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## The use of psychological state terms by late talkers at age 3

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### ABSTRACT

The use of psychological state words during mother–child play sessions at age 3 was examined in 31 children diagnosed with delayed expressive language at 24–31 months and 21 age-matched typically developing comparison children. Children and mothers in the late talker group made more references to physiological states and fewer references to cognitive states than the children and mothers in the typically developing comparison group. The children’s use of cognitive terms correlated significantly with measures of language ability, including mean length of utterance, Index of Productive Syntax score, and use of propositional complements, as well as with their mothers’ use of cognitive terms. The delay in the emergence of psychological state words, particularly cognitive terms such as *think* and *know*, may affect other aspects of late talkers’ cognitive and social development.

This study examines the use of four kinds of psychological state terms (physiological, emotional, desire, and cognitive) in 3-year-old children who had been late talkers as toddlers. Children with normal language development begin to use psychological state language in a predictable sequence, first to refer to physiological states, emotions, and desires, and somewhat later to refer to thoughts and beliefs. However, no research has examined the acquisition of psychological state language in late talkers. Late talkers are first identified because of a delay in vocabulary acquisition, and they continue to have weaker vocabulary skills than comparison peers from similar backgrounds at age 3 (Rescorla, Roberts, & Dahlsgaard, 1997). However, it is not known if late talkers lag behind their typically developing peers in the lexicon of psychological state terms.

In an early study, Bretherton and Beeghly (1982) found that physiological terms (such as *sleepy* and *hungry*), desire words (particularly *want* and *need*), and emotion words (such as *happy* and *sad*) were the earliest and most common psychological state terms to appear in children’s naturally occurring speech. Such words were present in the lexicons of most children in their sample by 28 months. Dunn, Bretherton, and Munn (1987) reported that the majority of the

children in their sample referred to a range of feeling states (including emotions and physiological states) in their natural conversations at home by 2 years of age. Wellman and his colleagues (Bartsch & Wellman, 1995; Wellman & Bartsch, 1994) reported that before the age of 3, children's mental state language consisted of references to physiological states, emotional states, and desires. Children at this age made few, if any, references to thoughts or beliefs (Bartsch & Wellman, 1995; Furrow, Moore, Davidge, & Chiasson, 1992; Shatz, Wellman, & Silber, 1983; Wellman & Bartsch, 1994).

As children approach their third birthday, their talk about psychological states changes in several ways. Children begin to refer to the causes and consequences of feelings more often and discuss a wider variety of feeling states. Brown and Dunn (1991) suggested that these developmental changes in children's emotional state language influence their ability to enter into conversations about psychological states. Through these conversations, children have the opportunity to gain a deeper understanding of the mental states motivating human behavior.

A second important developmental change that takes place around age 3 is that children begin to make references to cognitive states and to use words such as *think* and *know*. Shatz and her colleagues (Shatz et al., 1983) conducted an early study of cognitive state language in which they assessed the frequency and function of children's emerging cognitive state vocabulary, particularly the words *think* and *know*. In that study, Shatz differentiated between conversational uses of these terms and genuine references to cognitive states. Conversational uses include rote or formulaic phrases such as, "I don't know." Genuine references to cognitive states require the use of contrastives, such as, "I thought he went to the store, but he went to school." The results of this study (Shatz et al., 1983) showed that children began to use cognitive terms in their 3rd year, first for conversational functions and later for genuine references to cognitive states. True cognitive state references began to appear at age 2 years and 8 months (2;8) in the speech of the focal child of their study.

Bartsch and Wellman (1995) conducted a search of over 200,000 child utterances from the CHILDES corpus for terms referring to thoughts, beliefs, and desires. Results showed that these cognitive terms began to appear in children's natural language by the third birthday and increased substantially over the next several years.

The studies reviewed above have outlined a developmental sequence in which normally developing children acquire the lexicon of psychological state terms. Given that children with expressive language delays lag behind age expectations in overall vocabulary acquisition, it might be expected that they would also be delayed in their acquisition of psychological state terms. However, such a delay in psychological state terms has not been examined in children with language delay.

Children who have delays in receptive and expressive language that cannot be attributed to a more primary disorder, such as mental retardation, autism, gross neurological dysfunction, physical impairment, hearing loss, or psychological disorder, are diagnosed as having specific language impairment (SLI; Bishop & Edmundson, 1987; Bishop & Leonard, 2000; Rescorla & Lee, 2000;

Tallal, 1988). Children with SLI have normal nonverbal intelligence, as measured by standardized performance IQ tests, and no other obvious disorder or impairment. SLI is a very common developmental disability and a major health problem, particularly among preschool-aged children (Beitchman, Nair, Clegg, Ferguson, & Patel, 1986; Tallal, 1988). In a large-scale epidemiological study, the prevalence of SLI among 5-year-olds was 7.4% (Tomblin et al., 1997).

When children under the age of 4 meet the diagnostic criteria for SLI, they are often referred to as late talkers. Many late talkers have age-adequate receptive language, but some have delays in both receptive and expressive language. Roughly half of late talkers show age-adequate expressive language skills by age 3 and most have normal language skills by age 5 (Paul, 1996; Rescorla & Lee, 2000; Whitehurst & Fischel, 1994).

