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**The effect of sociocognitive conflict and ability grouping on the  
reading achievement of high school students**

**Malazzo, Ronald Anthony, Ph.D.**

**City University of New York, 1991**

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THE EFFECT OF SOCIO-COGNITIVE CONFLICT AND ABILITY GROUPING  
ON THE READING ACHIEVEMENT OF  
HIGH SCHOOL STUDENTS

by

RONALD MALAZZO

A dissertation submitted to the Graduate Faculty in  
Educational Psychology in partial fulfillment of the  
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**ABSTRACT****THE EFFECT OF SOCIO-COGNITIVE CONFLICT AND ABILITY GROUPING  
ON THE READING ACHIEVEMENT OF  
HIGH SCHOOL STUDENTS**

by

**RONALD MALAZZO****Advisor: Professor Nicholas Anastasiow**

The purpose of this study was to investigate the role of socio-cognitive conflict and ability grouping on the development of reading comprehension skills and story schema. Exploration included a comparison of dyadinal and individual students working in homogeneous high, homogeneous low, and heterogeneous settings. The socio-cognitive conflict model, usually applied to spatial perspective taking tasks, was applied to the area of reading using Kintsch's (1980) reading comprehension model. Piaget's, Bearison's, Kintsch's and other theories and empirical studies that address the issues of social interaction, cognitive conflict, and reading comprehension are reviewed and critically examined.

The study consisted of 120 ninth grade students equally, randomly selected from high and low academic tracks. They were randomly assigned to treatment dyads or

individual control groups according to reading ability. All subjects were pre and post-tested on reading comprehension and schema development. Subjects were asked to read a short passage and answer ten comprehension questions each school day for nine weeks. Audiotaped data was collected every three weeks. Subjects in the socio-cognitive conflict condition discussed and came to agreement before answering each question. Subjects in the control condition performed the same task individually without discussion. Socio-cognitive conflict was observed and measured along with comprehension gain.

Following treatment several analyses of variances and test of correlation were conducted. Frequency of socio-cognitive conflict, reading comprehension gain and story schema gain were the dependent variables. Results indicated that socio-cognitive conflict facilitated greater reading comprehension gain than the control group. In addition heterogeneous ability grouping seemed to produce greater learning for low pretest reading subjects than homogeneous grouping and subjects who worked alone, while it seemed to have no significant effect on homogeneous high pretest ability readers. .

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The Effect of Socio-Cognitive Conflict and Ability Grouping  
on the Reading Achievement of  
High School Students

Ronald Malazzo

CHAPTER I

SCHEMAS AND COGNITIVE DEVELOPMENT

Recently several studies have been conducted examining the effect of socio-cognitive conflict on cognitive development (Wertsch 1979, Light 1983, Doise, Mugny & Perret-Clermont 1975, Damon & Killen 1982). However, no investigation has as of yet been conducted investigating the effect of socio-cognitive conflict on the reading achievement of high school students.

According to Piaget (1968), a person attempts to understand the world he or she lives in through the construction of schemas. Schemas are the internal structures or organizations of actions and thought as they are transferred or generalized by repetition in similar or analogous interactions with the environment (Piaget 1970). Schemas are potential actions. Like plans or blueprints, they exist in a state ready to be used whenever the environment can be assimilated into an existing structure. Cognitive development occurs when the child actively

attempts to assimilate disequilibrating environmental stimuli into presently existing structures (schemas). If the stimuli cannot be immediately taken into the presently existing structure or organization, accommodation (modification of the schema) must occur in order for the child to accurately comprehend his or her world. Such equilibration is the primary process by which logical organizations or structures are constructed.

It is through interaction with the world that a person begins to take in (assimilate) and modify (accommodate) his or her presently existing schema resulting in the subsequent construction or reconstruction of hierarchically more complex, homeostatic structures. The inability of a person to immediately assimilate environmental action or thought into presently existing structures without accommodation is identified by Piaget (1970) as cognitive conflict. It is through a person's attempt to resolve cognitive conflict that hierarchically more complex internal organizations are constructed, resulting in an increasingly greater ability to derive meaning from oral and written stimuli (Byrd and Gholson 1980).

