과제해결조건 및 과제 유형이 유아의 혼잣말과 과제수행력에 미치는 영향*

The Effects of Task Solving Conditions and Task Types on Children's Private Speech and Performance

이 정 화**

Lee, Jeong Hwa

ABSTRACT

본 연구는 혼잣말이 유아들의 인지적 과정에 중요한 역할을 한다는 비고츠키의 이론을 검증하는데 그 목적이 있다. 비고츠키의 혼잣말에 관한 이론을 확인하고자 하는 선행연구들은 일관된 결과를 보이지 못해 왔다. 이에 본 연구에서는 두 가지 과제해결조건, 즉 혼잣말을 억제하는 경우와 혼잣말을 격려하는 조건하에서 두 종류의 과제를 수행할 경우, 유아들의 혼잣말의 발생 빈도와 과제수행력은 어떠한 양상으로 나타나는지를 알아봄으로써 혼잣말의 인지적 기능을 확인하고자 한다. 30명의 5세 유아들을 대상으로 하여 이루어진 본 연구의 결과는 다음과 같았다. 유아들이 자발적으로 사용하는 혼잣말은 혼잣말이 적극 격려되는 조건일 때 그리고 언어적 과제유형보다는 공간-지각적 과제유형에서 더 높은 빈도로 관찰되었으며 높게 나타난 혼잣말은 공간-지각적 과제의 수행력에 긍정적인 영향을 보였다. 이는 비고츠키의 주장대로, 유아들의 혼잣말에 인지적 자기조절 기능이 있음을 지지하는 결과로 해석된다.

Key Words

비고츠키(Vygotsky), 혼잣말(private speech), 자기조절이론(self-regulation theory)

I. INTRODUCTION

Children's audible speech directed toward the self is known as private speech. Private speech is typically thought of as self-verbali -zations that perform a self-regulatory function but both definitions and functions of private speech have varied depending on the

---

perspective of the theorists or researchers. The role of self-verbalizations in the development of self-control has been investigated from at least three major perspectives: Piagetian, Vygotskian, and Behaviorists perspectives(Berk, 1992; Harris, 1990). These perspectives use different terms for children's self-speech and endorse opposing orientations about the role of the speech in the development of self-regulation.

From the Vygotskian perspective, private speech, whether overt or internalized, is a critical component of thinking process and a tool for higher mental function. Vygotsky(1962) considered private speech as representative of children's attempts to use language as an instrument of thinking and self-regulation, and thus a useful tool for researchers who wish to examine children's thinking and cognitive growth. The self-regulatory role of private speech has been confirmed by many researchers whose empirical studies focused on children's spontaneous use of private speech during cognitive and academic tasks and the functional value of that speech for children during problem solving activities (Harris, 1990). It is believed that private speech helps children become conscious of certain aspects of the situation and thus better able to overcome difficulties (Berk & Winsler, 1995; Winsler, Diaz, & Montero, 1997). A preponderance of empirical research in the last two decades has determined that children frequently produce private speech in order to guide activity and to regulate their ongoing behavior, for example, to focus

attention to a task, to pace their motor activity, to reduce tension or stress, and to sustain persistence and motivation (Diaz, 1992).

Although Vygotsky's hypothesis on the self-regulatory function of children's private speech has been supported by many researchers, the results of empirical studies that look at the functional relationship between children's production of private speech and their successful performance on cognitive tasks have been inconsistent (Berk, 1992). While the authors of some studies report a strong or significant correlations among the total frequency (or amount) of children's private speech, their performance, and task-related behaviors (i.e., Azmitia, 1992; Behrend, Rosengren, & Perlmutter, 1989; Duarte & Baer, 1994; Goodman, 1981), others fail to find such relationships (i.e., Berk, 1986; Frauenglass & Diaz, 1985; Zivin; 1972).

The inconsistent findings about the relationship of private speech to task performance and the different interpretations of the positive and negative relations led researchers to examine the various methodologies used in previous studies. Frauenglass and Diaz (1985), for example, point out that the failure of some studies to obtain significant relations is due to low production of private speech. Specifically, they propose that the previous studies observed a scarcity of spontaneous private speech because they typically relied upon nonverbal tasks that could easily be solved by children without

the use of language (i.e., visual-spatial strategies such as puzzles, finger mazes, or block designs) and did not encourage children to talk out loud.