Late talkers are generally first identified because they lag behind age expectations in vocabulary acquisition (Rescorla & Lee, 2000). In a sample of 40 late talkers identified between 24 and 31 months, mean vocabulary on the Language Development Survey (LDS; Rescorla, 1989) was 20 words, in contrast to a mean reported vocabulary of 226 words in the typically developing comparison children of the same socioeconomic status (SES) background (Rescorla et al., 1997).

Longitudinal research suggests that the vocabulary delays manifested by late talkers tend to resolve by ages 3 to 4 (Fischel, Whitehurst, Caulfield, & Debaryshe, 1989; Paul, 1996; Rescorla et al., 1997; Thal, Tobias, & Morrison, 1991). In Rescorla's (Rescorla et al., 1997) longitudinal study, only 21% of the late talkers scored more than 1 *SD* below age expectations on the Expressive One-Word Picture Vocabulary Test (Gardner, 1981) by age 3 follow-up; however, late talkers as a group had significantly lower vocabulary scores than comparison peers. Rescorla, Mirak, and Singh (2000) found that late talkers who were still very delayed in vocabulary at age 2;6 were most likely to continue to manifest significant expressive language delays at age 3 in terms of grammatical skills.

As late talkers and preschool children with SLI acquire vocabulary during the early period of language development, the types of words they use seem to match the types used by younger children with typical language development (Leonard, 1998; Leonard, Camarata, Rowan, & Chapman, 1982). In a recent study investigating word frequencies in the lexicons of late talkers from ages 2 to 3, Rescorla and her colleagues (Rescorla, Alley, & Book, 2001) used the LDS (Rescorla, 1989) to compare word frequencies in a sample of 40 late talkers with word frequencies in a large community sample of toddlers. The average late talker of 34–36 months had a mean LDS vocabulary comparable to that of the average typically developing child of 24 months. The highest frequency words in the early lexicons of typically developing children were among the first words acquired by late talkers who were acquiring vocabulary at a later age. However, there were some words for which the frequency level in the age 3 late talker sample was quite different from the frequency level in a Pennsylvania community sample of typically developing 2-year-olds. These differences in word frequency were explained by the age difference between the two samples and the

fact that the 3-year-old late talkers appeared to have different interests and abilities than the 2-year-olds (e.g., 3-year-olds are no longer focused on bottles and diapers; Rescorla et al., 2001).

Late talkers typically have delays in expressive grammar skills at ages 3 and 4, even when their early vocabulary delays have resolved. For example, Paul's late talker sample (Paul, 1993) scored in the average range for receptive and expressive vocabulary and receptive grammar at ages 3 and 4, but 60% at age 3 and 47% at age 4 were below the 10th percentile on Developmental Sentence Score (Lee, 1974). Paul and Alford (1993) also reported delays in grammatical morpheme acquisition in their late talkers at age 4. In the Rescorla et al. (1997) follow-up of 34 late talkers to age 3, the percentage of children scoring within 1 standard deviation of the age level mean was 79% for single word expressive vocabulary but 35% for mean length of utterance (MLU) and 24% for the Index of Productive Syntax (IPSyn; Scarborough, 1990).

Studies of preschool children with SLI have also consistently reported syntactic delays (Bishop & Leonard, 2000; Leonard, 1998). For example, Johnston and Kamhi (1984) reported that language-impaired 5-year-olds produced sentences that were grammatically less complex and had more difficulty with auxiliary, catenative, and infinitive verb structures than MLU-matched control children. Furthermore, Johnston and Kamhi (1984) indicated that their language-impaired children talked more often about ongoing events and self-movement actions and less often about intentions and necessities than the comparison children. Children with SLI appear to have particular difficulty with verbs (Leonard, 1998). Fletcher and Peters (1984) found that preschool-age children with SLI used lower frequencies of verb types than their age controls. Similarly, Watkins, Rice, and Moltz (1993) reported that preschool age children with SLI used a more limited variety of verbs than MLU controls as well as age controls.

In summary, late talkers, like children with SLI more generally, acquire their first words later than typically developing children. However, their early lexicons are generally similar in content to those of younger children with typical language development. As they acquire larger vocabularies, late talkers and preschool children with SLI tend to have difficulty producing syntactically complex language. Delays in MLU and grammatical morphology, particularly verb inflections, have been widely noted.

The present study was conducted in order to examine a specific aspect of the lexicons of 3-year-old children who had been slow to talk as toddlers, namely, psychological state vocabulary. This study assessed the use of psychological state terms in 52 children aged 3 years and engaged in natural conversations with their mothers. First, we compared the use of psychological state words at age 3 in 31 children who were identified between 24 and 31 months of age as late talkers and 21 age-matched typically developing comparison children. By the age of 36 months, some of the youngsters in the late talker group had caught up to age expectations in expressive language but others were still significantly delayed. Therefore, in the second part of our data analysis, we divided the whole late talker group into two subgroups, the late bloomers (those children who had caught up to age expectations) and the persistent late talkers (those who were still significantly delayed). A three-group analysis was used to compare the late

bloomers, the persistent late talkers, and the typically developing comparison group in their use of psychological state terms. The study addressed the following four questions:

1. Are there differences between the children with early history of delayed expressive language and typically developing comparison children in terms of the frequency, types, and referents of psychological words used? Are there differences in the mothers' use of these words?
2. Is the children's use of psychological state words related to the mothers' use?
3. To what extent is the use of psychological state words a function of the children's language ability, as measured by MLU, IPSyn, and the use of propositional complements?
4. Finally, do the two subgroups of late talkers (the late bloomers and the persistent late talkers) differ from each other and from typically developing comparison children in terms of frequency and types of psychological terms used?

