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ABSTRACT

A study addressed the question of how young children's spontaneous use of private speech in the kindergarten classroom varies as a function of contextual variables, such as type of activity, immediate presence of others, degree of teacher-given structure, and classroom age composition. Twenty children from two classrooms (one mixed-age, one same-age) were systematically observed in their regular kindergarten classroom for four weeks, using a time-sampling procedure. Results from ANOVA, chi-square, and logistic regression analyses indicated that young children's use of private speech does vary systematically according to the immediate physical and social context. More specifically, children were found to use more self-regulatory language when they were: (1) engaged in goal-directed task activity, compared to free play or other activities; (2) when they were in a classroom context which provided an intermediate degree of teacher regulation, compared to contexts in which either very little or a great deal of external structure was present; and (3) when they were with their younger classmates, compared to either their same-age or older peers. No differences in overall private speech usage were found between the mixed-age and same-age class. Frequency of private speech did not vary depending on whether children were alone, with other children, or with adults. (Four figures of data and 37 references are attached.) (Author/SR)

Private Speech in the Classroom:

The Effects of Activity Type, Presence of Others, Classroom Context, and Mixed-Age Grouping

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Running Head: Private Speech in the Classroom

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Abstract

This study addressed the question of how young children's spontaneous use of private speech in the kindergarten classroom varies as a function of contextual variables, such as type of activity, immediate presence of others, degree of teacher-given structure, and classroom age composition. Twenty children from two classrooms (one mixed-age, one same-age) were systematically observed in their regular kindergarten classroom for four weeks, using a time-sampling procedure. Results from ANOVA, chi-square, and logistic regression analyses indicated that young children's use of private speech does vary systematically according to the immediate physical and social context. More specifically, children were found to use more self-regulatory language when they were 1) engaged in goal-directed task activity, compared to free play or other activities; 2) when they were in a classroom context which provided an intermediate degree of teacher regulation, compared to contexts in which either very little or a great deal of external structure was present; and 3) when they were with their younger classmates, compared to either their same-age or older peers. No differences in overall private speech usage were found between the mixed-age and same-age class. Frequency of private speech did not vary depending on whether children were alone, with other children, or with adults. Implications of the present study for private speech researchers and early childhood educators are discussed.

Private Speech in the Classroom: The Effects of Activity Type, Presence of Others, Classroom Context, and Mixed-Age Grouping

Private speech is defined as speech which is either overtly directed toward the self or not explicitly addressed to another person. Vygotsky (1934/1962, 1930-1935/1978) saw the young child's use of private speech as representing the very significant period in development when language begins to be used by the child not only for communication, but also as a means of self-guidance and self-direction. The primary function of private speech, therefore, according to Vygotsky, is self-regulation. Private speech was seen by Vygotsky as a manifestation of the child's developing integration of thought and language as the child's social speech gradually becomes internalized to form inner verbal thought. This progression from social speech to private speech, and ultimately to verbal thought, is viewed as an important developmental outcome which enables the child to engage in all forms of higher human psychological functioning (i.e., voluntary selective attention, metacognition, voluntary memory, planning). Through the use and internalization of private speech, young children, whose interactions with the world were once limited to rigid and unreflective reactions to stimuli, are able to gain distance from the concrete stimulus field and function at a more "executive" or intentional level (Diaz, Neal, & Amaya-Williams, 1990).

If indeed, as Vygotsky's theory suggests, private speech is a tool for self-regulation, then young children's use of private speech would be expected to vary in predictable ways depending on the child's activity and the surrounding physical and social context, rather than simply occurring randomly as an epiphenomenal event. More specifically, a child would be expected to use self-regulatory private speech in those situations which require self-regulation and executive functioning, and not in other contexts where self-direction is relatively unnecessary. For example, during challenging problem-solving activity with little external (parental or caregiver) regulation present, children would be more likely to use private speech as a tool to regulate their behavior than they would during nondemanding leisure activity. The present study addresses the question of

how young children's use of private speech in a kindergarten class varies as a function of several contextual variables in the classroom. That is, what kinds of classroom contexts appear to facilitate or constrain children's spontaneous use of private speech?

An understanding of the circumstances in which young children spontaneously use private speech is crucial 1) for educators who wish to promote self-regulatory competence in their classrooms, 2) for practitioners who wish to intervene with impulsive/hyperactive children by training them to use private speech to gain self-control over their behavior, and 3) for basic researchers of private speech who wish to better understand the relation between language and thought. Since the preschool/kindergarten period is a critical one for the development of self-regulation, and private speech is a major tool children use to develop their self-regulatory capacity (Diaz et al., 1990), knowledge of the classroom conditions which promote young children's use of private speech is of particular relevance for early childhood educators. Only through such knowledge can we, as educators, act in a way that is consistent with the goal of providing developmentally appropriate education during early childhood by tailoring our educational practices to capitalize on and foster the competencies which are developing during this period (Bredekamp, 1987).

Although few investigations have examined private speech in classroom settings, private speech researchers, in overall support of Vygotsky's predictions, have found the following contextual variables to affect children's spontaneous use of private speech: 1) the type of task or activity the child is engaged in, 2) the difficulty level of the task, 3) the presence of others, and 4) the characteristics of others present (for a review, see Berk, 1992). Most of these findings, however, have been obtained in laboratory settings. We will first, therefore, review the findings from the earlier studies and then use them to formulate hypotheses about how private speech would be expected to vary in the more ecologically valid setting of the classroom.

Type of Activity

Private speech does not occur randomly across all of the different activities children might find themselves engaged in. Several researchers have found that young children use more private

speech when they are engaged in a semi-structured problem-solving or goal-directed task activity, compared to a free play situation (Berk & Garvin, 1984; Dickie, 1973; Ru[illegible], 1979). This finding is directly in line with Vygotsky's predictions because it is in precisely those situations where the child is trying to solve a problem or reach a specific goal that s/he will spontaneously use private speech as a tool to help guide, monitor, and regulate her/his own behavior. When engaged in unstructured free play activities, children generally do not need to use private speech because the self-regulatory demands placed on them in these situations are minimal.

