in storytelling, their metacognitive comprehension and performance on a false-belief battery did not significantly improve. One interpretation of these results is that *passively* listening to stories with mental state terms alone is not enough to significantly improve understanding of metacognitive language or accelerate theory-of-mind development. The

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authors suggest that hearing numerous inner state terms in stories may be less effective than having to actively construct one's own mentalistic interpretations of stories highlighting mental states.

In line with this suggestion, we focused on the role of language games involving the use of metacognitive vocabulary within social interactions. We assumed that the *active* use of these terms in everyday conversations enhances children's competence in understanding internal states and mental lexicon. This hypothesis constitutes the theoretical and methodological bases for the current study, in which the active use of language was specifically encouraged, unlike in the Peskin and Astington (2004) research. Therefore, the innovative feature of the current study is the use of language games in the context of group conversations.

The study had three main aims: first, to examine whether, compared with a control group, training preschool children in using mental state talk results in an advanced understanding of this talk; second, to examine whether such training improves their performance on theory-of-mind tasks; and third, to analyze the results as a function of age. It was expected that the training group would outperform the control group on the understanding of mental state terms and on the theory-of-mind tasks. No specific differences were predicted as a function of age, given that none had emerged from earlier training studies reported in the literature.

METHOD

Participants

The 70 participants ($M = 3;10$; $SD = 5.96$ months; age range = 2;11–4;9) in the study were preschool children attending two infant schools (kindergartens) located in Milan, Italy, and province. Participants belonged to *two age groups*: thirty-four 3-year-old children ($M = 3;5$; $SD = 3.5$ months; age range = 2;11–3;11) and thirty-six 4-year-old children ($M = 4;3$; $SD = 2.9$ months; age range = 3;10–4;9).[1] All participants came from middle-class socioeconomic backgrounds, were native Italian speakers, and did not present any linguistic or psychological deficits. Furthermore, their linguistic and cognitive development fell within the standards for their age group. Children were evenly divided by gender (35 males and 35 females). Participants from both age groups were randomly assigned to an *experimental* (or *training*) *group* and a *control group* (seventeen 3-year-olds, eighteen

[1]The data on the age of participants refer to the pretest phase. At the posttest, the mean age was 4;4 ($SD = 6.67$ months). An average of 5.2 months elapsed between pretest and posttest.

4-year-olds; total $n = 35$ participants for each of the two group conditions). There were no differences between experimental and control groups on any of the pretest measures administered before the training.[2]

Design and Measures

A training study was then conducted in three phases: pretest, training, and posttest. The pretest and posttest, which were individually administered in counterbalanced order, consisted of the following five measures.

Language comprehension. All participants were administered the Language Evaluation Test (TVL; Cianchetti & Sannio Fancello, 1997) designed for 2- to 6-year-old children. The TVL assesses understanding of words and sentences, repetition of sentences, naming objects, and production of spontaneous speech on a prescribed theme. In the current study, only the subtest Comprehension was used. The first part of the subtest evaluates lexical knowledge and includes vocabulary on parts of the body, objects, actions, and qualities; the second part assesses children's comprehension of simple and complex sentences. The raw scores were totaled and then converted using weighted score tables.

False-belief understanding. This measure consisted of two first-order false-belief prediction tasks and one false-belief explanation task: a) the false-belief location change task (Baron-Cohen, Leslie, & Frith, 1985) in the Italian adaptation of the classic "Sally and Ann" story (Liverta Sempio, Marchetti, Castelli, Lecciso, & Pezzotta, 2005); b) the false-belief unexpected content task (Perner, Leekman, & Wimmer, 1987) in the Italian adaptation by Liverta Sempio et al. (2005); and c) the false-belief explanation task developed by Peskin and Astington (2004). The latter consisted of four illustrated scenarios followed by a question assessing participants' conceptual understanding that a story character may be ignorant of a situation that the participant knows to be true. The original task was translated/back translated and the illustrations redrawn for the current study. The 3-year-olds were only tested on the false-belief change location task, whereas the 4-year-olds completed the whole battery of false-belief tasks (the two first-order tasks and the explanation test). This methodological choice was

[2]Independent samples *t*-tests were run to compare children's performance on the pretests as a function of group condition. No significant differences emerged between experimental and control groups.

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based on the literature, which reports that children's false-belief understanding is generally acquired at 4 years of age.