## METHOD

### *Participants*

Participants in this study included 52 children aged 36 months and the mothers of these children from the Pennsylvania longitudinal study of expressive language delay (Rescorla, Dahlsgaard, & Roberts, 2000; Rescorla et al., 1997; Rescorla & Schwartz, 1990). In the sample of the present study were 31 children who were late talkers (29 boys, 2 girls) and an age-matched comparison group of 21 children (20 boys, 1 girl) with normal language histories. These constituted all the children in the two cohorts for whom an age 3 play session with a complete transcription was available at the time the data were coded. It should be noted that the results of the present study did not change when comparisons were made using a random sample of 21 of the late talkers and all 21 comparison children. The children were recruited to participate in the longitudinal study of expressive language delay through newspaper advertisements, notices to pediatricians, and a local infant lab. All of the children came from intact two-parent, middle to upper middle class white families.

All of the children in the late talker group had been identified at ages 24–31 months as having normal nonverbal abilities and age-adequate receptive language but also significant delays in expressive speech. Selection criteria included a Bayley Mental Development Index (Bayley, 1969) score of 85 or greater; a Reynell Receptive Language Scale (Reynell, 1977) score within 3 months of chronological age; a Reynell Expressive Language Scale score of at least 6 months below chronological age; and significant delays in expressive speech documented by parental report. The children in the normal language comparison group had to meet these same criteria and score within 3 months of their chronological age on the Reynell Expressive Language Scale. All children in both groups met these group selection criteria except for three late talkers, whose receptive language skills were 4 rather than 3 months delayed, and one comparison child, who had an expressive language age of 4 months below chro-

Table 1. *Intake and outcome measures for late talkers and comparison children*

	Late talkers		Comparison children		<i>t</i>	<i>p</i>
<b>Intake measures</b>						
Intake age (months)	26.06	(2.26)	25.42	(1.96)		<i>ns</i>
Hollingshead total	52.13	(13.60)	52.62	(9.92)		<i>ns</i>
Reynell receptive <i>z</i> score	0.16	(0.60)	0.86	(0.63)	-4.00	.001
Reynell expressive <i>z</i> score	-1.68	(4.35)	0.30	(0.52)	-14.47	.001
LDS vocabulary	20.68	(22.83)	225.67	(67.21)	-13.46	.001
<b>Outcome measures</b>						
Total words uttered	306.20	(103.45)	443.70	(85.76)	-4.92	.001
Word types	108.93	(28.85)	153.40	(21.19)	-5.90	.001
MLU	2.51	(0.92)	4.12	(0.64)	-6.97	.001
IPSyn	51.17	(16.84)	77.90	(7.50)	-6.81	.001
Propositional complements	0.00	(0.00)	1.76	(1.89)	-4.76	.001
Conjoined sentences	0.19	(0.48)	0.81	(0.81)	-4.90	.001
<i>Wh-</i> clauses	0.09	(0.72)	0.76	(0.89)	-3.87	.001
Infinitives	0.45	(0.72)	1.76	(0.54)	-7.07	.001

nological age. Because none of these deviations was sufficient to place the subject in the contrasting group and the results of the study were unchanged when these children were excluded, they were included in their respective groups for all analyses.

Intake data for both cohorts appear in Table 1. The children in the late talker and comparison groups were essentially identical in age and Hollingshead SES score (Hollingshead, 1978). The two groups were significantly different in receptive language as measured by the Reynell Receptive Language Scale *z* score. Although the late talkers had receptive skills within the normal range for their age, the comparison children were advanced in receptive language. There was a striking difference in Reynell Expressive Language Scale *z* score between the two groups. On average, the late talkers at age 2 were at the 16-month age level in expressive language, whereas the comparison children were at the 26-month level. According to Rescorla's (1989) LDS, the late talkers had a mean reported vocabulary of 21 words, in contrast to a mean reported vocabulary of 226 words for the comparison children. The two groups in this study were similar on all intake variables to the groups of late talkers and typically developing comparison children from this project whose outcomes were reported in previous studies (Rescorla et al., 1997, 2000), despite a slightly different sample size.

In the combined sample of 52, Reynell Expressive and Receptive Language Scale *z* scores had a correlation of only .47 ( $p < .01$ ), indicative of the fact that more than half of the sample had a large discrepancy between receptive and expressive language skills. The LDS Total Vocabulary score had correlations of .89 ( $p < .01$ ) with the Reynell Expressive *z* score and .53 ( $p < .01$ ) with the Reynell Receptive *z* score.

