

# International Journal of Behavioral Development

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*International Journal of Behavioral Development* 2006; 30; 537

DOI: 10.1177/0165025406072902

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## Preschool children's awareness of private speech

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The present study explored: (a) preschool children's awareness of their own talking and private speech (speech directed to the self); (b) differences in age, speech use, language ability, and mentalizing abilities between children with awareness and those without; and (c) children's beliefs and attitudes about private speech. Fifty-one children between the ages of 3 and 5 completed a selective attention task from which a sample of private speech was video-recorded for use during a subsequent experimenter-child interview. Children also completed a standardized language assessment and a battery of mentalizing tasks. Roughly half of the children (54%) showed awareness of talking during the task, and 52% of the children who talked during the task stated that their speech was self-directed. Children who were aware of their private speech were significantly older, had greater expressive language skills, used more private speech, and had higher deceptive-box scores than children who were not aware of their private speech. Participants believed that private speech was positive and helpful. Implications of this work for researchers and early childhood educators are discussed.

Keywords: Awareness; preschoolers; private speech; self-talk

There has been a long tradition of examining relations between language and cognition in the study of the developing human mind. Vygotsky (1934/1987) suggested that language is an important mediator in the development of cognitive abilities. Developmentalists are now beginning to study children's cognitive understanding of language, particularly in relation to self-regulation and self-reflection (Flavell, Green, Flavell, & Grossman, 1997; Winsler & Naglieri, 2003). Recently, researchers have begun to examine how children's cognitive development, understanding, and awareness of speech use might impact self-regulation.

According to Vygotsky, children develop higher-level, uniquely human, cognitive processes through social interactions with adults during joint activity. Over time, speech used during such adult-child interactions is appropriated by young children, and private speech (overt self-talk) emerges and becomes a tool children use to guide themselves during individual problem solving (Berk & Spuhl, 1995; Vygotsky, 1934/1987; Wertsch & Tulviste, 1992; Winsler, Diaz, & Montero, 1997). The internalized form of private speech, inner speech or covert self-talk, involves no overt signs of speech (Berk, 1992; Winsler & Naglieri, 2003). Vygotsky's theory focuses on the importance of private speech as a facilitator of higher cognitive functions (Vygotsky, 1934/1987). Accordingly, Vygotsky notes that private speech does not merely accompany a child's activity but acts as a tool used by the developing child to facilitate cognitive processes, such as overcoming task obstacles, enhancing imagination, thinking, and conscious awareness (Vygotsky, 1934/1987). Although researchers have examined private speech's self-regulatory role during problem-solving, other more meta-cognitive aspects of such speech, such as conscious awareness, have yet to be explored.

Research on private speech has generally focused on: (a) the self-regulatory functions of such speech and speech-performance relations (Behrend, Rosengren, & Perlmutter, 1992; Berk, 1986; Duncan, 2000; Winsler et al., 1997); (b) systematic variations in the appearance of private speech across settings, task conditions, and child characteristics (Frauenglass & Diaz, 1985; Krafft & Berk, 1998; Winsler, 1998; Winsler & Diaz, 1995); and (c) ontogenetic and microgenetic developmental trajectories for children's private speech (Berk & Spuhl, 1995; Bivens & Berk, 1990; Duncan, 2000; Winsler, Diaz, Atencio, McCarthy, & Adams Chabay, 2000). The literature suggests that private speech emerges in the toddler years, peaks in frequency during early childhood, and then gradually reduces in prominence throughout the early elementary school years, all the while following a shift from overt (out loud) self-talk, to partially-internalized speech (whispers), to fully covert (silent, inner) speech or verbal thought.

Winsler et al. (2000) have noted that in addition to this general ontogenetic quantitative trajectory, another qualitative shift in the systematicity and regulatory context of the private speech used by children may take place between the ages of 3 and 4. They found that, unlike 3-year-old children, whose private speech in the naturalistic setting of the preschool classroom appeared across many different situations and settings, 4-year-old children's private speech appeared more systematically as a function of their goal-directed task activities and social context. Although this is only one study in need of replication, these authors speculate that such changes in private speech use may be related to other important developments that may take place between the ages of 3 and 4 in children's self-awareness and/or mentalizing abilities.

Research on children's awareness of private speech has only

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We would like to acknowledge Michael Feder, Amy Madigan, and

Shannon Tyler, not only for their insightful thoughts during the development stage of this project, but also for playing a critical role in seeing the project to fruition.

received cursory attention to date. A handful of studies have explored the relation between children's private speech and "awareness", where awareness refers to either self-recognition or a temporary state of self-reflection. Morin (Morin, 1993; Morin & Everett, 1991) investigated the effects of inducing a temporary state of self-awareness (by placing the child in front of a mirror) on the amount of private speech young elementary-aged children ( $M = 6.6$  years) used while rating the attractiveness of pictures. Although these researchers found no association between private speech use and self-awareness for elementary school children, subsequent work by Morin (1999, 2001, 2003) found support for such a relationship in adults suggesting that at some point self-awareness and self-speech do coincide. Fernyhough and Russell (1997) showed that 5-year-old children who use more private speech during free play were better able to recognize their own voice in the presence of other voices in a speech-recognition task, compared to children who engaged in less self-talk. In another study, Fernyhough (1997) found a positive relationship between the amount of self-regulatory private speech used by 4-year-olds and children's mentalizing (theory of mind) skills. This suggests that children who are more aware of themselves as mental agents may use more self-regulatory or developmentally mature forms of self-speech, though Fernyhough (1997) points out that the direction of effect is unclear. Mature, self-regulatory private speech might be the product of increased mentalizing skills, or private speech may lead to increased mentalizing skills; both causal directions may be in place simultaneously, or both may be caused by other mechanisms.

Winsler and Naglieri (2003) examined children's observed use of private speech and post-task self-report (awareness) of such speech during a planning task with a large, cross-sectional sample of youngsters age 5 to 17. They found that children's awareness of their own self-speech was generally quite low, especially for the youngest children, and that it improved with age. Although a relatively flat 59% of the children across all age groups engaged in some form of self-talk during the task (with younger children's speech being more overt and older children's speech more covert), only 16% of the 5-year-olds reported doing so compared to 41–52% for the adolescent age groups. The probability of children reporting overt private speech given that it was observed for the 5- to 7-year-olds was about .22 whereas the same conditional probabilities for the adolescents were around .40–.50. Awareness of self-speech appears to be important for those who talk to themselves as well. Talkers who reported their self-speech did better on the task than talkers who did not report such speech. Two important limitations of the Winsler and Naglieri (2003) work, however, are that: (1) the children, rather than being explicitly asked about their self-talk, were asked to reflect upon the "strategies" that they had engaged in during a task they had just completed; and (2) preschool-age children (the age period of most developmental interest in terms of the use and internalization of speech) were not included.

Although the present study is the first to directly address preschool children's awareness of overt private speech, other investigators have examined young children's knowledge and/or awareness of similar cognitive functions (Flavell & Miller, 1998), such as inner speech (silently thinking to one's self in words) (Flavell et al., 1997), gesturing (Goldin-Meadow, 1997), and other typically non-conscious processes (Flavell, Green, Flavell, & Lin, 1999). Results from these studies find that children younger than 5 or 6 have minimal

awareness and understanding of such functions. For example, Flavell et al. (1997) collected interview data with 4- to 7-year-olds and college age students to determine whether children reported engaging in inner speech and whether they were aware of other people's use of inner speech. Participants were presented with live scenarios in which experimenters interacted with each other and either appeared to think silently, speak out-loud while thinking, or read/count to themselves (a more "obvious" verbally-mediated activity), and then the participants were asked questions about what the experimenters were doing. Participants were also asked whether they themselves were thinking verbally or visually during a variety of imaginary tasks/events. Results indicated that 4-year-olds, compared to subjects 6 years and older, were considerably less aware that they (and others) use inner speech when engaging in highly verbal mental activities. For example, 45% of 4-year-olds stated that a person could talk to himself in his head; 20% stated a person could tell a story in his/her head without moving his/her lips; 40% stated that they verbalized their name in their head; and 55% stated that they verbalized their age in their head. Perhaps self-speech for 4-year-olds is still overt and still in the process of internalization and such children do not yet have enough experience with inner speech to know that they are using such speech. It is equally possible that 4-year-old children use inner speech but are not consciously aware of this *until* they talk about it.

