

THINKING OUTLOUD: THE PROBLEM-SOLVING LANGUAGE OF PRESCHOOLERS
WITH AND WITHOUT LANGUAGE IMPAIRMENT

by

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ABSTRACT

Eighteen preschoolers were asked to build bridges out of diverse construction material, two children working in parallel. Their utterances were coded for task relevance, function (regulative vs. affective) and addressee (private vs. social). The language of six children with specific language impairment was compared to that of six age-matched, and six language-matched peers. Correlations between dependency, impulsivity and efficiency and language use were also investigated. 39% of the speech was narrowly task relevant and regulative. Similar proportions of private and social speech occurred but problem-solving language was more likely to be private (61%). Group differences were found only in amount of speech. These findings indicate first that the correlation between function and addressee, while consonant with traditional accounts, is far from perfect: researchers interested in the intellectual functions of language should study both social and private speech. Second, language impaired children use speech for problem-solving to an age appropriate degree, though formulation problems may still reduce the efficacy of such use. A positive correlation was found between impulsivity and task irrelevant speech, while dependency was negatively correlated with the total number of utterances, the number of broadly task relevant utterances, and the number of social utterances. Correlations between efficiency and language use revealed a split between children with normal language and children with specific language impairment. Efficient children with normal language spoke more and devoted more of their speech to narrowly task relevant utterances. Efficient children with specific language impairment spoke less but also devoted a larger proportion of their speech to narrowly task relevant speech. These findings indicate that the intellectual function of language is used productively by efficient children regardless of language status but efficient children with specific language impairment rely on it less.

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CHAPTER ONE

LITERATURE REVIEW

The Emergence of the Semiotic Function

During most of the first two years of life infants are unable to use symbolic representations, which leaves them anchored to their immediate environment. They begin interacting with their surroundings through reflexive sensori-motor movements and through this interaction learn to attribute meaning to actions and objects (Ginsburg & Oppen, 1979; Piaget & Inhelder, 1969). At this point, however, thought and action cannot be separated, leaving the child tied to the present. During this period infants make many cognitive advances, including the ability to imitate something previously seen and to anticipate the future position of an object before it moves, as well as the understanding of object permanence (Cromer, 1991). Nonetheless, it is only as children develop the capacity to use a symbol to represent something not immediately present, i.e. the semiotic function, that they are able to expand their perspective beyond the immediate environment.

By approximately age two, certain cognitive skills emerge which indicate that the child is beginning to employ the semiotic function. At this point children develop the ability to use mental symbols, usually words, and thought and action become separated. This reflective ability allows children to think about objects that are not immediately present and engage in symbolic play routines such as "house", where they use role play and toys to symbolize real life. This reflective ability also allows children to consider past experiences and future possibilities (Piaget & Inhelder, 1969). The child is able to remember that "yesterday I didn't come up 'cause I was

too sick" as well contemplate plans for tomorrow, e.g. "are you going to bring this tomorrow so we can play again?" Since this and other such skills require the use of mental symbols, the advent of the semiotic function is a significant step in the child's development. The child, freed from the immediate environment, is now able to begin exploring the world of possibilities.

Connections Between Thought and Language

Language, being the most common, overt form of semiotic function in humans, appears about the same time as other manifestations of the semiotic function. Although language is only one expression of the semiotic function, it seems to play a major role in the way children learn to structure their thoughts. "It contains a notation for an entire system of cognitive instruments...for use in the service of thought" (Piaget & Inhelder, 1969), or, as Moffett argues, it is an abstraction of the structure of the world into a symbolic system that more closely resembles the structure of the mind (as cited in Blank & Franklin, 1980). Researchers argue that language allows the child to: 1) represent a number of factors simultaneously (Cromer, 1991; Piaget & Inhelder, 1969); 2) make spatial, temporal and causal discriminations (Blank, 1974; Cromer, 1991; Oppen & Ginsburg, 1979); and 3) increase the speed of representation over other nonverbal representational systems (Blank, 1974; Cromer, 1991).

Language is also commonly used to refer to absent objects and actions, states of affairs, emotions, and abstract concepts. It allows communication between individuals of not only what is seen, but also about what is unseeable, e.g. propositional connections and thematic schemes (Ginsburg & Inhelder, 1979; Heath, 1989). In short, language is both a mode for the symbolic

representation of thought and a means for communicating that thought to others. These two roles of language, and their developmental connections, are discussed below in more depth.

Language Communicates Thought

Language is the human's tool of choice for social interaction. It is both learned and used in a social setting. Children actively seek out new information in their environment. Through communication with peers and adults they can learn about, and from, the experiences of others. Cultural knowledge, for example, is passed down from adult to child, from generation to generation, largely via language (Ginsburg & Oppenheimer, 1979). Perhaps more interestingly, social interactions contribute to the development of language as a tool for expressing thought. "This is of the very first importance for the understanding of child thought...intelligence, just because it undergoes a gradual process of socialization, is enabled through the bond established by language between thoughts and words" (Piaget, 1955, p.64). By means of social interaction, children learn to express their own thoughts in a way that is comprehensible to others. Although thought and language are not innately connected, through social interactions with others, children learn to use language to generate and express complex thought sequences.

With development, thought and speech unite into verbal acts of thought that reflect reality in a way quite different from sensation. Researchers differ somewhat in their account of this change. Piaget believed that children began life in an individualized "autistic" state (as cited in Vygotsky, 1934/1968, p.16). Though interacting with others, the child must progress through an egocentric period before developing socialized, increasingly mature thought (Duncan, 1991). The child

advances through many intermediary stages between autism and mature thought but the most important one is egocentric thought (Piaget, 1955). At the egocentric stage, children attempt to adapt their thoughts to reality but have not yet learned to communicate them as such. Accordingly, their early language not only reflects this egocentric style of thought, but also influences and fosters it. "The mere fact, then, of telling one's thought, of telling it to others, or of keeping silence and telling it only to oneself must be of enormous importance to the fundamental structure and functioning of thought in general and child logic in particular" (Piaget, 1955, p.64).

Piaget stressed peer interaction rather than adult-child interaction as the crucial factor in the development and socialization of children's thought and language (Forman & Kraker, 1985; Piaget & Inhelder, 1968). Children often play a passive role in adult-child interactions, simply complying with demands placed on them by the adult. In peer interactions, however, cognitive development is fostered because a mismatch is often set up between the thoughts of the child and those expressed by peers. Children are more likely to contest the ideas of their peers and try to reconcile them to their own ideas. When there is a disagreement between peers the new information is frequently assimilated into the child's thought, resulting in adjustments being made to the child's view of the world (Forman & Kraker, 1985, Oppen & Ginsburg, 1979; Piaget & Inhelder, 1968).

In opposition to Piaget, Vygotsky saw speech as being socialized from the beginning. He considered gestures and cries, as well as speech and language proper, to be socialized, adaptive

communication. (Vygotsky, 1934/1968). Rather than developing from an individualized to a socialized state, Vygotsky believed that children developed from a socialized state to an increasingly individualized state of being. In early interactions, adults often use language to direct and regulate children's actions. Adults guide children through difficult tasks, enabling them to solve problems they would not have been able to work out on their own. As the child's competence at the task improves, the adult gradually shifts the control of problem-solving to the child. As children mature they internalize the adult's regulation and the emphasis shifts from other-regulation to self-regulation of thought and action. "Since the main course of the child's development is one of gradual individualization, this tendency is reflected in the function and structure of his speech" (Vygotsky, 1934/1968, p.133). Children begin to use language to regulate their own thoughts and behaviour in the same way that the adult's language once regulated them (Vygotsky, 1934/1968). As children develop, social interactions with others facilitate their ability to function as independent self-regulated problem-solvers for whom language functions as a private-cognitive as well as a social-communicative tool.

Inner Speech: Language Represents Thought

Whichever of these approaches one takes, it is clear that well before adulthood, language functions as more than just a medium for social communication. One special form of language, "inner speech", plays a private rather than a social function. As it is usually conceived, inner speech is a form of language that is used strictly for thinking for oneself (Vygotsky, 1934/1962; Feldman, 1977). Vygotsky's account of this construct is the most fully elaborated. He argues that speech turns inward as its function changes from social to personal adaptation. Inner speech

is an abbreviated, internal form of language in which only the predicate is expressed. It is an instrument for symbolically representing ideas in order to delineate and clarify them more clearly (Feldman; 1977). A single word or nonconventional sign may become so saturated with meaning that it takes many words to explain it in external speech (Vygotsky, 1934/1962). Inner speech is used for thought and, as such, Vygotsky (1934/1968) believed it to be the intermediary between language and thought. "Inner speech is to a large extent thinking in pure meanings. It is a dynamic, shifting, unstable thing, fluttering between word and thought, the two more or less stable, more or less firmly delineated components of verbal thought" (Vygotsky, 1934/1962, p.149). If, as Vygotsky hypothesized, inner speech is the connection between thought and language, then determining the specific characteristics and functions of inner speech could reveal the connection between the two. Unfortunately, by its very nature, inner speech is inaccessible to regular methods of research, making it a difficult notion to study.

Egocentric Speech

One avenue that is open to investigation, however, is the phenomenon of "egocentric speech". Vygotsky (1962/1934) postulated that egocentric speech is an intermediate step between external, socialized language and internalized, inner speech, and that it occurs in the developmental stage before inner speech emerges. It is expressed like external speech but fulfils many of the same functions as inner speech. "When circumstances force (the child) to stop and think, he is likely to think aloud. Egocentric speech, splintered off from general social speech, in time leads to inner speech" (Vygotsky, 1934/1968, p.19). For Vygotsky, egocentric speech is speech on its way inward, on the whole already incomprehensible to others and meant for self, but still

manifesting itself externally. The structural and functional idiosyncrasies of verbal thought are shaped as it progresses from external speech to egocentric speech to inner speech.

Both Vygotsky and Piaget theorized about the implications of egocentric speech in the development of language and cognition in young children but drew different conclusions about its role. According to Vygotsky (1934/1962), egocentric speech assists in cognitive self-guidance. It is used to plan solutions to problems and to direct thoughts and actions toward consciously directed goals. Piaget, on the other hand, hypothesized that egocentric speech plays little function in children's thinking or activity. It primarily occurs in conjunction with them because young children do not differentiate between actions and words (Ginsburg & Opper, 1979). Children speak their thoughts out loud because they are "incapable of keeping to [themselves] the thoughts which enter his mind" (Piaget, 1955, p.59). Egocentric speech, then, provides a window into the child's thought. The following sections will consider the ideas of each of these theorists in more detail.

Piaget and Egocentric Speech: Failure to Adapt

Piaget, who introduced the term egocentric speech (as cited in Goudena, 1987), described it as audible speech that *does not appear to be directed or adapted to a listener's point of view*. He was not interested in egocentric speech *per se*, but considered it an avenue for studying children's cognition (Goudena, 1987). For Piaget, egocentric speech plays no important role in the

psychological or cognitive development of children. Their speech is abbreviated and missing information the listener needs to understand what the child is trying to say because children are centred around themselves and fail to take the listener's point of view into consideration when speaking. Their speech, then, reflects the egocentric nature of their thought. "Since language and logic are obviously interdependent" (Piaget, 1955, p.28), egocentric speech provides insight into the child's thoughts.

While Piaget believed that the unfolding of the semiotic function contributes to cognitive development, he felt it was the physical realizations rather than linguistic realizations that are of primary importance. At this age inner speech is not yet possible, so children use action to fulfil similar functions. "Rather than simply recalling an event, the child has need of a more direct symbolism which enables him to relive an event" (Piaget & Inhelder, 1969). The child symbolizes an event through acting it out. When egocentric speech occurs "the child is simply thinking out his action aloud" (Piaget, 1955, p.36). Before approximately age seven, children have not learned to differentiate between word and action so the word is considered part of the object or action. Thought and word are linked so tightly that they also occur simultaneously. The child symbolizes thought through action, and egocentric speech occurs simply as an attribute of the action.

In studying the spontaneous speech produced by two six-and-a-half-year-old subjects, Piaget (1955) discovered that egocentric speech accounted for nearly half of the speech produced by both children. This high proportion of egocentric speech in their spontaneous language led Piaget

to regard egocentric speech as a useful instrument for the study of child logic. He believed it provided great insight into the child's comprehension of the world, and studied the phenomenon closely enough to devise a developmental scheme (Oppen & Ginsburg, 1979). Under Piaget's scheme, egocentric speech is broken down into three categories: collective monologue, individual monologue and repetition.

The *collective monologue* occurs when two or more children are together and one child is speaking but is ignored by the other(s). Piaget hypothesized that when such collective monologues occur the speaker is attempting to communicate with those present. The child may even believe that communication is taking place, but the egocentric nature of the speech makes it impossible for others to understand (Ginsburg & Oppen, 1979). The speech is often lacking in definite reference and is centred about the child's activities, real or imagined. The child does not consider what information is required for the listeners to understand. There is no attempt at dialogue, or conversation development with the other children. In fact, it is sometimes the case that two or more children will carry on collective monologues simultaneously with no regard to the interest or understanding of the others (Piaget & Inhelder, 1969). In such cases the language is no longer communicative or social in nature. It merely occurs in the presence of others.

The *individual monologue* is similar to the collective monologue except that there is no one present to ignore the child: the child is alone and yet speaks out loud. Two hypotheses were proposed by Piaget to explain the occurrence of this type of speech (Ginsburg & Oppen, 1979). As a first hypothesis, Piaget suggested that in some cases the child's speech is a type of word

fantasy. The child uses language as a kind of wish fulfilment, to accomplish what action cannot. "If the child talks even when he is alone as an accompaniment to his action, he can reverse the process and use words to bring about what the action itself is powerless to do" (Piaget, 1955, p.36). Unable to achieve a goal through actions, the child attempts to attain the goal with words instead. During one of the experimental sessions in this study, ME, after numerous failed attempts to insert a pipecleaner into a straw, told the pipecleaner "hey, come on, come on in".

The other hypothesis suggested by Piaget is that words and actions have not become separated and the child sees the two as an undivided whole. The word is a part of the action or thing and so accompanies the child's actions. "In such cases speech does not communicate the thoughts of the speaker; it serves to accompany, to reinforce, or to supplement his action" (Piaget, 1955, p.39). The arbitrary relationship between language and action is not yet clear in the child's mind, so the child treats the word as a component of the action. The individual monologue, then, is simply part of the child's actions and not communicative.

The third component of Piaget's classification scheme, *repetition*, makes up a very small proportion of egocentric speech. Repetition is simply that: the child echoes something just heard. According to Piaget, when children mimic they often are not aware that they are merely repeating something another person has just said (Ginsburg & Oppen, 1979). Imitation occurs when the child confuses the activities of others with the activities of self (Piaget, 1955). Repetition is not communicative in nature. Children repeat both their own words and those of others to practise

verbal skills just as they repeated behaviour patterns to practise sensori-motor skills during the earlier sensori-motor period.

As children mature, their thought becomes socialized and they learn to take others' points of view into account (Ginsburg & Oppen, 1979). Just as infants progress from an "autistic" sensori-motor stage to an egocentric period, so toddlers advance through egocentricity and on to maturing, socialized thought. The child speaks "first and foremost to himself, and that speech, before it can be used to socialize thought, serves to accompany and reinforce individual activity" (Piaget, 1955, p.59). As children's thoughts become more socialized, egocentric thought, and therefore egocentric speech, decreases. Both gradually diminish until they finally disappear.

Vygotsky and Egocentric Speech: Speech for Self

The Piagetian view emphasized the communicative inadequacy of egocentric speech and paid little attention to its function. Egocentric speech was seen to provide a window to the child's thought, but it was not viewed as important to the development of mature logic and reasoning. Vygotsky (1934/1968) differed dramatically from Piaget on each of these points. He believed that the development and internalization of egocentric speech was key to the maturation of intellect and thought. For Vygotsky, the egocentric speech of young children is thought which has not yet been internalized. More than that, however, it is a tool for cognitive self-guidance, aiding children in planning, orienting, organizing and structuring their behaviour as well as guiding and regulating their thoughts (Vygotsky, 1934/1968; Berk, 1986; Goudena, 1987; Harris, 1990). Egocentric speech "does not merely accompany the child's activity: it serves mental

orientation, conscious understanding; it helps in overcoming difficulties; it is speech for oneself, intimately and usefully connected with the child's thinking" (Vygotsky 1962/1934, p.133).