### Procedure

The children and their mothers were videotaped in a free-play situation with the Fisher Price Village, a toy that contains a wide variety of environments and equipment conducive to pretend play. Mothers were instructed to play with their children as they normally would at home. This play session was both videotaped and recorded on an audiocassette tape recorder placed near the child. In addition, a speech-language pathologist present in the room during the play session took running notes of all utterances. Transcripts from these 30-min sessions were prepared from the tapes, with every utterance and action of the children and mothers recorded. The transcripts followed conventions established by the CHILDES consortium (MacWhinney, 1991). When the transcripts had been checked and rechecked, the CLAN procedures (MacWhinney, 1991) were used to identify a corpus of the first 100 complete child utterances, after excluding imitations, immediate self-repetitions, single-word yes or no responses to questions, memorized songs/rhymes, and unintelligible utterances. The CLAN MLU program was then run on the 100-utterance corpus. Each 100 utterance corpus was also coded using the IPSyn (Scarborough, 1990), which measures syntactic and morphological development. The MLU and IPSyn scores were converted into *z* scores using the benchmark mean and standard deviation values provided by Scarborough (1990). Syntax data for these transcripts were reported in Rescorla et al. (1997, 2000).

The transcripts were then coded for all children's and mothers' utterances containing psychological state terms. The terms selected for analysis were based on those used in earlier studies on children's use of psychological state terms (e.g., Bartsch & Wellman, 1995; Bretherton & Beeghly, 1982; Dunn et al., 1987; Shatz et al., 1983; Wellman & Bartsch, 1994). Utterances containing psychological state terms were closely examined to determine if the speaker made a genuine reference to a psychological state rather than only using the term in a formulaic, conversational fashion (e.g., "I don't know" and "Know what?"). When these phrases were used in isolation, they were excluded from analysis. However, statements such as, "I don't know what that is," were included in the analysis because the added complement indicated that the speaker was describing his or her state of knowledge about a particular object. All terms that occurred in the context of memorized songs or rhymes, such as "Happy Birthday," were excluded. This method of selecting terms for analysis is consistent with the procedures used by Shatz et al. (1983) and Bartsch and Wellman (1995).

Utterances containing references to psychological states in each transcript were coded for speaker (mother/child), type of word (physiological, emotional, desire, or cognitive), and referent (partner, self, toy, or other). Each speaker's use of psychological state terms was calculated as a proportion of total words uttered, in order to account for the fact that the late talkers talked less than the children with normal language abilities.

For this study, physiological state terms were defined as referring to internal states of the body, such as *hot*, *hurt*, and *asleep*. Emotional terms were defined as references to affective states and included words such as *happy*, *sad*, and

*mad*. Words such as *want* and *need* were categorized as desire terms. Finally, cognitive state terms were defined as references to thoughts and beliefs and included words such as *think* and *know*. A list of the terms used by the children and group frequencies for each word appear in the Appendix.

Thirteen (25%) of the transcripts were independently coded by two coders, the first author and an assistant. Overall, the coders agreed on 96% of the codings. Interrater reliability was also computed for each of the four coding categories. Agreement on the physiological state and the cognitive state categories was 90 and 92%, respectively. Agreement on the desire and emotional state categories was 100%. These reliability figures included agreement as to which utterances should be excluded because they were formulaic (e.g., "I don't know").

Group differences in the use of each type of psychological state term were analyzed using independent group *t* tests. When the proportional measurements were converted to arc sines and new *t* tests were run, the results were identical. Bonferroni corrections were employed to correct for the number of *t* tests used. Because five tests were done in each set of analyses (overall psychological state terms plus four types of terms), the alpha level was set at  $p < .01$ . Pearson product moment correlations were used to examine the relationship between the children's and mothers' use of the psychological state words and between the language measures and children's use of psychological state words.

Our first analyses compared the whole group of late talkers with the typically developing children. The second set of analyses divided the late talker group into 10 late bloomers, who had age 3 MLU scores within 1 *SD* of the mean, and 21 persistent late talkers. The purpose of this subgroup analysis was to see whether late talkers who had language skills in the average range by age 3 were more similar to the comparison children than to the late talkers who were still language delayed.

## RESULTS

### *Whole group analysis*

*Frequency analysis.* When the four types of terms (physiological, emotional, desire, and cognitive) were pooled together, the late talkers did not differ significantly at age 3 from the typical language comparison group in terms of the frequency of their use of psychological state terms as a proportion of total words uttered. For both groups, psychological state terms accounted for approximately 2% of their total words uttered.

Although the two groups did not differ in terms of the frequency of their total use of psychological state terms, significant differences emerged between the two groups when the frequency of each category of terms as a proportion of total words uttered was analyzed separately. In particular, the late talkers used significantly fewer cognitive terms, such as *think* and *know*, than the children with normal language,  $t(50) = -5.20, p < .001$ . Second, the late talkers made more references to physiological states, such as *hungry* and *sleepy*, than the normal language group,  $t(50) = 1.89, p < .05$ . The two groups did not differ in their use of emotional terms (*mad*, *hungry*) or desire terms (*want*, *need*), which