Though all 4-year-olds may not demonstrate an understanding of inner speech (Flavell et al., 1997), extensive research on theory of mind (the ability to infer mental states in others, such as desires, emotions, beliefs, etc.) suggests that a child's mentalizing abilities undergo considerable development during the fourth year (Flavell & Miller, 1998). Four-year-old children's emerging understanding of their own and other people's ability to think may be intimately related to their awareness and use of private speech as a tool of thought. For this reason, in addition to collecting data on children's awareness of speech, we also administered mentalizing tasks here to observe associations between speech awareness and theory of mind.

Also explored here are children's language skills, long known to be related to both theory of mind (Jenkins & Astington, 1996) and to private speech use and internalization. Children who are more advanced linguistically appear to use and internalize private speech earlier (Berk & Garvin, 1984) and perhaps such children are also more aware of such speech. Karmiloff-Smith (1986) has argued that children develop awareness of behaviors *after* they have had experience with those behaviors. Therefore, we expect that children with more language experience (i.e., higher language scores) are likely to show greater speech awareness. Finally, although not designed for this purpose, this study will also provide preliminary data as to whether children's general awareness of private speech is related to their performance on a problem-solving task. It is not clear what to expect in terms of relations between speech awareness and performance. Although awareness of strategy use is often completely unrelated to strategy use, strategy effectiveness, and task performance (e.g., Siegler & Stern, 1998), Winsler and Naglieri (2003) found that children who used speech and reported their speech during the task performed slightly better than children who talked but did not report speech use. Children who are more aware of their private speech use may be more likely to use it and use it effectively.

Although research to date might suggest that preschoolers

do not have much awareness of private speech, such a conclusion would be immature given that previous work did not directly address preschool-aged children's awareness of overt private speech, and prior studies did not directly ask questions about children's own use of overt private speech. Given that the preschool period is the one in which considerable private speech is used by children and the period during which speech internalization occurs (Berk, 1992; Winsler, Carlton, & Barry, 2000), it would appear critical to investigate children's awareness of private speech among 3- to 5-year-olds. The present study fills this gap in the literature and provides data on speech awareness during the age range in which private speech is of much interest.

A final point of interest to the present study is children's beliefs regarding their use of self-talk. In other words, do children believe that their private speech helps them regulate their behavior – do children think private speech is helpful in completing a task? Private speech researchers believe such speech is a good tool for children to use during problem-solving (e.g. Berk & Spuhl, 1995; Winsler et al., 2000), but children have never been directly asked whether they themselves think private speech is a good thing. First, this line of questioning is important in its own right as there are no empirical data on children's beliefs about private speech, despite the fact that interventions have been designed to increase children's use of self-speech during problem-solving (Diaz & Berk, 1995) and children's attitudes about such speech in a therapeutic context are likely to be important. Second, we believe this line of inquiry is important within the context of assessing children's awareness of private speech because there could be a link between children's actual speech use and their awareness of that speech. Are children who have positive attitudes about private speech more likely to talk to themselves and more likely to be aware of such speech use compared to children with less positive views of self-talk?

The present study, thus, asks the first set of important questions pertaining to relations between language, awareness, and private speech: to what extent are preschool (3- to 5-year-olds) children aware of talking in general, and private speech in particular, both in themselves and others? What are the differences in age, mentalizing abilities, language ability, speech use and speech type between children who are aware and not aware of their own speech, private speech, and other's private speech?

## Method

### *Participants*

Fifty-one preschool-aged children (56% female) between the ages of 37 and 71 months ( $M = 52.5$  mos,  $SD = 9.24$ ) participated in the current study. Participants were recruited from local preschools and organizations providing group activities for young children in a large Mid-Atlantic US suburban area. The majority of participants were Caucasian (90%), with 4% Hispanic, 2% Asian-American, 4% "Other" including African-American and Middle Eastern.

The age range was restricted to 3-, 4-, and 5-year-olds ( $M3\text{-year-olds} = 43.25$ ,  $SD = 2.83$ ,  $M4\text{-year-olds} = 54.05$ ,  $SD = 4.05$ ,  $M5\text{-year-olds} = 65.42$ ,  $SD = 3.53$ ) because previous research has indicated that children within this age range use high amounts of self-talk. The children were primarily from two-

parent homes (92% married) with an annual income ranging from \$40,000 to over \$200,000 with an average income of \$100,000, which is representative of the median income of the geographic area. Children were excluded if they had documented language delays/disorders or if they were not fluent in English. No children were excluded from participating after asking parents; however it is not known how many children may have self-excluded based on recruitment information. Two children (beyond the 51) were not included in the study because they did not complete all tasks. One of the included 51 children had incomplete data due to nonparticipation in some part of the study, and two children who did complete the protocol were excluded from some analyses due to technical recording difficulties and equipment failure.

### *Procedure and measures*

*Overview.* Participants were brought into a laboratory room on campus arranged as a friendly play environment with child-size chairs and a table in the middle of the room. An adjacent room, connected by a one-way mirror, was set up to videotape the session. The one-way mirror was small and located high on a single wall and was out of the direct view of the children. The video camera was located behind the mirror and never seen by the child. Since the child was unable to see him/herself in the mirror, the mirror was not viewed as a self-focusing stimulus (Carver & Scheier, 1978) or as a stimulus interfering with data collection. Sessions lasted approximately one hour with a 10-minute break half-way through the session, and all sessions started with a joint experimenter-child rapport-building coloring task. Children then completed a selective attention task (an opportunity to engage in private speech) and an interview (consisting of awareness and attitude questions) with the first, male experimenter (the first author), followed by a short snack break. Then, a second, naïve, female experimenter administered a standardized language assessment, followed by the first experimenter's administration of mentalizing tasks. All children received the same order of activities.

*Selective attention task.* An interesting and age appropriate selective attention (SA) task, which has been found to elicit overt speech in preschool age children (Winsler et al., 1997), was used in the present study. Children examined two pictures secured to a 4" × 8" card (12 in total: 2 for training, 10 for testing) that shared a common element (either color or shape), determined the commonality between the two pictures, and then selected a third picture that matched the common element (20 pictures to choose from: 12 answer items, 8 extra). The experimenter explained and demonstrated how to complete the task with two training items until the child demonstrated understanding by completing the two items correctly by him/herself. The child then completed the remaining 10 items with no assistance from the experimenter. When the child was to work independently on the task, the experimenter moved to the back of the room (behind the child) and looked busy with paperwork, as is typically done (Winsler, Fernyhough, McClaren, & Way, 2005). If the child attempted to speak to the experimenter, the experimenter initially did not respond to the child until he was certain the child was speaking to him (eye contact, calling his name, etc.) and then gently encouraged the child to continue working on the task alone (e.g., "You are doing good. You know how to do it. Please

finish all by yourself.”). The average time needed by each child to complete the task was  $M = 5:41$  minutes,  $SD = 3:56$ .

*Interview.* Immediately following the SA task, each child was interviewed about his/her awareness of private speech. The author-constructed interview was based on developmentally appropriate interview guidelines (Saywitz & Camparo, 1998) and similar work by Flavell et al. (1997) and Flavell et al. (1999) that assessed children’s knowledge of inner speech and unconsciousness by directly asking children questions about these phenomena, and then asking additional questions after presenting visual scenarios to the child.