On the false-belief prediction tasks, the children were given scores of 1 for the correct answer and 0 for the wrong answer. The scoring procedure for the explanation task was as follows: There were four false-belief explanations required, one for each of the four stories. For each story, children's explanations were scored as 1, 0.5, or 0, yielding a possible maximum score of 4. A score of 1 was awarded for a spontaneous, appropriate explanation using a metacognitive term (e.g., *know, think, wonder*) or a term implying a mental state (e.g., *see, tell, check*). If a prompt was required for an appropriate explanation, a score of 0.5 was awarded. Any other response, or nonresponse, elicited a 0. This included a few inappropriate explanations that happened to use a metacognitive term.

Scores for the battery were then summed to give a possible maximum total score of 6 (1 for the location change task, 1 for the unexpected content task, and 4 for the explanation task).

Metacognitive verb comprehension. We used the *Metacognitive Vocabulary Test* (MVT) designed by Pelletier and Astington (1998) for 3- to 7-year-old children. It consists of 12 short stories with illustrations, each followed by a question. Specifically, the child is asked to choose which of two alternative verbs better expresses the mental state of the story's protagonist. In our study, we used the Italian standardized version of the MVT (Iannello & Antonietti, 2006), for which the illustrations were redrawn. The verbs used in the Italian version are: *remembering, learning, understanding, teaching, foreseeing, wondering, explaining, concluding, denying, knowing, forgetting,* and *guessing.* The test is divided into two parts, each made up of 6 stories. Only the first part of the test was administered. A score of 1 was awarded for a correct choice of verb, and a score of 0 was awarded for a wrong choice, yielding total scores from 0 to 6.

Emotion comprehension. The *Test of Emotion Comprehension* (TEC) was administered to all participants in the Italian standardized version of the test (Albanese & Molina, 2008). This test was devised by Pons and Harris (2000) and assesses the emotion understanding of 3- to 11-year-olds. It tests the child's comprehension of the nature, causes, and regulation of emotions across nine different components (Pons, Harris, & de Rosnay, 2004). The children were awarded a point for each of the nine components, and scores ranged from 0 to 9 (for more details about the components of emotion understanding, see Pons & Harris, 2005).

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Pragmatic competence. To assess the participants' pragmatic competencies, they were administered the subtest Pragmatic Judgment from the Comprehensive Assessment of Spoken Language (Carrow-Woolfolk, 1999). This test measures knowledge and use of pragmatic language as well as ability to judge whether pragmatic language has been applied appropriately in subjects aged from 3 to 21 years. In our study, the first 12 illustrated items, suitable for 3- to 7-year-olds, were used. Each item describes an aspect of everyday life that requires communication or a pragmatic judgment on the part of the examinee. After reading the stimulus item, children are asked to respond with the appropriate thing to say or do in the situation. Participants were given 1 point for each of the 12 questions correctly answered.

The Intervention Procedure

Between the pretest and posttest, a 2-month *intervention* took place. Children assigned to the experimental condition, in groups of about six at a time, took part in twice-weekly intervention sessions lasting around 20 minutes each. During these sessions, they listened to stories enriched with mental state language. Subsequently, they took part in language games (an example of the training activity is provided in the Appendix).

In contrast, after listening to the same story, the children in the *control groups* were allowed to engage in free play and were provided with toys such as jigsaw puzzles and construction games, deliberately selected to minimize conversation amongst the participants. Composition of the working groups was on the basis of teacher nomination; all groups were mixed gender and made up of children of the same age.

The stories were presented in an illustrated story book entitled *The Adventures of Jack and Theo* (Ornaghi, Orlandi, & Perego, 2007), specifically created for the study. The book contained 16 stories[3] (a sample story is provided in the Appendix) structured according to the story schemas of Stein and Glenn (1979). The age-tuned intelligibility and appeal of the stories were pilot tested with some preschool children who did not take part in the study. The 16 stories featured adventures by the same two protagonists, Jack and Theo, a dolphin and a shark, that encounter problems and come up with solutions.

The texts were extensively enriched with mental state language. Their sequence reflected the degree of difficulty and order of appearance of the

[3]The book was created in collaboration with Dr. Ilaria Orlandi and Dr. Erika Perego. Ilaria Orlandi produced the illustrations for the 16 stories.

target mental state terms. In particular, eight mental state terms were used: *getting scared, getting angry, wanting, remembering, knowing, thinking, believing,* and *deciding*. Each target word was presented twice, in two different stories and read at two different training sessions.