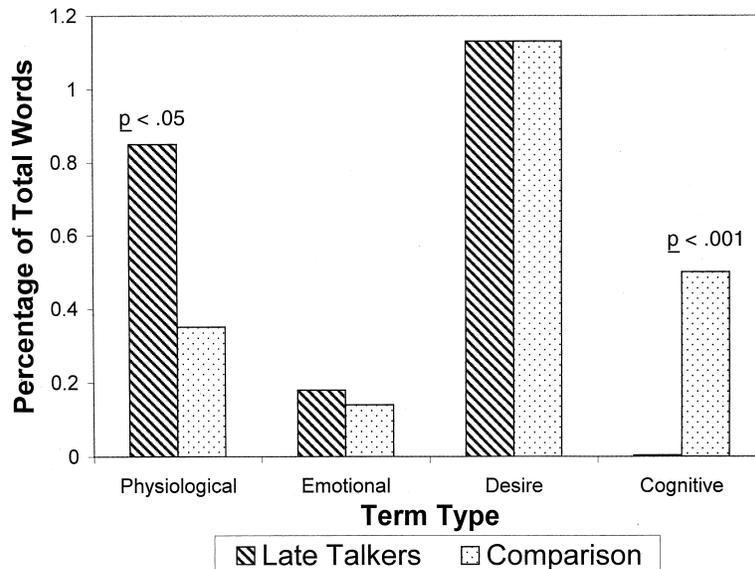


Figure 1. The use of psychological state terms by late talkers and typically developing comparison children.

were the most frequently used psychological state terms for both groups. The mean frequencies for the use of each type of term for the two groups of children are shown in Figure 1. As shown in the Appendix, the children in the typically developing comparison group used a broader range of each type of term.

When the psychological state terms used by the children were examined in terms of adult word class categories, it was apparent that the emotional terms tended to be adjectives and adverbs, whereas the physiological, desire, and cognitive terms used by the children in this study were more likely to be verbs. As shown in Table 2, the late talkers did not differ from the comparison children in their use of verbs to describe desire or physiological states. Therefore, differences in the use of the four types of psychological state terms did not seem to be due to a particular problem with verbs in the late talkers.

Results indicate that the mothers' use of the four types of terms followed a pattern similar to that of the children. The mothers did not differ in their use of emotional and desire terms. However, mothers of the late talkers used significantly fewer cognitive terms,  $t(50) = -3.49, p < .01$ , and significantly more physiological terms,  $t(50) = 2.68, p < .01$ , than the mothers of the children with normal language ability. The mean frequencies of each type of term for the two groups of mothers are shown in Figure 2. For both groups, the children's total use of psychological terms was significantly correlated with their mothers' usage ( $r = .46, p < .01$ , and  $r = .47, p < .01$ , for the late talkers and normal language children, respectively).

No significant differences were found between the groups for the children's

Table 2. *Psychological state words by word class by group*

Word type	Word class	Late talkers	Comparison
Physiological	Noun	10	0
	Verb	49	26
	Adj/Adv	10	7
Emotional	Noun	0	0
	Verb	1	1
	Adj/Adv	14	13
Desire	Noun	0	0
	Verb	130	103
	Adj/Adv	0	0
Cognitive	Noun	0	0
	Verb	7	53
	Adj/Adv	1	1

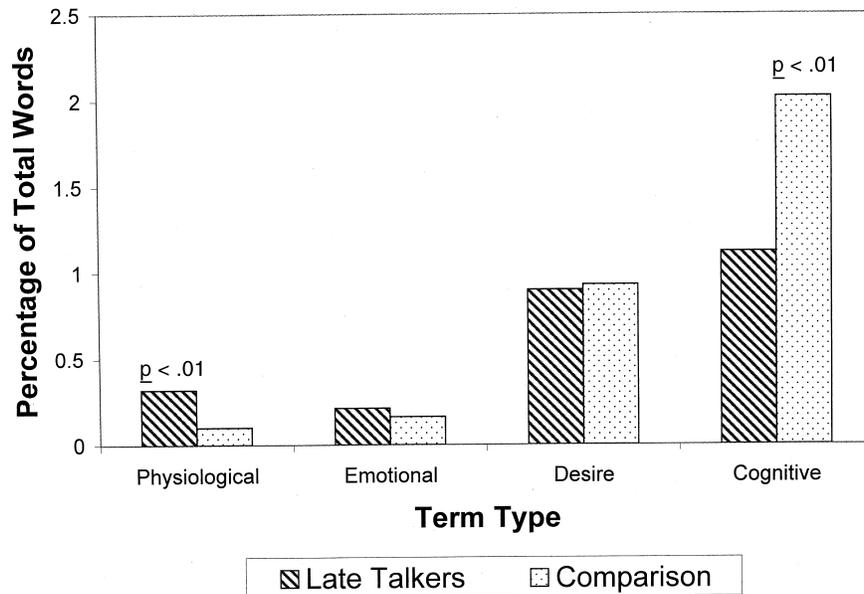


Figure 2. The use of psychological state terms by mothers of late talkers and typically developing comparison children.

referents of the psychological state words. The children in both groups referred most often to their own psychological states, whereas the mothers most often used the psychological state words in reference to the children's state of minds. The mothers of the children with typical language ability referred to their own states significantly more than did the mothers of the late talkers,  $t(50) = -3.72, p < .001$ .