The interview began with general questions about the task. The general questions asked of the children were as follows: (1) “Did you like playing that game?”; (2) Did you think it was easy, medium, or hard?”; (3) “What were you doing while working on that game?”; and (4) “How did you figure out how to do the game?”. Following these general questions three specific questions were asked as to whether or not the child recalled talking during the task: (1) “Were you thinking or talking or anything else during the game?”; (2) “Were you talking or saying anything while working on the game?”; and (3) “Some kids talk while playing games, did you talk when playing this game?”. We asked the children whether they used speech with three questions to make sure they understood what was being asked of them. If at any point during these questions, the child reported talking, s/he was marked as being aware of his/her talking during the task (if in fact s/he had talked during the task). Children who did not talk during the task and indicated *not* talking were also marked as being aware of their (lack of) talking during the task. Children who did not indicate that they had talked during the task when in fact they did talk were marked as not demonstrating awareness of their speech during the task. It is worth noting that all 10 of the children who did not talk during the task correctly indicated that they did not speak during the task, and thus it appears that the children did not feel pressured by the questions asked to say they were talking just to please the experimenter.

After the children were asked questions regarding awareness, they were shown a video clip of themselves during the task. A 30- to 45-second video clip, which contained the highest frequency of private speech use, if any, by the child working on the SA task only minutes earlier, was used as visual stimulus for the next set of questions. The video clip was set up by a second experimenter behind the one-way mirror during the early interview questions. This experimenter used a separate recording device to tape the SA task. While the taping was going on, this second experimenter watched and jotted down time points and indications of amount of private speech. Immediately after the child finished the SA task, this experimenter rewound the tape-recording of the SA task to the point where most private speech occurred. If the child did not use any speech throughout the entire task, the video was just rewound to a central point in the task.

If the child was observed using speech during the task but did not report talking yet, they were asked the same questions listed above in order to bring to their attention the fact that they talked. This was done so that all the children who had used speech could be asked questions about who they were talking to. Three questions were asked: (1) “Who were you speaking to?”; (2) “Were you just talking to [name said by child] or anyone else?”; and (3) “Were you talking to just [name said by child] or were you talking to someone else, like yourself?”.

If the child was observed using private speech and s/he indicated speaking to him/herself, then s/he was marked as being aware of his/her use of private speech. If on the other hand, the child was observed using private speech but did not report that the speech was addressed to the self, then s/he was marked as not having awareness of private speech.

All children were then shown a 45-second video clip of another child (4-year-old boy) using private speech while completing the very same SA task just completed by the child. The video child used a high volume (with every task item) of relatively loud, task-relevant, private speech. The same questions that were asked of the child after s/he completed the SA task were asked about the video child. All of the children reported that the video child was in fact talking during the task and thus all were asked the three questions regarding to whom the video child was speaking. If the child reported that the video child was speaking to himself, then that child was marked as demonstrating awareness of another child’s use of private speech.

*Attitudes interview.* Children were also asked questions about their attitudes towards using speech during the task. Questions were asked about the child’s own use of speech and about the video child’s speech. For the questions about the self, only the children who were observed to use speech during the task and reported using speech were asked ( $N = 31$ ). First, an open-ended question (“Why were you talking to yourself?”) was asked to give the participants an opportunity to answer freely, followed by four specific questions: (1) “When you were talking during the task, did it help you or mess you up?”; (2) “When you were talking, do you think it made playing the game better or worse?”; (3) “Do you think the talking made the game go faster or slower?”; and (4) “Do you think talking made the game easier or harder?”. Questions were asked exactly the same way for all children in the same order but the two response options (i.e., help/mess up) for each of the questions were counter-balanced for the order in which option was mentioned.

All children were also asked attitude questions for the video child and then in general with the aid of toy figurines. Concerning the video child, the same four questions discussed above about the child’s thoughts on their own speech were asked about the video child, plus one additional question: “Do you think he was smart or not smart for talking during the game?” Next, children were shown two dolls (hard plastic figurines matching the sex of the child) pretending to work on the SA task; one was talking loudly to him/herself (the experimenter engaging in a pretend, higher pitch than normal, doll voice), and the other was completely silent. The silent doll was shown examining the SA task item in the same way as the talking doll but selecting a response without any verbalizations made by the experimenter/figurine. Children were asked the same five attitude questions described above in the context of comparing the talking doll to the quiet doll. One additional question was added to the five that were asked about the video child: “Which doll [talking one or quiet one] is working harder on the task?” To avoid a response pattern in which the child always picked the first (or second) doll mentioned, the order of the dolls to choose from (talking vs. quiet) was flipped for each subsequent question.

For each of the interview items having to do with the child’s belief about the usefulness of private speech (either for the self or other), a “1” was given if the child stated that private speech

was positive (good, helpful, easier, faster, smarter . . .), and a “0” was given for negative views (slower, worse . . .). An average positive attitude score about private speech was calculated for both the child’s own speech and about speech use among others by taking the sum of the scores and dividing them by the number of questions asked in that section (self  $k = 4$ , other  $k = 11$ ). Scores, therefore, could range between zero and one, with one showing a completely positive attitude toward private speech and zero showing a completely negative attitude.

*Language development.* The Test of Early Language Development (TELD) (Hresko, Reid, & Hammill, 1981), used in previous research (e.g. Jenkins & Astington, 1996) and shown to have good test–retest, alpha, equivalent form, and interscorer reliability as well as good content, predictive, and construct validity (Hresko et al., 1981), was also administered. The test is divided into two parts: receptive and expressive. The receptive component consists of questions asking the child to point to pictures and objects that correspond to statements given by the experimenter. For example, the experimenter shows the child a page with four different pictures and says, “Can you point to the boy standing to the left of the fireman?” The expressive component requires the child to verbally respond to questions. For example, the child might be asked to repeat a sentence verbatim or tell a story based on a picture shown to him/her. Testing time averaged between 15 and 30 minutes. The TELD yielded raw receptive ( $M = 27.85$ ,  $SD = 4.15$ ) and expressive ( $M = 29.17$ ,  $SD = 4.68$ ) language scores.

*Mentalizing tasks.* Four mentalizing tasks were included: (1) an appearance–reality task; (2) a deceptive–box task; (3) an unexpected–identity task; and (4) an unexpected–location task. In the appearance–reality task (Flavell, Green, & Flavell, 1986), children were first asked to tell the experimenter what they believed an ambiguous object (a bouncing–ball that looked like a rock) to be. Then, the children physically examined and bounced the ambiguous object, and after were asked what they originally believed the ambiguous object was (one question). Responses to this question were scored as pass/fail. In the deceptive–box task, children were shown two boxes (a Band-Aid box that contained crayons, and a Crayon box that contained Band-Aids) and asked what they believed was in each box. Next, the children were asked to examine the actual contents of each box and report to the experimenter. Finally, the children were asked to state what they originally said was inside each box (two questions). Responses to these questions were scored as pass/fail. A total deceptive–box score (using the two questions) was calculated.

Immediately following the appearance–reality task with the boxes still on the table, an unexpected–identity task (Perner, Leekam, & Wimmer, 1987) was given to the children. The children were reintroduced to one of the dolls used during the interview and told: “This is Sarah/Mike. Sarah/Mike has a cut. S/he wants a Band-Aid. Where do you think s/he will look for Band-Aids?” The child’s response to this initial question, either by pointing or verbal report, was scored pass/fail. In order to pass, the child had to show that s/he understood that the doll was unaware that the Band-Aids were in the crayon box. If the child responded incorrectly, s/he was shown the doll looking for a Band-Aid in the Crayon box (E moved the doll to the box, opened the box with the dolls hands, and looked inside the box) and was asked a follow-up question (without the child

being shown the contents of the box), “Does s/he think there are Band-Aids in here?”. Again, responses were scored pass/fail.