Internal and External Speech: Vygotsky (1934/1968) considered all language, both social and private, to be made up of two fundamental elements: the internal semantic representation and the external phonetic one. The relationship of meaning (semantic) to "word" (phonetic) is a dynamic one. Word meanings evolve and change as the language and culture evolve. "The relationship of thought to word is not a thing but a process, a continual movement back and forth from thought to word and from word to thought. In that process the relation of thought to word undergoes changes which themselves may be regarded as development in the functional sense" (Vygotsky, 1934/1968, p. 125). The external and internal aspects of speech also change and develop over time, but each does so in its own unique way. As the maturation of these two components progresses, the relationship between thought and word changes. At each stage word meaning has a distinct, complex relationship with both speech and thought.

Though forming a complex whole, the external and internal aspects of language have their own independent development. As a child learns to speak, the external phonetic component of speech (external speech) progresses from single word to complete sentence - from part to whole (Vygotsky, 1934/1968). Children typically progress from single word to two word sentences. Gradually, as their language skills develop, children advance from simple to more complex sentences. Finally, as grammar and morphology are fully developed, speech becomes a coherent stream of sentence linked to sentence, expressing complex thoughts.

In contrast, the internal semantic component of language (internal speech) begins as a complex whole that only later gets broken down into its simpler semantic units (Vygotsky 1934/1968). Children's first utterances are often single word sentences where one word expresses a complete thought. Only as the semantic component of the language develops do children begin to master the meaning of words and break down complex thoughts into smaller differentiated segments. Word meanings "change as the child develops; they change also with the various ways in which thought functions" (Vygotsky, 1934/1968, p. 124). Children learn to use words as representations of simpler, discrete semantic units which can then be combined to express intricate thoughts. Ergo, the external and internal aspects of language develop in reverse directions: external speech develops from single word to multiple sentences, while the internal component of language evolves from complex whole to discrete part.

Because these two aspects of language develop in opposite directions it is important to distinguish between them. This does not mean, however, that the two are unrelated. The development of each one plays a significant role in the development of the other (Vygotsky, 1934/1968). The structure of language does not duplicate the structure of thought. Language does not merely communicate thought, it shapes thought as well. Thought undergoes significant changes as it turns into speech. "Thought is not merely expressed in words; it comes into existence through them" (Vygotsky, 1934/1968, p.125). Children's thoughts begin as vague composites that can only find expression in single words. As their thoughts become differentiated children are able to construct complex strings of words to express those thoughts.

Conversely, as children progress from single to multiple word sentences their amorphous thoughts get broken down into discrete units that can then be combined in a variety of ways.

It is still necessary to look past the external and internal components of language, however, to understand the relationship between thought and language. This relationship goes beyond the phonetic and semantic aspects of the word to the plane of inner speech, where thought and language eventually unite. "The relationship of thought and word cannot be understood in all its complexity without a clear understanding of the psychological nature of inner speech" (Vygotsky, 1934/1968, p.130). Once language and thought have developed some degree of sophistication, the child begins to use language for thinking. At first, private speech and social speech are indistinguishable, but as language develops further and the relationship between thought and language progresses, distinctly personal uses of language can be seen. Such egocentric speech is a transitional phase in the evolution of social speech to inner speech, and as such, exhibits characteristics of both. Although it is still vocalized, audible speech, it has the function and structure of inner speech, making it a key to the connection between language and thought.

In the early stages of language, egocentric speech and social speech are undifferentiated because language is "parasocial" in nature (Vygotsky, 1934/1968). When speaking, children distinguish between themselves as speakers and others as listeners, but they do not distinguish between themselves as listener and other as listener (Kohlberg et al, 1968). Because they do not

distinguish between themselves and others as listener, neither do they distinguish between speech for self and speech for other.

As the child matures, however, the structural and functional idiosyncrasies of egocentric speech evolve. It becomes less audible, less socially communicative and more abridged in nature (Vygotsky, 1934/1968). As the specific function of egocentric speech develops, its syntactic peculiarities become more pronounced and it becomes less and less similar to external speech. These characteristics are most prominent by approximately age seven. By this point, egocentric speech has developed a structure and function that is totally different from social speech, and children realize that it plays a private, not communicative role. As they become capable of abstracting the sound from the language, vocalizations decrease and become more incomprehensible. The child is able to think the words instead of saying them, and inner speech begins (Vygotsky 1934/1968).

The Function of Egocentric Speech: If Vygotsky is correct in hypothesizing that children use egocentric speech in much the same way as adults use inner speech, then egocentric speech plays a central role in the development of children's cognitive processes. It is *speech for self*, intimately connected with the child's thoughts. Children will use *speech for self* to focus and direct their thoughts. Egocentric speech, then, does not merely accompany children's actions, it aids in mental orientation and conscious understanding, increases attentional focus, and guides and directs motor activities (Vygotsky, 1934/1968; Bivens & Berk, 1990; Frauenglass & Diaz, 1985). Egocentric speech makes the relationship between action and goal explicit and therefore

clearer (Pellegrini & DeStefano, 1979). It also serves as an affective release, as an avenue to express both positive and negative emotion about the state of affairs (Vygotsky, 1934/1968; Goodman, 1981; Berk & Garvin, 1984).

Vygotsky (1934/1968) particularly emphasized the self-regulatory, planning function of *speech for self*. He believed that egocentric speech "represents the child's attempts to use language as an instrument of thought...a tool to plan, guide and monitor problem-solving activity" (Frauenglass & Diaz, 1985, p.357). Its function is to communicate with the self: to plan, guide and direct actions. Unlike adults, children vocalize these thoughts because they cannot direct their actions in a covert manner (Kohlberg et al., 1968). Using egocentric speech helps them to develop strategies and action-plans for problem-solving. Verbalizing thoughts about possible steps to take assists children in mapping out feasible alternatives before and during problem-solving tasks.

The semantic aspect of *speech for self* assists in orienting and organizing behaviour, according to Vygotsky (1934/1968). Children use egocentric speech to consciously understand a situation and overcome difficulties manifested by that situation (Harris, 1990). *Speech for self* increases children's focus on a problem and allows them to explicitly outline its exact nature. It helps children direct their attention more closely to the problem at hand, focus on it, and identify the precise obstacles that need to be overcome. By aiding in mental orientation, it permits children to delineate the problem-area, eliminate factors that are not necessary to the problem-solving task and concentrate on the factors most pertinent to the problem.

Speech for self also serves an expressive function, including motivational utterances, comments about task performance, and other positive and negative affective verbalizations (Vygotsky, 1934/1968; Meichenbaum & Goodman, 1979; Furrow, 1984). Children often make comments to themselves, both positive and negative, about their performance and ability to do a task (Harris, 1986; Goodman, 1981). Expletives are expressed when failure or success occurs. Throughout a task children remark on their performance and compare it to that of other children. These types of utterances all communicate emotion, and egocentric speech serves as the means of expressing it.

Given the rich theorizing and intrigue on the part of these two pioneers of egocentric, or private, speech, it is not surprising that there is recurrent interest in this phenomena. The perspectives of Vygotsky and Piaget differ so dramatically on this point, however, that the current literature is often difficult to interpret.

Current Developments: Private Speech

Since Vygotsky first hypothesized *speech for self* as an instrument of human cognition, the concept has evolved from a functionally defined construct with incidental behavioural accompaniments to a behaviourally defined construct with less clear function. In the current literature, *speech for self* has been transformed into the notion of *private speech*, a term coined by Flavell (as cited in Goudena, 1987). Contemporary researchers share Vygotsky's view that *private speech* is speech that guides thought, but his purely functional definition has given way to a more restrictive definition that can be operationalized. As well as having content that refers

principally to the speaker's own activities and consciousness about those activities, *private speech* must now be speech that is clearly not social. In behavioural terms, this usually reduces to the criterion that there be no evidence of an addressee. Vygotsky made no distinction between *speech for self* and social speech: an utterance could be spoken in the presence of a listener, with clear intent to communicate, and still be *speech for self*. It "may come very close in form to external speech or even become exactly like it" (Vygotsky, 1934/1968, p. 47). Whereas Vygotsky's *speech for self* was defined by the cognitive function it fulfils, *private speech* is importantly defined by what it is not. The effect of this modern change has been, of course, a dramatic reduction in the range of speech and language behaviours that are viewed as serving thought. A careful look at the literature suggests that valuable information has been lost.

The Potential Cognitive Role of Social Speech

Although a large proportion of speech generated during private speech studies is social in nature, its occurrence is normally considered an unwanted concomitant of the experimental design and is discouraged by the experimenter (Duncan, 1991; Berk, 1986; Goodman, 1981; Kohlberg et al, 1968). Those studies that investigate children's speech in social settings with adults discuss the influence that adult speech has on children's cognition and problem-solving abilities (Behrend et al., 1989; Goudena; 1987), but offer no reflection on the influence the children's own social speech has on task performance. Yet, the form of language children use to interact with others fundamentally affects the type of information they, in turn, receive (Blank & Franklin, 1980). Since children produce social speech during problem-solving tasks and other activities, even when

it is discouraged, it seems feasible that such speech performs functions beyond that of communication.

Very little information is available on the function that social speech performs in children's activities. Goodman (1981) examined how children's verbal and motoric behaviour are related. Although social speech was not directly examined, this is the only study on private speech that reports the proportion of social speech occurring during the task. Thirty-eight four-year old children were video-taped during a jigsaw-puzzle solving task. The children's verbalizations were transcribed and categorized into social and private speech. Social speech was categorized as task-relevant or task-irrelevant, while private speech was classified as fulfilling one of six functions. In addition, the children's actions were also unitized and categorized on a five point scheme: 1) immediately successful placement; 2) success following spatial reorientation; 3) success following trial and error; 4) failure due to placement error; and 5) failure, piece returned to table. The co-occurrence of private speech and puzzle-solving behaviours was then examined. The results pertaining to private speech will be discussed in detail at a later point in the chapter. What is of interest here is that task-relevant social speech made up 24% of the children's utterances during the task. This equals the proportion of utterances that were *private* and devoted to verbalizing plans or thoughts. Another point of interest is that very little of the social speech was task-irrelevant. Only 3% of the verbalizations fell into this category.

There is only one study to date which presents an overall view of the function of children's speech. Furrow (1984) compared the uses of social and private speech in two-year-olds,

employing the same categorization scheme for all utterances. Twelve children were audio- and video-taped in a free play session with an adult. Two hundred spontaneous utterances were: 1) classified as social (eye-contact), other social, and private; and 2) assigned one of twelve communicative functions. Because Furrow's classification system accounts for both social and private utterances, utterances are categorized in a manner that is quite different from the classification schema used for private speech. The twelve categories used in this schema include:

- 1) Instrumental: an utterance refers to the child's wants or is "whined";
- 2) Regulatory: an utterance refers to an event that might be immediately carried out; the child is not the stated agent and the action is not performed by the child;
- 3) Self-regulatory: an utterance refers to an event that might be immediately carried out; the child is the stated agent and the action is performed by the child;
- 4) Attentional: an utterance refers to a sensory event that is ongoing or might immediately be carried out;
- 5) Interactional: utterance content is a conventional greeting;
- 6) Expressive: Utterance content is an evaluative opinion, an expression of an internal state or stock phrase that expresses feeling;
- 7) Referential: an utterance refers to a present object or a present event that does not involve the child;
- 8) Describing own activity: an utterance refers to an ongoing or just completed event in which the child was involved;
- 9) Question: utterance intonation contour resembles adult rising question intonation and/or an utterance is syntactically a question;
- 10) Imaginary: an utterance is sung, is word play, or represents a transformation of real objects or events, whether present or not;
- 11) Informative: an utterance refers to a nonpresent object or event;
- and 12) Incomprehensible: an utterance is inaudible or incomprehensible.

Results indicated that regulatory, attentional and informative functions were exclusive to social speech. While private speech tended to be self-regulatory, expressive and descriptive of own activity, no

functions were exclusively private in nature. All functions performed by private speech were also performed by social speech.

Much still needs to be learned about the role of social speech in problem solving, but these two studies establish that while social speech appears to have unique functions, it performs all of the functions of private speech as well. If this is true, then social speech will contribute to the cognitive development of a child in a manner that is parallel to private speech.

Contemporary Studies of Private Speech

Despite the fact that studies of private speech have examined only a subset of the functionally interesting data, they have largely supported Vygotsky's view that language can guide thought. Private speech has been most commonly defined as speech that is either not adapted to a listener or not clearly and definitely addressed to another (Berk & Garvin, 1984). It is speech that is not overtly marked as intended for a listener: (1) it does not occur in combination with eye contact and/or body orientation toward the listener; (2) there is no explicit verbal reference to the listener; (3) the remark is not repeated until a response is received; (4) a response is not demanded; (5) no physical proximity/contact is initiated; (5) volume is reduced relative to social utterances (based on Feigenbaum, 1989). Using some version of this definition, a number of studies performed over the past fifteen years support the three main hypotheses put forth by Vygotsky (1934/1968): 1) private speech develops out of social speech; 2) private speech follows a developmental pattern that culminates in true inner speech; and 3) children use private speech to guide and direct behaviour. Although each study investigates a different facet of Vygotsky's

theory on private speech, together they provide clear support for these three hypotheses. Since each of the studies is designed to investigate slightly different aspects of private speech, each also uses a slightly different categorization scheme for private speech. The schemes are similar enough, however, to allow a general discussion on the role of private speech in children's problem-solving and the developmental ascendancy of private speech, with its roots in social speech and its maturity in true inner speech.

The Social Roots of Private Speech: A study by Berk & Garvin (1984) investigated the development of private speech in low income Appalachian children. Subjects in this study consisted of thirty-six low income Appalachian children, ranging in age from four to ten years old. Two observers dictated detailed narratives of the children's behaviour into tape recorders. The children were observed for two continuous one-hour periods, one by each of the observers. Each child was observed in each of the following natural school settings: the classroom, the playground, the halls and the lunchroom. All speech was coded as private or social. Two environmental conditions were also examined in this study: 1) cognitive demands of tasks; and 2) adult presence. The data pertaining to private speech and the effects of these conditions will be discussed at a later point in the chapter. The overall frequencies of social and private speech produced by each child were positively correlated. The more verbally interactive children also produced more private speech. An additional finding suggests that this was not due to mere talkativeness. The earlier forms of private speech, e.g. word play and repetition, were more strongly correlated to social interaction than were the later forms, e.g. describing own

activity/self-guidance and inaudible mutterings. This supports the notion that social interaction assists in the development of early forms of private speech.

Similar findings were obtained in the first of four pioneering studies by Kohlberg et al. (1968). This study was designed to investigate the incidence of private speech, its relationship to the child's cognitive level, and the correlation between social interaction and incidence of private speech. The third purpose will be considered here, while the first two will be discussed below. Twenty-eight children between four and seven participated in the first study. They were divided in to four equal groups: bright 4's, average 4's, bright 6's and average 6's. The mean Stanford-Binet IQ of the bright subjects was 129 and of the average subjects, 104. Each child was followed by an observer for two morning school or preschool sessions, and detailed recordings were made of all speech and behaviour for a period of two hours. Approximately equal portions of each narrative were devoted to outdoor play, indoor free play and adult-structured activities. All speech was coded as private or social. Each child was also rated by a teacher on a 7-point scale of popularity, indicating general social participation. A positive correlation was found between the amounts of private and social speech produced. A positive correlation was also found between ratings of popularity and the amount of private speech generated. These findings suggest that private speech and social speech both develop out of a social orientation and reflect the "parasocial" nature of private speech.

Goudena (1987) hypothesized that children would be more likely to produce private speech following interaction with a collaborative adult than a non-collaborative adult. Twenty-two 4-

year-old children participated in the study. Each child was observed under two conditions, the collaborative (C) and the noncollaborative (NC) conditions. The order of presentation of the two conditions was randomly counterbalanced. In condition C one of two female experimenters presented two puzzle-type tasks to the child. The experimenter completed the first puzzle and then asked the child to also complete the task. If the child displayed difficulty, the experimenter, without verbalizing during the task, put the child's pieces together correctly and then asked the child to try again. The second task was done in a similar manner except that the experimenter only arranged the first item of the puzzle before the child started to work. In the NC condition one of two experimenters also presented two puzzle-type tasks. The experimenter did not complete the puzzle in the presence of the child but presented an already completed figure for the child to copy. If the child failed at the task the experimenter simply asked the child to try again and did not offer any assistance. When the presentation of the two puzzles was finished (constituting the C or NC conditions), the experimenter handed the first of two new puzzles to the child and asked the child to try to complete it, indicating that she was going to be occupied with something else. The experimenter then sat down in a corner of the room behind the child's back, started to read and was minimally responsive to social comments made by the child. The children produced more private speech overall in condition C than in condition NC. When children have received direct regulation and that regulation is then withdrawn, they were more likely to produce private speech than when they have not received any regulation in the first place. This supports the view put forth by Vygotsky (1934/1968) that children internalize the adult's regulation and the emphasis shifts from other-regulation to self-regulation of thought and

action. Children begin to use language to regulate their own thoughts and behaviour in the same way that the adult's language once regulated them.