Task Difficulty

Another fairly consistent finding in the research literature is that, within a particular goal-directed activity, private speech increases with task difficulty. That is, children use more self-regulatory speech as their problem-solving activity becomes more challenging (see Anastopoulos & Krehbiel, 1985; Beaudichon, 1973; Deutsch & Stein, 1972; Kohlberg, Yaeger, & Hjertholm, 1968; Vygotsky, 1934/1962). Heightened usage of private speech during cognitively challenging activity is generally thought to help children sustain their attention, reflect on their problem-solving activity, remain motivated, and overcome obstacles throughout the task. Behrend, Rosengren, and Perlmutter (1989) recently extended these findings, however, by demonstrating that private speech only increases under conditions of intermediate difficulty - that is, when a task is challenging to a child, but still within her/his range of capabilities. These authors call our attention to Vygotsky's original formulation of private speech as the intermediate step in the internalization of verbal thought:

> When a task is easy for a child, the necessary regulatory capacities have been internalized already, and little private speech should be expected. As tasks become more difficult, and more appropriate for the child's ability, self-regulatory private speech should increase, but only to a certain point. When a task is too difficult, and children do not have adequate regulatory capacities available, either their behavior will be unregulated and unsuccessful, or some other external source of regulation will be required and private speech will decrease. (Behrend, Rosengren, & Perlmutter, 1989, p. 307)

Thus, children have been found to use proportionately more private speech when they are engaged in moderately challenging problem-solving activities.

The presence and characteristics of others

It is understandable that early studies of the effects of others' presence on private speech were inconclusive (for a review, see Fuson, 1979), because it is only now becoming clear that it is not simply the presence or absence of others that is important for children's private speech production, but how much the others are (or are not) externally regulating the child's behavior (Behrend, Rosengren, & Perlmutter, 1992; Diaz, 1992). If there is no need for a child to regulate her/his own behavior (i.e., if other people are doing it for her/him), then private speech would not be expected to occur. In contrast, if an adult or more competent peer were helping a child complete a task on her/his own, then the child's private speech would be expected to increase. Thus, when children are in a context where their attempts at self-direction are being supported, private speech should be maximized.

One context which provides minimal external regulation of children's activity is when they are alone. Several researchers have found that young children's private speech increases when they work alone on a task, compared to working with an adult teacher or a parent (Berk & Garvin, 1984; Martlew, Connolly, & McCleod, 1978; Rubin, Hultsch, & Peters, 1971). Although these studies did not explicitly measure the adults' helping behaviors, it is presumed that the observed decrease in private speech when the child is with an adult is due to the adult being relatively directive, thereby externally regulating the child's activity.

A second social situation which seems to encourage the use of private speech and self-direction is when young children are in the presence of an adult who is carefully scaffolding the child's problem-solving activity. Recently, a group of studies has provided preliminary support for the idea that children use a considerable amount of private speech when they are accompanied by an adult who is scaffolding their mutual goal-directed activity. In such contexts adults encourage the child to self-direct as much as possible, contingently keeping the task demands at an appropriately challenging level and helping the child stay engaged with the task (Behrend et al.,

1989, 1992; Winsler, Atencio, & Diaz, 1991). Similarly, Goudena (1987) demonstrated that a "collaborative condition," in which an adult allowed youngsters to complete an activity by themselves while remaining available and responsive to their requests for help, yielded significantly greater amounts of private speech from the children during a subsequent session while working alone than did having children work in what he called his "noncollaborative condition" in which no contingent support took place.

Thirdly, numerous investigators have demonstrated that private speech is augmented when young children are with their peers as opposed to with adults (Berk & Garvin, 1984; Dickie, 1973; Kohlberg et al., 1968; Vygotsky, 1934/1962). Since peers seem to function less as direct regulators of children's behavior than do adults (Azmitia & Perlmutter, 1989), the observed increase in self-regulatory private speech when young children are with their peers can be interpreted as being, at least in part, due to the decreased amount of other-regulation present in this context.

Thus, a number of investigations have suggested that young children's use of private speech varies according to theoretically relevant contextual variables. However, with the notable exception of Berk and her colleagues (see Berk, 1986; Berk & Garvin, 1984; Berk & Potts, 1991), the vast majority of the studies were conducted in laboratory or quasi-laboratory type settings.

Mixed-age grouping

There has been renewed interest over the past few years in the field of early childhood education in the idea of mixed-age grouping, that is, placing children of slightly different ages together in one classroom. In addition to having an intuitive appeal for many parents and teachers, mixed-age grouping in early childhood has been claimed to be beneficial for children's social and cognitive development (Katz, Evangelou, & Hartman, 1990). Based on the foregoing review, there are a number of reasons to expect that the amount of private speech exhibited by children in a mixed-age classroom would differ from that exhibited in a same-age class. To our knowledge, the present study is the first to directly address the impact of mixed-age grouping on the self-regulatory

language behavior of children. It is unclear, therefore, from previous research and theory, in which type of classroom situation more private speech should occur.

On the one hand, there are several reasons to expect children to use more private speech in mixed-age classrooms. First, it has been suggested that youngsters in mixed-age groups do more tasks either on their own or with the help of other children, resulting in less direct adult intervention in the classroom (Katz et al., 1990). Indeed, children in mixed-age classes have been shown to spend more time in social interaction with their classmates and less time in direct interaction with teachers than youngsters in same-age classes (Goldman, 1981; Reuter & Yunik, 1973). Recall here that researchers have found children to use more private speech when they are with their peers than when they are with adults. Second, there has been a recent suggestion that children in mixed-age classrooms engage in more goal-directed task activity, and for longer periods of time, than do children in same-age classes (see Katz et al., 1990). Recall also that young children have been found to use more self-regulatory speech during goal-directed problem-solving activity.