Next, the child was shown a second doll and told: “This is Michelle/Joey. Michelle/Joey also has a cut and wants a Band-Aid.” Michelle/Joey was shown walking up to the Band-Aid box. The child was asked: “Why do you think Michelle/Joey is looking in there?” A pass/fail score was given based on whether or not the child’s response indicated that s/he understood that the doll believed the Band-Aids were in the Band-Aid box (pass). Statements that suggested the doll *would not* look in the Band-Aids box or that the doll believed the Band-Aids were in the Crayon box were scored as incorrect. If the child responded incorrectly to the initial question, s/he was given a follow-up question: “What does Michelle/Joey think?” If the child then stated that the doll believes Band-Aids were in the Band-Aid box it was considered correct.

Finally, the children completed an unexpected–location task (Wimmer & Perner, 1983). Children were shown a same–gender doll playing with a ball, putting the ball away inside a box, and then leaving the scene. Next, they were shown a second doll that went into the box, got the ball, and began playing with it also. After a few moments, the second doll was shown putting the ball into a different location (a basket) and then leaving. Children then saw the first doll eagerly return to play with the ball and were asked: “So, it looks like Sarah/Mike wants to play with the ball again. Where will Sarah/Mike look for the ball?” Responses were scored pass/fail. Correct responses identified the box (the place Sarah/Mike left the ball) as the place the first doll would look. If the child incorrectly answered the first question, s/he was given a second opportunity with the follow up question: “Well, what does Sarah/Mike think?” A total score (using the six possible unexpected–location and unexpected–identity questions) was calculated.

*Speech use.* Use of both private speech and social speech (speech directed toward the experimenter) was noted by the experimenter while the child was working on the SA task and later confirmed with the videotapes, and recorded on a tally sheet as Yes/No for speech use in general, private speech use, and social speech use. Speech noted online never contradicted the later video tape viewing. These measures of observed use of speech provided the “actual” speech use indicators for comparison with the child’s reported speech use. The total number of speech utterances (a complete sentence, an independent clause, a conversational turn, or any word or phrase separated from another by three or more seconds) that were reliably coded (10% random sub-sample of transcripts; percent agreement = 92, Kappa = .84) into private and social speech categories was calculated. Private speech utterances were then reliably further broken down into: (a) task–irrelevant; (b) task–relevant; and (c) partially–internalized (inaudible, incomprehensible muttering, silent verbal lip movements, and task–relevant whispers) categories by two independent raters (10% random sub-sample of transcripts; percent agreement = 93, Kappa = .86). Speech utterances per minute variables were calculated and used for the analyses. Coding systems used were those from previous research (Winsler et al., 2005).

## Results

Preliminary analyses examined relations between age, percent correct and time spent on the SA task. A bivariate correlation

between age in months and percentage correct yielded a significant relationship,  $r = .44, p < .05$ , such that the older the child, the more items s/he correctly completed on the task. Also, a correlation between age in months and time spent on the task yielded a significant relationship,  $r = -.43, p < .05$ , such that the older the child, the less time spent on the task. Thus, it appears that the task was somewhat easier for the older children. Because of variance in time spent on the task, speech use per minute was used.

### Amount and type of speech used

The first goal of this research was to determine the extent to which 3-, 4-, and 5-year-old children were aware of their own private speech. It was thus necessary to compute the observed amount (whether the children talked and if so, the number of speech utterances) and type (private or social) of speech a child used. Table 1 provides the number and percentage of children who talked during the task, by age, and also the amount of speech per minute children used.

While working on the SA task individually, four-fifths of the

participants used some form of speech, with 71% using social speech during the task and 75% using private speech (of the 25% who did not use private speech, one was a 3-year-old, five were 4-year-olds, 7 were 5-year-olds). The 3-year-old age group was most likely to talk during the task (19 out of 19; 100%) compared to the 4-year-olds (15 out of 20; 75%) and 5-year-olds (7 out of 12; 58%),  $\chi^2(2) = 8.71, p < .05$ . This finding shows a decreasing likelihood of speech during the task as age of child increases. This same pattern was also true for social speech  $\chi^2(2) = 12.71, p < .05$ , and for private speech,  $\chi^2(2) = 10.91, p < .05$ . This pattern was to be expected given that age was positively associated with performance on the task ( $r = .44, p < .05$ ), which indicates younger children, as expected, had more difficulty with the task. Table 1 also shows the median number of speech utterances (per minute) used by speech category and by age. The largest median number of private speech utterances used was relevant (level 2) to the task compared to irrelevant (level 1) or partially internalized (level 3) (Kendall's  $W = .32, \chi^2(2) = 31.18, p < .05$ ). A Wilcoxon signed ranks test indicated that overall, children used more private speech than social speech,  $Z = -2.51, p < .05$ .

**Table 1**

Number (%) of participants' observed speech, mean (SD) and median utterances observed, and number (%) of participants reporting speech use in themselves and others, by age

Observed	Age group			Overall (N = 51)
	3-year-olds (N = 19)	4-year-olds (N = 20)	5-year-olds (N = 12)	
<i>Total speech</i>				
No. (%) of participants <sup>a</sup>	19 (100%)	15 (75%)	7 (58%)	41 (80%)
Mean (SD) utterances per min.	7.18 (5.05)	5.57 (5.15)	4.78 (5.61)	5.97 (5.21)
Median # utterances per min.	5.98	5.98	1.91	4.99
<i>Social speech</i>				
No. (%) of participants <sup>a</sup>	19 (100%)	11 (55%)	6 (50%)	36 (70.6%)
Mean (SD) utterances per min.	2.92 (2.28)	2.11 (2.88)	1.31 (1.85)	2.21 (2.48)
Median # utterances per min.	2.02	.76	.65	1.39
<i>Private speech (total)</i>				
No. (%) of participants <sup>a</sup>	18 (95%)	15 (75%)	5 (42%)	38 (74.5%)
Mean (SD) utterances per min.	4.26 (4.19)	3.46 (3.73)	3.47 (4.18)	3.76 (3.95)
Median # utterances per min.	3.42	2.83	1.46	2.73
Task irrelevant – mean (SD) per min.	.54 (.52)	.21 (.35)	.35 (.65)	.37 (.51)
Median # per min. <sup>f</sup>	.40	.07	.00	.15
Task relevant – mean (SD) per min.	3.28 (3.76)	2.71 (3.35)	2.58 (3.79)	2.89 (3.55)
Median # per min.	2.04	1.19	.25	1.19
Part-internal – mean (SD) per min.	.44 (.58)	.53 (.63)	.54 (.81)	.50 (.65)
Median # per min.	.24	.26	.22	.24
<i>Reported</i>				
<i>Self</i>				
Aware of not talking	0/0 (100%)	5/5 (100%)	5/5 (100%)	10/10 (100%)
Aware of talking <sup>b,c</sup>	12/19 (63%)	8/15 (53%)	2/7 (29%)	22/41 (54%)
Aware of private speech <sup>d,e</sup>	5/16 (31%)	8/11 (73%)	3/4 (75%)	16/31 (52%)
<i>Video other</i>				
Aware of private speech	10 (56%)	16 (80%)	8 (67%)	34 (68%)

<sup>a</sup>  $\chi^2, p < .05$ .

<sup>b</sup> Numbers based on pre-video interview questions.

<sup>c</sup> % based on total number of children with observed speech utterances.

<sup>d</sup> Numbers based on combined pre- and post-video interview questions.

<sup>e</sup> % based on total number of children with observed private speech utterances.

<sup>f</sup> Comparison not possible due to zero variance in one cell.