Goudena also reports, however, that when only the instruction periods are considered, children produced approximately three times as much private speech during the NC instruction session as during the C instruction session. When the children received direct regulation from an adult while learning a task, they produced far less private speech than in situations where they received no adult regulation. This finding seems to oppose the Vygotskian position, but is probably an artifact of the definitional decisions discussed earlier. Children who were interacting with the adults already might well choose to do their cognitive work socially, rather than privately.

These studies support the hypothesis put forth by Vygotsky (1934/1968) that private speech has its origins in social speech. The overall frequencies of social and private speech are correlated (Berk & Garvin, 1984; Kohlberg et al. 1968), and earlier forms of private speech are more highly correlated to social speech than later forms of private speech (Berk & Garvin, 1984). Socially oriented children are more likely to produce private speech (Kohlberg et al., 1968), and, when children received direct regulation but were later required to work on their own, they were more likely to produce private speech than when they have not received any regulation in the first place (Goudena, 1987).

The Goudena findings also support the view put forth by Vygotsky (1934/1968) that children internalize the adult's regulation and the emphasis shifts from other-regulation to self-regulation

of thought and action. Children begin to use language to regulate their own thoughts and behaviour in the same way that the adult's language once regulated them. This regulatory theme will be discussed in a later section. The major point here is that egocentric speech develops out of the social paradigm as the child learns to transfer behaviours learned in the social realm to that of the inner realm.

Developmental Course: Vygotsky (1934/1962) proposed that private speech followed a distinct developmental path. He proposed that private speech first monitors action and then precedes it. Early forms of private speech play a descriptive role, occurring in conjunction with the child's actions, assisting the child in monitoring behaviour. As private speech develops, it begins to precede action and play a guiding, planning role in the child's activities. Over time it becomes less audible, and finally ceases as it becomes fully internalized, inner speech. Kohlberg et al. (1968) was particularly interested in understanding the relationships between cognitive development and private speech. The classification system they proposed consists of a developmental sequence of six categories: 1) word play and repetition; 2) remarks addressed to nonhuman objects; 3) describing own activity; 4) questions answered by self; 5) self-guiding comments; 6) inaudible or indecipherable muttering. Kohlberg et al. (1968) hypothesized that private speech reaches the end of its developmental sequence as it becomes muttering. After this point it becomes internalized, increasingly mature verbal thought. Most subsequent studies in private speech have either used this categorization scheme or established their schemes upon it (Duncan, 1991; Berk, 1986; Berk & Garvin, 1984).

As mentioned above, the first study of Kohlberg et al. (1968) was designed to investigate the incidence of private speech and its relationship to the child's cognitive level, as well as the correlation between social interaction and incidence of private speech. In this study only the first five categories of the classification system were used because the children were followed at a distance, making it impossible to record inaudible mutterings. The results showed a large decrease in the proportion of private speech from age four to age six. In addition, the bright and average 4's generated similar proportions of private speech while the bright 6's produced lower proportions of private speech than the normal 6's. These findings are consistent with a cognitive-development explanation of private speech. Younger children use more private speech than older children and cognitive maturity quickens the developmental process.

The second study by Kohlberg et al. (1968) attempted to confirm the correlations between private speech, chronological age and intellectual maturity found in the first study. A subsample was also followed up one year after first testing to investigate longitudinal trends. One hundred twelve subjects between the ages of four and ten participated in this study. Twenty-six subjects participated in the follow-up session. As in the first study, intelligence groups were determined by Stanford-Binet performance, with bright subjects having an average IQ of 131, and normal subjects having an average IQ of 106. Each child participated in two sessions, one with a male experimenter and one with a female experimenter. The children participated in parallel play with the experimenter, making sticker designs. The experimenter made a check in one of four categories for each sentence-like verbal remark the child made. The categories consisted of:

egocentric speech; statement of information; question; and request for help/approval. Egocentric speech was further categorized using the six point coding system noted above.

The results from the second study differed slightly from those of the first study. In the second study the bright children produced more private speech than the normal children at the early age, whereas in the first study both young groups produced similar amounts of private speech. This is likely due to the inclusion of inaudible mutterings under egocentric speech. If private speech does follow a developmental pattern and inaudible muttering is the most mature form of private speech, then the inclusion of category six in the classification scheme would be expected to alter the results in just such a manner. The bright younger children would be expected to produce more advanced levels of private speech than the normal younger children, and the inclusion of such speech in the data collection would increase the amount of private speech produced by the brighter children. Long term results indicated a curvilinear trend, with private speech declining around age six to seven. The age decline in the bright group occurred at an earlier chronological age, but similar mental age, presenting even clearer support for a cognitive-development interpretation of private speech.

The third study by Kohlberg et al. (1968) examined the feasibility of the proposed developmental classification system listed above. This category system was applied to the data gathered during the follow up portion of study 2. Inaudible mutterings, the presumed most mature category of private speech, increased regularly with age. Mirror image trends between self-guiding speech (Category 5) and inaudible mutterings (Category 6) suggest that mutterings come to take the

place of self-guiding speech. The infrequency of self-answered questions (Category 4) at any age casts doubt on the developmental significance of this category. Describing own activity (Category 3) declined steadily with age. Repetition and talking to inanimate objects (Categories 1 and 2 respectively) had very low occurrences, suggesting that children in this age range had progressed beyond these immature levels of private speech. The results of this study indicate that the classification system put forth by the researchers (with the possible exception of Category 4) captures the developmental pattern of private speech.

Similar confirmation of Vygotsky's developmental account can be found in these more recent studies by other research teams. Berk (1986) investigated the relationship between the private speech of elementary school children and their behavioural accompaniment to task, attention and task performance. Seventy-five children in the first and third grades were observed during daily math seatwork periods. Their private speech, motor accompaniment to task and level of attention were recorded by four observers. Each child was observed for four periods (from the beginning to the end of one assignment), once by each observer. Private speech and behavioural accompaniment were only recorded when: 1) the children were at least moderately attentive to the task; and 2) children were working independently, i.e. were not seeking help from the teacher or being offered assistance by the teacher. The classification system for the private speech was reduced to three categories: 1) self-stimulating, task-irrelevant (word-play/repetition; task-irrelevant affect; comments to nonhuman others); 2) task-relevant, externalized (describing own activity/self-guiding comments; self-answered questions; reading aloud; task-relevant affect); and 3) task-relevant, external manifestations of inner speech (inaudible muttering involving clear

mouthings of the words; lip and tongue movement only (with no clear mouthing of words). Behaviour was categorized as: 1) tension-reducing behaviour, e.g. fidgeting; 2) task-facilitating behaviour; and 3) no movement. Attention level was also categorized on a three point scale: 1) focused; 2) moderately focused; and 3) diverted.

The main findings of Berk (1986) were: task irrelevant private speech was positively correlated with fidgeting and negatively correlated with no movement; externalized, task relevant private speech was positively correlated with task-facilitating motor behaviour and negatively correlated with no movement; and task relevant externally manifested inner speech was positively correlated with no movement and negatively correlated with tension-reducing, task irrelevant behaviour. These correlations indicate that private speech is related to functionally similar forms of behaviour. The most immature level of private speech is positively correlated with task irrelevant behaviours and negatively correlated with no movement, implying that at this level the speech is occurring with, but not yet imposing any regulation on, the behaviour. The intermediary level of private speech occurs in conjunction with task relevant behaviour but is negatively correlated to no movement, suggesting that private speech at this level is regulating behaviour. At the most mature level of private speech, externalized inner speech, no movement is positively correlated while task irrelevant movement is negatively correlated. By this level private speech has become internalized and is regulating thought but is no longer associated with behaviour. The child is able to abstract the word from the action. This pattern of private speech and behaviour correlations also support the developmental pattern proposed by Vygotsky (1934/1968).

Berk and Garvin (1990) performed a longitudinal study based on the work of Berk (1986) above. Thirty-three children (grades one, two and three) were observed over a three year period. The children were observed only when they worked on assignments requiring individualized practice in arithmetic concepts and skills. Each child was observed for four entire seatwork periods (from beginning to completion of an assignment or until the math seatwork session for the whole class ended, whichever occurred first). Observations were randomly assigned to observers with each child's four periods being assigned to a different observer. The same classification system for private speech, behaviour and attentional level as described in Berk (1986) was used in this study.

Although the overall incidence of private speech did not change with age, it did undergo longitudinal age-related changes. Task irrelevant (Level 1) private speech, and task relevant externalized (Level 2) private speech decreased linearly with age, while task relevant internalized (Level 3) private speech increased linearly. The maturation process is more evident when subtypes within the three levels of private speech are considered. Decreases in the amount of the Level 1 subtype of "wordplay/repetition" appeared responsible for linear decrease in Level 1 speech over time. The other subtypes of "expression" and "comments to nonhuman objects" were low in frequency and showed no developmental changes. All Level 2 subtypes, except "self-answered questions" decreased significantly across all ages. The most frequent Level 2 subtype "describing own activity/self-guiding comments" decrease sharply between first and second grade at the same time Level 3 subtype "inaudible muttering" showed a rapid increase, nearly doubling in frequency. "Inaudible mutterings" then dropped off between second and third

grade as Level 3 subtype "lip and tongue movement" increased dramatically. As the child matures task relevant internalized private speech not only becomes the most dominant but also the most consistent type of private speech.

Finally, Behrend et al. (1989) evaluated the effects of age, task difficulty and parent presence. Twenty-four children at each of three age levels (2, 3 1/2, and 5 years) participated in the study (seventy-two children in all). An easy, medium and difficult puzzle was presented to each child in each of two conditions: mother present, mother absent. Different puzzles were used for each condition. The difficulty level of the puzzles was matched to the child's age, to ensure a roughly equal range of difficulty for each age group. The effects of task difficulty and parent presence will be considered later in the chapter. The number of self-directed utterances increased with age and older children were more likely to produce self-directing utterances than younger children, supporting a developmental view of private speech.

Each of these studies supports some aspect of the cognitive development interpretation of private speech. Private speech shows a curvilinear development with very young children (2- to 3-year-olds) producing less private speech than young children (4- to 5-year-olds) who generate more private speech older children (six years plus) (Kohlberg et al., 1968; Behrend et al., 1989). More intellectually mature children use more mature forms of private speech earlier than average children and the curvilinear trend with private speech declining around age six or seven is associated more strongly with mental age than chronological age (Kohlberg et al., 1968). Private speech also appears to be related to functionally similar forms of behaviour. More mature forms

of private speech are positively correlated with more mature forms of behaviour and negatively correlated with more immature forms of behaviour (Berk, 1986). The inverse relationship between self-guiding utterances and inaudible mutterings implies that external manifestations of inner speech replace task-relevant self-guiding externalized forms of private speech with increasing age. Private speech, therefore, becomes increasingly internalized and task relevant with age. Intercorrelations among the private speech levels and categories both within and across age groups provides confirmation that private speech goes underground to become inner speech (Bivens & Berk, 1990; Kohlberg et al., 1968). Private speech appears to follow a distinct developmental pattern culminating in internal verbal thought. This pattern appears to be similar to the one suggested by Kohlberg et al. (1968), building on the observations and theories of Vygotsky.

Cognitive Self-guiding Function: As private speech develops it plays an increasingly important role in orienting and guiding children's behaviour. Children use private speech to plan their actions, monitor their behaviour and delineate the problem space. The fourth study by Kohlberg et al. (1968) explored the self-guiding nature of private speech as well as the influence that culture and sex have on its incidence. Thirty-four 4- to 5-year-olds participated in this study. Each child was given four tasks in the following order, from easiest to most difficult: 1) bead stringing; 2) easy jigsaw puzzle; 3) building a tower with fifteen 1-inch cubes; and 4) hard jigsaw puzzle. Speech was coded for private and social and all private speech was coded using the Kohlberg categorization scheme mentioned above. No cultural or sex differences were evident in the findings. The amount of cognitive activity required for solving a task, i.e. task difficulty,

had a significant influence on the amount of private speech generated by the task. Children were more likely to use private speech to talk themselves through difficult tasks than easy ones.

In the Goodman (1981) study described above, faster rates of action and shorter completion times on the puzzles were associated with a higher rate of verbalizations. The children who were most successful at the task also produced the most private speech. The children produced speech when they were successful in placing puzzle pieces, but they were more likely to verbalize when they failed in an attempt to place a puzzle piece. This suggests that the children were using verbalizations in an attempt to overcome difficulty. These results indicate that private speech does more than simply accompany children's actions. Children use it as a strategy to overcome obstacles.

Duncan (1991) examined the use of private speech by preschool children over two sessions. Thirty-two preschoolers were video-taped during two sessions, while arranging sets of pictures to make brief stories. During the first session, half the children were given collaborative assistance by the experimenter and half were not. During the second session all children worked on the tasks alone. During the first session they worked on easy and difficult story-sequencing tasks. During the second session, they worked on familiar and novel items. The familiar tasks were tasks that had been presented during the first session whereas the novel items had not. Sessions were approximately one week apart. The children produced more private speech when working on the difficult tasks than on the easy ones but produced similar amounts on familiar and novel tasks.

As in the Goodman (1981) study, the children were more likely to verbalize when they experienced difficulty, suggesting that private speech was used to perform a self-guiding function. Behrend et al. (1989) also found that private speech occurred most frequently when children worked on puzzles that were appropriate for, or slightly above, their general level of cognitive ability. In each of these three studies children actively used language to guide themselves through difficult tasks.

The findings of Berk & Garvin (1984), described above, also support the hypothesis that the primary function of the private speech is one of self-guidance. Focused attention increased as more internalized levels of private speech were exhibited, indicating that attention comes increasingly under the control of private speech. The most frequently occurring categories of private speech utterances were describing one's own activity/self-guidance and inaudible muttering. The children in this study were more likely to use private speech for guiding and orienting themselves to the task than for any other purpose.

Recall that Berk (1986), described above, found that: 1) task irrelevant private speech was positively correlated with fidgeting and negatively correlated to no movement, and 2) negatively correlated to no movement; and 3) task relevant externally manifested inner speech was positively correlated with no movement and negatively correlated with task-facilitating behaviour. These correlations indicate that private speech is related to functionally similar forms of behaviour. Self-guiding speech occurs in conjunction with appropriate behaviour. For children who displayed large amounts of off-task behaviour, greater use of externalized task-relevant private speech was

related to lower levels of inattentiveness. This indicates that distractible children use private speech in an attempt to control and focus attention. This is in keeping with the interpretation that children use private speech to focus and guide behaviour.

Finally, Berk and Garvin (1990) described above, found similar correlations between private speech and behaviour to Berk (1986). As Level 1 (task irrelevant) speech declined, so did tension reducing, task irrelevant behaviour (e.g. scratching, chewing). As Level 2 (task relevant, externalized) speech diminished, task facilitating movements (e.g. pointing, gesturing) also declined. As children used more Level 3 (internalized) private speech, focused attention also increased. Private speech appears to facilitate, or at least occur in conjunction with, increasing self-control over behaviour and attentional focus.

The above studies provide clear evidence of the self-guiding nature of private speech. Children consistently produced more private speech on difficult tasks than easy ones (Duncan, 1991), particularly if the task was at or slightly above their general cognitive level (Behrend et al., 1989). They were also more likely to verbalize when experiencing difficulty on a task (Goodman, 1981). Private speech was not only correlated to the ability to focus attention (Berk & Garvin, 1984; Berk, 1986; Berk & Bivens, 1990), but was related to functionally similar forms of behaviour (Berk, 1986; Bivens & Berk, 1990). Children used similar types of behaviour and private speech simultaneously. As the cognitive level of the children's private speech increased so did their ability to maintain focus on the task (Berk, 1986; Bivens & Berk, 1990). These findings support the view put forth by Vygotsky (1934/1968) that children use private speech to

guide and regulate behaviour and to focus attention on the task at hand. Children use private speech to guide their actions and thoughts as they work through problems and difficult conditions.

In summary then, current research provides confirmation of the three main hypotheses postulated by Vygotsky (1934/1968) concerning private speech. Private speech is rooted in social interaction and is used as a tool for guiding behaviour and focusing attention. As children mature, the other-directed regulation provided by social interaction with adults is replaced with the self-regulation of private speech. As children become more proficient at using private speech for self-regulation, it becomes progressively more task-relevant and internalized until finally evolving into fully internalized verbal thought.