Many studies indicate that children's use of private speech varies as a function of contextual variables; specifically, the production and frequency of private speech varies depending on the physical and social context in which children are engaged. Winsler and Diaz (1995) indicate that there are a number of contextual variables that affect children's use of private speech, including the type of task or activity in which children are immersed, the difficulty level of the task, presence of others, and characteristics of others present.

Several researchers have found that young children's private speech increases when they were engaged in a semi-structured problem solving or goal-directed task activity as compared with a free play situation (Berk & Garvin, 1984; Dickie, 1973; Rubin, 1979). This finding is consistent with Vygotsky's prediction that children use private speech as a tool to guide and monitor their own behavior. When engaged in free play activities, children do not generally need to use private speech because the self-regulatory demands placed on them in these situations are minimal. Within a particular goal-directed activity, childrens private speech production becomes greater

with task difficulty (Winsler & Diaz, 1995). Many studies report that children use self-regulatory speech more often as their problem solving activity or task becomes more challenging (Anastopoulos & Krehbiel, 1985; Beaudichon, 1973; Deutsch & Stein, 1972; Kohlberg, et al., 1968; Vygotsky, 1962).

From Vygotsky's theory and as confirmed in many previous studies, it is reasonable to hypothesize that if private speech plays a central role in mental functions, deprivation of private speech will interfere with children's ability to succeed on tasks as well as with their ability to regulate focus of attention on the task. In order to get an answer to the question of what happens when children are either encouraged or discouraged from using private speech, the present study included a discouraging private speech condition in which children's use of private speech was not allowed during task completion. That was the most significant difference between this research and other previous studies designed to examine Vygotsky's theoretical assertion about the self-regulatory role of private speech.

The examination of the effects of the use of private speech on performance was the primary interest of this researcher. The current study was also designed to verify whether children's production of private speech is influenced by task type.

II. METHOD

1. Subjects

The research participants consisted of 30 5-year-old preschoolers ranging in ages from 4 years, 11 months (59 months) to 6 years, 0 months (72 months). The participants were students recruited from three preschools in the city of Bloomington, Indiana, in the United States. Participation of the children in the study was strictly voluntary and approved by each of the children's parents. The sample consisted of 13 girls and 17 boys, all of whom were native speakers of English. The average age of the children was 5 years and 5 months (M = 65.3 months, S.D. = 4.52). Twenty seven children were Caucasian, one was African-American, one was Asian-American, and one was of Hispanic origin.

Twenty four children in the sample(80%) lived with both parents. The parents themselves, as a group, were highly educated and in most cases at least on parent held a professional-level position. The fathers, as a group, were well educated, with 14 possessing graduate degrees, 10 having bachelor's degrees, and six reporting at least partial college or technical school experience. The group of mothers was similarly well educated. 28 mothers had attended at least some college, with 10 mothers holding graduate degrees, 12 possessing bachelor's degrees, and 6 with partial college or technical school experience. Only two of the mothers had no education beyond the high school level.

2. Materials

Two kinds of tasks were used: a semantic task and a perceptual task. The Story Sequencing Task was used for the semantic task and the Tangram Puzzle was employed for the perceptual task.

Story Sequencing Task

The Story Sequencing Task used in this study consisted of nine sets of story sequencing cards: two sets for practicing and seven sets for testing. Each set was composed of four 4 X 4 inch sized cardboard cards which were given to the children in random order. Each card portrays a different event that is part of a story sequence, for example, putting a watermelon on a table, picking up a knife, cutting a watermelon, and eating a watermelon. Children were required to put cards in the Story Sequencing Task in the correct temporal order to receive full points on this task. The nine sets cards in the Story Sequencing Task included the following themes or events: two sets for practicing—eating a watermelon and eating a banana; and seven sets for testing—calling a phone; diving into a pool; making a popcorn;

making a cake; packing a backpack; flying a kite; and getting ready for bed. There is no difference among the seven sets of cards in the Story Sequencing Task in terms of level of difficulty, and the order of presentation of the cards was the same for all children.