### Self-reports of speech use

**Reports of talking.** Table 1 provides the number and percentage of children who reported talking during the task (before viewing the video). Twenty-two participants (54%) reported talking during task. Among the 29 participants who did not report "talking" during the task, 10 were correct that they did not talk during the task (100% of non-talkers), nine admitted talking after seeing themselves talk on the video, and, interestingly, the remaining 10 never admitted talking during the task even after seeing the video in which they were quietly talking to themselves. It is possible that the term "talking" used by the experimenter held a specific meaning by the children that may not include softer forms of talking (i.e., whispering) or louder forms of talking (i.e., yelling). Thus, 32 of the 51 participants (63%) accurately reported whether or not they had spoken (including both talkers [22] and non-talkers [10]). Interestingly, the probability of reporting speech given that the child talked varied somewhat by age, favoring the younger children. Twelve (63%) of the nineteen 3-year-old talkers accurately reported talking, eight (53%) of the fifteen 4-year-old talkers reported talking, and only two (29%) of the seven 5-year-old talkers accurately reported talking.

**Reports of private speech.** After reporting or seeing themselves (via the video) use speech and stating that they were talking during the task, these participants ( $n = 31$ ; sixteen 3-year-olds, eleven 4-year-olds, four 5-year-olds) were asked to whom they were speaking. (Of these 31 children, 30 children used private speech and one child used only social speech.) Sixteen (52%) of the 31 children who used and reported speech said they were talking specifically to themselves. The remaining participants who reported talking stated that their speech was directed either toward the experimenter or to someone outside the room. (The one child, a 3-year-old who did not use private speech, correctly stated that he was only speaking to the experimenter.) Thus, of the children who admitted they were talking and actually did use private speech ( $N = 30$ ), 16 (53%) said they were talking to themselves. Five-year-olds had the highest percentage of stating the self as the interlocutor (75%) compared to the 4-year-olds (73%) and 3-year-olds (31%).

### Group comparisons of children aware and not aware of their speech

A second goal of this paper was to determine group differences between children who were aware and not aware of their social and private speech. Age, speech amount/type (per minute), performance, and language ability were examined. In order to lower family-wise error, we have conducted multivariate tests first for language abilities (receptive and expressive) and mentalizing abilities (appearance-reality, deceptive-box, and unexpected-change).

**Age.** In order to determine if there were differences in age between the children who demonstrated awareness and those who did not, independent  $t$ -tests were conducted. Results of these tests along with group means and standard deviations are presented in Table 2. There was no mean difference, statistically, in the age between children aware of their talking during the task and children not aware of their talking. A significant difference, however, was observed for awareness of private speech such that children who demonstrated awareness of

**Table 2**

*Differences between children aware and not of speech and private speech*

	Awareness of talking	
	Aware N = 21	Not aware N = 18
Age (in mos.)	49.91 (8.86)	52.37 (8.67)
Task performance	.74 (.24)	.67 (.28)
Receptive language	27.41 (3.95)	28.32 (3.37)
Expressive language <sup>+</sup>	27.32 (4.30)	29.79 (3.72)
Appearance-reality	.47 (.51)	.67 (.49)
Deceptive-box	.34 (.47)	.38 (.47)
Unexpected-change <sup>+</sup>	.36 (.32)	.55 (.33)
Speech use (total) per min.*	8.78 (4.83)	5.54 (4.83)
Social speech per min.	3.11 (2.35)	2.36 (2.66)
Private speech per min. <sup>+</sup>	5.66 (4.19)	3.19 (3.60)
Irrelevant PS per min.	.49 (.55)	.34 (.54)
Relevant PS per min.*	4.65 (3.85)	2.35 (3.10)
Part-intern PS per min.	.52 (.57)	.50 (.61)
<i>Awareness of private speech</i>		
	N = 15	N = 14
Age (in mos.)*	53.94 (8.73)	47.00 (7.54)
Task performance	.73 (.27)	.64 (.25)
Receptive language	28.63 (3.20)	26.67 (4.53)
Expressive language*	30.38 (3.56)	26.07 (4.03)
Appearance-reality	.57 (.51)	.36 (.51)
Deceptive-box*	.54 (.50)	.08 (.28)
Unexpected-change	.45 (.36)	.39 (.31)
Speech use (total) per min.	9.50 (3.69)	6.53 (5.62)
Social per min.	2.90 (1.96)	2.95 (2.78)
Private per min.*	6.60 (3.84)	3.58 (4.14)
Irrelevant per min.	.44 (.47)	.38 (.54)
Relevant per min. <sup>+</sup>	5.49 (3.64)	2.81 (3.74)
Part-internal per min.	.67 (.77)	.39 (.37)
<i>Awareness of other's private speech</i>		
	N = 33	N = 15
Age (in mos.)	53.94 (8.75)	50.75 (10.00)
Task performance	.76 (.26)	.72 (.26)
Receptive language	28.47 (3.22)	27.38 (4.66)
Expressive language +	30.12 (4.11)	27.63 (5.49)
Appearance-reality	.63 (.49)	.62 (.51)
Deceptive-box*	.54 (.50)	.20 (.37)
Unexpected-change	.54 (.33)	.40 (.32)
Speech use (total) per min.	6.13 (5.21)	5.67 (5.55)
Social per min.	2.04 (2.13)	2.60 (3.24)
Private per min.	4.09 (4.16)	3.06 (3.61)
Irrelevant per min.	.36 (.51)	.39 (.54)
Relevant per min.	3.22 (3.77)	2.23 (3.15)
Part-internal per min.	.52 (.64)	.45 (.70)

\* $p < .05$ .

<sup>+</sup> $p < .10$ .

self-talk were significantly older ( $M = 53.94$ ,  $SD = 8.73$ ,  $MIN = 42$ ,  $MAX = 71$ ) than those who did not ( $M = 47.00$ ,  $SD = 7.54$ ,  $MIN = 37$ ,  $MAX = 63$ ),  $t(27) = 2.36$ ,  $p < .05$ . These findings indicate that awareness of private speech is greater among older preschool children.

**Performance.** Overall, the children in the present study did rather well on the task. The average percent correct was .75

( $SD = .26$ ). The range of scores, however, varied from 20% correct to 100% correct. A breakdown by age is consistent with the correlation between age and performance presented at the beginning of the results section: the average percent correct for the 3-year-olds was .62 ( $SD = .22$ ), for the 4-year-olds .79 ( $SD = .22$ ), and for the 5-year-olds .88 ( $SD = .29$ ). Differences in performance for children who were aware of their speech compared to those who were not aware of their speech did not reach significance for both awareness of talking and awareness of private speech. It is worth mentioning, however, that in both cases, the children who were aware performed slightly better than the children who were not aware.

*Differences in speech use.* The top of Table 2 provides the group level comparisons between children who were aware of their talking and those who were not for all of the coded speech types. Results of independent  $t$ -tests revealed that children differed in the amount of speech use (per minute) for total speech and relevant private speech. In both cases, children who demonstrated awareness of speaking in general were those who talked more in general and those who used more relevant private speech. Because frequency of private speech use is associated with task difficulty (Vygotsky, 1934/1987), it could be that children who had a more difficult time with the task used more speech and hence simply had more opportunity to become aware of their talking during the task. If this were true, then the differences found in speech use between children who were and were not aware of talking should disappear when factors that might be related to task difficulty are covaried. To check this, two measures were independently covaried from the difference in relevant private speech (per minute) for children aware and not aware of talking in two ANCOVAs: (1) items correct on SA task; and (2) time spent working on SA task. In both ANCOVAs, significant differences remained ( $F[1,36] = 4.06$ ,  $p < .05$ ,  $F[1,36] = 4.45$ ,  $p < .05$ , respectively) for relevant private speech (per minute). This indicates that the difference in amount of relevant private speech use between children who are and are not aware of talking is not simply due to task difficulty. Finally, an ANCOVA examining the differences in relevant private speech for children aware and not aware of talking was conducted with age controlled. Results yielded a significant finding,  $F(1,36) = 5.32$ ,  $p < .05$ , such that children aware of their talking used more relevant private speech than those who were not aware even when age is controlled statistically.