Personality Characteristics and Private Speech

Thus far I have looked at the literature on private speech as it relates to the Vygotskian view of development. There is one further aspect of modern literature on private speech, however, that is not developmental. Since there is a high degree of interpersonal variation in the amount of private speech produced by children (Behrend et al., 1989; Frauenglass & Diaz, 1985; Kohlberg et al., 1968; Fuson, 1979), it is possible that this variation is correlated to certain personality characteristics. Language use is very individual. Some people are highly verbal while others are naturally taciturn. Personality may influence the manner in which individuals incorporate language into daily routines and problem-solving activities. Almost no research has been done on the influence that intrapersonal characteristics have on the production of private speech. What

research does exist, discusses three characteristics that are believed to be correlated with the use of private speech: dependency; impulsivity; and efficiency. Dickie (1973) found that impulsive children appear to use lower levels of private speech (as cited in Fuson, 1979). Impulsive children were more likely to use task-irrelevant and outward directed private speech than reflective children. Klieman (1974) found that independent children were more likely use private speech than dependent children (as cited in Meichenbaum & Goodman, 1979). Goodman (1981) found that efficient children produced a higher rate of private speech. Goudena (1987) performed measures of impulsivity and dependence for each of his subjects because he hypothesized that these factors were related to private speech production, however, he failed to report on the presence or absence of any correlations between these two characteristics and the speech produced by the children. While the evidence is sparse supporting of the relationship between personality characteristics, e.g. dependency, impulsivity and efficiency, and private speech, these studies provide some confirmation that private speech in general, and certain types of private speech in particular, are more likely to be produced by children displaying certain personality characteristics than others.

In summary, then, private speech is one visible example of the way in which language serves thought. The empirical data and theory provide insight into the development of private speech and therefore the development of cognition. As such, private speech provides a key to understanding the connection between thought and language and the influence that each has on the other. As the precursor to inner speech it also provides information on children's cognitive development, because advances in cognitive ability will be reflected in the private speech

produced. There are two gaps in the current literature, however. Little information exists on the role of social speech in cognitive development and the influence of personality on language use. These two areas are important in understanding the larger picture, i.e. the association between language and thought. An awareness of the role these two factors play in the relationship between language and thought is necessary for a full comprehension of the intellectual uses of language.

The Effects of Specific Language Impairment (SLI) on Cognition

I come now to the final motivation for this study - the language impaired child. Although it was once believed that specific language impaired children had normal cognitive functions, research over the last decade has indicated that these children display widespread cognitive delays (Johnston, 1988, 1991; Thal, 1991). They are more likely to display chronic learning problems than normal children and exhibit cognitive dysfunctions over a wide range of tasks (Johnston, 1988, 1991). There are three possible explanations for the cognitive delay exhibited by SLI children: a) the cognitive impairment is a result of a cognitive processing problem that underlies the language impairment; (b) it is a direct consequence of the language impairment; or (c) both are factors. The work on private speech suggests that explanations (b) or (c) are most likely. Since private speech appears to play a role in cognitive development, a language impairment will presumably affect a child's ability to effectively use language as a cognitive self-guiding strategy. While there is no published work on the use of self-regulating speech by young children with specific language impairment, it seems possible that these children have not learned to use the regulatory, planning functions of language. Interesting confirmation of this fact comes from

research by Harris (1990; 1986), which indicates that the explicit teaching of private speech may help learning disabled children learn cognitive self-guidance.

The Current Study

The purpose of this study, then, is three-fold. First, it was designed to investigate the intellectual role of social as well as private speech. By categorizing both elicited social speech and private speech using a cognitively based taxonomy it may be possible to determine whether both social speech and private speech play similar roles in cognitive development, with some children using one over the other as their preferred learning strategy. Second, I was interested in the relationship between personality characteristics and language use. The literature suggests that children who display certain personality characteristics appear to be more likely to use private speech. Three such characteristics are independence, efficiency and impulsivity. If a relationship can be revealed between personality characteristics and the tendency to use private speech over social speech as a learning strategy, then it may be possible to identify children who would benefit most from explicit teaching of self-guiding strategies. Finally, I felt it was important to investigate the effect of SLI on cognitive uses of language. To this end the study also included a preliminary investigation of the use of self-regulatory speech by children with a specific language impairment.

In conclusion, the five questions asked in this study are: 1) What are the problem solving functions of speech? (2) Do private speech and social speech play similar roles in problem-solving? (3) Do some children show a preference for private speech or social speech as their

main problem-solving strategy? (4) What correlation exists between language use and personality characteristics? and (5) Do children with a specific language impairment differ significantly from normal children in their use of self-guiding speech?

CHAPTER TWO

METHOD

Overview

This study was designed to investigate questions concerning the intellectual uses of language by normal and specific language impaired preschoolers, in particular: 1) what role does speech play in problem-solving; (2) do private and social speech play similar roles; (3) do children with a specific language impairment use self-regulatory language in a way that is fundamentally different from normal children; (4) do some children show a preference for private speech or social speech as their main problem-solving strategy and if so; (5) what correlations exist between this preference and the child's level of independence, efficiency, and cognitive style.

Preschool children were audio- and video-taped while participating in a fantasy-play session involving a building task (the bridge task). The audio- and video-tapes of each session were transcribed and the children's utterances were coded for task relevance (irrelevant, broadly relevant, narrowly relevant). Those utterances pertaining to the task were further coded for function (regulative, affective, word play), addressee (private, social) and level of cognitive complexity (Blank, 1974).

Subjects

Eighteen preschool children participated in the study: six 3-year-olds (YNL) and six 4-year-olds (ONL) with normal language development and six 4-year-olds (SLI) with delayed language development. All spoke English as their first language and scored within ± 1 Standard Deviations

on the Leiter International Performance Scale (LIPS), indicating age-appropriate cognitive development. The language impaired children were recruited from a pool of children receiving services from the Speech-Language Pathologists associated with the Central Fraser Valley Health Unit. The children with age appropriate language abilities were recruited through a daycare in New Westminster and a preschool in Vancouver. All the language impaired children and two of the 4-year-olds with age-appropriate language were at home with their mothers. The remainder of the children were in daily child care.

Prior to inclusion in the study, the children underwent a screening assessment of cognitive and language skills. Children were selected to participate on the basis of:

1. Cognitive Ability: Children performing within ± 1.00 Standard Deviations of the mean on the Leiter International Performance Scale (LIPS) (Leiter, 1969) were considered as displaying age-appropriate cognitive development. The LIPS is a non-verbal test requiring judgements of perceptual and conceptual similarity. Only children with age-appropriate cognitive development were considered for the study.
2. Language Ability: Children were grouped according to their expressive and receptive language skills. The language portion of the screening assessment was primarily based on the Developmental Sentence Scoring (DSS) (Lee, 1974), performed on a spontaneous sample audio-taped during a 15 minute free play session. Three secondary language measures were also used to corroborate the DSS findings. These included: (1) the Expressive One Word Picture Vocabulary Test-Revised (EOWPVT-R) (Gardner, 1979); (2) the Peabody Picture Vocabulary Test (PPVT) (Dunn & Dunn, 1981); and (3) the Test of Auditory Comprehension

of Language-Revised, subtests 2 and 3 (TACL-R) (Carrow-Woolfolk, 1985). See Appendix A for a brief description of these measures.

Children performing more than 1.5 standard deviations below the mean on the DSS and at least two of the other three language measures were considered as displaying a significant language delay. Children within ± 1.0 standard deviations of the mean on the DSS and at least two of the other three language measures were considered as having age-appropriate language development. The 3-year-old age-appropriate children were matched as a group to the 4-year-old delayed children on the basis of the DSS score obtained during the screening assessment. There was no statistically significant difference between the mean of the DSS scores of the 4-year-old delayed children and that of the 3-year-old age-appropriate children.

Children with normal language development were solicited through a daycare centre and preschool in the Greater Vancouver Area. Fifty letters and consent forms were sent to the parents of children attending the daycare and preschool, asking if they would consent to participate along with their child in the study. See Appendix B for a copy of the letter and consent form sent to parents. Fifteen responses were received and these fifteen children were screened. One child was eliminated from the study because her score on the LIPS was more than 1.00 standard deviation above the mean. Two more children were dropped from the study because they stopped attending the daycare they were canvassed through. The other twelve children met the screening requirements for children with normal language development and were included in the study.

The selection process for the SLI children began with the director of Speech Services at the CFVHU and the experimenter reading the files of each child receiving speech-language services through the CFVHU (approximately thirty-five children). Fifteen children were eliminated from the potential subject list because they exhibited global or cognitive delays. Of the remaining twenty children, the twelve children exhibiting the most significant language delays were chosen as potential subjects for the study. A letter and consent form were sent from the CFVHU to the parents of each child, asking if they would consent to participate with their child in the study. See Appendix B for a copy of the letter and consent form. Five parents, one with two SLI children, responded to the letter. These six children met the screening requirements for SLI children and were included in the study.

A summary of the screening results can be found in Table 1.

TABLE 1: SUBJECT SELECTION DATA

GROUP	SUB #	CA	LIPS	DSS	DSS%ile
GRP 1					
SLI	1	61	110	6.7	14
SLI	2	58	110	6.3	10
SLI	3	56	101	4.4	07
SLI	4	57	115	4.2	07
SLI	5	57	115	4.9	08
SLI	6	<u>60</u>	<u>110</u>	<u>5.7</u>	<u>08</u>
MEAN		58.2	110	5.4	9.0
GRP 2					
ONL	1	57	110	8.1	48
ONL	2	59	116	8.8	55
ONL	3	51	116	7.1	37
ONL	4	58	110	7.4	29
ONL	5	51	101	8.3	60
ONL	6	<u>54</u>	<u>94</u>	<u>7.8</u>	<u>45</u>
MEAN		55.0	108	7.9	45.7
GRP 3					
YNL	1	42	91	6.2	30
YNL	2	38	108	4.6	25
YNL	3	39	105	5.6	40
YNL	4	44	107	6.4	27
YNL	5	42	105	7.4	80
YNL	6	<u>45</u>	<u>100</u>	<u>6.4</u>	<u>27</u>
MEAN		41.7	103	6.1	38.2

A one-way ANOVA, using the post-hoc Tukey Studentized Range Method test option, was performed on each of the selection variables to see if there were significant differences among the groups. The results are given below in Table 2.

TABLE 2: SUBJECT SELECTION DATA COMPARISON

<u>CHRONOLOGICAL AGE (CA)</u>			
	SLI	ONL	YNL
SLI			**
ONL			**
 <u>LIPS</u>			
	SLI	ONL	YNL
SLI			
ONL			
 <u>DSS</u>			
	SLI	ONL	YNL
SLI		**	
ONL			**
 <u>DSS PERCENTILE</u>			
	SLI	ONL	YNL
SLI		**	**
ONL			

** denotes significance at $p = 0.01$

* denotes significance at $p = 0.1$

The mean chronological ages of the SLI and ONL children are not significantly different; however, the mean chronological age of the YNL children is significantly lower than that of the SLI and the ONL children. There are no significant differences between the mean LIPS scores of the three groups. The mean DSS score of the SLI group is significantly lower than the mean

DSS score of the ONL group but is not significantly different from that of the YNL group. The mean DSS score of the ONL group is also significantly higher than the mean DSS score of the YNL group. The mean DSS percentile of the SLI group is significantly lower than the mean DSS percentile of both the YNL and the ONL groups. The mean DSS percentiles of the YNL and ONL groups are not significantly different.

Procedures

Each subject participated in three to four sessions, including two or three assessment sessions and one experimental session. All sessions were conducted in surroundings familiar to the child (child's home, daycare/preschool centre) by the same female experimenter. During the assessment sessions the child and experimenter were alone in a quiet room. The experimental sessions were conducted with two children who were familiar with each other and, on five occasions, a mother of one child was also present. In each experimental session at least one child of the dyad displayed normal language development.

Assessment Procedures

The assessment was conducted over two or three 45 minute sessions. When two sessions were required, the LIPS and the PPVT were administered during the first session and subtests two and three of the TACL-R, the EOWPVT and a 15 minute free play period completed the second session. If three sessions were required to complete the assessment, the LIPS was administered

during the first session, the PPVT and subtests two and three of the TACL-R were administered in the second session, and the EOWPVT and a free play period completed the third session. The free play period was audio-taped, the child's first 50 utterances were transcribed and the DSS was performed on those utterances.

Standardized Tests

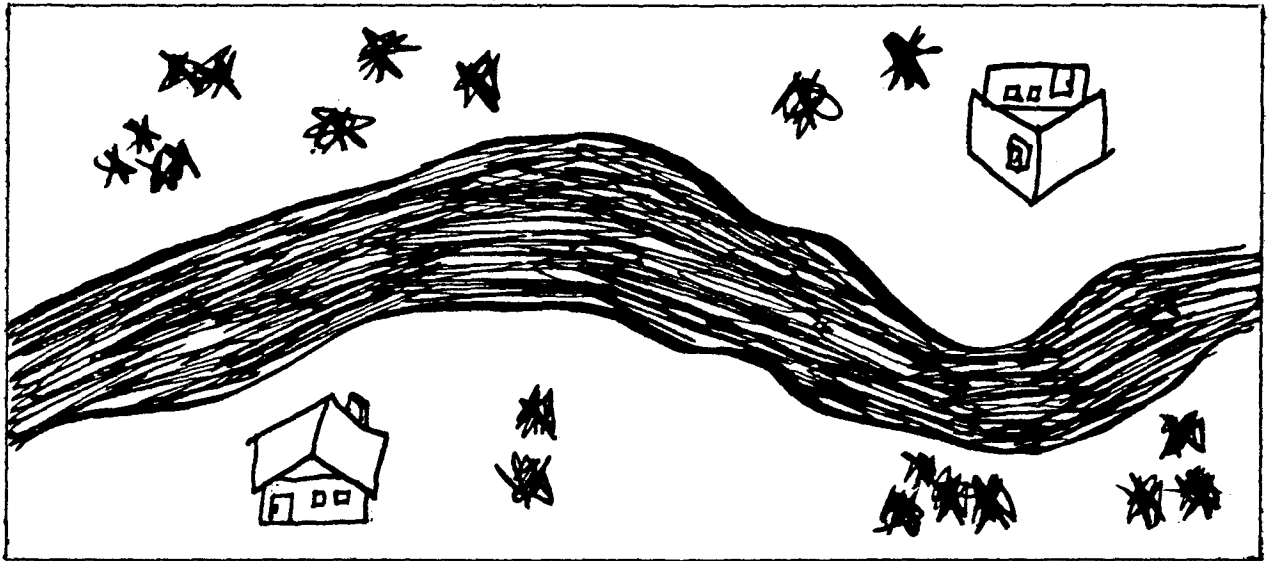
In addition to the cognitive and language tests described earlier, each child was given the Kansas Reflective-Impulsivity Scale for Preschoolers (KRISP) (Wright et al., 1978). This test measures the cognitive style (impulsive/reflective) and efficiency of the child. If two sessions were required to complete the assessment the KRISP was administered during the first session. If three sessions were required, the KRISP was administered during the second session. See Appendix C for a brief description of this test.

The Beller Questionnaire (Beller, 1957) was also given to a parent of each child. The children were not matched on these variables but both measures were taken into account during the data analysis. See Appendix B for an example of the questionnaire.

Experimental Task

Materials: At the beginning of the experimental session a 70" X 32" piece of cardboard with a coloured diagram of a river valley was placed on the floor in the middle of a large open area. The diagram consisted of a winding river running the length of the cardboard with trees and two houses drawn kitty-corner to each other.

FIG. 1



A pile of building supplies was located on the floor beside each house. Each pile consisted of fifty blocks of assorted sizes, shapes, and colours, fifteen flexible straws, ten - 12-inch pipecleaners, five pieces of coloured string approximately 12 inches in length, a 3-inch diameter ball of playdough, and twenty popsicle sticks. Also included in each pile were three pictures of bridges made by the experimenter out of the above listed supplies.

A video camera and tripod were used to video-tape each session. Two Samson remote lapel microphones, one for each child, and a two-channel Marantz tape recorder, Model No. PMD430, were used to audio-tape the sessions. The lapel microphones were placed in custom-made vests which the children wore during the task. The audio and visual equipment was set up approximately 10 - 15 feet from the river valley diagram.