Tangram Puzzle Task

Tangrams, an ancient Chinese Puzzle, are generally used in mathematics education to facilitate childrens problem solving ability (Thoburn, 1991). The Tangram is actually a square divided into seven pieces: two large triangles, two small triangles, one medium sized triangle, a small square, and a parallelogram. The Tangram pieces can be put together on an activity card to form geometric shapes or patterns that resemble real objects, people, or animals. With just a few geometric shapes, children can make countless intriguing patterns and pictures. In this study, a set of Tangram pieces that were jewel-tone colored (purple) transparent and plastic was used. In addition to the seven Tangram pieces, six laminated activity cards that had outlines of different animals were used. The activity cards included the following: two cards for practicing—a swan and a horse; and four cards for testing—a fox; a camel; a shark; and a skunk. Like the Story Sequencing Task, the difficulty level of the six items was kept the same and all children were given the puzzles in the same order.

3. Procedure

After the final sample was obtained,

participating children were randomly assigned to one of two experimental conditions: (1) an encouraging private speech condition in which children were encouraged to use private speech; and (2) a discouraging private speech condition in which they were inhibited from using private speech while engaging in the tasks. Then, a schedule for testing which was convenient for all involved parties was set up with the center directors, teacher, and the experimenter. All children were tested individually while performing the two kinds of problem solving tasks. Testing was conducted by a single experimenter trained by this researcher.

In order to avoid possible language problems and to make sure that children would be treated appropriately, a person who was native speaker of English and who had experience with preschoolers was employed. She was given a manual for testing and asked to become acquainted with the procedures and instructions. Also, the researcher modeled for the experimenter how to manage the testing session, specifically, how to present the task materials, give instructions, and respond to children appropriately in the discouraging versus encouraging cases. The experimenter was kept blind to the hypotheses of the study.

Each of the children were brought to a private room outside of the children's preschool classroom but within the building. The room included a child-sized table and two chairs, two kinds of tasks, a remote microphone, and a video camera set up on a

tripod ready to record the children's responses. The video camera was not visible to the children because it was hidden by a free-standing lightweight collapsible screen. Each childs individual session was videotaped by the researcher who sat behind the screen while the child, sitting next to the experimenter, worked on the tasks.

Upon entering the testing room, children were asked to sit at the child-sized table and the experimenter sat next to them. Specific procedures for assessing problem solving ability on the two types of tasks were followed by the experimenter. Problem Solving Task 1, the Story Sequencing Task, and Problem Solving Task 2, the Tangram Puzzle Task were administered according to the following three phases: (1) Developing Rapport (3-5 minutes); (2) Practicing with Sample Items (5 minutes); and (3) Problem Solving with Testing Items (7-10minutes).

The instructions were given to all participating children. However, for children who were in the encouraging private speech condition, the following additional instruction were given: "Some children like to talk aloud while they play this game. I would like you try that. You can talk aloud and say whatever you want to say while you work. Do you understand? Try to use your words." For children who were in the discouraging private speech condition, different additional instructions were given: "I don't want you to talk aloud while you are playing this game. Don't say anything. Now even to yourself. Do you understand? It's best if you do not

use your words." If children assigned to this condition tried to talk while they worked, the experimenter immediately but nicely reminded to be quiet. Holding his/her arm or shoulder gently, the experiementer said, "I don't want you talk aloud while you're working on this. Please try not to use your words. Okay?"

For half of the children, the Story Sequencing Task was administered first followed by the Tangram Puzzle Task while for the other half of the children, the Tangram Puzzle Task was performed first, followed by the Story Sequencing Task. The entire testing session for each child lasted approximately 30 minutes.

4. Measures

Performance on the two kinds of problem solving tasks, private speech amount and type were assessed for all participating children. In addition, inter-coder agreement for both private speech categorization was determined.