Following a standard procedure during the language game activity, the adult repeated a sentence from the story that had just been read, which contained the target term to be focused on in conversation during the training session. In this way, children were allowed to relate the activity to content that they had just heard and to contextualize the language game. Following the "word launching" technique (Ciceri, 2001),[4] the children were invited to participate in a conversation with the researcher. The adult explained to the children that the game consisted of using the selected term: "In the sentence I have just read to you, there is the word *think.* Now we are going to play with this word; so the game involves using the word *think*. Remember you have to use it. So, if I say *think*, what does it remind you of? Remember, you have to use this word when you speak, for example with expressions like *I think that* . . . or *when I think* . . . " During the conversation the researcher stimulated the children to use the target word as much as possible by means of focused questions or comments. In addition, he/she strove to involve all the participants in the conversation. After about 10 to 15 minutes of conversation, the researcher wound up the session. The aim of the training activity with the experimental group was to give all the children in the group practice in thinking about and using the target mental state terms.

The sessions took place in a nonclassroom area of the school building that had been specially laid out by the researcher.

RESULTS

The data were analyzed using a *doubly multivariate design*. A preliminary analysis was conducted with the factors time (pretest vs. posttest), group condition (experimental vs. control), and age (3 years vs. 4 years) as independent variables. Specifically, time was a *within-subject* variable, while group condition and age were *between-subject* variables. Effect sizes were calculated using partial eta-squared (η_p^2).

Scores for emotion comprehension, linguistic comprehension, metacognitive vocabulary comprehension, pragmatic competence, and false-belief measures were the dependent variables. At this level of analysis, age was

[4]The technique of "word launching" consists of saying a word and inviting the children to say freely what this word means to them or reminds them of (Ciceri, 2001).

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not found to interact with the time or group condition factors but did display a significant multivariate main effect, Wilks' $\lambda = .549$, $F(5, 57) = 9.37$, $p < .001$, $\eta_p^2 = .45$. Given this result, further analyses were run separately by age group.

The Effect of Training in the 3-Year-Old Group

Although the research design included a measure of false-belief understanding for 3- and 4-year-olds, we excluded this variable from our follow-up analyses for the 3-year-old group, as the pretest scores were heavily skewed thus compromising the results of the multivariate tests. In fact, at the pretest stage, 97% ($n = 33$) of the 3-year-old children scored 0 and 3% ($n = 1$) scored 1 on the location change task. Therefore, we examined the 3-year-olds' performance on all measures except the false-belief task.

The multivariate analyses of variance revealed a significant effect of time, Wilks' $\lambda = .685$, $F(4, 26) = 2.98$, $p < .05$, $\eta_p^2 = .315$, and a significant time-$\times$group condition interaction, Wilks' $\lambda = .653$, $F(4, 26) = 3.46$, $p < .05$, $\eta_p^2 = .347$.

The univariate tests showed a significant interaction effect for emotion comprehension, $F(1, 29) = 9.286$, $p < .01$, $\eta_p^2 = .243$, and metacognitive vocabulary comprehension, $F(1, 29) = 6.854$, $p < .05$, $\eta_p^2 = .191$. Significant differences did not emerge for general language comprehension, $F(1, 29) = 3.449$, $p < .10$, $\eta_p^2 = .106$, or pragmatic competence, $F(1, 29) = 3.323$, $p < .10$, $\eta_p^2 = .103$. However the significance values for the latter measures were under .10, indicating that the test was low in power for these variables (.435 and .422 respectively), so further analyses were conducted.

The interaction effect between the group condition and time factors was broken down into the simple main effects. For the group condition factor, the differences between experimental and control groups were analyzed at both pretest and posttest stages; for the time factor, the differences between pretest and posttest scores were analyzed for each of the two groups. Calculation of the main effects did not yield any significant differences between the two groups at the pretest stage. At the posttest stage, there were statistically significant differences between the two groups on the following variables: TEC, $F(1, 29) = 7.51$, $p < .05$, $\eta_p^2 = .21$; MVT, $F(1, 29) = 16.82$, $p < .001$, $\eta_p^2 = .37$; and TVL, $F(1, 29) = 4.90$, $p < .05$, $\eta_p^2 = .15$. That is, the children in the experimental group obtained higher scores than the control group on these measures (see Table 1).