Procedures: The children played in pairs. The diagram of the river valley was placed on the floor and two sets of building supplies were piled on the floor on opposite sides of the diagram. Each

child was asked to sit down by a pile of building supplies. The experimenter then placed a 6-inch clay monster in the middle of the river and told the children the following story:

You (pointing to one child) live on this side of the river (pointing to the house the child is sitting beside) and you (pointing to the other child) live on this side of the river (pointing to the house the child is sitting beside). A monster lives in the river (picking up the monster and putting him back down again). He likes to eat little children. You need to build a bridge to get across the river so that you can play with each other. Here are some picture of bridges that other children have built (picking up the pictures in each of the piles). You have straws, and string, and blocks, and playdough, and popsicle sticks, and pipe-cleaners to build the bridge (picking up an example of each from each child's pile as they are listed). You build the biggest, best bridge that you can to get over the river so the monster doesn't eat you. Use as many of these (indicating the supplies) as you can. I'm going to sit over here (indicating a location near the audio-visual recording equipment, approximately 10 - 15 feet away) while you build. Both of you build whatever you can to get across the river.

The experimenter then withdrew to the indicated location where she could observe the children and the audio-visual equipment but be apart from the task. If the children became involved in a task that was broadly related to the bridge building task, i.e. building a boat or a trap for the monster, they were permitted to continue uninterrupted. If the children were off-task for longer than two minutes, completed part of the task and were unsure of how to proceed, or announced that the task was complete before 30 minutes had expired, the experimenter would prompt them

to continue with the assigned task. Sessions lasted 30 minutes or until the children lost interest (minimum = 15 minutes).

The task was called to a halt after 30 minutes or when the children indicated that they no longer wished to continue playing. This was signified by direct verbal comments such as "I don't want to play any more" or an unwillingness to stay on task regardless of prompting by the experimenter. The minimum time period for the experimental session was 15 minutes.

Experimenter Conduct: When the children went off task, were unsure how to proceed with the task, or indicated that they had completed the task, the experimenter prompted them on with comments such as "what else can you build?", "can you build a bigger bridge that the monster can go under?", or ""could you build a trap for the monster?". If the children questioned the experimenter about the supplies or asked for clarification/repetition of the task she would repeat/clarify the information as requested. Other comments and questions about the task were responded to with non-specific comments such as "you put it wherever you want", "that's pretty good", "see what you can make", "looks good", "wow", "mm-hmm", etc. If the children persisted in requesting a more precise answer they were told "this is your job to work on. I'm not going to help you. I have my own work to do over here." Questions and comments that were irrelevant to the task were answered as briefly as possible and, if necessary, the child's attention was directed back to the task at hand. If the child's attention wandered from the task or the child completed a task and was unsure of how to proceed, the experimenter would prompt

the child to " use as many of the supplies as you can", "see what else you can build using those things" or " can you build a bigger bridge/trap/boat/etc.?"

Transcription and Coding of Language Data

The audio- and video-tapes from each experimental session were transcribed and the children's utterances were evaluated for their connection to the problem-solving task according to a taxonomy of Problem Solving Utterances, derived from the work of Blank and Franklin (1980).

With two exceptions, single word utterances were not coded. Single wh-question words were coded as questions and "okay" was coded if it was not being used as a synonym for "yes". All other utterances were coded for task-relevancy (task irrelevant, broadly relevant, or narrowly relevant, unknown). Utterances that were broadly or narrowly task-relevant were further coded for function (affective, regulative, word play), addressee (private, social) and cognitive complexity. Further details of these coding schemes are given below.

Coding Scheme

Relevance: Utterances were coded for one of three levels of relevancy: narrowly task relevant, broadly task relevant and task irrelevant. In a few instances it was impossible to determine the meaning of the child's utterance and these were coded as *relevancy unknown*. Those utterances that were totally unrelated to the bridge task were coded as *task-irrelevant*. This included comments about family and friends - "my Mummy's at school"¹; toys at home - "my baby's

¹ all examples are taken from the transcripts

pretend and her name's Sissy"; or comments about events other than those pertinent to the task at hand - "we don't want bugs to live in your hair, yuck".

Utterances that were directly relevant to solving the bridge building problem were coded as *narrowly relevant*. This included questions and comments about what to build - "hey, I think I'm gonna build a trap for it"; how to build it - "hey, how you build that?"; why it was being built - "then the monster can't come out"; and other problem-solving types of utterances - "and this is how I'll stop it".

All other utterances were coded as *broadly relevant*. These included fantasy play utterances - "he's karate and then the karate man get that monster out and then he kick and they kick"; drawing attention to the structure being built - "see what I made?"; general comments about the building supplies - "how do you get this mixed up playdough?" (referring to the multi-coloured playdough); and other utterances generally related to the bridge task - "I'm bigger than the monster is 'cause he's little". Only utterances coded as narrowly or broadly task relevant were subsequently coded for function, addressee, and cognitive complexity.

Function: All task relevant utterances were subsequently coded for the general sort of function they fulfilled: regulating, affective, or word play. Utterances that primarily served to express emotions were coded as *affective*. These include positive or negative evaluations - "mine almost done" and "can't do that one"; fantasy affect - "that monster's gonna be really scary"; emotional exclamations - "oopseys"; or exclamations such as "ahhh" when a structure crumbles. Word play,

nonsense words, singing, and single words and nonsense words accompanying actions were coded as *word play*. This includes utterances like "log wog hog, I got log". Action accompaniment included such things as bouncing the monster down the river and saying "hop, hop, hop". Singing included a range of from "do do do do do" to singing the Batman theme song when attacking the monster.

Utterances that were coded as *regulatory* in nature included statements about action - "I'm gonna put everything away"; statements about states of affairs - "can't reach over here" or "I don't have any more bricks"; commands (including requests for attention, clarification, action) - "look", "tell us the story" (about the monster); "don't put it there"; questions - "what these are?"; and back channel responses - "let's see". In a very few cases, it was not possible to determine what function the utterance served and these were coded *function unknown*.

Addressee: All task relevant utterances were coded for whom they were addressed to: self (private) or other (social). Typically, when speech is social, i.e. is addressed to another, eye contact is at least briefly established and/or the speaker's body is oriented toward the listener. When eye contact is difficult or inconvenient, speakers tend to compensate and mark the speech as intended for a listener by: (1) making explicit verbal reference to the listener; 2) repeating their remark until a response is received; 3) demanding a response; 4) initiating physical proximity/contact; or 5) increasing volume (Feigenbaum, 1989). In this study, task relevant speech was judged to be *social* if it met any one of these criteria. Speech was judged to be *private* if it: 1) was subvocal; 2) was reduced in volume; or 3) failed to meet the criteria for

social speech. On occasion it was difficult to determine if an utterance was social or private in nature. These utterances were coded as *addressee unknown*.

Cognitive Complexity: The fourth level of coding performed on the transcripts evaluated the utterances for the cognitive complexity of the material being expressed, based on Blank (1974). Cognitive complexity was sometimes judged over a span of utterances when the utterances were conceptually linked, e.g. "I'm gonna build the water" "so he can't get over". *Level 1* utterances matched or analyzed the here-and-now experience. These included utterances that noted attributes - "long blocks"; locations - "right over there"; current actions - "me put that on"; or deficiencies in the present situation - "he (the block) can't fit".

Level 2 utterances were those which restructured the here-and-now, including fantasy creations - "I'm making a blast off castle"; similes - "like a high jump slope" , generalizations - "no monsters can go through there"; simple statements about possible states of affairs - "don't put that there or it will break" and plans of action - "now I'm gonna make a tunnel". Utterances which expressed reasoning about the restructured reality were classified as *Level 3* utterances. These included conditional relationships - "I need one of those to stop the truck goin' fallin' back" and explanations - " we put this" "so the monster can't get out". Those utterances that were incomprehensible were coded as *level unknown*.

Inter-Rater Reliability

A second rater, trained on the coding criterion by the experimenter, independently coded 18% of the total utterances, with approximately equal numbers of utterances being sampled from each child. Reliability measures were calculated for each level of coding as well as for transcription of the utterances. A 98% agreement was reached on the transcription of the utterances. On classification of Relevancy, a 93% inter-rater agreement was reached. Ninety-nine percent agreement was reached on Function, and 89% on Addressee. Inter-rater reliability was 95% for level of Cognitive Complexity.

Table 3 summarizes all coding categories and criteria.

TABLE 3: CODING CATEGORIES FOR PROBLEM SOLVING UTTERANCES

Level 1 Matching/analyzing here and now experience.

Includes: noting attributes, locations, current actions; noting deficiencies in present situation.

Level 2 Restructuring the here and now.

Includes: fantasy creations, similes generalizations, simple statements about possible states of affairs and plans of action.

Level 3 Reasoning about the restructured reality.

Includes: conditional relationships, explanations

Regulating: occurs at all 3 levels of cognitive complexity)

includes utterances that are primarily regulating in nature include: statements about action; statements about states of affairs; commands(including requests for attention, clarification, action); questions; back channel responses, etc.

Affective: occurs at all three levels of cognitive complexity: fantasy affect is level 2 complexity; explanation of affect is level 3 complexity

includes utterances that primarily serve to express emotion including: positive and negative evaluations; emotional exclamations and fantasy affect

Word Play: occurs only at level 1 of cognitive complexity

includes word play; nonsense words; singing; single words and nonsense words accompanying actions

CHAPTER THREE

RESULTS

This study was designed to investigate the intellectual uses of language by normal and specific language impaired preschoolers. In particular I was interested in the role that speech plays in problem-solving. To this end I asked:

- 1) Do young children use speech to assist in problem-solving?
- 2) Do private speech and social speech play similar roles?
- 3) Do children with a specific language impairment use self-regulatory language in a way that is fundamentally different from normal children?
- 4) Do some children show a preference for private speech or social speech as their main problem-solving strategy?, and
- 5) What correlations exist between the child's level of dependence, cognitive style or efficiency and language use in problem-solving tasks?

Two data bases were set up to investigate the research questions. The first data base included all utterances generated by each child during the bridge task, to a maximum duration of 30 minutes. Because of the degree of individual variation in the transcript length (15 to 30 minutes), a second data base included only on the utterances generated during the first fifteen minutes of the bridge task. Since there was little difference in the patterns of results produced by the total utterance and 15 minute data bases, all results presented in this chapter are based on the total utterance data base.

Speech and Problem Solving

The first analysis examined the functions that speech performs during problem-solving tasks.

As a first step, an utterance coded as "task-irrelevant" was not coded further for function. All task-relevant utterances were coded for the function they fulfilled e.g. "regulating", "affective" or "word play". If an utterance fulfilled more than one function it was coded for each function as well as coded for fulfilling a "multiple function". Also, some utterances were impossible to code for function, e.g. confused or subvocal utterances, and these were coded as "unclear function".

Table 4 lists the group means for the total utterances and the proportion of utterances in each of the above categories. Although all the children produced utterances that were irrelevant to the task, the majority of their speech was about the task at hand (83.8% - 91.5%). A relatively small proportion of utterances produced were irrelevant to the task (8.5% - 16.3%), with the younger children generating a larger proportion of off topic speech than the two older groups. Only a small proportion of utterances fulfilled the functions of "affective" (8.6% - 9.5%) or "word play" (2.0% - 2.3%). The majority of utterances produced by all three groups were regulatory in nature (76.6% - 84.2%).

It is clear that speech plays a large regulatory role during problem-solving tasks. When presented with a problem to overcome, children will use language to discuss and consider solutions for that problem. The language may play a variety of functions but it is overwhelmingly centred around the task. At this level of analysis, only normal developmental differences were evident. The

younger children were more likely to go off task and produce less regulatory language than the older children. Differences between the SLI and NL children will be considered in more detail later in this chapter.

TABLE 4: THE FUNCTIONS OF SPEECH IN PROBLEM-SOLVING TASKS

	SLI	ONL	YNL	MEAN
TOTAL UTTERANCES	155.3	186.3	136.7	159.4
% TASK IRRELEVANT UTTERANCES	8.5	9.4	16.3	11.4
% REGULATING UTTERANCES	84.2	81.2	76.6	80.7
% AFFECTIVE UTTERANCES	8.6	9.4	9.5	9.2
% WORD PLAY UTTERANCES	2.4	4.6	3.5	3.5
% UNCLEAR FUNCTION UTTERANCES	2.3	2.0	2.2	2.2
% MULTIPLE FUNCTION	6.0	5.8	8.0	6.6

The Roles of Social and Private Speech in Problem Solving

The second set of analyses investigated whether private speech and social speech play similar roles in problem-solving activities. I was interested to see if children preferred to use private speech for guiding their thinking on the bridge problem or whether they were just as likely to use social speech. To this end the proportion of all task relevant private speech and social speech

used by each child was calculated as a function of the total number of utterances. The proportion of narrowly task relevant (NTR) private and social speech was similarly calculated. Table 5 lists the group means for these variables, as well as the mean for all three groups combined. Total utterances was used as the denominator in these variables to facilitate the eventual use of ANOVA techniques. As can be seen, the proportions of social and private speech are approximately equal when all task relevant language is considered. When only narrowly task relevant language is considered, more private speech is produced than social speech. It is of interest, though, that there is as much social problem-solving language as there is. Even though children are more likely to use private speech when focusing narrowly on the problem at hand, they still produce considerable amounts of social speech.

TABLE 5: PROPORTION OF TOTAL UTTERANCES THAT WERE TASK RELEVANT AND EITHER PRIVATE OR SOCIAL SPEECH

	ALL TASK RELEVANT UTTERANCES		NARROWLY TASK RELEVANT UTTERANCES	
	SOCIAL	PRIVATE	SOCIAL	PRIVATE
SLI	44.7	45.5	14.8	29.0
ONL	48.3	41.1	20.1	26.0
YNL	<u>44.8</u>	<u>35.2</u>	<u>12.2</u>	<u>19.4</u>
MEAN	45.9	40.6	15.7	24.8

The reliability of the observed differences was tested with two - two-way repeated measures ANOVAS, Group (3) X Addressee (2), with percent of all utterances falling within a given Addressee category as the dependent variable. I will report here only those effects that concern the Addressee factor. The main effect for Addressee was not statistically significant when all task relevant language was considered, $F = 0.97$; $df = 2, 1$; $p = 0.34$. The second ANOVA considered only those utterances that were narrowly task relevant and regulating, again looking for differences in Addressee. The dependent variable was percent of all utterances falling within a given Addressee category. In this analysis, the main effect for Addressee did prove to be statistically significant, $F = 6.81$; $df = 2, 1$; $p < .02$. There were no significant Group X Addressee interactions in either ANOVA.

The nature of the Addressee effect can be more clearly seen if the proportion of task relevant utterances that were either private or social is calculated, i.e. further restrict the denominator of the proportions. Table 6 lists group means for these variables. Children used the same proportion of private and social task relevant speech throughout the session (53% vs. 47%), but when speaking specifically about the problem-solving aspects of building the bridge they used more private than social speech (61% vs 39%). Although neither ANOVA yielded significant Group X Addressee interactions, the SLI children consistently produced equal or greater amounts of private speech than social speech, while the normal children produced more private speech than social speech only when narrowly task relevant language was considered.

TABLE 6: PROPORTION OF TASK RELEVANT UTTERANCES THAT ARE PRIVATE AND SOCIAL IN NATURE

<u>ALL TASK RELEVANT LANGUAGE</u>		
	SOCIAL SP	PRIVATE SP
SLI	50.0	50.0
ONL	54.0	46.0
YNL	<u>56.0</u>	<u>44.0</u>
MEANS	53.0	47.0

<u>NARROWLY TASK RELEVANT LANGUAGE</u>		
	SOCIAL SP	PRIVATE SP
SLI	34.0	66.0
ONL	44.0	56.0
YNL	<u>39.0</u>	<u>61.0</u>
MEANS	39.0	61.0

The Effects of SLI on Regulatory Language

The earlier analyses examined the function of language in problem-solving tasks across groups of children. In this third set of analyses I was interested in whether the SLI children used regulatory language in a manner that was different from normal children. Since I was particularly interested in language produced by children to guide and direct their thinking about a problem, I focused the analyses on those utterances that were specifically about the problem-

solving aspects of building the bridge and were regulatory in nature, as opposed to affective or word play. Table 7 indicates the number and proportion of such utterances that were produced by each group.

TABLE 7: NARROWLY TASK RELEVANT, REGULATING SPEECH

	SLI	ONL	YNL
NO. OF REGULATING UTTERANCES	33.3	43.4	19.3
% OF REGULATING UTTERANCES	0.44	0.47	0.33

The ONL children produced more narrowly task relevant, regulating utterances than the SLI children, who in turn produced more than the YNL children. The YNL children tired more quickly. The SLI children kept working but were less talkative. There are no differences in the proportion of language produced by the three groups, however, when only narrowly relevant, regulating speech is considered.