Problem Solving Performance

Before scoring, each child's response to the task was recorded. On each recording sheet, there were pictures of all six animal outlines used for the Tangram Puzzle Task and the Story Sequencing Task. Each animal picture on the recording sheet included the correct solution to the puzzle, showing how the seven Tangram pieces should be placed inside the outline of each animal. For scoring children's Tangram Puzzle Task performance,

the experimenter marked puzzle pieces that a child placed correctly while he/she worked on the task. Children could not see the puzzle solutions in the scoring sheet because the experimenter recorded their responses on a clipboard held out of view.

Performance on the Tangram Puzzle Task was scored by the number of puzzle pieces correctly placed on the animal shaped by the children. Each piece placed correctly was given one point and therefore, the range of possible scores for the Tangram Puzzle Task is zero to 28 points (i.e., four items X seven pieces).

On the scoring sheet for the Story Sequencing Task, each of the seven sets of stories (composed of four pictures each) was shown arranged in correct temporal order. Children's performance on the Story Sequencing Task was scored by recording the number of sets correctly arranged in proper sequence. If children completed a story correctly, they were awarded a total of four points for that set. Thus, the range of scores for this task was also zero to 28 points (i.e., seven sets of stories x four cards.).

Private Speech

The frequency of self-utterances emitted by children was individually assessed. Each child's verbalizations during the two kinds of problem solving tasks were transcribed from the videotapes and coded into mutually exclusive categories. A verbalization was considered to be a separate utterance if it was separated from other speech by 3 or more seconds based on Diaz and Lowe(1987) or if there will be a shift in content, that is, a change of topic. Each utterance was coded either as being private (self-directed) or social (directed towards the experimenter). Only private utterances were measured. The criteria for coding speech as private was as follows: the criteria is that the utterance: (1) is not part of an ongoing dialogue or a response to the experimenter's question; (2) does not contain the name (or pronoun) of a person who can be addressed; (3) is not accompanied by eye contact with the experimenter; or (4) is not followed by the anticipation of a response from another person, as indicated by eye contact, head turning towards the experimenter, or a tag question. After finishing the coding, the frequency of self-utterances in each category was counted. These criteria were based upon the work of Behrend, Rosengren, and Perlmutter (1989). All speech coded as private speech was sub-coded into one of the following three categories devised by Berk and Spuhl (1995).

(1) Task-Irrelevant Private Speech
   a) word play and repetition (i.e., Tra, la, la, la)
   b) task-irrelevant affect expression (i.e., "I miss my Mom.")
   c) comments to absent, imaginary, or nonhuman others (i.e., "John's absent today.")
(2) Task-Relevant Private Speech

a) Describing and labeling parts of the task(e.g., "A square goes right her e.", "This looks like a mean shark.")

b) Expressing plans and goals(e.g., "I need one more triangle.", "I will make a purple fox.")

c) Questions and answers directed to the self(e.g., "Where does this diamond go?", "Oh, I know, it goes on his tail.");

d) Task-relevant affect expression(e.g., "This is so hard.", "I think, I can do it.")

(3) External Manifestations of Inner Speech

a) inaudible muttering (remarks involving clear mouthing of words that are not fully audible but that are related to some aspects of the task)

b) lip and tongue movement(speech-like lip and tongue movements associated with some aspects of the task)

Inter-Coder Agreement

Inter-coder agreement for each private speech coding categorization was computed. A second coder coded 33% (ten children of the sample, 30 children) of the subjects' videotapes. The inter-coder agreement was calculated using Pearson's correlations and Cohen's Kappa in order to control for chance agreement. Scores given by the two coders correlated strongly in a positive direction at the $p < .001$. For the categorization of the six private speech codes, the Kappa = .79 and the Pearson's r = .82.

III. RESULT

1. The Effects of the Problem olving Conditions and Task Types on Private Speech

In order to analyze the effects of task types and problem solving conditions, several two-way repeated ANOVAs where the problem solving conditions were entered as between-subject factor, and task types were entered as within-subject factor were computed for total private speech and for the six categories of private speech. Table 1 shows means and standard deviations for the number of utterance for total private speech and for

the six private speech categories by task types and instruction conditions. Table 2 presents the results of the ANOVA for total private speech.