With regard to the simple main effects for the time factor, significant differences between pretest and posttest scores were only found for the experimental group, Wilks' $\lambda = .496$, $F(4, 26) = 6.60$, $p < .01$, $\eta_p^2 = .50$, except for the language comprehension measure, which was found to improve

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TABLE 1
Means and Standard Deviations for All Variables by Group Condition in the 3-Year-Olds

	Pretest		*Posttest*	
	Experimental	*Control*	*Experimental*	*Control*
Emotion comprehension	2.24[c] (1.60)	3.14 (1.61)	4.29[a,d] (1.61)	2.86[b] (1.23)
Metacognitive vocabulary comprehension	3.47[c] (1.07)	3.79 (1.37)	4.65[a,d] (0.70)	3.57[b] (0.75)
Language comprehension	8.88 (1.45)	8.93 (1.44)	9.53[a] (0.87)	8.57[b] (1.50)
Pragmatic	6.88[c] (2.39)	7.71 (1.94)	8.88[d] (1.31)	8.14 (2.18)

Note. Numbers in parentheses are standard deviations.

The average values marked with superscripts *a* through *d* were found to be statistically significant on application of a post-hoc Bonferroni correction; *a* and *b* denote the comparisons between experimental and control groups for each of the pretest and posttest measures; *c* and *d* denote comparisons between pretest and posttest scores for experimental and control conditions, respectively.

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significantly in both groups. Table 1 shows that in general the scores of the experimental group increased more than those of the control group, which only varied slightly.

The Effect of Training in the 4-Year-Old Group

The pretest and posttest scores of the 4-year-old group, including false-belief understanding scores, were analyzed following the same procedure used for the 3-year-old group.

The multivariate analyses revealed a significant effect of time, Wilks' $\lambda = .237$, $F(5, 28) = 18.03$, $p < .001$, $\eta_p^2 = .763$, and a significant time × group condition interaction, Wilks' $\lambda = .580$, $F(5, 28) = 4.06$, $p < .01$, $\eta_p^2 = .420$. There was no significant main effect of group condition.

The univariate tests showed a significant interaction effect for metacognitive language comprehension, $F(1, 32) = 12.92$, $p < .01$, $\eta_p^2 = .288$, and false-belief understanding, $F(1, 32) = 5.81$, $p < .05$, $\eta_p^2 = .154$. There was no significant interaction effect for emotion comprehension and pragmatic competence. With regard to language comprehension, there was a significant interaction effect with a probability of less than .10. Again, this result may be linked to the low statistical power of the test (.465), so the variable was included in the next analyses.

The simple main effects were then calculated for both group condition and time factors. Again, analysis of the group condition factor did not show any significant difference between the two groups at the pretest stage. In contrast, there was a significant main effect of group condition at the

TABLE 2
Means and Standard Deviation for All Variables by Group Condition in the 4-Year-Olds

	Pretest		*Posttest*	
	Experimental	*Control*	*Experimental*	*Control*
Emotion comprehension	3.22[c] (1.89)	3.38 (2.06)	4.78[d] (1.83)	4.19 (1.76)
Metacognitive vocabulary comprehension	3.89[c] (1.68)	3.78 (1.06)	5.39[a,d] (1.25)	3.78[b] (1.53)
False-belief understanding	2.14[c] (1.84)	2.44[c] (1.12)	4.72[a,d] (1.62)	3.72[b,d] (1.18)
Language comprehension	8.39 (1.97)	9.00 (1.36)	9.33 (1.24)	8.56 (1.96)
Pragmatic	9.17[c] (2.01)	8.50[c] (2.09)	11.06[d] (1.21)	10.56[d] (1.54)

Note. Numbers in parentheses are standard deviations.

The average values marked with superscripts *a* through *d* were found to be statistically significant on application of a post-hoc Bonferroni correction; *a* and *b* denote the comparisons between experimental and control groups for each of the pretest and posttest measures; *c* and *d* denote comparisons between pretest and posttest scores for experimental and control conditions, respectively.

posttest stage. That is, after the training, the experimental group had higher average scores on metacognitive vocabulary comprehension, $F(1, 32) = 15.86$, $p < .001$, $\eta_p^2 = .33$, and on false-belief understanding, $F(1, 32) = 4.16$, $p < .05$, $\eta_p^2 = .12$ (see Table 2).