A two-way repeated measures ANOVA, Group (3) X Addressee (2), with *absolute number* of narrowly task relevant utterances as the dependent variable was performed to test the reliability of the observed group differences. The main effect for Group was statistically significant, $F = 7.11$; $df = 2,1$; $p > 0.01$. The ONL children produced more regulating utterances than the SLI

children, who produced more regulating utterances than the YNL children. When a similar ANOVA was performed, using the *proportion* of narrowly task relevant, regulating utterances as the dependent variable, the main effect for Group no longer proved to be statistically significant, $F = 2.17$, $df = 2,1$; $p = 0.15$. Although the three groups produced different amounts of language during the task, they devoted the same proportion of their speech to the problem-solving aspects of the task.

Interactive vs. Solitary Problem Solvers

As a group the children displayed a strong trend for using private speech when problem-solving. I was interested in seeing whether this trend also held at the individual level or whether some children showed an inclination for social speech over private speech as their main problem-solving strategy. To answer this question, only narrowly task relevant utterances were considered. Children who produced at least 30% more private NTR utterances than social NTR utterances during the task were considered solitary problem-solvers. Those who produced at least 30% more social NTR utterances than private NTR utterances during the task were considered interactive problem-solvers. Those who produced less than a 30% difference between social and private utterances were considered versatile problem-solvers. Out of the eighteen subjects, three children (one SLI, one ONL, and one YNL) showed a marked preference for social speech when problem-solving. Ten children (four SLI, four YNL and two ONL) showed a strong preference for private speech and 5 children (one SLI, one YNL, and three ONL) showed no strong preference between the two types of speech when problem-solving. Although there was an overall preference among the children to use private speech over social speech as the main language strategy when problem solving (ten children vs. three children) this was not universal.

Some children appeared to prefer to problem solve in an interactive setting while others seemed to use social and private speech to the same degree when attempting to construct solutions to problems.

Personality Characteristics and Language Use

Since there was a distinct difference among the children in the style of language used during problem-solving (private vs. social), the next logical step was to ask if there were any correlations between the personality characteristics and the tendency to use private or social speech as the main problem-solving strategy. During the assessment sessions data was collected on three personality characteristics of the children: cognitive style (impulsivity), efficiency and level of dependency. The raw latency and error scores collected on the KRISP were transformed into z-scores, based on the distribution of scores across all three groups, and the efficiency and impulsivity scores were derived from these. Highly positive impulsivity scores indicate that the child has an impulsive cognitive style while highly negative impulsivity scores indicate a reflective cognitive style. High positive efficiency scores indicate low efficiency while highly negative efficiency scores indicate high efficiency. Dependency scores were calculated from the parent responses on the Beller Questionnaire. The higher the dependency score the more dependent the child was judged to be. A summary of the results can be found in Table 8.

TABLE 8: PERSONALITY CHARACTERISTICS

GROUP	SUB #	IMPULSIVITY	EFFICIENCY	DEPENDENCY
GRP 1				
SLI	1	-1.54	-0.52	46
SLI	2	0.75	-1.05	41
SLI	3	1.13	-0.11	50
SLI	4	-0.53	-1.29	56
SLI	5	-1.02	0.28	36
SLI	6	<u>1.07</u>	<u>0.39</u>	<u>46</u>
MEAN		-0.02	-0.38	45.83
GRP 2				
ONL	1	0.27	-0.13	46
ONL	2	-0.85	-2.09	51
ONL	3	-0.89	-0.73	47
ONL	4	-2.32	-0.18	46
ONL	5	0.69	-0.55	47
ONL	6	<u>-0.61</u>	<u>-1.01</u>	<u>46</u>
MEAN		-0.62	-0.78	47.17
GRP 3				
YNL	1	1.01	0.89	50
YNL	2	-0.97	2.87	59
YNL	3	3.00	-0.22	53
YNL	4	-1.78	2.36	43
YNL	5	3.31	1.23	39
YNL	6	<u>-0.67</u>	<u>-0.51</u>	<u>51</u>
MEAN		0.65	1.10	49.17

The personality characteristic scores of the seven children showing the most distinct differences in the production of social and private narrowly task relevant speech (three showing a strong social preference and four showing the strongest private preference) were compared. There was no evidence of a pattern between any of the characteristics and style of language preferred. The personality characteristics of the four children displaying the least difference between the amount of social and private narrowly task relevant speech were also compared and again no pattern was found. It appears the preference for social or private speech in problem solving is unrelated to the child's level of dependency, efficiency, or cognitive style.

The final analysis looked at whether correlations exist between the personality characteristics of efficiency, cognitive style and level of dependency and other aspects of language use. Unless otherwise noted, the correlations were calculated across all children, regardless of group membership and are based on absolute numbers of utterances, not proportions. Analyses were performed to investigate correlations between the three personality characteristics and the use of private speech, social speech, total utterances, task irrelevant utterances, narrowly task relevant (NTR) utterances, broadly task relevant (BTR) utterances, and affective utterances. Both the proportion and the absolute amount of each of these aspects were compared to the three personality characteristics.

TABLE 9: CORRELATIONS BETWEEN PERSONALITY CHARACTERISTICS AND LANGUAGE USE

	EFFICIENCY	IMPULSIVITY	DEPENDENCY
PRIVATE SPEECH			
SOCIAL SPEECH			-.53 **
TOTAL UTTERANCES			-.61 **
TASK IRRELEVANT UTTERANCES		.58 **	
NTR UTTERANCES	.47 **		
BTR UTTERANCES			-.71 **
AFFECTIVE UTTERANCES			

** indicates significance at $p \leq 0.05$

There was a positive correlation between the level of impulsivity displayed by the child and the amount of task irrelevant speech produced. Impulsive children produced more task irrelevant utterances than reflective children, $r = .58$; $p > 0.02$. No other significant correlations were found between impulsivity and language used.

A negative correlation was found between dependency and quantity of speech produced. The less dependent children produced more total utterances and more broadly task relevant utterances,

$r = -.61$; $p < .01$; $r = -.71$; $p > 0.001$. Less dependent children also produced more social speech than dependent children, $r = -.53$; $p > 0.03$. Children displaying more independence are more likely to talk in general than dependent children. In particular they are more likely than dependent children to interact socially using language and talk more extensively about the task at hand.

A positive correlation existed between efficiency and the proportion of narrowly task relevant speech produced. The more efficient children devoted a larger proportion of their speech to narrowly task relevant remarks, $r = .47$; $p = 0.05$. No other correlations were found between efficiency and language use when all the children were considered as a homogenous group.

To further explore possible correlations between personality and language use, it was decided to split the children into two groups: those who displayed a specific language impairment (SLI) and those who did not (NL). I felt that the delayed language development of the SLI children might be masking developmental trends between language use and the three personality characteristics. The SLI children would be more similar to the ONL children in nonverbal maturity but more similar to the YNL children in language ability. They would be less impulsive, less dependent and more efficient but display less mature forms of language.

All the above mentioned analyses were also performed on the two subgroups and similar results were obtained for both groups. Other analyses performed on the efficiency measure, however, indicated significant correlations and significant group differences between SLI and NL children. SLI children exhibited a negative correlation between efficiency and the total number of

utterances produced, $r = -.78$, $p = 0.07$, while NL children displayed a positive, though non-significant, correlation between the two, $r = .35$; $p = 0.27$. The same converse relationship was observed between efficiency, narrowly task relevant speech and private speech. The more efficient SLI children produced less narrowly task relevant speech, $r = -.74$; $p = 0.09$, while the more efficient NL children produced more narrowly task relevant speech, $r = .61$; $p = 0.04$. SLI children scoring high in efficiency produced less private speech, $r = -.61$; $p = 0.20$ (non-significant), while NL children scoring high in efficiency produced more private speech, $r = .60$; $p = 0.04$. In all three instances the SLI children exhibited a negative correlation between efficiency and language while the NL children displayed a positive correlation. More efficient SLI children produced less total speech, less narrowly task relevant speech and less private speech than less efficient SLI children. Conversely, the more efficient NL children produced more language overall, more narrowly task relevant speech and more private speech than the less efficient NL children.

When absolute values of speech are considered, SLI children displayed negative correlations between efficiency and language while NL children displayed positive correlations between the two. As noted above, however, when proportions of language are considered, all the children displayed a positive correlation between efficiency and the proportion of speech devoted to narrowly task relevant comments. The SLI children talk less than the NL children. The more efficient SLI children were likely to produce even less speech. When they did talk, however, it was more likely to be narrowly task relevant. Although they spoke less they devoted a larger proportion of their speech to narrowly task relevant comments than the less efficient SLI children.

In contrast the more efficient NL children were more likely to produce more speech as well as devote more of their speech to narrowly task relevant remarks.

In summary, the major findings of this study were as follows:

- 1) The vast majority of utterances generated by all the children during the bridge task were task-relevant and regulating.
- 2) The same amounts of social and private speech were used in broadly task relevant remarks but private speech dominated in narrowly task relevant remarks.
- 3) The SLI children produced less speech than the NL children. The older children (both SLI and NL) talked more than the younger children and the younger children were off task more frequently. Although there were group differences in the absolute amount of speech produced, all three groups devoted the same proportion of remarks to narrowly task relevant speech.
- 4) Some children displayed a preference for social speech as their main problem-solving strategy, some preferred private speech, while some used both equally.
- 5A) There were no correlations between the preference in (4) above and the three personality characteristics, but there were correlations with other aspects of language use.
- 5B) A positive correlation existed between impulsivity and task irrelevant speech.
- 5C) A negative correlation was found between dependency and two aspects of language: the total utterances produced and the amount of broadly task relevant speech produced.

- 5D) A positive correlation was found between efficiency and the proportion of narrowly task relevant speech produced by all the children. The data on SLI children displayed negative correlations between efficiency and three aspects of language use: the total utterances produced; the number of narrowly task relevant utterances; and the amount of private speech produced. Conversely, the data on the NL children displayed positive correlations between efficiency and these three aspects of language.

CHAPTER FOUR

DISCUSSION

This study was motivated by two major issues: the possible intellectual functions of social and private speech in children's language; and the possible influence specific language impairment exerts on a child's ability to take advantage of these intellectual functions. A secondary purpose of the study was to investigate whether there were any correlations between personal style and the manner in which the children used language. Since this is the first study in this area, some of the findings, while supportive of general research, the results are unique in the questions they raise concerning children's use of language.

Intellectual Functions of Language

A major goal of this study was to explore the intellectual functions of language, be it social or private. In the present study the amount of task relevant speech increased with age from 83% for the younger children to 91% for the older (both NL and SLI) children. The majority of speech produced by all the children during the bridge task was directly concerned in some manner with the task itself, but the younger children produced more task irrelevant speech than the older children. This is in accordance with results produced by Kohlberg et al. (1968) and Behrend et al. (1989) indicating that very young children produce less task relevant speech than older children. The younger children may also have been off task more frequently because they were less interested in the task. It was more difficult to get the younger children involved in the task than the older children, and they also appeared to lose interest in the task more quickly than the older children.

Also consistent with previous findings (Berk, 1986; Berk & Garvin, 1984; Goodman, 1981), a large proportion of the task relevant speech (77 - 84%) was regulatory in nature. Again, the younger children produced less regulatory speech than the older children. The remaining speech was purely affective or word play. The children used language throughout the bridge task. The results suggest that they used it primarily to talk about the task, to direct themselves and others in possible task solutions and to focus attention on the problem at hand. These results will be discussed more fully throughout the following pages.

Broad Task Relevant (BTR) Speech

Broadly task relevant (BTR) speech is speech that was generally relevant to the bridge task but was not specifically problem-solving in nature. This speech included fantasy play utterances, general comments about the building supplies or other utterances generally related to the task. BTR speech was equally likely to be private or social in nature (53% vs 47%). When the children were discussing general parameters of the task or were building on the fantasy aspects of the bridge task, they were as likely to use social speech as private speech. Although there was a great deal of variation from dyad to dyad in the story-line behind the fantasy play, all the children's solutions were influenced by the story-line developed in their particular session. Take for example the following monologue of private BTR speech by JP:

JP a diving boat.
 JP you know he ate that.
 JP went into the water then.

Later in the session JP built a boat to get across the river. Social BTR speech appears to similarly influence the children's approach. The following is a short conversation between CW and NC, about the monster, the wind and their castles.

NC look it the wind blew everything.
 NC look at the wind.
 CW you not gonna break down my castle.
 CW because my castle's a very very very strong one.
 CW something a hurricane can't break down.
 NC no mine is the strongest.
 NC see he [the monster] likes my castle 'cause he thinks is it high.

Shortly after this conversation CW began fortifying her castle so the wind/monster could not break it down. BTR speech appears to supply an overall context from which to draw a solution. It is possible that the BTR speech provides a method of "brain-storming" or "free association" until the child develops a working theory to take to the problem-solving task. Each explanation is equally plausible given the results of this study. Regardless of the role that BTR speech plays in problem-solving, at this level of task relevance the language of thought is equally private and social in nature. As the language became more narrowly task relevant, however, it also became more inwardly directed.

Narrow Task Relevant (NTR) Speech

By definition narrowly task relevant (NTR) speech focused on the problem-solving aspects of the task. These utterances were directly relevant to solving the bridge problem. NTR utterances included questions and comments about what to build, how to build it and why it was being built. NTR speech was used as an attentional aide to assist the children in focusing their thoughts on the task. The children were also mapping out general plans for and identifying

specific steps needed to complete the project. The children were more likely to use private speech than social speech to focus their thoughts and direct their actions when working on problem-solving aspects of a task. A high proportion of NTR speech was private in nature (61% vs 39% social). The following example illustrate the focusing function of language. MM is talking to himself while instigating an extensive search for a particular block. He appears to be using language to keep his thoughts focused on what he is searching for.

MM red.

MM where where red.

MM where where where where red.

This focusing function of language was also exhibited in other ways. The children were not constantly focused on the bridge-problem throughout the task. They would occasionally go off task or indulge in fantasy play. When returning to the specific problem-solving aspects of the task, they often repeated empty phrases such as "let's see" or "okay" once or twice as if to focus themselves on the problem. These utterances were frequently subvocal and private.

The planning and problem-solving functions of language were also frequently performed by private speech. The children often talked to themselves when they encountered difficulties to overcome. Following are two monologues of private speech produced during the bridge task.

TK now I can't fit.

TK which one fits?

TK nope.

TK why can't it?

TK why can't?

TK where's the XX for it?

TK where did it go?

and

ME me do it too.
 ME then let me do that too.
 ME no girl.
 ME I got one.
 ME I need more playdough for it.
 ME move it there.
 ME no, come around.
 ME then hammer.
 ME there.
 ME okay, okay.

The children talked to themselves more than they talked to others when they were specifically focused on solving the bridge task. These results add to those in the current literature on the cognitive self-guiding use of private speech. While previous research indicates that much of private speech is self-guiding in nature (Berk, 1986; Berk & Garvin, 1984.; Berk & Bivens, 1990; Goodman, 1981), this research is the first to indicate that the majority of direct problem-solving speech is private in nature.

A fair proportion of NTR speech (39%), however, was also social. Focusing on private speech when investigating the cognitive self-guiding functions of language ignores a full third of the language used for this purpose. Furrow (1984) reported that no function of language was totally fulfilled by private speech alone. These results indicate that children's social speech may also play a significant role in regulating actions and thoughts about a task. Such social speech may potentially be self-regulating or other-regulating. If it is self-regulating then it may very well play an identical role to private speech. During the following monologue AM is attempting to get a plug of playdough out of a straw. She stops working and makes eye contact with the experimenter as she says each remark then returns to her work.

AM I gonna break it pieces then it will come out.
 AM I (break) it up.
 AM XX it come out?

This is similar to NTR private speech. Although it is directed to an external listener it appears to play a self-regulatory role. This NTR speech seems to be directed at self, in spite of its social form.

Social NTR speech may also other-regulating. In these types of interactions one child directly regulates the other child's actions. In the following exchange AG is helping SG rebuild a structure that has just collapsed. SG is in the process of adding a large block.

AG no (the structure falls again).
 AG see.
 AG see what I told you.
 AG wouldn't work (begins to rebuild the structure).
 SG mm-hmm (picks up another large block).
 AG nope, no tall one.
 AG nope nope.
 SG okay.

AG's comments are directly focused on SG's actions. Through his comments he successfully prevents SG from repeating an error. His language is specifically intended to direct the actions of the other child he is interacting with.