In addition, older and more competent children in mixed-age situations do appear to assist, lead, and help younger children in a positive, prosocial way (French, Waas, Stright, & Baker, 1986; Stright & French, 1988). This assistance from other children has been likened to scaffolding (Katz et al., 1990), and it is possible that this type of mixed-age peer interaction helps both the younger and older children in the class engage in and maintain problem-solving activity. This type of interaction also seems to have a direct and positive effect on the younger child's subsequent private speech. Azmitia (1992) recently observed that more competent peers function as facilitators of subsequent verbal self-regulation in less competent children. Azmitia recorded the private speech of 40, five-year old novices who were individually working on a lego-building task before and after they worked either with an expert, with another novice, or alone. She found that the novice five-year-olds who had worked with an expert peer used significantly more private speech at post-test compared to pre-test, whereas the private speech of the other two groups did not change.

Finally, Lougee and Graziano (1986, reported by Katz et al., 1990) proposed that mixed-age classes improve the self-regulatory skills of older children because, by enforcing classroom rules and helping the younger children in the class, older children are better able to reflect upon and regulate their own behavior. Given the crucial role that private speech plays in the development of self-regulation (Diaz et al., 1990), it is quite possible that self-regulatory language mediates, or is the mechanism for, the development of these self-regulatory skills.

On the other hand, there is also reason to suspect that children would use less private speech in mixed-age classrooms because of the presence of the older children in the class. Tudge (1990) has pointed out that children, rather than being good "scaffolders," are often quite controlling in their interactions with younger peers. Congruent with this position, Azmitia and Perlmutter (1989) have noted that "expert" children often interact with "novice" peers in a dominating and controlling way. If this is the case, then the older children in the mixed-age class would suppress the younger children's private speech usage by being overly directive.

The present study

The present investigation fills an important gap in the private speech literature in that, although there are a number of previous studies suggesting that young children's spontaneous use of self-regulatory private speech is influenced by theoretically relevant contextual variables, evidence of ecological validity is sorely lacking. Almost every investigation in this area has observed children in either a psychologist's research laboratory or in an experimentally manipulated separate room within a preschool or child care facility. The typical protocol for these studies has involved an experimenter bringing the child or dyad into the research room, giving them instructions as to what they are to do with the experimenter's materials, and then observing their behavior (with or without a video camera). Since it is quite possible that young children's behavior in these rather contrived situations does not generalize to their typical behavior in school or at home, a naturalistic investigation of how youngsters use self-regulatory language in their everyday environments was clearly needed.

The present study attempts to replicate, in a naturalistic school setting, the findings from earlier private speech studies by directly observing children's use of private speech as it spontaneously occurs in a variety of different classroom contexts which vary along the dimensions which have been previously noted to affect private speech production. Specifically, the variables studied in this investigation were type of activity, the presence of different types of others, classroom context, and classroom age composition. Twenty kindergarten children from two classrooms (mixed-age, same-age) were systematically observed while participating in their regular summer-school program. The youngsters from both classrooms were observed in four different classroom contexts which ranged from being unstructured and relatively unregulated (i.e., free play) to very structured and other-regulated (i.e., teacher-directed activities). For each observation, the child's activity and immediate social context were recorded as well as whether or not s/he was using private speech.

The purpose of the present investigation was therefore twofold: 1) to replicate some of the previous laboratory findings in a more ecologically valid and naturalistic setting, and 2) to examine the impact of several common early childhood classroom practices on private speech and to compare these practices on the degree to which they promote opportunities for self-direction, using quantity of private speech as a measure of self-regulatory behavior. The hypotheses for the present project were that children would use more private speech 1) during the classroom contexts which provide intermediate amounts of structure or external regulation, compared to those which are either very structured or completely unstructured; 2) when they are engaged in goal-directed, problem-solving activity, compared to free play; and 3) when they are either with their peers or alone, compared to with adults. No hypothesis was offered with regard to the mixed-age vs. same-age variable, since it was unclear what effect, if any, mixed-age grouping per se would have on children's use of private speech. If the children in the mixed-aged class spend more time in goal-directed, academic activity and less time interacting directly with the teacher, then we would expect to see more private speech in the multi-age classroom. However, if older children in the mixed-age

class tend to be highly controlling in their interactions with their younger classmates, we would expect private speech to be suppressed relative to the level observed in the same-age class.

Method

Subjects

A total of 20 kindergarteners, 10 from a same-age classroom and 10 from a mixed-age classroom, served as subjects for the study. The children were enrolled in a regular summer school program at a primary education center in the San Francisco Bay Area. The same-age (SA) group consisted of 10 children (5 boys, 5 girls / Mean age = 72.5 mos.) who were selected at random (stratified by gender) from their all-kindergarten classroom. The mixed-age (MA) group consisted of the 10 kindergarteners (5 girls, 5 boys / Mean age = 75.3 mos.) who were part of a multi-age/grade classroom consisting of Pre-kindergarteners (≈ 4-yr old children who would be entering kindergarten soon), Kindergarteners (≈ 5-yr old children who had completed kindergarten and would soon be entering the first grade), and 1st-graders (≈ 6-yr old children who would soon enter the second grade). The ethnic breakdown of the sample of 20, as determined from parental self-identification on school registration forms, was 70% white, 25% Hispanic, and 5% black. Both of the classrooms had 22 children with one teacher and one teacher's aide (all female), and both of the classes participated in the same types of activities, according to approximately the same daily schedule. The present study was part of a larger investigation initiated by the local school district designed to evaluate the utility of their mixed-age summer school program and to compare it with their regular age-graded program. In an effort to minimize subject selection bias, the children who had originally registered for the center's four-week summer school program were randomly assigned to either the same-age or mixed-age classroom.