Cognitive conflict may result from interaction with environmental objects or through social interaction with adults and peers (Bearison 1982). Traditionally studies of cognitive development have relied on the inner reflections of subjects interacting individually with environmental

inanimate objects in problem solving situations (Piaget 1936, Piaget 1941, Piaget and Inhelder 1963).

## CHAPTER II

### SOCIO-COGNITIVE CONFLICT

However, an alternative to studies of children's solitary problem solving activities are studies in which subjects work collectively to solve problems and resolve mutual differences. These kinds of studies have the potential to reveal cognitive conflicts and resistances that are not apparent in individual problem solving activities (Damon 1980).

Cognitive conflict which occurs as a result of interaction with others is called socio-cognitive conflict (Bearison 1982). According to socio-dialogical theories of cognitive development (Mead 1934, Vygotsky 1962), there is a temporal and logical priority to the social matrix from which individual knowledge is constructed (Bearison 1982). According to Vygotsky (1962), the development of knowledge first appears between people as an interpsychological category and then within the child as an intrapsychological category. Piaget (1985) states that thought forms are a prolongation of living morphogenesis through social structure, since the operation of reason is always dependent on cooperation. In other words, "What the child can do in

cooperation today, he can do alone tomorrow" (Vygotsky 1962, p. 104).

While Vygotsky (1962) and his followers have stressed the role of language as a shared social system through which the social origins of thought are transferred, Piaget (1966) has emphasized that it is the internalization of the reversible coordinations of actions that structures thought. These coordinations are both individualizations that are both individually and socially organized. According to Piaget,..."individual operations of intelligence and operations making for social discourse in cognitive cooperation are one and the same thing, the 'general coordination of actions' to which we have continually referred being an interindividual as well as an intraindividual coordination..."(1971, p.360).

Piaget states that all knowledge is social in nature because the categories of knowledge derive their meaning through social discourse, and it is precisely by a constant interchange of thought with others that we are able to decentralize ourselves to coordinate internal relations from different viewpoints (Piaget 1950). Therefore the mastery of interindividual coordinations during social interaction leads the way for the mastery of intraindividual coordinations (Piaget 1950, Bearison 1982). The principle cognitive function of social interaction therefore, is the decentering of the child; the forcing of the child to

recognize viewpoints and elementary cognitive schemas which differ from his or her own (Damon 1982, Doise, Mugny, and Perret-Clermont 1976, Bearison 1982).

In social interaction, individuals face others who disagree with or contradict their own intuitively derived concepts and points of view, thereby creating cognitive conflicts whose resolution results in the construction of more complex, more complete schemas (Bearison 1982). Socio-cognitive conflict is therefore a feeling of disequilibrium that a person experiences because he or she is unable to immediately assimilate an action or statement from another that is contradictory to his or her own without somehow modifying their presently existing schema through cognitive reconstruction. It is through this disagreement that a person begins to change his or her own cognitive schemas, creating more complex schemas, that he or she is better able to understand the world (Bearison 1982, Damon and Killen 1982, Doise, Mugny, and Perret-Clermont 1975, Doise, Mugny, and Clermont 1976, Ames and Murray 1982).

Each individual's internal representational organization of his or her world is based upon his or her own personal experiences with the world and other people. When interacting with objects individually, the person has only the need to satisfy his or her own disequilibrium. Contact with other people produces doubt, and the desire to prove or verify one's own ideas. In collective situations,

each individual is pressed not only to satisfy themselves, but to satisfy the other members of the group as well in attempting to find a solution to a problem. This need to coordinate one's own ideas and actions with another structures the process of social interaction in ways that promote growth (Damon 1982, Bearison 1982, Doise, Mugny, and Perret-Clermont 1976).