The children also provided ideas for each other just by working on the bridge task at the same time. For example, in the session with EW and ST, EW decided to make a trap for the monster. When the monster entered her trap, a block fell and hit him on the head. Within moments ST also began to build a trap with a falling block. This type of imitation occurred in a number of

sessions. The children were able to watch each other and duplicate the strategies and solutions adopted by the other child in the dyad.

In other exchanges the children spoke to each other about their relative successes and provided suggestions and opinions to each other. In these types of interactions one child did not directly regulate the other's actions. The child might identify a problem but leave the solution up to the other. This is similar to scaffolding, where an adult, or peer, provides structure for a task keeping it within the child's ability level but allowing the child to complete the task alone.

Following is an excerpt of a conversation between SK and TK about the bridge that TK has built.

- TK now that's high enough.
 TK see?
 SK ya but how you supposed to get over now?
 TK what?
 SK you gotta get over there and you can't climb (TK gestures jumping up to the bridge).
 SK no, I mean if you had a person, how you going to get up and onto the other side?
 TK easy (lifts the monster up and over the bridge).
 SK 'cause you can't do that the way you're building.
 TK jump.
 SK jumping won't - you can't jump.
 TK just watch.
 TK I'll just drive up there on these blocks.

TK went on to build steps up to the bridge so that a truck could drive up and over the bridge. By pointing out flaws and making suggestions to each other on how to improve the structure, the children used language to scaffold the task for each other. Children who were scaffolded in this way had the advantage of extra input into the bridge problem without direct regulation curtailing their actions.

The children not only received general problem-solving information about the bridge task from each other, but also from the experimenter. The experimenter did not directly regulate the children's behaviour but on occasion refocussed their attention on the task or reminded them of the parameters of the bridge task as in the following conversation with AG and SG.

- EXP how about trying to build a bridge that the monster can go through?
 AG he can break down that one but I'll make a taller one for he can't break down.
 EXP mm-hmm.
 SG I'm gonna make a bridge that he can go under it.
 EXP that would be a good idea.

The children then went on to integrate the new information into their solutions. This type of interactive situation offers alternative solutions that might not have occurred to the children on their own. They do not have to follow through on the offered solutions, but at least had the opportunity to consider the potential of each one and then adopt or discard the solutions as they choose.

Language appears to play an important role in the way children learn to structure their thoughts. Children use language not only to communicate their thoughts to others, but to communicate thought to themselves. Both social and private speech may be used as the language of thought. Although direct problem-solving types of language tend to be expressed through private speech the correspondence is not perfect. Social speech also plays a significant role in the child's understanding and solving of a problem-solving task.

General Incidence of Private Speech

One of the reasons this study was successful in looking at the intellectual functions of language is because we were able to elicit a high percentage of private speech during the bridge task. The children in this study generated a large number of utterances, a large proportion of which were private in nature (27% - 63%), and private speech was used by all subjects. Many previous studies report a low incidence of private speech, with some children producing no private speech during the experimental session. Beaudichon (1973) reported as few as 0.60 utterances per minute. In the first three studies by Kohlberg et al. (1968), only 50% of the children produced private speech. The difference between the present study and these earlier studies is likely the result of differences in the experimental setting. In the present study the experimenter encouraged interaction between the children. She also interacted with the children herself. Berk & Garvin (1984) found that adult (teacher) presence hindered the production of private speech. Other studies, however, have reported if the adult does not regulate the child's behaviour, the incidence of private speech is either not affected or actually increases. Behrend et al. (1989) found that parent presence increased the frequency of both social and private speech produced by the children, while Goudena (1987) noted that the children produced more private speech when they were in the company of a collaborating adult. It seems that environments that encourage interaction promote the overall use of both social and private speech. While the present experimenter did not encourage interaction herself and the children, neither did she discourage it. Also, the children were encouraged to actively interact with each other. Although no previous studies have investigated children's private speech in interactive group situations, it is likely that such an environment would also elevate overall language use. The presence of

peer/adult and the interactive setting are probably responsible for the high levels of private speech in this study.

The Effects of SLI on Language Use.

The question here is how SLI effects a child's ability to make use of language. The first aspect of the data of interest concerns the intellectual functions of language. Although the SLI children produced less speech overall than the ONL children, there was no significant difference in the proportion of speech devoted to the task by the two groups. Language appears to play a generally regulatory role, regardless of language ability. The similarity in the proportion of speech devoted to NTR utterances and private speech by both SLI and NL children indicates that speech for self functions in a similar manner in SLI and NL children. Although SLI children talked less than NL children, children of similar cognitive levels (i.e. same chronological and mental ages) appear to use the same proportion of regulatory language. Language status seems to have little effect on the use of this function of language. Such results indicate that SLI children attempt to use the cognitive functions of language to the same degree as NL children. It does not follow, however, that language functions as productively in SLI children as in NL children. Whether they are as effective in their use of language as NL children is still unknown.

A second aspect of SLI language concerns the social nature of language. The NL children produced slightly more social speech than private speech during BTR talk, and significantly more private than social speech in NTR utterances. The SLI children, however, consistently produced more private speech than social speech across situations. They also consistently

produced a higher proportion of private speech than the NL children. In other words the SLI children talked more to themselves than they talked to others.

Two possible explanations exist that may explain this apparent difference in the way that NL and SLI utilize language. It is possible that the SLI children produce more private speech because they understand themselves better than others do. SLI children find it harder to communicate with others and make their thoughts understood, so they do not talk as frequently. One of the characteristics of private speech is that it is somewhat idiosyncratic. SLI children may not be at the same fundamental disadvantage when they are talking to themselves as when they are talking to others, so private speech is not reduced. The second possible explanation is that SLI children are less effective in social interaction than NL children. The current literature on the social relations among SLI children indicates that they are less likely to interact socially and are less successful than NL children when they do interact (Bryan, 1986). Such children are often less socially accepted and do rouse negative expectations in others through inappropriate and deficient use of social language.

Personal Style

Personal style appears to exert a great deal of influence over how language is used. While the private speech was more commonly used for NTR utterances, there was also individual variation in the manner in which the children used social and private speech. Correlations were also evident between language use and the personality characteristics under investigation, i.e. impulsivity, efficiency, and dependency.

Solitary or Interactive

Although most children preferred to use private speech when problem-solving, some embraced a consensus-style approach. Three of the eighteen children (inter-active problem-solvers) relied heavily on social speech for most of their problem-solving. The majority of their NTR utterances were social rather than private. Ten children preferred private speech (solitary problem-solvers) as their main language strategy for problem-solving, while five children showed no preference for either (versatile problem-solvers). These children used social and private speech equally throughout their problem-solving (NTR) utterances. There were no correlations between any of the personality characteristics under consideration and this individual style. Also, the children from the three groups were randomly distributed throughout the three styles.

To date no studies are available which investigate this aspect of language use, but several possible explanations exist: the developmental course of private speech and personal style may explain this pattern of language use. The curvilinear development of private speech, as suggested by Vygotsky (1934/1962), provides one possible answer to the observed individual variation. If the children were at different stages of internalizing regulation then this pattern of results would be expected. Although children pass through similar stages around similar times, language development follows an idiosyncratic time line and there is much individual variation. The interactive problem-solvers (3 children) may have not yet learned how to step other-regulation toward self-regulation. They remain dependent on others to regulate their actions, and this is reflected in their language. The versatile problem-solvers (5 children) are balanced between other-regulation and self-regulation, relying on both equally. Vygotsky might argue that their

self-regulatory function is beginning to develop. At these ages, however, most (10 children) have begun to take full advantage of the self-guidance and self-mediation functions of speech for self.

Plausibility notwithstanding, the lack of other developmental trends in this study make a Vygotskian explanation unlikely. Children who preferred private speech were not older, less impulsive, more efficient or more independent. It thus appears more likely that this individual variation is simply due to personal style. While the majority of children seem to prefer using private speech when problem-solving, this does not hold true for all. Some children appear to use social speech to a lesser or greater extent for the same purpose.

Personality Characteristics

In spite of the tremendous individual variation in the way language is used in problem solving there is very little in the current literature about the effects of personality on language use. There is no information on correlations between personality and the use of social vs. private speech and only preliminary results exist on other characteristics. What information there is, however, indicates that impulsivity, efficiency and dependency all exert some influence on aspects of language use.

Impulsivity: Impulsivity appears to affect the child's ability to focus on the problem space. Impulsive children are fast but inaccurate workers (Salkind & Wright, 1977). Although they work quickly, they make a lot of errors, sacrificing accuracy for speed. Dickie (1973) found that impulsive children were more likely to use "self-stimulating", i.e. task-irrelevant, private speech.

Impulsivity was also positively correlated with the number of task irrelevant utterances in this study. The more impulsive children were more likely to produce task irrelevant speech than the less impulsive children. These results may reflect the combination of two developmental trends. Children become less impulsive as they become older and older children tend to use less task irrelevant speech than younger children. This correlation between impulsivity and task irrelevant speech may just indicate the independent co-occurrence of these two aspects of the maturation process.

Alternatively, there may be a true connection between impulsivity and language use. The results indicate that impulsivity affects the degree to which the child talks about the task. Impulsivity may not affect language so much as it affects thought. If impulsive children go off task more frequently, their language may reflect this thought pattern. Interestingly, if language is also capable of regulating thought, then therapy designed to develop the focusing and orientation functions of speech for self may assist impulsive children in staying on task. Berk (1986) found that among children who were more off-task, the greater use of private speech was related to lower levels of inattentiveness. Although no similar correlation was found in this study this may be due to the measure used for impulsivity. The impulsivity measure was a Z-score, ranking each child's level of impulsivity in relation to the other children in the study. A limited range of impulsivity in this population may account for the observed lack of correlation. The children in this study did appear to use private speech to focus attention. It is possible that impulsive children would benefit from the explicit teaching of this function.

Dependency: The less dependent children were not only more likely to talk than the more dependent children but they were also more likely to engage in social language use. The strongest correlation, however, was between the use of BTR speech and independence. Less dependent children were more likely than dependent children to engage in BTR speech. If BTR speech acts as a springboard for NTR speech then less dependent children may be better at developing this springboard than more dependent children. These children may engage in more social speech because they are more able to generate independent ideas to add to the overall topic development. They may be less reliant on others to provide scaffolding for a task. While Klieman (1974) did not measure the use of social speech, she found that independent children were more likely to use private speech than dependent children. The lack of similar findings in this study may be an artifact of the small sample size. It may also be due to the relatively small range of dependency in the children. The dependent children were not that different from the independent children in their scores on the Beller (1957) Scale. This may account for the lack of confirmation of this correlation between private speech and independence.

Efficiency: Efficiency was the only personality characteristic where significant group differences were exhibited between NL and SLI children. Efficient children work quickly and accurately (Salkind & Wright, 1977). These children balance speed and accuracy without sacrificing one for the other. Recall that analyses were run on both proportions and absolute numbers of each aspect of language under consideration. One aspect of language use generated the same correlation with SLI and NL children. Highly efficient children devoted a larger proportion of their speech to NTR remarks than less efficient children, regardless of language status.

In other aspects, however, the efficient NL children differed from the efficient SLI children.

The SLI children display mirror image correlations to those of NL children when absolute values of language were considered. SLI children displayed a significant negative correlation between efficiency and total utterances produced, a non-significant negative correlation between efficiency and the absolute number of NTR remarks, and a non-significant negative correlation between efficiency and the amount of private speech produced. The NL children, on the other hand, exhibited a non-significant but positive correlation between efficiency and total utterances produced, a significant positive correlation between efficiency and the number of NTR remarks, and a significant positive relationship between efficiency and the amount of private speech produced. Even though the correlations were not always significant the trend is apparent. The more efficient SLI children generated fewer total utterances, less narrowly task relevant speech and less private speech than the less efficient SLI children. With the NL children the trend was reversed. Efficiency was consistently correlated to greater language use in these three areas. Goodman (1981), who defined efficiency as a faster rate of motoric acts and shorter time to solve the puzzle, also reported a correlation between efficiency and private speech with NL children. The more efficient (NL) children in her study also produced more private speech.

This difference in language use between NL and SLI children is a new finding in the context of both private speech and language use by SLI children. There appear to be two pieces to the correlation between efficiency and language use in SLI children. Efficient SLI children talk less, but when they do talk it is narrowly task relevant. When they use speech, it tends to be specific to the problem-solving task.

The instrument used to measure efficiency in this study, the KRISP, is a visual perceptual task, so children scoring high in efficiency on this task were also strong visual processors. If efficient children make the best use of the strategies and tools available to them in the problem-solving environment, then they will also minimize the use of ineffective strategies. Children who are highly efficient and who also have solid language skills take full advantage of those skills and use them to their fullest advantage. Language normally is an effective tool in problem-solving, so efficient NL children use it a lot. The current results suggest that efficient children who are weak in language skills will minimize the use of weak skills and develop other tools available to them, such as visual-perceptual skills. It would also hold that what language they do use would be highly specific to the task. This explanation is supported by the above reported pattern of correlations between efficiency and language use.

Stronger support for this particular view could, in principle, also come from the experimental task. For example, the more efficient children would be those who were quickest at solving the bridge-task. Unfortunately, it was too difficult to apply a measure of efficiency to the bridge task. The children were able to choose their own approaches and solutions to the problem. Although the task was set up as a bridge-building task, the children were permitted to devise any solution that allowed them to get across the river without being eaten by the monster. Some of the solutions were very simple, others were very elaborate. Some children created five or more structures during the experimental session, while others worked on the same structure for most of the session. This variation in solutions made any direct measure of task efficiency impossible to apply across all the children.

Further research is required to investigate this apparent link between efficiency and language status, but it may be that successful compensation of SLI over time leads to less language use. This has significant implications for early language intervention with SLI children. Working silently may be an indication of an effective adaptation to SLI. Early intervention may decrease the child's ability to work efficiently but increase versatility. It is important to recognize the gains of either situation and structure intervention accordingly.

Clinical Implications

There are three points to keep in mind when considering intervention for the SLI child: 1) the intellectual functions of social and private language; (2) SLI children are less effective in social interactions; and (3) efficient adaptation to SLI may lead to reduced language use. If social speech does provide scaffolding for the task, then the SLI children are not receiving the full benefit of the scaffolded setting. If private speech rises out of the social setting, then SLI children are at a further disadvantage. Since the children are less likely to interact socially, the amount of other-directed regulation they receive may be reduced. They will receive less guidance, and therefore, less transfer to self-guidance may occur. Their language impairment may also interfere with their ability to make full use of other-regulation when it is provided. For this reason, clinicians should consider devoting a proportion of their time to the explicit teaching of self-guiding strategies. They might also use a scaffolding approach to therapy sessions so the SLI children receive increased social input from which to develop self-guiding strategies. Such sessions may also teach the children better social interaction skills. Children's language directly affects the way in which peers and adults interact with them (Blank & Franklin, 1980). Parents

and teachers find SLI children more difficult to talk to (Bryan, 1986). Improving SLI children's social communication skills may ultimately improve the scaffolding they receive from their environment. When SLI children are engaged in these types of activities, however, the clinician should not expect high performance on the play task. The children will be applying language to the task but utilizing a less efficient problem-solving strategy.

The effective use of private speech should also be a consideration of language intervention. SLI children appear to use private speech similarly to NL children. Efficient SLI children use less speech when problem-solving but when they use it, it tends to be specific to the problem-solving situation. If self-guiding speech arises out of the social context then the above intervention should also improve the effectiveness of private speech by SLI children. It's effectiveness should not be measured by increased use however. SLI children who have successfully internalized the scaffolding provided during intervention will use a higher proportion of those strategies in their private speech but their overall use of language will not increase. These children will benefit from utilizing improved language strategies in private speech but will still function most efficiently when working silently.

Theoretical Implications

Vygotsky (1934/1962) proposed that speech for self arises out of social speech. In this study, interaction between the children and the children and experimenter seemed to provide new ideas and information for the children to integrate with their own thoughts. The children appeared to interact with each other to develop a general framework from which to launch their particular

solutions to the problem. Speech for self may fulfil a cognitive role that is not limited by whom the speech is addressed to. Through the regulation provided by others, the child may learn self-regulation. Speech for self may begin as social and then turn inward. Goudena (1987), for example, found that children who had received direct instruction (regulation) on a task produced more private speech after receiving instruction than children who had received no regulation. In this study, the children were able to interact at will with others. The information garnered in social interaction may have provided the children with a springboard. Input is received from others as well as from self until a possible solution is devised. BTR remarks were equally social and private. Such speech may have assisted in orienting the child to a specific approach and provided an outline from which to formulate a solution to the problem. Once the child has devised a working theory, private speech becomes the dominant form of speech for self as the child works out the finer details to the solution. These results indicate that Vygotsky (1934/1962) was correct when he hypothesized that speech for self arises from the social context. Children use the information provided through social speech when using language to regulate their thoughts and actions.