Procedure

Naturalistic classroom observations - A total of 710, 30-second observations (356 in the mixed-age class, 354 in the same-age class) were conducted by the first author during the last three weeks of the center's four-week summer school program. The first week of the program served as

an adaptation period during which the children were given an opportunity to become acclimated to the classroom as well as to the presence of the observer. Therefore, with the exception of pilot observations, no data were collected during the first week. A time-sampling observation method was used whereby each child was observed for approximately nine, 10-minute observation sets. Each 10-minute set included 5 independent 30-second periods of direct observation, separated by ninety second intervals. Thus, the observer sampled the behavior stream of each target child for 30 seconds, recorded the child's behavior and the surrounding context on an observational checklist for 90 seconds, and observed the child again for another 30 seconds, and so on. A portable cassette recorder with pre-recorded time signals and one small earphone were used by the observer to help maintain the integrity of the time-sampling schedule. In order to minimize the possibility of observer bias and subject reactivity, the observations were conducted in a predetermined random order, the children were unaware of both the nature of the study and who was being observed at any one time, and the researcher remained as unobtrusive as possible throughout the observations.

Each child was systematically observed during the following four classroom contexts, which are listed in ascending order with respect to the amount of external or teacher regulation present:

Free Play - (FP) The least structured part of the day when the children played freely outside during recess.

Plan/Do/Review - (PDR) A tacitly structured part of the day when the children could choose who they wanted to work/play with, but were limited to a number of different "activity areas." Activity areas were parts of the room where children could go to encounter a variety of different toys, tasks, or games which all lended themselves well to goal-directed task activity. The activity areas included, for example, the block area, the painting corner, the "house" area, and the puzzle area.

Teacher-Directed Spontaneous - (TDS) Semi-structured, curriculum-based activities where the teacher would give the children a particular task to do, but the children would be allowed to spontaneously choose who, if anyone, they wanted to work with, and how much and in what fashion the task would be done. The activities typically included things like writing into a journal, making something to eat, or exploring a balance scale.

Teacher-Directed Given - (TDG) The most structured of the classroom contexts which was essentially the same as TDS with the exception that the teacher would 1) tell the children who they were to work with during the activity, and 2) give more explicit instructions to the children about what exactly they were to do with both the task materials and their partner(s).

Observational Categories

The following information was recorded with the aid of a behavioral observation checklist instrument for each observation:

Private speech. The observer noted for each 30-second observation period whether or not the target child emitted private speech. Private speech was defined as any verbalization by the child which was not explicitly addressed to another person. This definition, consistent with previous work in the field, incorporates each of the different private speech categories encapsulated by coding systems (Berk, 1986; Diaz, 1986), including inaudible muttering (utterances which are clearly words but not discernable) and whispers.

Type of activity. The type of activity the target child was engaged in during the observation period was coded into one of three general categories of behavior: *Work* , *Play*, or *Other*. "Work" was defined as any behavior which was clearly oriented toward the attainment of a particular task goal. The goal-directed activities which made up the work category included mostly academic tasks like writing, making something with the help of a model, tangible problem solving, weighing objects on a balance, and completing a handout from the teacher. "Play," on the other hand was operationalized as behavior which was not oriented toward a specific task outcome, but rather was an end in itself (Garvey, 1977). Play behaviors included physical play (running, touching, dancing), manipulatory play (spinning a toy on one's finger, repetitively pouring water from one cup to another), and fantasy play ("house" or "school"). The "Other" category included all other miscellaneous classroom behaviors like going to the bathroom, eating, standing around looking confused, or watching others from a distance.

Presence of others. Whether or not the target child was alone or with others during an observation period was also recorded. If the target child was with one or more persons, the number and type (pre-kindergartner, kindergartner, 1st grader, or adult) of each person were also recorded.

Amount of external regulation. The degree to which a child's behavior was being externally regulated was coded by having the observer note in which of the four classroom contexts detailed above (FP, PDR, TDS, TDG, in ascending order of external control) the observation was taking place. Thus, the classroom activities were thought of as representing four points on a continuum of teacher regulation with *Free Play* (FP) being the classroom context with the least amount of other-regulation and *Teacher-Directed Given* (TDG) representing the context with the most. By design, because classroom context was a variable not determined by the child, an attempt was made to observe each child an equal number of times in each of the four classroom contexts.

Reliability of Observation

Inter-observer agreement, calculated during the piloting of the observational checklist instrument when two coders conducted 40 simultaneous observations of eight children, were .78 (number of others present), .88 (private speech - yes/no), .95 (activity - work/play/other), and 1.00 (social context - alone/with kids/ with adult).

Results

Two of the subjects from the mixed-age class withdrew from the school during the second week of the program, and two children from the same-age class attended the program only sporadically. Because these four children had only been observed a few times, their data were omitted from all subject-level analyses. Because of the unequal numbers of observations between children and between contexts, the private speech frequency data were converted to percentages of observations the children engaged in private speech. An arcsine transformation was then performed in order to stabilize the data for ANOVAs and t-tests. One- and two-way mixed and repeated-measures ANOVAs were then conducted, with the dependent variable being the percentage of observations in which the child used private speech and the independent variables being those

related to context (class, classroom context, social context, and type of activity). In addition, chi-square and multiple logistic regression procedures (both with observations as the unit of analysis) were used.

Distribution of Observations

Before discussing the results of the analyses concerning the relationship between the contextual variables and private speech, it is important to note that because of the naturalistic design of the study, there were unequal opportunities to observe private speech co-occurring with all levels of each of the variables. For the variables which were determined by the program and the teacher, namely *classroom* (MA, SA) and *classroom context* (TDG, TDS, PDR, FP), an attempt was made to equalize the number of observations in each setting, that is, to have the same number of observations in each classroom and to observe each target child in the four classroom contexts an equal number of times. However, the other variables of interest, namely, *activity* and *social context* depended on what the child was doing, and who s/he was with during the time of the observation. Thus, for example, while there were many observations during *Plan/Do/Review* where the target child was playing with other children, there were few, if any, occasions during *Free Play* when the child was with an adult, working on a task. Figure 1 shows the distribution of observations by classroom, classroom context, social context, and type of activity. In a sense, because of the unequal distribution of observations, conclusions drawn from the data should be weighted by the relative number of observations in each of the relevant cells.