Significant effects for problem solving condition and task types were found for total private speech, F (1,28) = 15.23, at the p < .001 level and F (1, 28) = 10.20, at the p < .05 level respectively (See Table 2). As seen in Table 1, children in the encouraging condition produced greatly more self-utterances for all six categories of private speech than in the discouraging condition and the Perceptual Task elicits a greater amount of total private speech than does the Semantic Task.

Table 1 includes the results from follow-up

ANOVAs for each of the six categories of private speech. A significant effect based upon problem solving condition was found for 'describing and labeling', 'expressing plans and goals', 'questions and answers to the sel f', 'task-relevant affect expression', and 'external manifestations of inner speech'.

Significant effects based on task type were also found for three categories of private speech: i.e., for 'questions and answers to the self', 'task-relevant affect expression', and 'external manifestations of inner speech'. This result suggests that the Perceptual Task elicits a greater amount of total private speech, especially in terms of questions and answers to the self, task-relevant affect expression, and external manifestations of inner speech than does the Semantic Task.

\<Table 1\> Means, Standard Deviation, and Results of Repeated Measures of ANOVA for Six Private Speech Categories by problem Solving Conditions and Tasks

		Problem Solving Conditions		F	Problem Solving Tasks		F
		Encouraging (n = 15)	Discouraging (n = 15)		Perceptual (N = 30)	Semantic (N = 30)	
IR							
	M	1.50	0.24	3.55	1.27	0.47	1.79
	SD	3.09	0.54		2.71	0.93	
DL							
	M	8.74	0.27	11.45**	4.47	4.54	0.00
	SD	10.34	0.75		4.57	6.53	
PG							
	M	2.60	0.10	6.56*	1.83	0.87	1.35
	SD	4.88	0.60		3.05	2.13	
QA							
	M	1.87	0.04	10.87**	1.64	0.27	15.34***
	SD	2.27	0.13		1.84	0.57	
AE							
	M	3.17	0.07	32.41***	2.70	0.54	36.07***
	SD	4.73	0.26		1.74	0.88	
EM							
	M	2.60	0.33	7.29*	2.20	0.73	5.00**
	SD	3.92	0.99		3.05	1.86	
Total							
	M	20.47	1.04	15.23**	14.10	7.40	10.20*
	SD	20.76	1.68		12.50	9.94	

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

R: Task-Irrelevant Private Speech
DL: Describing and labeling parts of the task
PG: Expressing plans and goals

QA: Questions and answers directed to the self
AE: Task-relevant affect expression
EM: External Manifestations of InnerSpeech

<Table 2> Repeated Measures of ANOVA for Total Private Speech

Between Subject E ffect				
Source		DF	MS	F
Encouraging vs. Discouraging	5664.82	1	5664.82	15.23**
Error	10412.93	28	371.89	

Within Subject Effect				
Source	SS	DF	MS	F
Perceptual vs. Semantic	673.35	1	673.35	10.20*
Interaction	510.41	1	510.41 ·	7.73*
Error	1847.73	28	65.99	

*$p < .05$, **$p < .001$

2. The Effects of the Problem Solving Conditions and Task Types on Performance In order to examine whether problem solving performance was related to either the conditions or the task types, children's scores on both the Perceptual and the Semantic Tasks were analyzed as dependent variables in a two-way repeated ANOVA where the problem solving condition was entered as a between-subject factor. Table 3 shows means, standard deviations, and ranges of scores on both tasks, and Table 4 includes the results of the ANOVA for performance. As seen in Table 4, no significant condition effect was observed. However, a significant effect was found for task type on performance, $F (1, 28) = 4.47$, $p < .05$, indicating that the participating children achieved higher performance scores on the Perceptual Task than on the Semantic Task.

This researcher considered that it was not fair to compare the scores on both task

because the two tasks were different in nature. Therefore, a follow-up analysis was done using t-tests in order to examine if there were significant differences in the performance on each task between children in the encouraging condition and the discouraging condition. The data were presented in Table 5. A significant difference between the encouraging and discouraging condition was found for performance on the Perceptual Task, $t (29) = 2.43$, $p < .05$.