The middle section of Table 2 presents the differences in speech use for children who demonstrated awareness of private speech compared to those who did not. Independent  $t$ -tests were conducted with speech use variables as the dependent measure and awareness of private speech as the independent grouping variable (aware, not aware). The only significant finding was that children who were aware of their private speech used a higher amount of overall private speech (per minute) compared to those who were not aware,  $t(27) = 2.03$ ,  $p < .05$ . Although only marginally significant,  $t(27) = 1.96$ ,  $p = .06$ , relevant private speech seems to be what is driving the significant difference in the overall private speech difference.

*Language.* Table 2 also shows differences in language skill between children who were and were not aware of various aspects of speech. A separate MANOVA for awareness of speech in general and awareness of private speech were conducted with receptive and expressive language as the dependent variables. No significant differences were found for

children's language ability as a function of their awareness of speech use in general. However, there was a significant MANOVA for awareness of private speech,  $F(2,28) = 4.91$ ,  $p < .05$ . The follow-up univariate test indicated that there were significant differences in children's expressive language skills,  $F(1,29) = 10.00$ ,  $p < .01$ , and not their receptive language skills,  $F(1,29) = 1.95$ ,  $p = .17$ . Children aware of private speech were significantly stronger in expressive language ( $M = 30.38$ ,  $SD = 3.56$ ) compared to those unaware of private speech ( $M = 26.07$ ,  $SD = 4.03$ ).

Because of the high association between expressive language and age ( $r = .65$ ,  $p < .05$ ), an ANCOVA was conducted examining the differences in expressive language ability for those varying in their awareness of private speech with age as the covariate. Results were still significant when age was controlled,  $F(1,28) = 5.39$ ,  $p < .05$ . This indicates that age does not explain the finding that children who are aware of their own private speech are more advanced in terms of expressive language compared to children not aware of their private speech.

*Mentalizing abilities.* Additionally, Table 2 contains information about differences in mentalizing ability for children who were and were not aware of their speech. First, a MANOVA was conducted for both awareness of speech in general and awareness of private speech with the appearance-reality, deceptive-box, and unexpected-change tasks as the dependent variables. There were no significant differences found on mentalizing abilities for children varying in their awareness of talking in general. There was, however, a significant MANOVA for awareness of private speech,  $F(3,18) = 3.58$ ,  $p < .05$ . Of the three mentalizing tasks, univariate tests revealed only differences in the deceptive-box scores for children who were aware of their private speech compared to children who were not aware of their private speech,  $F(1,20) = 8.68$ ,  $p < .01$ . This difference was also examined with age controlled in an ANCOVA. The results yielded a significant test statistic,  $F(1,24) = 4.73$ ,  $p < .05$ , such that children aware of private speech had higher deceptive-box scores when age was controlled compared to children not aware of private speech. When the differences were tested with expressive language, which is highly related to the deceptive-box score ( $r = .65$ ,  $p < .001$ ), removed statistically in an ANCOVA, the difference was no longer significant,  $F(1,24) = 1.37$ ,  $p = .25$ . This suggests that awareness differences are more related to expressive language than they are to mentalizing abilities.

#### *Awareness of others' use of private speech*

As reported in the bottom of Table 1, 34 of 50 (68%) participants (data from one participant were lost due to instrument failure) reported that the speech being used by the video child was self-talk. The other 16 participants did not state at any time that the video child was speaking to himself (although the video clearly showed him doing so).

To examine the consistency between reporting one's own speech as being private and reporting the speech of the video child as being private, a chi-square analysis was conducted on the proportion of children who reported their own and the other's speech as being private. This revealed a statistically significant association,  $\chi^2(1) = 9.21$ ,  $p < .05$ . Fifteen of the 16 (94%) participants who noted their own use of private speech also reported that the video child was talking to himself, while only 43% (6 of 14) of the participants who failed to report

their own use of private speech reported that the video child was using private speech. Only one child of the 16 (6%) children who reported awareness of private speech for the self did not report another child's private speech, and eight of the 14 (57%) children who reported not being aware of their own private speech were also unaware of another child's private speech. Thus, children who report their own private speech are more likely to report private speech use in other children, compared to those unaware of their own private speech.

*Group differences for awareness of other's private speech.* The bottom section of Table 2 presents mean differences between children who demonstrated an awareness of the other child's private speech and those who did not. Multivariate tests yielded no significant differences for language ability or mentalizing abilities.

### Children's attitudes/perceptions about private speech

Our final research question had to do with what children think about private speech for themselves and for others. Table 3 displays the percentage of children who had positive attitudes regarding private speech for themselves and for others (video child and dolls). Recall that each question was given a score of 1 for positive (0 for negative) and then averaged to create a total score, which is shown in the bottom row of the table. Because these scores differ for the two lines of questioning (self, other), we do not believe that these scores merely reflect child optimism (i.e., children are not just being favorable in all their answers), but rather reflect favorability toward their own private speech. However, optimism should not be ruled out as a plausible explanation. For questions pertaining to the child's private speech, the mean positive value across all children was 0.80 ( $SD = .25$ ). This score was tested against chance/neutral-ity (0.50) with a one-sample  $t$ -test and found to be significantly above chance (more positive),  $t(30) = 6.55, p < .05$ , suggesting that children see their own private speech as serving very positive functions for them.

**Table 3**

*Number (and percentage) of children endorsing positive beliefs about private speech*

	Self ( $N = 31$ ) <sup>a</sup>	Other ( $N = 49$ )
Help <sup>b</sup>	25 (81%)	38 (78%)
Better <sup>b</sup>	21 (84%)	31 (63%)
Faster <sup>b</sup>	21 (70%)	37 (76%)
Easier <sup>b</sup>	24 (89%)	37 (76%)
Smart <sup>b</sup>	–	35 (71%)
Work harder	–	26 (57%)
Overall positivity score (0–1)*		
<i>M</i>	.80	.54 <sup>c</sup>
<i>(SD)</i>	(.25)	(.26)

<sup>a</sup> Only children who stated that they were talking ( $N = 31$ ) received this line of questioning.

<sup>b</sup> Children were counted in "Other" if they indicated a positive belief regarding either the video child or the dolls.

<sup>c</sup> The overall positivity score for "Other" is averaged across all responses for both the video child and the dolls.

\* paired  $t(29) = 4.87, p < .05$ .

When children were asked to state what they thought about the video child and dolls' use of speech, they were only slightly more positive than neutral as shown in Table 3. The average rating of positive attitudes for others was 0.54 ( $SD = .26$ ). When tested against chance (0.50) in a one-sample  $t$ -test, it was not different,  $t(49) = .96, p = .34$ , suggesting that children do not see private speech as being particularly helpful (nor harmful) for other children. To explore differences in children's attitudes toward private speech as a function of referent (self, other), the mean overall positive functionality scores for each referent were entered as dependent measures in a paired  $t$ -test. For this analysis, only the 30 participants who completed questions for all three of the interview components were included. This yielded a significant effect for referent,  $t(29) = 4.87, p < .05$ , indicating that children rate their own private speech as being more positive/useful ( $M = 0.82, SD = 0.21$ ) than the private speech of others ( $M = 0.57, SD = 0.25$ ).