(Insert Figure 1 about here)

To understand how the number of observations (number of opportunities to see private speech) varied for the different variables, and to obtain an overall sense of how the children were behaving in different contexts, a series of two-way chi-square analyses were conducted with the counted variable being the number of observations, summed across subjects, in each condition (i.e., the dots in each of the cells in Figure 1). There was no difference in the overall amount of observations conducted in the two classrooms, but the number of observations did vary

considerably according to classroom context, χ^2 (3, N_{obs} = 710) = 11.62, $p < .01$, with the teacher-directed contexts in both classrooms having fewer observations than the other two contexts.

As would be expected, children's activity was different depending on classroom context, χ^2 (6, N_{obs} = 710) = 213.32, $p < .001$, in that children engaged in much more play behavior during the more unstructured contexts (PDR & FP) than they did in the teacher-directed contexts (TDG, TDS). The opposite pattern was observed for goal-directed activity (i.e., more goal-oriented task activity occurred during TDG and TDS than in the other two contexts). Similarly, who the target children were with varied by classroom context, χ^2 (9, N_{obs} = 710) = 88.75, $p <$ .001. Namely, the children were more often observed to be with an adult durir ̧ the teacher-directed contexts and more likely to be either alone or with other children during *Plan/Do/Review* and *Free Play*. Also, children's activity was not independent of their social context, χ^2 (6, N_{obs} = 710) = 70.56, $p < .001$. Although the number of times the children engaged in goal-directed task activity did not change depending on whether they were alone, with other kids, or with an adult, play behavior was much more common when the children were with other youngsters. With the exception of a trend for the kids in the mixed-age class to engage in more task activities and less play, χ^2 (2, N_{obs} = 710) = 4.93, $p = .08$, activity and social context did not differ in the two classrooms.

Class and Classroom Context. There were no differences in the overall amount of private speech observed in the two classes. Although, on average, the children in the mixed-age class used more private speech (17% of the observations) than those in the same-age class (13%), this difference was not significant. Because the same pattern of private speech usage was observed in both classes across the four classroom contexts, the classes were combined for further analyses of classroom context.

Private speech usage did vary reliably and systematically depending on the amount of external regulation provided by the classroom context, F (3, 13) = 5.59, $p < .01$, according to the main effect for classroom context in a 2 x 4 mixed ANOVA with class (MA,SA) as a between-

subjects variable and classroom context (TDG, TDS, PDR, FP) as a within-subjects variable. As can be seen in Figure 2, the first hypothesis received considerable support as it was a classroom context with an intermediate amount of external structure (TDS) which elicited the greatest amount of private speech from the children.

(Insert Figure 2 about here)

Activity. The second hypothesis received strong support from the data as well, as can be seen in Figure 3. In an effort to control for the confounding effects of social context on activity and to minimize the number of subjects that would be deleted due to missing data, the analysis of frequency of private speech by activity type was limited to observations when the children were with other children (63% of the observations). While with other youngsters, considerably more private speech was used by the children when they were engaged in goal-directed activity (25.9%) compared to free play (5.9%) or other (6.3%) activities (one-way repeated-measures ANOVA - F [2, 15] = 10.86, $p < .001$).

(Insert Figure 3 about here)

Social Context. Although more private speech was used when the children were alone (14.3%) or with other children (12.5%) than when they were either in the presence of an adult (10.5%) or exclusively with an adult (3.1%), these differences were not statistically reliable, χ^2 (3, N_{obs} = 710) = 3.19, p = .08. With the hope that an effect of social context on private speech would obtain if activity were held constant, another chi-square analysis was then performed restricting the observations to those in which the target child was engaged in task activity (the activity where private speech is most commonly observed). However, this analysis also failed to reach significance, χ^2 (3, N_{obs} = 288) = 4.73, p = .19. Thus, in this investigation, the extent to which young children used private speech did not appear to be affected by whether they were alone, with other children, or in the presence of an adult.

However, an interesting and unexpected finding with regard to the effect of social context on private speech was that children's use of private speech while with other children varied systematically depending on the age of the accompanying peers. As shown in Figure 4, kindergarteners in the mixed-age class used significantly more private speech with their younger peers (27.6%) than with either same-age (7.4%), or older (3.9%) companions, $\chi^2(3, N_{obs} = 226) = 8.94, p < .05$. A fairly linear relationship is suggested in these data between the age of an accompanying peer and amount of private speech used by kindergarteners; that is, the older the companion, the less private speech is used, and if the accompanying peers are of a mixture of ages (younger, same-age and older), an intermediate amount of private speech (14.5%) is used.

(Insert Figure 4 about here)

Gender. Another interesting finding of the present study was the suggestion of a gender difference in the amount of spontaneous private speech used by young children. There was a strong, albeit nonsignificant trend, $t(17) = 1.94, p = .07$, for boys to use more private speech overall (16% of the time) than girls (8%). Because girls spent more than twice as much of their time with adults than did boys (7% vs. 3%), and because less private speech is generally used by children when they are in the presence of adults, it was thought that this gender difference could be due to the girls' extra time with the teachers. However, even after limiting the observations to those that occurred when the children were with other children working on a task, boys used nearly twice as much private speech (33%) compared to girls (17%), $t(18) = 1.89, p < .05$.