With regard to the main effects of the time factor, the results show some significant differences between pretest and posttest performance in the experimental group, Wilks' $\lambda = .257$, $F(5, 28) = 16.15$, $p < .001$, $\eta_p^2 = .74$; and the control group, Wilks' $\lambda = .463$, $F(5, 28) = 6.50$, $p < .001$, $\eta_p^2 = .54$ (see Table 2). There was a significant main effect of time for emotion comprehension, metacognitive vocabulary comprehension, and language comprehension in the experimental group only. There was a significant main effect of time for false-belief understanding and pragmatic competence in both the experimental and control groups.

DISCUSSION

The current training study had two principal findings. First, training preschool children in using mental state language had a significant effect on their comprehension of metacognitive language at both 3 and 4 years of age. Listening to stories rich in explicit mental terms alone was not sufficient; rather, children needed to be trained in the active use of mental state terms to better understand them. Second, children in the 3-year-old experimental group improved their performance on the emotion comprehension

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test, while children in the 4-year-old experimental group showed gains in false-belief understanding.

These findings will be discussed in turn.

The Effect of Training on Metacognitive Language Comprehension

The principal aim of this study was to examine whether training children in *using* mental terms, rather than only passively exposing them to mental terms (Peskin & Astington, 2004), could facilitate the development of their understanding of these terms, and as a consequence, their theory-of-mind development. For this reason, two conditions (experimental and control) were created. In the experimental condition, children were read stories enriched with mental state terms, and then they were trained by engaging in conversational language games that involved mental state terms. In the control condition, children were read the same stories, but instead of practicing mental state terms, they were simply encouraged to play.

As predicted, the analyses showed that the training had a significant effect on participants' performance on the MVT, while passive listening to stories enriched with mental terms did not appear to facilitate children's understanding of this vocabulary. In a sense, the results confirm the findings of Peskin and Astington (2004), who carried out a training study to investigate the effects of exposing kindergarten children to stories with added metacognitive language. In that case, although the training led to improvement in the children's metacognitive language production, it did not have any impact on their metacognitive language comprehension. As in Peskin and Astington's (2004) study, the results from the current work support the theoretical approach that emphasizes the significant role of conversation and pragmatics in acquiring meaning and understanding others (Nelson, 2007; Siegal, 2008). These findings are also in line with an array of studies showing that children who grow up in families where mental states and feelings are the ongoing subject of conversation, over time, demonstrate a more advanced and differentiated understanding of their own and others' minds and emotions (Cutting & Dunn, 1999; Dunn & Brophy, 2005; Garner, Jones, Gaddy, & Rennie, 1997).

The following example, an extract from the training activity with a group of 3-year-olds, is an illustration of how children were explicitly asked to use the target word by the adult and how even very young children were able to use an inner state term appropriately.

> Adult: Hi guys, do you remember the story? Jack Dolphin *has been wanting* a birthday party for years. Today, we're going to play with the word *wanting*.

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The game is to use this word. If I say *wanting*, what does it remind you of? What does it make you think about?

L: I *want* an ice cream, because my mother never gets me ice cream . . . but now she's going to buy one for me. . .

C: Me too.

Adult: Remember that you have to use the word *want*.

C: I *want* an ice cream too.

Adult: Very good.

F: I *wanted* a Winx and Santa Claus brought it to me.

V: *Wanting* means that my mother buys me the doll that I want.

It can be noted that after practicing the use of this term, at the end of the conversation, one child focused on its meaning, although she was far from stating the accepted meaning of *wanted*. Understanding of mental terms develops via a process that Nelson (2007) calls "co-construction." In this process, children are not passive recipients of mental concepts but are actively involved with others in the construction of their meaning. Montgomery (2005) claims that the meaning of mental terms is directly related to routine social activities between children and others (adults and toddlers); he underlines that "language matters for theory of mind because learning to use mental terms across a variety of social contexts shapes the meaning and nature of the corresponding concepts; children express themselves (e.g., their desires, intents, beliefs), and the meanings of these expressions are formed by the responses of the community" (p. 119). In sum, the roles that mental terms play are determined by the specific responses of others during socially constructed communicative interplay (Carpendale & Lewis, 2006).

The Effect of Training on Theory-of-Mind Development

The second aim of this study was to investigate whether training children in using mental state terms would result in a greater understanding of the mind. This aim was assessed via a number of theory-of-mind tasks. Children were pretested and posttested using the TEC (Pons & Harris, 2000) and a false-belief battery.

As predicted, the training led to improved performance on posttest theory-of-mind tasks. In general, the mean posttest scores of the children in the training condition were significantly higher than those of the children in the control group.