*Correlates of positive attitudes.* Table 4 shows correlations that were conducted to determine if age, language ability, and speech use (per minute) were associated with attitudes about private speech. Correlations between the two attitude scores (self, other) and age in months revealed a significant positive association between age and belief about the usefulness of private speech for the self,  $r = .40, p < .05$ . These results indicate that as children get older they gain a more positive view of private speech for themselves, but not necessarily for others. Expressive language was the only variable significantly associated with the other-attitude score. Self-attitude was significantly associated with age and expressive language. This indicates that children with more positive attitudes toward private speech are older and have higher expressive language abilities. Partial correlations reveal that expressive language was still significantly related to self-attitudes even when age was controlled ( $r = .38, p < .05$ ). Nothing was associated with

**Table 4**

*Correlations between positive attitudes toward private speech and predictors*

	Attitudes	
	Self	Other
Age (in mos.)	.40*	.02
Receptive language	.17	.12
Expressive language	.51*	.29*
Appearance-reality	.27	.01
Deceptive-box	.37+	-.01
Unexpected-change	.25	-.04
Speech use (total) per min.	.26	.04
Social per min.	-.00	-.17
Private per min.	.30	.16
Irrelevant per min.	-.01	-.18
Relevant/self-regulatory per min.	.30	.17
Partially-internal per min.	.21	.16
Attitudes		
Self	–	.28
Other	.28	–

\* $p < .05$ .

+ $p < .10$ .

positive attitudes about private speech when expressive language was controlled.

*Awareness group differences in attitudes.* Group differences in positive attitudes toward private speech were also examined for those children who did or did not demonstrate awareness. Children who demonstrated awareness of private speech were significantly more positive ( $N = 16$ ,  $M = .91$ ,  $SD = .14$ ) in their attitudes regarding their own private speech compared to children who were not aware of private speech ( $N = 14$ ,  $M = .68$ ,  $SD = .30$ ),  $t(28) = 2.75$ ,  $p < .05$ . It is important to point out that both awareness groups had positive attitudes about private speech (both significantly greater than chance; one-sample  $t(15) = 12.00$ ,  $p < .05$  for children with awareness, and one-sample  $t(13) = 2.33$ ,  $p < .05$  for children without awareness). Children aware of their self-talk, however, had extremely positive views about such speech. No significant differences in private speech attitudes were found as a function of awareness of talking in general or for awareness of the video child's private speech.

## Discussion

The major goals of this study were to examine preschool children's awareness of private speech, to identify differences between children with and without awareness, and to determine children's attitudes about self-talk. Gaining an understanding of young children's awareness of self-talk is important theoretically because children's knowledge of private speech could conceivably play a role in children's internalization of language, children's capacity to use speech for behavioral self-guidance, and metacognitive development. Understanding what children think about overt self-talk may also be useful from a practical standpoint, as the effectiveness of interventions designed to help children gain control over their behavior through speech might hinge upon the child's awareness of and attitudes about private speech. This study represents the first attempt to date to directly assess preschool-age children's awareness of overt private speech and extends the works of others who have explored awareness of inner speech with young children (Flavell et al., 1997) and private speech among older children (Winsler & Naglieri, 2003) using other methods. Awareness of speech here was assessed via self-report. Recently, researchers (Duncan & Cheyne, 1999) have shown that self-report methods of private speech use, at least in young adults, is a sound method for assessing private speech usage.

### *Awareness of speech*

Findings from this study show that the majority of 3- to 5-year-old children are aware when they are talking during problem-solving activities, and that even 3-year-olds are largely able to correctly report whether or not they said anything during a recent task activity. Indeed, awareness of having spoken audibly was high for more overtly vocal children, which included many 3-year-olds. Awareness of talking appears to be associated with the type and amount of private speech used by children. Children who used much relevant private speech at a reasonable volume during the task tended to be the ones who were best at accurately reporting that they had spoken during the task. It is important to note

that only task-relevant private speech, not other, full-volume speech such as irrelevant private speech or social speech, was significantly different between children who were and were not aware of talking. This suggests that the content and task-directed nature of private speech might play a role in children's awareness of talking during tasks. This may be related to the suggestion by Bray, Huffman, and Fletcher (1999), that children are more aware of strategies during problem-solving that are effective, and/or related to task performance, than strategic behaviors that are not effective.

It is interesting to note that 5-year-olds were actually less aware of their speech (29%) during the task than 3-year-olds (53%). Most private speech research has shown that as children get older, they use less and less overt forms of private speech and begin to use more covert or partially covert forms of private speech (Berk & Spuhl, 1995; Winsler et al., 2000), and the findings here are consistent with that work. Older children, who used less private speech and whose speech tended to be more characterized by low volume and whispers, appear to have a hard time distinguishing between talking out-loud and talking inside one's head. This idea suggests the need for empirical work to answer an additional question that conjoins the current work on awareness of overt speech with Flavell et al.'s (1997) work on knowledge of inner speech; namely, children's awareness of the distinction between partially internalized private speech (whispers) and fully silent inner speech. While children are using low-volume muttering and whispering, they may not understand the difference or make a distinction between inner speech and overt speech; they may believe that all their speech was internal even though much was audible to others. Flavell et al. (1997) argued that children's "inexperience with silent reading might lead them to assume that speech could not be speech if it were not overt" (p. 40), thus suggesting that children who use inner or partially inner private speech would not recognize that what they were doing was talking (albeit in their head). This would explain the relatively large number of 4- and 5-year-olds who said they were not talking when in fact they were whispering, but who also had no trouble saying that their speech (after being shown on the video) was directed to the self. Being able to distinguish between inner speech and overt private speech might be something that develops after children are fully able to use inner speech. Thus, the fact that the older children in this study appeared to be less aware of their talking than would be expected, rather than indicating developmental arrest or regression, may simply indicate that the older preschoolers are struggling with an additional and more complex distinction (between silent inner speech and quiet overt speech) that may not be an issue for the younger children. The younger children, though they do use quiet overt speech, may not be having problems yet with this distinction possibly because they have yet to develop the cognitive capacity (e.g., theory of mind) to do so.

The current study was not designed to assess whether children were able to distinguish between inner and overt self-speech. Additional work should be conducted to determine if understanding the distinction between overt and covert self-talk is something that: (1) develops independently of awareness of overt self-talk or awareness of inner speech; (2) develops prior to or after children have an awareness of inner speech; or (3) is irrelevant. It is possible that the important development is in understanding the phenomena of self-talk, and that distinguishing between overt (i.e., private speech) and

covert (i.e., inner speech) is unnecessary. Children might simply develop the knowledge that they can direct speech to themselves, and at the same time understand that such self-talk can be used in the mind just as easily as out-loud.

The finding that children who were aware of their own speech were the ones who used the most relevant private speech can also be interpreted through the work of Fernyhough (1997), who suggested that children who use more self-regulatory/relevant private speech might be using this type of speech because they view themselves as mental agents who can actively use language to guide or control behavior. If we consider awareness of talking as part of one's mental self, then the results from the present study coincide with Fernyhough's suggestion that the more a child becomes aware of themselves as mental agents, the more they will use self-regulatory speech. The current study provides only partial support for this idea in that children who were aware of their own private speech use scored higher on the deceptive-box task suggesting that children who are aware of private speech have higher mentalizing abilities in at least some areas.

### *Awareness of private speech*

In terms of children's awareness of private speech, it was found here that those who demonstrated this awareness were older (54 months old on average) than those who did not (47 months old). Additionally, a majority of 4- and 5-year-olds reported that they were talking to themselves compared to only a minority of the vocal 3-year-olds. It would appear that considerable development takes place between the ages of 3 and 5 in understanding overt private speech. The fact that almost a third of the 3-year-olds and three-quarters of the 4- and 5-year-olds revealed an understanding of private speech is, however, impressive and reveals more awareness of private speech in 3- to 5-year-olds than has been suggested indirectly by previous research (Flavell et al., 1997; Winsler & Naglieri, 2003). The methodology used here was the first to directly ask preschool children about their use of speech during a specific task and whether such speech was directed toward the self, and therefore it is not surprising that more awareness of speech use (discussed above) and private speech was found in this investigation.