Predicting Private Speech. In an effort to tease out the individual and combined contributions of each of the variables in predicting children's spontaneous use of private speech, the data were also submitted to multiple logistic regression procedures. The logistic regression model is one in which a binary response variable can be predicted from a series of categorical variables using the logit transform (Agresti, 1990). In this case, the model was private speech (yes, no) = child's activity (work, play, other) + social context (alone, with other children, with an adult, with an adult and other children) + classroom context (TDG, TDS, PDR, FP) + classroom

(MA, SA). Using observations as the unit of analysis, the procedure essentially estimates the probability that private speech will occur based on the levels of each of the independent variables. The model significantly predicted private speech usage, $\chi^2(9, N_{obs} = 710) = 64.73, p < .001$, and indicated that only *Activity* and *Classroom Context* contributed significantly to the prediction, with goal-directed task activity being the best predictor of private speech and classroom context or amount of external regulation adding incrementally to the prediction even after activity was taken into account.

Discussion

This investigation addressed the question of how young children's spontaneous use of private speech in the naturalistic setting of the kindergarten classroom varies according to contextual variables in the classroom, including age composition, classroom context or amount of teacher-given structure, social context, and type of activity. The results suggest that private speech does indeed occur systematically in certain situations and less so in others. This study replicates a number of earlier findings in different settings, fails to replicate some others, and suggests a few areas in need of further research.

Probably the most robust finding in this investigation is that private speech occurs mostly in situations when the child is engaged in a problem-solving or goal-directed type of activity compared to other types of activity. This finding replicates that of previous researchers in the classroom (Berk & Garvin, 1984), confirms in a more ecologically valid setting the earlier laboratory findings (Dickie, 1973; Rubin, 1979), and gives strong support to the idea that young children do use private speech as a tool for guiding their behavior in challenging academic situations which require executive types of abilities. It is essential for educators to note that private speech is an important tool used by children to guide and regulate their problem-solving activities, and that its use should not be discouraged by a teacher who wishes to maintain a "quiet" classroom.

Another finding of the study was that private speech varied systematically depending on the external regulation given by the classroom context (Figure 2). Of the four classroom contexts in

which children were observed (TDG, TDS, PDR, FP), it was a context with an intermediate amount of classroom structure, *Teacher-Directed Spontaneous*, in which the most private speech was used. The data suggest that a curvilinear relationship exists between the amount of external regulation provided by a context and the amount of self-regulatory speech used by young children. In other words, young children's use of private speech is maximized in those situations which provide enough structure to facilitate their active engagement in cognitively challenging activity, and private speech is minimized in contexts which provide either a great deal of external behavioral regulation or very little external structure. For example, during a highly structured, teacher-directed academic activity where the teacher is telling the children exactly what to do each step of the way, the children do not need to use self-regulatory speech to guide their thinking or behavior because such guidance is being provided for them externally. Likewise, during a highly unstructured activity, like free play outside during recess, children do not need to use private speech as a self-regulatory tool because, most likely, there are few cognitively challenging demands being placed on them in this setting.

Interestingly, the Teacher-Directed Spontaneous context was also the one in which the children spent the highest proportion of their time (80%) engaged in goal-oriented task-like activities. This finding may seem counterintuitive to educators who believe that children spend more time-on-task during the most teacher-directed or structured activities. Nevertheless, the results of this study suggest that if the goal is to maximize the amount of time young children spend working productively toward a goal, then the best strategy is to provide a framework of instructional goals and task activities, but then to let children be actively engaged in setting priorities, planning their approach to the task, experimenting with possibilities, monitoring feedback, and evaluating their own work.

The fact that both private speech and goal-directed task activity were most common during the TDS context could lead one to the conclusion that it was simply the goal-directed activity which accounted for the private speech and not the classroom structure. However, the results of the hierarchical regression procedures indicated that both (and only) activity and classroom context

contributed unique variance to the prediction of private speech. Even after activity was entered into the model, classroom context continued to add significantly to the prediction.

The results on the effect of mixed-age interaction on private speech from this study are interesting in that they depend on the level of analysis. At the classroom level, no significant difference in the overall amount of private speech used by the children in the two types of classes was observed. There was only an nonsignificant trend for more private speech to be used in the mixed-age class, which is probably indirectly explained by the strong but also nonsignificant trend for more goal-directed work activity to occur in the mixed-age class. At the individual level, however, looking within the peer interactions in the mixed-age class, significantly more private speech was observed when the kindergarteners were with their younger classmates, and less private speech was observed as the age of an accompanying peer increased (Figure 4). Thus, there seems to be supporting evidence from this investigation for both of the hypotheses noted earlier regarding the consequences for private speech of placing children in mixed-age classes. Because the target children in this study were kindergarteners - the children in the middle of the age hierarchy in the mixed-age class - both the facilitating effect of mixed-age grouping on private speech (when the children were with their younger counterparts), as well as the suppressing effect of mixed-age grouping on private speech (when the kindergarteners were with their older classmates) were observed.

Why kindergarteners use more private speech while with their younger counterparts, and what exactly it is they do at these times is not clear. However, the fact that they do use more self-regulatory language under these circumstances is commensurate with the claim by advocates of mixed-age grouping (Katz et al., 1990; Lougee & Graziano, 1986) that older children's self-regulation appears to be benefited by being grouped with younger peers. A closer look at the observations involving children interacting with their younger peers revealed that about 70% of the private speech utterances occurred when they were mutually engaged in goal-directed task activities. The suggestions from the work of Tudge (1990) and Azmitia and Perlmutter (1989) were also supported in the present study as the kindergarteners in the mixed-age class used less

private speech while they were with their older classmates. The observed suppression of self-regulatory speech when youngsters are with older classmates suggests that the older children are indeed being quite active and directive with their younger counterparts.

Thus, it appears that mixed-age grouping alone, as a classroom setting, does not produce an effect on the overall amount of self-regulatory language used in the classroom, for at the classroom level, the differences observed in private speech usage due to the age of accompanying classmates cancel each other out when they are averaged across both social situations (with older and with younger students). Mixed-age grouping could influence private speech production through a different route, however, by affecting the type of activity that goes on in the classroom. There is still the possibility that more goal-oriented task activity goes on in mixed-age, compared to same-age classrooms. That the present study found a marginally significant ($p = .08$) difference in the amount of goal-directed activity in the two classrooms (greater in the mixed-age class) is interesting, and suggests that more research should be conducted on this question.