With regard to *emotion comprehension*—an important aspect of understanding the mental states of self and others—the current study showed an effect of training on the emotion understanding abilities of 3-year-olds.

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These findings are in line with other recent longitudinal and intervention studies showing how children's emotion understanding was enhanced by participation in explanatory conversations (Grazzani Gavazzi & Ornaghi, 2011; Taumoepeau & Ruffman, 2006, 2008; Tenenbaum et al., 2008).

A possible explanation for the fact that the training effect was only found for 3-year-olds may be that, at this age, children are just *beginning* to have the linguistic tools required to converse and consequently to reflect on their own and others' mental states, and so they are able to derive maximum benefit from participation in language games.

With regard to *false-belief understanding*, as expected, 4-year-olds who were trained in the use of mental terms obtained higher posttest scores than their peers in the control group. This result is of particular interest, given that 4 years is universally considered to be a crucial stage in the acquisition of the metarepresentative abilities required for successful completion of false-belief tasks.

The results underline, once again, the role of language games and conversation in children's development of false-belief understanding. These findings are echoed by studies that used explicitly conversational approaches to improve children's false-belief understanding (Guajardo & Watson, 2002; Lohmann, Tomasello, & Meyer, 2005).

Limitations, Educational Implications, and Future Directions

A few limitations are apparent in this study. First, the effect of the training was evaluated only by set tasks administered individually before and after the intervention. It would be useful to include a posttest measure involving the class teachers and possibly also family members by asking them to observe, note, and report any differences between the pretest and posttest phases in children's spontaneous language during interactions.

Second, it would be of value to examine the extensive narrative material gathered during the training activities to obtain information on children's use of mental state terms (e.g., Brockmeier, 2005; Daiute & Lightfoot, 2004). For example, this type of analysis could shed light on the process of change that unfolds as the child moves from having difficulty in using the target term supplied by the adult to learning to use it spontaneously.

Finally, it would be useful to ascertain how long the effects of the training last. In this regard, a future follow-up assessment should be carried out to evaluate the long-term effect of the training.

Despite these limitations, the current study provides evidence for the usefulness of intervention in educational contexts (such as kindergartens and schools), where teachers may have a decisive role in fostering mental state understanding. Teachers can operate at a dual level. First, they may

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intensify their own use of mental state talk with children, and secondly, they can actively involve children in conversations about the mind by explicitly asking them to use mental lexicon. Further research is needed to confirm the results of the present study and enable their generalization to different educational and linguistic contexts.

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APPENDIX

Sample Story and Training Session Transcript

Story: The Message in the Bottle (term Target: "to Believe")

One day, Theo Shark was on his way home from school when he found a glass bottle with a note inside. He started to *think* and *wonder to himself*: "What could it be? What could be written on that note?" *He wasn't sure what*

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to do, but in the end *he decided* to pick up the bottle. Straight after lunch, Theo raced to Jack Dolphin's house to show him what he had found, and Jack, after looking carefully at the bottle, said: "*I think* there's a message asking for help in this bottle." The two friends *decided* to break the bottle so they could read the note. On the faded yellow paper was written: "Thank you for opening the bottle. If you really want to help me, come to Seaweed Park as soon as you can!" Jack Dolphin *was a little bit frightened* about going to the park without knowing what they were going to find there. But Theo Shark, who *was very brave, decided* to go to Seaweed Park. *He really wanted* to find out who had written that strange message and to help them. So Jack Dolphin, even though *he was terribly scared*, agreed to come on this new adventure with Theo. A little while later, the two friends arrived at the park, and beside a bench, they found another bottle, which looked very much like the first one. At first, the two friends were quite surprised because they had *expected* to find someone in danger, not another bottle.

Then Jack said: "That's strange. Maybe it's a joke . . . " Theo *felt so curious* that he *decided* to open the new bottle immediately. There was another note inside with a new message: "It's great that you've found the second bottle. Do you remember where Molly Whale's cave is? Please come and get me there!" Theo and Jack, *thinking* that at last they were going to find somebody, swam to the cave as fast as they could. But when they got there, they found . . . another bottle! Now the two friends *did not know what to think*. Jack Dolphin, instead of *feeling scared* was now beginning to *feel a bit angry*, because he was *more convinced than ever* that it was a joke. Theo, on the other hand, was *getting more and more worried* about the person who had left the messages. Once again, the two friends opened the bottle and read the note inside, which said: "Unfortunately, I've had to move on again. I couldn't stay here, but if you swim on really fast, you'll find me at the coral reef."