Children who were aware of their private speech were more advanced with respect to expressive language even after controlling for age. It might be that rich use of language provides children with more experience of hearing their own voice in multiple contexts. Such experience may help children understand that they can use speech to not only communicate with others but also that they can overtly communicate with themselves. This suggestion was not directly assessed in the current study, however, and therefore should be the subject of future work. Children who were aware of their private speech performed better at the deceptive-box task compared to children who were not aware of their private speech. This suggests that awareness of private speech might be related to mentalizing abilities; at least those assessed in by the deceptive-box task. Arguably, understanding that one's speech is directed at the self is a more advanced form of mentalizing ability compared to simply recognizing that one has talked; being aware that one is talking appears to develop before knowing that speech can be self-directed.

### *Children's attitudes about private speech*

Another major goal of this paper was to discover what preschoolers think about private speech. Overall, preschool children reported that using speech for the self during the task was a good thing; they believe that it helps them, that it makes them go faster, and that it makes tasks easier. This is important from both a theoretical and practical perspective. In terms of theory, it is one thing to know simply that a cognitive phenomenon exists but it is quite another to understand the value and purpose that a mental activity has for influencing behavior. The preschoolers in this study, even the 3-year-olds, revealed a fairly sophisticated meta-cognitive understanding of the interface between language, cognition, and behavior, one that surpasses what has been found in most previous research. In terms of practical applications, it is good to know that preschoolers see self-talk as a useful tool. This might be important information for intervention efforts and classroom teachers. Although various types of self-instructional interventions, programs designed to get/teach children to talk to themselves through situations, have been around for some time (Diaz & Berk, 1995), it is not until now that we have a sense of what the children themselves think about this activity. Finally, examination of the correlates of children's attitudes toward their own private speech revealed that expressive language and age are positively associated with positive attitudes about one's own private speech. The more linguistically advanced the child, the more likely they are to have positive attitudes toward such speech.

It is interesting to note that although children's attitudes were quite positive about their own private speech, they were more neutral about private speech use in others. There are a number of possible explanations for this. One is that the children are demonstrating an early self-serving bias (Fiske & Taylor, 1991). Simply put, they may be putting a positive spin on the things they do, but are ambivalent, negative, or more honest about the ways in which they rate other people's use of private speech. Another possibility is simply that although they know from their own experience what strategies are good for them to use during tasks, young children cannot speculate as to whether private speech is useful for others since they do not know the other/imaginary child involved directly. Some have argued, particularly regarding beliefs about traits, that preschool children are great optimists about themselves *and* about others (Schuster, Rubie, & Weinert, 1998). If these children were simply portraying a general optimistic view, then it would be expected that the attitude scores for both self *and* other would both be relatively high. Instead, the results yield a high score for the self and a neutral rating for others, indicated neither general optimism nor pessimism towards other children's private speech use.

### *Implications and limitations*

Among the findings here that have implications for researchers and for early childhood practitioners is the simple observation that children as young as three years old in this study were willing, open, and able to discuss their own meta-cognitive use of language for thinking and problem-solving and tell an unfamiliar experimenter whether or not they thought using private speech was good for them. This type of reflection on complex meta-cognitive phenomena and mental events is typically seen as emerging later in child development and not

among the capabilities of 3-year-olds (Flavell & Miller, 1998). Our impression from the interviews was that the 3-year-olds had far less inhibition reflecting on the vocal strategies they used while working on the task compared to the 4- and 5-year-olds; a position supported by the data as well.

It appears that younger children can talk about some complex cognitive functions, at least those tapped here, but then perhaps learn social rules that overlay their willingness to talk about these mental events as they age. This suggests that as researchers, we need to be careful about concluding that children younger than the lowest age included in a study have either the same or poorer abilities or competencies as the youngest age group observed. It is not uncommon for research examining children's theory of mind and understanding of mental events, for example, to include 4-year-olds as the youngest age group, find that they have limited knowledge about a cognitive phenomena (e.g., inner speech, Flavell et al., 1997), and then conclude that those under 4 must also not have much understanding of this component of mind. The 3-year-olds in this study had much to offer about their awareness of self-talk, information that would have been missed if they were not included. Children may be learning, possibly as a result of preschool experiences, new rules about what, when, and to whom they should talk about the various things they do mentally. In the sample of children used in the present study, most of the children attended at least half-day preschools, and the extent to which socialization in preschool may contribute to children's willingness to discuss certain linguistic and mental events may be an interesting avenue for future research.

Another important area for future research, now that we know a little about what preschoolers think about private speech, is to explore the views that teachers and parents hold about children's self-talk. Interesting anecdotal evidence from the current study suggests that preschoolers are very cognizant of teacher expectations and feelings toward the use of private speech. A handful of the subjects stated, in one way or another, that their teacher discouraged or did not let them talk to themselves while they were working on individual tasks. One youngster responded to the question as to whether or not she was talking during the task by stating that she would get in trouble with her teacher for talking. She had used private speech during the task, but basically stated that she was not willing to report using such speech because she also understood that she would sometimes get in trouble for it. Research on teacher beliefs, practices, and attitudes, toward children's private speech is still in its infancy (Deniz, 2003; Oliver, Edmiaston, & Fitzgerald, 2003), but preliminary findings indicate considerable variation in teacher dispositions toward children's self-talk and in the use of classroom practices that may foster or constrain children's use of private speech. This notion also parallels Siegler's work on children's use of fingers to help solve addition and subtraction problems. Despite the fact that teachers discourage finger counting, children often rely on finger counting when they are unable to recall answers from addition and subtraction tables, and Siegler and Jenkins (1989) have shown this to be a useful strategy for children.

A final point for future research has to do with the potential association between awareness of private speech and the effectiveness of private speech (i.e., increased self-regulation, higher task performance). Many researchers have discussed associations between private speech and self-regulation during problem-solving (Behrend et al., 1992; Berk, 1986; Duncan, 2000; Winsler et al., 1997), but questions remain regarding the

role of awareness in these associations. What is the role of awareness in task performance? Does being aware of one's own private speech relate to higher performance on tasks, or is awareness irrelevant to task performance? An examination of task performance in the present study did not yield any significant differences for aware children vs. children not aware; however, this particular investigation was not designed to explore awareness-performance associations. The task used in the present study was chosen simply because it was likely to elicit some private speech across ages. There were children in all age groups who performed perfectly (100% correct) on the selective attention task, thus limiting variability for a detailed exploration of performance. Additionally, the examination of performance in the present study was limited due to the global nature of the performance data (percentage correct across all items). Future work should examine these relations microgenetically with tasks without ceiling effects and tasks that are highly verbal (for all ages) such that questions about speech awareness can be sure to include all children.

As a first attempt at interviewing preschool children about their use and their views of private speech, the present study has a number of limitations. Clearly it is a methodological challenge to interview young children about such subtle and typically private linguistic and cognitive events. Some young children may have learned from school or home that talking out loud while working on a task or playing is not appropriate, and although they were doing it during the present experiment, they may have been loathe to report such behavior for fear of "getting in trouble." If this were the case, however, then the present study *underestimated* young children's awareness of talking and private speech. Along the same lines is the possibility that the children did not fully understand some of the questions being asked of them. It is possible that the terminology used in the interview possessed a very specific meaning to the child that was different than that of the experimenter (e.g., "talking" for the children may only refer to full volume social speech and not include more muted speech during the task). Also limiting in the present study was the small sample size and the fact that the protocol was such that at times only a smaller subset of children (those who talked and reported talking) were asked some of the questions. Finally, the fact that the amount of speech used by each age group varied, which resulted from the use of the same task across all ages, likely influenced the degree to which children were able to recognize their talking during task. With this noted, the present study was able to reach its goal of assessing children's awareness of private speech because children of all ages were able to see their talking via video tape, but nonetheless, it is possible that the effects found in this study may have varied slightly if all the groups had used near equal amounts of overt speech (something of course that cannot be controlled). Future work in this area will no doubt respond to these methodological challenges by finding other creative ways to assess preschool children's understanding of these and other such complex linguistic and mental events.

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