An obvious limitation of the present study with regard to increasing our understanding of the effect of peer age on private speech was that neither the private speech nor the actual behavior of the older and younger children during the observations was recorded. Clearly, further research is needed in order to understand the content and function of the dynamic social interaction which takes place during these mixed-age situations and to explore the effect of mixed-age interaction on the self-regulatory development of young children.

There were no significant differences in private speech usage depending on whether the child was alone, with other children, exclusively with an adult, or in an adult's presence. The present study, therefore, fails to replicate many of the earlier findings on the effect of social context on private speech (Berk & Garvin, 1984; Dickie, 1973; Kohlberg et al., 1968; Martlew, et al., 1978; Rubin et al., 1971; Vygotsky, 1934/1962), but is consistent with more recent work (Behrend et al., 1992) in suggesting that what is important for children's spontaneous use of private speech is not so much whether other people are present or not, but what it is the people present are actually doing. Unfortunately, the data from this study do not shed any light on the

interpersonal dynamics present during these different types of social interaction. The failure to obtain an effect of social context on private speech is not surprising, however, given the unequal distribution of observations with respect to this variable. As can be seen in Figure 1, there were very few observations where the child was alone, and only limited opportunities to observe the children either exclusively with an adult, or in the presence of an adult.

Lastly, the suggestion of a gender difference in the amount of private speech used by young children is interesting and not without precedent. Duncan (1991) also found that 4- and 5-year old boys were more likely to use private speech than were girls, and Berk and Garvin (1984) reported that, in their sample of 5-, 8-, and 10-year old elementary school children, the boys used significantly more of the egocentric or "immature" types of private speech than did girls. We interpret this gender difference in private speech usage to be due to at least two factors. First, it is consistent with the well documented finding in the clinical literature that self-regulatory difficulties or disorders (i.e., ADHD, impulsivity, hyperactivity) are more commonly observed in boys than in girls (Ross & Ross, 1982). If private speech is a tool used by young children to gain self-regulatory control over behavior, and if boys have, for whatever reason, more difficulty with impulsivity and inattention, then it makes sense for boys to engage in relatively more private speech because in order for them to maintain similar levels of functioning, they would need to use this self-regulatory tool more often. Also, it is commonly reported that boys and girls mature at different rates. Given that girls are often considered to be one or two years more biologically mature, in some ways, than boys, and given the well-documented curvilinear relationship between age and private speech usage (Frauenglass & Diaz, 1985; Kohlberg et al., 1968), it is logical that boys would use more private speech than girls because girls of the same age are farther along on the developmental trajectory of internalizing private speech.

In summary, young children use a substantial amount of private speech in the classroom. Kindergarteners' private speech appears systematically in situations where it can be used as a tool for self-regulation. Classroom contexts vary in the degree to which they promote self-direction through private speech. This study suggests that if one is interested in fostering young children's

development of self-regulation or in observing children's use of private speech, the optimum context is one which provides an intermediate amount of structure and allows the children to engage spontaneously in challenging goal-directed activity. This investigation replicates, in a naturalistic setting, a number of earlier findings from private speech researchers and describes the impact of novel contextual variables, such as classroom social organization and structure, on young children's use of self-regulatory language.

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Figure 1

The Distribution of Observations

TEACHER-DIRECTED GIVEN (TDG)

	Alone		Kids		Adult Present		
	Work	Other	Work	Other	Work	Other	(Total)
Mixed Age	..	.	....	.....	....	..... .	55
Same Age		...	....	..... .	....	....	82
(Total)	2	4	38	20	39	34	137

TEACHER-DIRECTED SPONTANEOUS (TDS)

	Alone		Kids		Adult Present		
	Work	Other	Work	Other	Work	Other	(Total)
Mixed Age	....	...	....	.....	....	.....	68
Same Age	..	.	....	.....	...	.....	45
(Total)	6	4	58	18	15	12	113

Figure 1 (continued)

The Distribution of Observations

PLAN/DO/REVIEW (PDR)

	Alone		Kids		Adult Present		
	Work	Other	Work	Other	Work	Other	(Total)
Mixed Age	.....	...	....	....	.....	....	120
Same Age	..... .	.....	....	....	....	....	130
(Total)	18	8	73	99	21	31	250

FREE PLAY (FP)

	Alone		Kids		Adult Present		
	Work	Other	Work	Other	Work	Other	(Total)
Mixed Age	...	....	.....	....		....	113
Same Age	...	.....	..	....		....	97
(Total)	6	29	12	131	0	32	210

FIGURE 2.