Just then, Theo *remembered* that there was a shortcut to get from there to the coral reef, so he and Jack Dolphin took it and swam as fast as they possibly could. When they got to the reef, they started to look amongst the corals, *impatient* to discover what new surprise was awaiting them. Near a pretty red coral, they found another bottle that was much bigger than the other bottles.

By now, Theo just *didn't know what to think* but *he was really hoping* to have arrived in time to help the mystery person. So, with Jack's encouragement, he opened the bottle and . . . a note fell out, which the two friends read together: "Dear friends, Dennis Crab, Mary Starfish, Sarah Sea Turtle, and I organized this treasure hunt, because we know that you two are very brave and love adventures. Because we like to have adventurous afternoons too, we have decided to set up an 'Adventure Club.' In the bottle, you will find two necklaces that we made with lots of seashells. These necklaces will be

the emblem of our group of friends. If you decide to wear them, we will be waiting to have a party with you at Mary's house." At the bottom of the bottle, Theo and Jack found the two necklaces. They put on the necklaces and went to Mary Starfish's house for a big party with their new club of friends. While they were enjoying themselves at the party, Jack *thought to himself*: "It sure is nice to have so many friends and to have fun with them, even though they sometimes play jokes on me."

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Training (4-Year-Olds)

Target term: *believe*

Adult: Do you remember today when we read the story, at one point Jack said, "I believe there's a message in the bottle"? So, he believed . . . Today, we are going to play at using this word, believe. What does the word "believe" make you think of?

Maria: Yes. If *I think* that there is a piece of paper in a bottle and that there is something written on it, I read it.

Beatrice: Like if somebody finds a bottle, he *believes* that there is a message inside it, then he breaks the bottle and reads it.

Marta: When somebody says it's their birthday, but really they're joking, I *believe* them.

Maria: I *think* that I *want* to play cars today, and if my Mum says yes, I *believe* it.

Michele: If my Mum says I have to go and do that (unintelligible), I *believe* her. Then if my sister says she ate everything at school, I *believe* her.

Beatrice: If I tell M that today is my birthday, he *believes* it. Then maybe one of my friends says, "When is your birthday?" and it's in June and he *believes* it.

Adult: So when somebody says something we believe it?

Davide: If today is really my birthday, my Mum and Dad *believe* it.

Luca: No, I never *believe* anything my brother says.

Beatrice: Like someone who, like I eat everything and I tell my Mum, "I ate everything," and she *believes* it, or you do a drawing and your Mum *believes* it.

Beatrice: Like someone *wants* to visit a castle and they tell their Mum and their Mum *believes* it.

Maria: If my Mum tells me that she's bought me Kinder eggs and biscuits, I *believe* it. And then if my Mum says that she's really got me something nice to wear, I *believe* it.

Luca: Like if my Mum says, "Today we're going to the park," and I *believe* it. Or if someone looks in the mirror and says (unintelligible), and the other person *believes* it. And then someone sees a butterfly, and they *believe* that it's a butterfly.

Michele: . . . gave me a letter, and I *believe* it.
Maria: If my Mum says she's got a present for me, I *believe* it.
Marta: If someone gives a present and the other person *likes* it, he *believes* it.
Maria: If my Mum gets me a surprise, I *believe* it, and then if my Mum gets us toys that we like, I *believe* it, and if she buys clothes and Juventus-Inter stuff, I *believe* it.
Beatrice: Like I *believe* my Mum that one day she's going to take me to dancing and I *believe* it that my Dad doesn't *like* (unintelligible) or. . .
Luca: If my Mum says that she's going to take me to the playground or to one of my classmate's houses and I go to the party and then I can go to a café too and I can even go out for a pizza. . .
Beatrice: Like someone who hurts himself and his Mum *believes* him, or someone who falls off a chair and his Mum *believes* it.
Adult: She believes it because she saw him fall off.
Marta: . . . I don't have anything to say.
Adult: I don't believe it! Did you hear that? I said I don't believe it . . . so come on!
Marta: Like if someone hurts himself and he tells me, I *believe* it.
Adult: Well, children, you've been very good. Today we've played at using the word . . . ?
Beatrice shouts louder than the others: "*Believe!*"
Adult: Next time, we'll read another story and we'll play at using another word.

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