*Correlational analysis.* As would be expected, the language ability of the children who had been late talkers as toddlers differed significantly from the children with normal language ability when tested at age 3. As can be seen in Table 1, in the sample of 100 utterances used in this study, the late talkers uttered fewer total words (word tokens) than their comparison peers. In addition, the children who had been diagnosed as late talkers at age 2 used a smaller variety of words (word types) at age 3. The children in the late talker group also had significantly lower MLUs than the normal language group. In addition, Table 1 shows that the late talkers differed significantly from the children with normal language in terms of their syntactic ability as measured by the IPSyn at age 3. The IPSyn (Scarborough, 1990) measures syntactic and morphological development in four areas: noun phrase, verb phrase, question/negation, and sentence structure.

One area of syntactic ability that was of particular interest to this study was the use of sentence complements. As shown in Table 1, the groups were significantly different in their use of propositional complements (e.g., "I know *that he went to the store*"). Sentence complement syntax is important for the expression of mental states because it is virtually required to express a false belief (deVilliers, 1995; deVilliers & deVilliers, 2000). As can be seen in Table 2, mean use of this complex syntactic form by the children with histories of expressive language delay was essentially at zero, whereas the mean for the comparison group was near the IPSyn maximum score of 2.0. In addition, only 2 of the 31 (6%) late talkers used this construction, compared to 14 of the 21 (67%) children with typical language development.

The IPSyn also measured the children's use of several other syntactic forms at roughly the same level of complexity as the propositional complement. These included noncatenative infinitive forms ("He likes to eat ice cream"), simple conjoinings ("Close the gate so he can't get out"), and *wh*-clauses ("This is where you go"). As can be seen in Table 1, the late talkers used significantly fewer infinitives, conjoinings, and *wh*-clauses than the comparison children.

The children's language abilities at age 3, as measured by word tokens, word types, MLU, IPSyn, and use of propositional complements, correlated positively with their use of the cognitive state terms at the same age. On the other hand, the language measures were correlated negatively with the children's use of the physiological state terms and uncorrelated with the use of desire and emotional terms. Table 3 shows the degree to which the children's use of the four types of psychological state terms was related to their language ability.

#### *Subgroup analysis: Three group comparison*

Outcome data for the 10 late bloomers (i.e., children in the late talker group who had MLU scores within the normal range at age 3) and the 21 persistent

Table 3. *Correlations between language measures and use of psychological state terms*

	Physiological	Emotion	Desire	Cognitive
MLU <i>z</i> score	-.29*	-.10	.28*	.61**
IPSyn <i>z</i> score	-.38**	-.05	.20	.57**
Word types	-.36**	.02	.17	.47**
Propositional complements	-.05	-.03	-.04	.74**

\* $p < .05$ ; \*\* $p < .01$ .

Table 4. *Language measures at age 3 for persistent late talkers and late bloomers*

	Persistent late talkers ( <i>N</i> = 21)	Late bloomers ( <i>N</i> = 10)
Total words uttered	270.05 (87.36)	390.56 (90.00)**
Word types	99.95 (27.44)	129.89 (20.73)**
MLU	2.02 (0.50)	3.54 (0.72)***
IPSyn	43.30 (14.51)	66.90 (7.50)***
Propositional complements	0.00 (0.00)	0.30 (0.67)*
Conjoined sentences	0.14 (0.36)	0.80 (0.79)**
<i>Wh</i> - clauses	0.00 (0.00)	0.30 (0.48)**
Infinitives	0.29 (0.56)	0.80 (0.92)**

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

late talkers appear in Table 4. As can be seen in Table 4, late bloomers were significantly different from persistent late talkers on all age 3 outcome measures. They used more words, more word types, longer and more grammatically complex sentences, and more advanced syntactic forms.

When the late bloomers were compared with the typically developing group, whose language outcomes appear in Table 1, no difference was found in MLU, as would be expected based on the criterion used to identify the late bloomers,  $t(16.11) = 2.19$ ,  $p = .05$ . The late bloomers also did not differ from the comparison children in terms of the total number of words used in the 100 utterance sample,  $t(14.69) = 1.48$ ,  $p = .16$ . However, the late bloomers had significantly lower total IPSyn scores,  $t(28) = 3.82$ ,  $p < .001$ , and they used fewer propositional complements,  $t(28) = 3.14$ ,  $p < .01$ , than the typically developing comparison group. The late bloomers did not differ from the comparison children in their use of simple conjoinings and *wh*- clauses, but they did use significantly fewer noncatenative infinitives than the comparison children,  $t(28) = 3.68$ ,  $p < .001$ . This suggests that, despite their equivalent MLUs, the late bloomers were not fully comparable to the typically developing comparison children in their syntactic skills.