PERCENTAGE OF TIME CHILDREN USED PRIVATE SPEECH, BY CLASSROOM CONTEXT/STRUCTURE

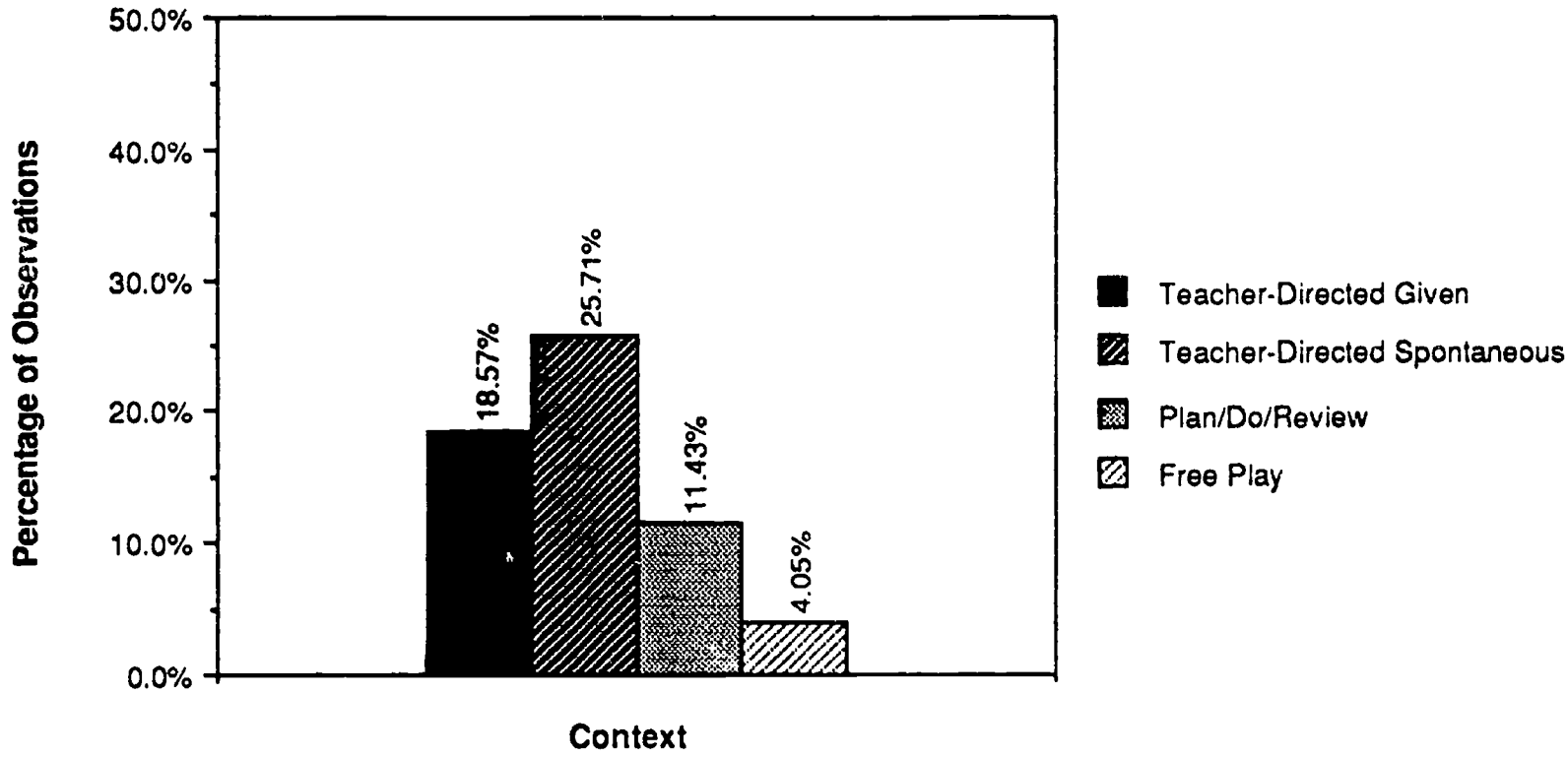

FIGURE 3.

PERCENTAGE OF TIME CHILDREN USED PRIVATE SPEECH WHILE WITH OTHER CHILDREN, BY ACTIVITY

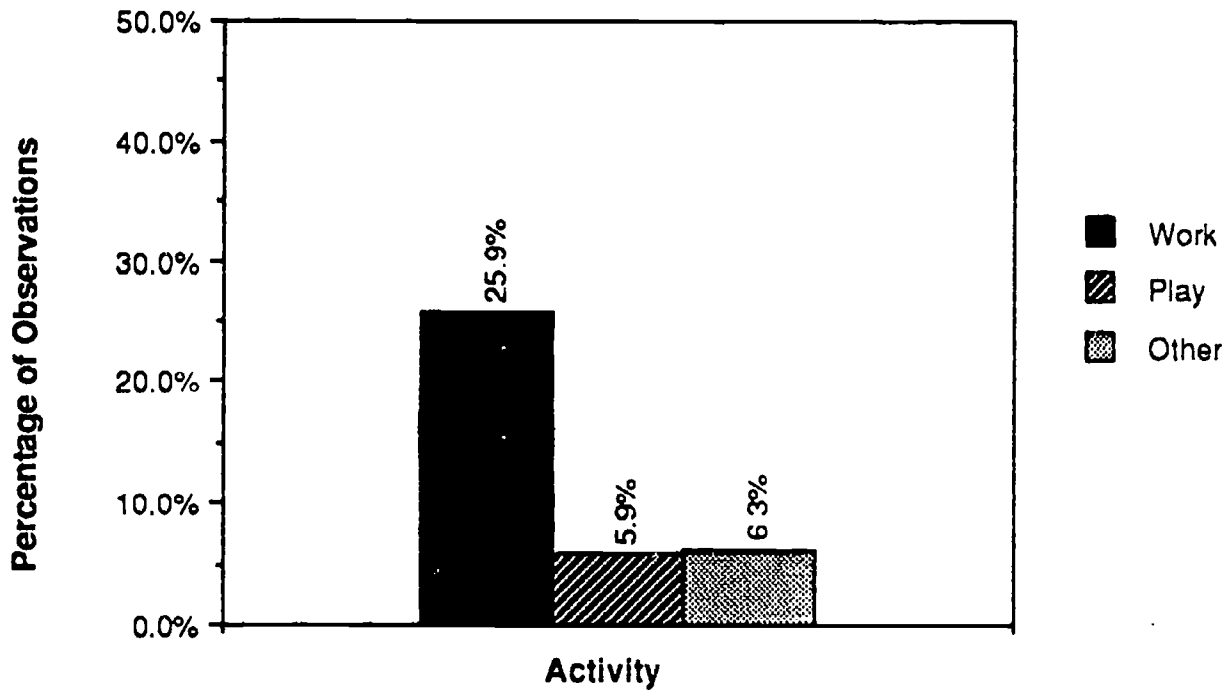

FIGURE 4.

PERCENTAGE OF TIME CHILDREN IN THE MIXED-AGE CLASS USED PRIVATE SPEECH WHILE WITH OTHER CHILDREN, BY AGE OF COMPANION