Vygotsky (1934/1962) defined speech for self by the function it played rather than by addressee. The current literature has focused solely on the behaviourally defined construct of private speech. The results of this study indicate that such a narrow definition excludes much valuable information about the intellectual uses of language. The language of thought does not appear to be restricted by addressee. While the intellectual function of private speech has been recognized, the role of social speech in cognitive development has been virtually ignored. The language of

thought transgresses the artificial boundaries of social and private speech. It is time to return to a more Vygotskian definition for the language of thought. Language should be defined by the function it performs rather than by merely the behaviour that accompanies it.

Future Implications

The results of this study suggest four main areas for future research.

First, researchers interested in the intellectual uses of language should not just study private speech. It is important for future research to begin taking into account the intellectual functions of social speech as well as private speech.

Second, the role of fantasy and collaborative narrative in problem-solving remains essentially unknown. If social language and fantasy play provide a foundation for children to build upon then it may very well play a significant role in the children's cognitive development. The effects of scaffolding and social interaction on children's development are related to this issue. It is time to drop back from the behaviourally defined construct of private speech and begin investigating the notion of speech for self as originally proposed by Vygotsky (1934/1962). The intellectual functions of language should not be limited by a behavioural approach to the problem space. Both social and private speech appear to contribute significantly to the cognitive development of children so both should be considered when investigating the roles of language in cognitive development.

Third, the relationship between efficiency and language use in children with normal language and children with SLI should be more closely investigated. The results of this study suggests that SLI has a definite effect on the way children utilize the intellectual uses of language. It is important to investigate if these trends hold for the larger population.

Finally, it is important to examine if children with SLI use language as effectively as children with normal language development. SLI children generally appear to use the cognitive functions of language in a manner similar to NL children during problem-solving tasks. The question remains to be asked: do they use it as effectively? The implications of reduced ability and use of social language in the cognitive development of SLI children must also be considered. Uncovering the differences and similarities in the way that SLI and NL children use both social and private speech to regulate and guide their thoughts will broaden our understanding of how language and thought interact.

Conclusion

This study was motivated by an interest in the intellectual functions of language. In particular, I was interested in the way children use language as a problem-solving tool and how SLI affects a child's ability to employ the cognitive uses of language. Of secondary importance was the relationship between personality and language use. Since individual style appears to effect language use and previous studies indicated correlations between dependency, efficiency and impulsivity and language use, I was interested in duplicating of those findings.

This study has uncovered the cognitive uses of social as well as private speech. Both Piaget and Vygotsky stressed the importance of interaction in language and cognitive development. While Piaget believed that peer interaction was the crucial factor in the development of children's thought and language (Piaget & Inhelder, 1968), Vygotsky (1934/1968) hypothesized that child/adult interactions exerted the greatest influence on cognition. The results of this study indicate that both may be correct. Social interaction with both peers and adults appears to foster greater overall use of language as an intellectual tool.

The children with SLI appeared to use language in a manner similar to children with normal language development. The SLI children used language to an age appropriate degree, but formulation problems may have decreased its effectiveness as a cognitive tool. The correlations between efficiency and language use are the first results to indicate the children with SLI utilize the intellectual functions of language in a manner different than children with normal language development. Given these findings, it is important that more research be done in this area. The relationship between efficiency and the effective use of language as a problem-solving strategy by both children with SLI and children with normal language development is still unclear. More investigation is needed in this area before any firm conclusions can be drawn.

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Appendix A Description of Language Assessment Materials

Four language measures were completed during the assessment sessions. Following is a description of those measures.

Developmental Sentence Score (DSS): The DSS is a method for evaluating the developmental level of a sample of free speech. A detailed evaluation of a child's use of standard English grammatical rules is performed on the first 50 complete sentences of a tape-recorded sample of the child's spontaneous speech in conversation with an adult (Lee, 1974). Points, from 1 to 8, are awarded for the occurrence of specified forms within eight categories: 1) indefinite pronouns or noun modifiers; (2) personal pronouns; (3) main verbs; (4) secondary verbs; (5) negatives; (6) conjunctions; (7) interrogative reversals; and (8) wh-questions. Forms that are typically learned later within each category earn higher numbers of points.

Language samples for the current study were recorded while the child and experimenter were playing with the Fisher-Price Farm set. Scores are percentiles for age (in 6 month blocks).

Expressive One Word Picture Vocabulary Test (EOWPVT): The purpose of this test is to evaluate the size of children's expressive vocabulary. The child is shown a series of black-and-white line drawings and asked to name each one, using a single word. Drawings primarily elicit labels for object and event categories. The child's response is written down and the test proceeds until 6 consecutive wrong answers/no responses are given. Scores are based standard scores with a mean of 100 and a standard deviation of 15.

Test for Auditory Comprehension of Language - Revised, subtests 2 and 3, (TOLD-R): Subtest 2 is a test of the child's auditory comprehension of the meaning of pronouns and grammatical morphemes such as prepositions, noun number and case, verb number and tense, noun-verb agreement and derivational suffixes, tested within the context of a simple sentence. Subtest 3 examines the child's auditory comprehension of the meaning of elaborated sentence constructions, including modality (interrogative sentences, negative sentences, active and passive voice, embedded sentences, and partially and completely conjoined sentences. Each subtest consists of 40 items. Each stimulus item is composed of a word or sentence and a corresponding plate that has three black-and-white line drawings. One of the three pictures for each item illustrates the meaning of the morpheme or syntactic structure being tested. The other two pictures illustrate either two semantic or grammatical contrasts of the stimulus, or one contrast and one decoy. The examiner reads the stimulus aloud, and the child is directed to point to the picture that best represents the meaning of the word, phrase or sentence spoken by the examiner. No oral response is required on the part of the child (Carrow-Woolfolk, 1985). Scores are percentile ranks (in 6 month block for ages 3;0 - 5;11 and year block from 6;0 - 8;11) with conversions for z-scores.

Peabody Picture Vocabulary Test (PPVT): the PPVT is designed to measure a subject's single word receptive vocabulary. Each stimulus is composed of a single word and a corresponding plate consisting of four line drawings. One of the four pictures for each item illustrates the meaning of the word being tested. The other three pictures are decoys. The examiner reads to stimulus aloud and the child is directed to point to the picture that best represents the meaning

of the word spoken by the examiner. No oral response is required on the part of the child. The test is discontinued when there are eight consecutive responses containing six errors. Scores are given as standard scores with a mean of 100 and a standard deviation of 15.

Appendix B
Letter and Consent Form sent to parents

Letter:

Project Title: The Role of Language in Problem-Solving

Investigators:

Arlene Sturn Speech-Language Pathology, M.Sc. student (U.B.C.) (604) 931-1317
Judith Johnston Professor, Audiology and Speech Sciences (U.B.C.) (604) 822-5591

We are asking you to consent to participate with your child in a research project currently underway through the **School of Audiology and Speech Sciences** at the University of British Columbia and the **Speech-Language Pathology Department** of the **Central Fraser Valley Health Unit**.

We are investigating the way in which children use language to solve problems. By comparing the verbal problem-solving strategies of 3- and 4-year old children with normal language development and 4-year old children with a language delay we hope to determine if distinctive styles of language are used in different problem-solving situations. This study is specifically designed to investigate if children use language in a different manner when they talk to themselves than when they talk to each other. Also under investigation is Whether independent/dependent children and impulsive/reflective children use different language styles in problem-solving.

Assessment: These two sessions will last approximately 20 - 30 minutes each and will be audio-taped. The children will be asked to participate in a series of screening tasks to determine their cognitive style (impulsive or reflective), to verify that their cognitive abilities are within normal range for their age and their language skills are developmentally normal/delayed. These tasks include a picture-naming task, a categorization task, and a free play period.

Experimental Task: If your child is appropriate for this study he/she will participate in an experimental task. This session will also last approximately 20 - 30 minutes and will be audio- and video-taped. During this time children will play a game in groups of two. A large drawing of a river valley will be placed on the ground. Each child will sit on opposite sides of the drawing and they will be asked to build a bridge across the river out of a variety of available building supplies.

Questionnaires: You will be asked to fill out a questionnaire which rates your child's level of independence. This will take approximately 10 minutes to fill out.

Your child's identity will be kept strictly confidential and will not appear in any report of this study.

Agreements: Any audio- and video-tape records of your child will be kept at U.B.C. and used only by the project researchers. Questionnaires and written versions of the taped material will have all names removed.

If you should choose no to participate in this project or wish to withdraw at any time, you are under no obligation to continue without jeopardizing the services that your child is receiving.

If you have any questions or concerns regarding the procedures listed above, please call Arlene Sturn at 931-1317 and I will gladly discuss the study with you.

Yours sincerely,

Arlene Sturn

Consent Form:

I consent to the participation of my child and myself in the study: "**The Role of Language in Problem-Solving**". I am fully aware of the purpose and objectives of this projects and all procedures have been clearly explained to me. I understand that my identity and that of my child will be kept completely confidential.

I understand that I am under no obligation to participate in this study, that I am free to withdraw at any time, and that doing so will in no way jeopardize the services that my child is receiving.

I have retained a signed copy of this consent form for my own records.

Please check one:

I consent to my child's and my participation in this project. _____

I **do not** consent to my child's or my participation in this project _____

Signature of Parent/Guardian

Date

PLEASE SIGN AND RETURN THIS COPY TO PROJECT INVESTIGATORS

Appendix C Personality Characteristic Measures

The following measures were used to evaluate the cognitive style, efficiency and dependency of the subjects:

Kansas Reflection Impulsivity Scale for Preschoolers: The KRISP was developed as an easier version of the Matching Familiar Figures Test (MFF) (Kagan, et al., 1964) suitable for young children. It consists of five practise, and ten test, items on each of two forms (A and B). Only form A was used for this assessment. Each item presents a standard line drawing of a common object, together with four to six similar alternatives, only one of which is an exact copy duplicate of the standard figure. The child is asked to find and point to the one exact copy in the array, and as is done with the MFF, latency to first response and number of errors are recorded. Children are advanced to the next item after a third pointing error on any item. Standard instructions are used, including standard prompts to be used when the children forget or fail to follow instructions.

Impulsivity and efficiency scores were derived from the raw KRISP scores through a statistical method proposed by Salkind and Wright (1977). The raw latency and error scores were transformed into z-scores, based on the distribution of scores across all 3 groups. This yielded two continuous scale distributions of all subjects in the sample, from most impulsive to most reflective, and most to least efficient. Large positive impulsivity scores are indicative of impulsivity while large negative impulsivity scores are indicative of reflectivity. Large positive efficiency scores signify inefficiency and large negative efficiency scores signify high efficiency.

Beller Questionnaire (Beller, 1957): The following questionnaire was given to parents to complete. The dependency score was the mean rating across all ten items yielding a continuous scale from most dependent (highest score) to least dependent (lowest score).

The following rating scale was used for each question:

Very often and persistently		often and persistently	occasionally and little persistence		very rarely and without persistence	
7	6	5	4	3	2	1

DEPENDENCY RATING QUESTIONNAIRE

1 HOW OFTEN DOES THE CHILD SEEK HELP?

By help is meant any form of assistance from another person. e.g., doing something for the child like dressing, washing, finding a toy for the child, pushing the child in the swing, protecting it against another child when attacked or something is taken away from it, etc., giving instructions and guidance, like demonstrating how to build, play, etc., giving what it asks for, e.g., a toy to play with, colour to paint, etc.

2 HOW OFTEN DOES THE CHILD SEEK RECOGNITION?

By recognition is meant any form of praise and approval. Child comes running to an adult to show what it did, e.g., exclaiming, "I washed my hands"; telling an adult that it carried out a command or request by the adult; e.g., "I put the blocks back," "I drank all the juice," etc. Calling an adult to see what it did, e.g. in the sand box, at painting, in the playroom, etc. Shouts to adult, "Watch me," when on the swing, when on a bicycle, when feeling it is especially good, doing something praiseworthy, etc.

3 HOW OFTEN DOES THE CHILD SEEK PHYSICAL CONTACT WITH AN ADULT?

Physical contact: wants to be picked up, holds on to adult's clothing, hugs adult's knee, holds or reached for adult's hand, puts arm around adult's neck (while adult demonstrates to child, reads to group, on the playground, etc.)

4 HOW OFTEN DOES THE CHILD SEEK ATTENTION?

How often does the child manage to keep other occupied with it? Getting another person to occupy themselves with the child, e.g., talking to them (answering questions, explaining, watching the child, giving approval, praising the child, scolding, punishing, etc.). Try to

ignore whether the child does it in a pleasant or unpleasant way, whether it is clever and skilful or clumsy or inefficient (a nuisance) in its efforts to draw attention, e.g., talking a lot, asking questions, volunteering answers, making a noise, making faces, being uncooperative, disobeying, excelling others, etc. use as your basic criterion how often it manages to keep others occupied with it.

5 HOW OFTEN DOES THE CHILD SEEK TO BE NEAR OTHERS?

By being near we mean just what it says. The child manages to sit near an adult (or another child), to play where an adult is (or where another child or children are) regardless of whether it interacts with the other person or not. If the child is active and skilful, this may express itself in the form of playing with, working with, talking to, offering help, asking for help; on the other hand, if the child is quiet and timid it may just hang around, watch, stand or sit near another individual child, adult (observer) or near a group. This differs from attention because it refers just to proximity and does not say anything about the relationship between the child rated to other children or to an adult when they interact.

6 HOW OFTEN DOES THE CHILD DERIVE SATISFACTION FROM ITS WORK?

This can be judged from the following behaviour: The child finishes its activity, e.g., painting, building, play, etc., without asking an adult for comment; without making derogatory comment on the work of other children; or without showing disturbance or irritation by bullying other children, dashing off wildly, destroying its own work, etc., but instead moving away from a completed activity and getting ready for a new period.

7 HOW OFTEN DOES THE CHILD ATTEMPT TO CARRY OUT ROUTINE TASKS BY ITSELF?

Routine tasks: e.g., dressing, washing, eating, toilet behaviour, etc. The rater is to put special emphasis on the child's attempts to carry out these routine tasks by itself. The occurrence of such attempts can be observed directly by seeing the child trying to dress by itself, to dress or undress at toilet or swimming pool, trying to get water running for washing, etc. (while an adult assisted another child), or the child may be found doing any of these in a clumsy way but doing them as best it can (The rater must be careful not to let the feeling of a self-evident duty to assist the child in all routines when the child needs assistance interfere with an objective appraisal.)

8 HOW OFTEN DOES THE CHILD ATTEMPT TO OVERCOME OBSTACLES IN THE ENVIRONMENT BY HIMSELF?

By obstacle we mean missing a necessary tool or object in play or work, having misplaced a towel, a toy, clothing apparel, etc., desired objects that are placed out of reach, etc. The extent of the child's striving to overcome such obstacles by itself can be seen when, after its turning away from an ongoing activity (play or work), it returns and continues after having overcome the obstacle. This is distinguished from reaction to such obstacles which are characterized by the child's interrupting his play or work to join other children or another child, to scream out loud - "I need a hammer," "I need another truck" - to go from child to child begging, demanding, and finally grabbing the desired object, or simply beginning to

daydream, wandering off aimlessly or crying. How often does the child seek or strive to overcome obstacles in the environment on his own without getting distracted from his ongoing activity?

9 HOW OFTEN DOES THE CHILD TAKE INITIATIVE IN CARRYING OUT ITS OWN ACTIVITY?

When the child comes into the room, playground, etc., it knows what it wants to do and proceeds to do so, e.g., sandbox, bicycle, swing, building a ship, or a tunnel with blocks, etc. This can be distinguished from going out into the playground and looking around for someone to join, clinging to an adult, standing or wandering around aimlessly until an adult takes initiative, asking someone to play with it, or mostly wanting toys or tools which other children have already begun to use. It does not matter whether another child enters its activity occasionally, the main criteria being whether it has its own ideas and proceeds to carry them out.

10 HOW OFTEN DOES THE CHILD COMPLETE AN ACTIVITY?

Once a task is set by an adult or selected by the child, the child carries it out to completion, e.g., construction, play, art, etc. This is to be distinguished from giving up easily, getting quickly bored, disinterested or distracted. It is also to be distinguished from rigid perseveration, i.e., a child just keeps on doing one thing regardless of whether it is a successful or unsuccessful attack on the task. Use as your basic criteria how often the child carries out an activity to its completion.