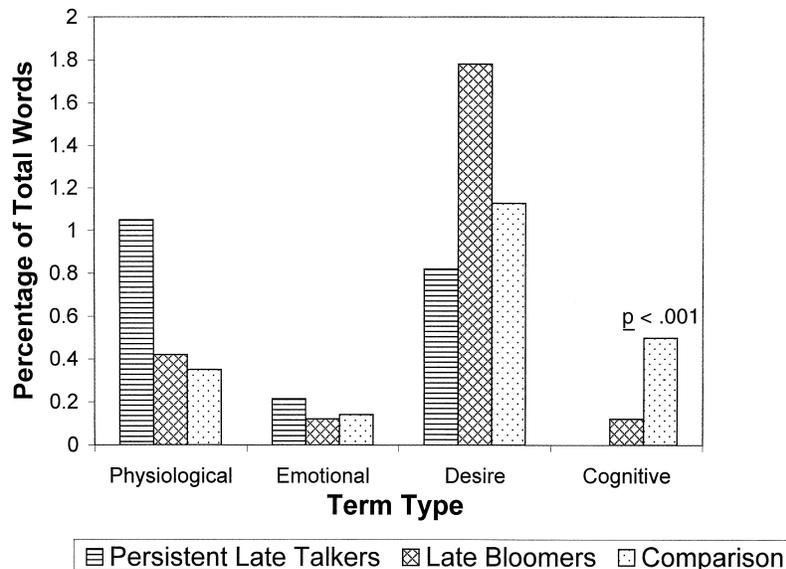


Figure 3. The use of psychological state terms by persistent late talkers, late bloomers, and typically developing comparison children.

Figure 3 shows the differences in the use of psychological state terms as proportions of total utterances between the children in the typically developing comparison group, the late bloomers, and the persistent late talkers. The three-group analysis indicated a significant difference in the children's use of cognitive state terms,  $F(2, 49) = 14.01, p < .001$ , with children in the persistent late talker group using the fewest cognitive terms and the typically developing comparison children using the most. Post hoc tests indicated that the late bloomers did not differ from the persistent late talkers in their use of cognitive state terms. However, the late bloomers did make significantly fewer references to cognitive states than the children in the typically developing comparison group,  $t(26) = 2.83, p < .01$ .

Differences in the use of psychological state language also emerged between the mothers of the late bloomers and the mothers of the children with typically developing language ability, with the mothers of the late bloomers making significantly more references to physiological states,  $t(29) = -2.16, p < .05$ , and significantly fewer references to cognitive states,  $t(26) = 2.83, p < .01$ , than the mothers of the typically developing children.

## DISCUSSION

This research assessed the use of psychological state terms at age 3 in children with a history of expressive language delay. According to the developmental timetables given by Bretherton and Beehly (1982) and Bartsch and Wellman

(1995), children at age 2 begin to make references to physiological states, emotional states, and desire. These studies indicate that children's use of psychological state terms increases in the third year. By age 3, children typically begin to use cognitive state terms such as think and know.

The results of this study indicate a developmental lag in the late talker group in the acquisition of psychological state terms. Whereas the late talkers had clear mastery of three types of psychological state terms (physiological, emotional, and desire), they lagged behind their typically developing peers in the acquisition of the most complex form of psychological state words, namely cognitive terms. Because cognitive state terms were such a small percentage of total psychological state terms used even in the typically developing group and because the late talkers used more physiological terms and the groups did not differ in the use of emotional and desire terms, the groups did not differ in overall percentage of psychological state terms relative to total vocabulary. Thus, it appears that the two groups were equally interested in conversing about psychological states. However, an inspection of the four subcategories of psychological state terms by group suggested a clear developmental difference between the late talkers and the typically developing children.

In the present study, 16 of the 21 (76%) 3-year-old children in the typically developing comparison group demonstrated an ability to use cognitive state terms in conversations with their mothers during play. Furthermore, they used these words quite frequently. However, the children who had been late talkers as toddlers rarely used cognitive state words during free play with their mothers. Only 2 out of the 31 children in the whole late talker group (6%) made reference to cognitive states, and these two children turned out to be late bloomers. Furthermore, the children with a history of early language delay made more references to physiological states, particularly sleep, hunger, and toilet activities, than the children in the typically developing comparison group. These terms are among the earliest psychological state terms acquired in typically developing children (Bretherton & Beeghly, 1982). Their relative preponderance in the conversations of the late talkers is a further indication of a developmental lag in their acquisition of psychological state terms.

Like the language of younger children, the language of the late talkers focused more on physiological states and needs rather than on thoughts and beliefs of the mind. That is, the children in both groups used the desire words such as want and need quite frequently, which indicates that the late talkers did not differ from their typically developing peers in the expression of needs, desires, and feeling states. Rather, they manifested a lag in the acquisition of cognitive terms, which are the emerging forms of psychological state terms as children reach age 3 (Bartsch & Wellman, 1995). At least in terms of their everyday verbal expression of their knowledge of mental states, the late talkers did not appear to have developed the more sophisticated awareness of mental states that includes thoughts and beliefs that was present in the typically developing comparison group. This finding is consistent with Johnston and Kamhi's (1984) report that the children with language impairment in their study talked more about ongoing events and less about intentions or necessities than MLU-matched control children.

Ten of the late talkers (late bloomers) were within the normal range for their age according to MLU by age 3. However, they had significantly lower IPSyn scores and used significantly fewer propositional complements than the typically developing children. The late bloomers were significantly different from the typically developing comparison group in their use of cognitive terms. Rather, the late bloomers' use of cognitive terms mirrored that of the whole late talker group. The late bloomers had caught up to the comparison children in terms of their MLU, but they were still delayed in this particular aspect of lexical development.