These findings indicates that the scores on the Perceptual Task in the encouraging condition were significantly higher than those achieved by children in the discouraging condition. Examination of the data on Table 5 shows the difference between the conditions quite clearly; children in the encouraging condition achieved higher performance scores on the Perceptual Task than children in the discouraging condition (i.e., a mean of 17.40 versus 14.53 puzzle

pieces placed correctly). For the Semantic task, however, no significant difference was found between the encouraging versus discouraging condition.

<Table 3> Means, Standard Deviations, and Ranges of Problem Solving Performance

	M	S.D.	Range
Encouraging Condition (n = 15)	15.24	5.18	0 to 24
Discouraging Condition (n = 15)	14.45	5.58	0 to 24
Perceptual Task (N = 30)	15.95	3.23	8 to 22
Semantic Task (N = 30)	13.74	7.53	0 to 24

<Table 4> Repeated Measure of ANOVA for Problem Solving Performanc.

Between Subject Effect				
Source	SS	DF	MS	F
Encouraging vs. Discouraging	8.82	1	8.82	0.18
Error	1401.33	28	50.05	

Within Subject Effect				
Source	SS	DF	MS	F
Perceptual vs. Semantic	74.82	1	74.82	4.47*
Interaction	66.15	1	66.15	3.59
Error	468.53	28	16.73	

$^*p < .05$

<Table 5> T-Tests for Difference in Performance for Both Tasks Between Encouraging and Discouraging Conditions

	Encouraging (n = 15)		Discouraging (n = 15)		
	M	SD	M	SD	t
Perceptual Task	17.40	3.00	14.53	3.46	2.43*
Semantic Task	13.07	7.35	14.40	7.70	0.49

$^*p < .05$

IV. DISCUSSION

1. The Effect on Private Speech

Eliciting significant amounts of private speech from children in the encouraging condition was expected by this researcher and therefore the finding was not surprising. An interesting finding was that overall, the Perceptual Task elicited more private speech than the Semantic Task. This finding contradicts Frauenglass and Diaz (1985) and is consistent with Duncan and Pratt (1997).

Two possibilities for this finding (i.e., more private speech on the Perceptual Task rather than the Semantic Task) should be considered. First, as discussed in the above section, there might be a difference in difficulty level perceived by children between the two tasks. The Perceptual Task used in this study might be appeared more difficult to children than the Semantic Task. As evidence of this, while working on the tasks, many children indicated that the Perceptual Task was difficult, saying, for example, "It is really hard!", "It is tough.", whereas they seemed to find the Semantic Task easy, saying, for example, "This ones pretty easy." Interestingly, even children who achieved poor performance on the Semantic Task appeared to find the task easy. From this observation, it is concluded that the Perceptual Task was more challenging to the children, which means that the self-regulatory demands were less for the Semantic Task than the Perceptual Task.

This pattern of finding supports Vygotsky's (1978) belief that children do not generally need to use private speech for easy tasks because it can be solved with more automatic and less cognitive efforts. Also, this finding confirms previous studies that determined that the level of task difficulty is an important variable which influences children's production of private speech. Several studies report that children's private speech, especially, the category 'task-relevant private speech' utterances occurs more frequently as tasks become more challenging (e.g., Beaudichon, 1973; Deutsh & Stein, 1972; Kohlberg et al., 1968; Vygotsky, 1962).

The second possible explanation for the difference between the two tasks is that the Perceptual Task involved more self-monitoring demands than the Semantic Task. The Perceptual Task was self-correcting (or self-feedback) in that children could determine if their attempts were correct or not, whereas the Semantic Task did not have this mechanism. The Tangram Puzzles used on the Perceptual Task consisted of activity cards that had outlines of different animals. The seven pieces of the puzzle needed to be placed inside the outline and none of the piece could overlap with any other piece for the animal to be successfully completed. Thus, children could check if their placement of the pieces on the card were correct or

not. When the children discovered that their placement was incorrect (i.e., out of line or overlapping with another piece), the nature of the task itself encouraged them to try another approach, i.e., moving the piece to another place, flipping it over, or trying another piece. While the Perceptual Task could be solved with these consecutive "try/self-check/retry" processes, the Semantic Task provided no such clues. Children completed this task by arranging the four story cards in temporal order that they thought best. It seems that the high self-monitoring demand on the Perceptual Task elicited more private speech, especially in the category of questions and answers to the self (i.e., "Does this diamond go here?", "Nope, it doesn't fit." or "Yes, it works.").

Both the first and second possible explanations for the difference between the two tasks might explain not only the difference in the frequency of task-relevant private speech between the two tasks but also the interaction effect of condition by task type on the categories, 'questions and answers to the self' and 'task-relevant affect expression'. The Perceptual Task was more demanding cognitively and therefore children who engaged in audible self-talk produced more 'questions and answers to the self' and 'task-relevant affect expression' for the purpose of self-monitoring and self-regulating their ongoing behavior. This finding supports Vygotsky's belief that children's emotional use of language increases with the demand of the task. Vygotsky (1978) states:

One way to increase the production of egocentric speech (private speech) is to complicate a task in such a way that the child cannot make direct use of tools for its solution. When faced with such a challenge, the children's emotional use of language increases as well as their efforts to achieve a less automatic, more intelligence solution. (p. 27)

Therefore, it is assumed that the greater amount of private speech on the Perceptual Task reflected children's efforts to overcome the obstacles they encountered.

2. The Effect on Performance

Previous research studies report that the relationship between private speech and task performance is small or at best nonsignificant, or even related in a negative direction. However, in the current study, children were observed taking advantage of private speech to complete their task.

The finding that children in the encouraging private speech condition achieved more successful performance on the Perceptual Task than children in the discouraging private speech condition, is understandable when the reasoning in the above section is applied. Based upon this reasoning, it is thought that children's private speech on the Perceptual Task was greater because of the higher cognitive demands of the task. In addition, it is considered that the increase of private speech on the Perceptual

Task led to more successful performance. This finding is in agreement with previous studies that determined that when children have more challenging, difficult tasks, their private speech aids task performance (e.g., Beaudichon, 1973; Behrend et al., 1989; Murray, 1979, Roberts, 1979).

From the findings of the current study, it is believed that for the Perceptual Task, children who were allowed to use private speech took advantage of task-relevant private speech to guide and direct their own actions. It is also believed that in the discouraging condition, the deprivation of private speech interfered with children's ability to achieve successful performance at least in the case of the Perceptual Task, with its high cognitive demands. Vygotsky and Luria (1994) emphasized the critical role of private speech in higher mental cognitive processes as follows:

The more complex the action demanded by the situation and the less direct its solution, the greater the importance played by speech in the operation as a whole. Sometimes speech becomes of such vital importance that without it the child proves to be positively unable to accomplish the given task (p.109).

The findings of this study provide clear support for Vygotskys theoretical assertion about the functional significance of private speech in childrens cognitive development and learning.

REFERENCES

Anastopolous, A. D, & Krehbiel, G. G. (1985, April). *The development of private speech: A review of empirical evidence addressing Vygotskys theoretical views.* Paper presented at the biennial meetings of the Society for Research in Child Development, Toronto, Canada.

Azmitia, M. (1992). Experts, private speech, and the development of self-regulation. In R. M. Diaz & L. E. Berk (Eds.), *Private speech: From social interaction to self-regulation* (pp. 101-122). Hilsdale, NJ: Lawrence Erlbaum.

Beaudichon, J. (1973). Nature and instrumental function of private speech in problem solving situations. *Merill-Palmer Quarterly, 19,* 117-135.

Behrend, D. A., Rosengren, K. & Perlmutter, M. (1989). A new look at children's private speech: The effects of age, task difficulty, and parent presence. *International Journal of Behavioral Development, 12*(3), 305-320.

Berk, L. E. (1986). Relationship of elementary school childrens private speech to behavioral accompaniment to task, attention, and task performance. *Developmental Psychology, 22,* 671-680.