An analysis of the parts of speech represented by each type of psychological state term showed that the percentage of psychological state verbs, nouns, adjectives, and adverbs used by the whole group of late talkers did not differ from those used by the comparison children. For example, all of the desire terms used in this language sample were verbs and the two groups were similar in their use of this type of psychological state term. Therefore, the lack of cognitive state terms in the vocabularies of the late talkers cannot be attributed to a difficulty with the use of verbs. However, the limited use of cognitive state verbs by the late talkers may reflect the difficulty these children seem to have with the syntactical structure (the propositional complement) needed to support the use of these verbs. The late talkers in this study were delayed in syntactic skills when compared to the children with normal language ability. Only 2 of the 31 (6%) late talkers demonstrated an ability to use propositional complements, even though 10 were late bloomers who had caught up to the comparison children in MLU. The late talkers also exhibited delays in other complex syntactical skills, including the use of infinitives, conjoinings, and *wh*-clauses. An overall delay in syntax may have contributed to the difficulty that the late talkers had in expressing cognitive states.

The psychological state terms used by the children in this sample were related to the terms used by their mothers. This is consistent with the results of a study by Furrow et al. (1992), which showed that at age 3, children's use of cognitive state terms was similar to their mothers' use. In the present study, the mothers of the children with history of language delay made more references to physiological states and fewer references to mental states than the mothers of the children with typically developing language abilities. Interestingly, the mothers of the late bloomers also used more physiological state terms and fewer cognitive terms than the mothers of the children with typical language development. Thus, the mothers of the late bloomers still talked with them as if they were language delayed and made few mental state references to their children. The mothers of the children with normal language ability made significantly more references to their own mental states than the mothers of the late talkers. Although no causal relationship can be inferred from these correlations, the conversations of the normal language dyads appeared to be more conducive to facilitating the children's understanding of the mind than were the conversations of the later talkers and their mothers.

Because no conclusions about causation can be made from the correlations between the children's and mothers' use of psychological state language, we cannot determine if the mothers were responding to the late talkers' level of

psychological state term usage or in some way shaping it by the nature of their input. We must also be aware that other contributory factors may be present. What can be said, however, is that both the late talkers and their mothers (even those who had “caught up” in MLU) used a less mature distribution of psychological state terms (e.g., more physiological, fewer cognitive terms) than the typically developing comparison children and their mothers.

In any event, the children with language delays were not entering into conversations about the mind and mental states, while their peers were beginning to do so. Delay in talk about psychological states may have an impact on the development of an understanding of the mind (Bartsch & Wellman, 1995; Brown, Donelan-McCall, & Dunn, 1996; deVilliers, 1995; deVilliers & deVilliers, 2000; Jenkins & Astington, 1996). According to one account, children’s participation in conversations about the mind may provide them with opportunities for learning about the mind and ultimately developing a theory of mind (Bartsch & Wellman, 1995; Brown et al., 1996; Dunn et al., 1991; Furrow et al., 1992; Hughes & Dunn, 1998; Sabbagh & Callanan, 1998). In addition, deVilliers (1995) showed that the mastery of sentence complementation, a skill not yet acquired by these late talkers, is related to children’s performance on theory of mind tasks. However, certain caveats must be heeded in interpreting these findings. It is not possible to conclude that late talking causes delays in theory of mind development: the cause and effect may run in the opposite direction or both may stem from some other factor, such as immature representational abilities.

The results of this study must also be considered in light of certain limitations inherent in the sample used. The late talkers in this sample were all children with average or better nonverbal abilities, good receptive language, normal social-personality development, and middle to upper middle class family backgrounds. It is possible, therefore, that the differences in the use of psychological state words would have been greater in a more diverse sample.

In the present study, children with a history of expressive language delay showed significant delays in both the lexicon of cognitive states and the use of propositional complements. A developmental lag in the ability to talk about thoughts and beliefs may have a negative impact on social understanding and peer interaction. The well documented finding that many children with SLI have higher rates of behavioral and emotional problems and weaker social skills than typically developing children of the same age may be related to delays in the understanding of and ability to converse about mental states of the self and of others (Baker & Cantwell, 1982; Beitchman et al., 1986; Fujiki, Brinton, & Todd, 1996; Stevenson & Richman, 1978).

APPENDIX

*Psychological state words used and frequencies by group*

	Persistent late talkers	Late bloomers	Comparison
Physiological			
Sleep/asleep	11	10	15
Wake up/awake	7	0	4
Died/dead	6	1	1
O.k./all right	0	2	2
Toilet references	16	3	10
Hot	1	0	1
Broken	2	0	1
Hurt (physical)	4	5	1
Booboo	1	0	0
Emotion			
Happy	5	0	4
Sad	2	1	1
Mad	2	1	5
Upset	0	0	1
Cry	1	3	0
Angry	0	0	1
Worried	0	0	1
Relax	0	0	1
Desire			
Want	37	60	65
Need	15	14	15
Like	0	2	10
Love	0	0	4
Hate	2	0	9
Cognitive			
Think	0	1	18
Know	0	3	20
Pretend	0	2	10
Guess	0	1	2
Right	0	1	1
Mean	0	0	1
Bet	0	0	1
Forget	0	0	1

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