Berk, L. E. (1992). Children's private speech: An overview of theory and the status of research. In R. M. Diaz & L. E. Berk (Eds.), *Private speech: From social interaction to*

self-regulation (pp. 17-53). Hilsdale, NJ: Lawrence Erlbaum.

Berk, L. E., & Garvin, R. A. (1984). Development of private speech among low-income Appalachian children. *Developmental Psychology, 20*, 271-281.

Berk, L. E., & Spuhl, S. T. (1995). Maternal interaction, private speech, and task performance in preschool children. *Early Childhood Research Quarterly, 10*, 145-169.

Berk, L. E., & Winsler, A. (1995). *Scaffolding children's learning: Vygotsky and early childhood education.* Washington, DC: National Association for the Education of Young Children.

Deutsch, F., & Stein, A. H. (1972). The effects of personal responsibility and task interruption on the private speech of preschoolers. *Human Development, 15*, 310-324.

Diaz, R. M. (1992). Methodological concerns in the study of private speech. In R. M. Diaz & L. E. Berk (Eds.), *Private speech: From social interaction to self-regulation* (pp. 55-81). Hilsdale, NJ: Lawrence Erlbaum.

Dickie, J. (1973). *Private speech: The effect of presence of others, task and intrapersonal variables.* Unpublished doctoral dissertation, Michigan State University, East Lansing.

Duarte, A. M., Baer, D. M. (1994). The effects of self-instruction on preschool childrens sorting of generalized in-common tasks. *Journal of Experimental Child Psychology, 57*, 1-25.

Duncan, R. M., & Pratt, M. W. (1997). Microgenetic change in the quantity and quality of preschoolers private speech. *International Journal of Behavioral Development, 20(2)*, 367-383.

Frauenglass, M. H., & Diaz, R. M. (1985).

Self-regulatory functions of childrens private speech: A critical analysis of recent challenges to Vygotsky's theory. *Developmental Psychology, 21(2)*, 357-364.

Goodman, S. (1981). The integration of verbal and motor behavior in preschool children, *Child Development, 52*, 280-289.

Harris, K. R. (1990). Developing self-regulated learners: The role of private speech and self-instructions. *Educational Psychologist, 25(1)*, 35-49.

Kohlberg, L., Yaeger, J., & Hjertholm, E. (1968). Private speech: Four studies and a review of theories. *Child Development, 39*, 691-736.

Murray, J. D. (1979). Spontaneous private speech and performance on a delayed match-to-sample task. *Journal of Experimental Child Psychology, 27*, 286-302.

Robert, R. N. (1979). Private speech in academic problem solving: A naturalistic perspective. In G.Zivin (Ed.), *The development of self-regulation through private speech.* New York: Wiley.

Rubin, K. H. (1979). Impact of the natural setting on private speech. In G. Zivin (Ed.), *The development of self-regulation through private speech* (pp. 265-294). New York: Wiley.

Thoburn, T. (1991). *Teaching guide: Tangrams.* Newbridge Communication

Vygotsky, L. S. (1962). *Thought and language.* (E. Hanfmann & G. Vakar, Eds. & Trans.) Cambridge, MA: MIT press. (Original work published 1934)

Vygotsky, L. S. (1978). *Mind in society.* (M. Cole, V. John-Steiner, S. Scribner, E. Souberman, Eds.). Cambridge, MA: Harvard University Press.

Vygotsky, L. S., & Luria, A. R. (1994). Tool

and symbol in child development. In R. der Veer, & J. Valisner (Eds.), *The Vygotsky reader* (pp. 99-174). Cambridge, MA: Blackwell.

Winsler, A. & Diaz, R. (1995). Private speech in the classroom: The effects of activity type, presence of others, classroom context, and mixed-age grouping. *International Journal of Behavioral Development, 18*(3), 463-487.

Winsler, A., Diaz, R., & Montero, I. (1997). The role of private speech in the transition from collaborative to independent task performance in young children. *Early Children Research Quarterly,* 12. 55-79.

Zivin, G. (1972). Functions of private speech during problem-solving in preschool children. *Dissertation Abstract International, 33,* (2-B), 1834. (University Microfilms No. 72-26, 224)