The relationship between social-contextual and cognitive organismic structures is reciprocal, presupposing as well as determining both individual and interindividual actions (Bearison 1982). While it is not presently possible to conduct an empirical investigation in order to determine if cognitive structures inferred through empirical observations of social interaction are identical to an individual's internal cognitive structures, investigators have proposed various systems of conventional bridges, mediating links and feedback systems to account for the relationship between cognitive reasoning and social interaction. According to Piaget (1970) and Bearison (1982), the structure of the social context is isomorphic or similar in form to the structure of the knowledge derived within that context, and therefore coordination of actions of individual's obeys the same laws as intraindividual coordination. Cognitive change occurs both interindividually and intraindividually through the process of equilibration. Social interaction is a process that

develops in tandem with the cognitive structural status of the individual. Thus the relationship that exists between cognitive and social interaction can be studied without recourse to externally derived, environmentally determined mediators or cognitive feedback systems (Damon 1982).

In attempting to determine if interindividual cognitive conflicts can promote cognitive development in individuals, Doise and his colleagues in Geneva have demonstrated that children working together in dyads are able to solve problems at a more advanced level of cognitive development than children working individually on the same problems. The experimental paradigm generally used in these studies consisted of children between five and seven years old who were initially pretested to determine their basal level of performance on a target problem and who were randomly assigned to individual or dyad treatment conditions. Subjects were then given a spatial perspective taking task requiring them to accurately reconstruct a three dimensional replica of a town from a three dimensional model placed in front of them and rotated 90 degrees to the right of the base. Subjects then performed the task either individually or in pairs while an observer waited until the pair stated that they had come to an agreement about the placement of the houses and the task was completed. Then the observer determined the deviation of the replica from the model and recorded the score. The results indicated that subjects who

worked together significantly outperformed those students who constructed a replica individually.

In a second subsequent experiment, Perret-Clermont (1976) had six and seven year old children perform a conservation of volume task requiring the decanting of liquids (Piaget and Szeminska 1952). All subjects were individually post-tested to determine whether or not they were conservers. The subjects were then placed in social interaction or individual control groups. In the social interaction groups, two conservers were placed with a non conserver. The nonconserver was required to pour out juice into three differently shaped containers so that they all received equal amounts of juice. All three children could only drink the juice when they had all come to an agreement that the amount of juice was equal in all three glasses. Then seven days later, and a month later the social interaction and the control subjects were individually administered a post-test with an experimenter who questioned them about how they poured out the juice. The results indicated that the subjects involved in the social interaction task advanced significantly more than the control subjects. Therefore, social interaction had a significantly greater effect on the development of conservation of volume than maturation alone. A qualitative analysis of children's explanations indicated that 66% of the subjects introduced one or more arguments that had not

been observed during social interaction. Among these were arguments of identity, compensation, and reversibility. These results thereby indicate that the interaction experienced in the social situation resulted in the internalization and elaboration of the operational structure of the individual child.

In a different study using the same paradigm, Perret-Clermont (1980), had the same subjects individually pretested on their ability to conserve number and volume. Subjects were then placed into either individual or dyad treatment groups. Subjects in the social interaction groups were composed of either one conserver or one nonconserver, or two nonconservers. Subjects were then given a task requiring them to come to an agreement as to which line of chips had more, the longer line or the shorter line. When subjects were certain that they had come to an agreement, they notified the observer. Individual control subjects were administered a post-test requiring them to identify whether a circle of chips had the same, less, or more chips than a line of the same item. Results indicated that subjects placed into the social interaction group advanced significantly more on the ability to conserve number than subjects who worked alone. A second post-test was then administered on the following day assessing subjects on their ability to conserve volume (decanting of liquid test-Piaget and Szeminski 1952), a task that was not administered

during treatment. The results indicated that dyads who participated in the previous conservation of number task, also advanced significantly more on the conservation of volume task than subjects in the control group who performed these same tasks alone. These investigations, therefore, demonstrated that subjects had internalized logical structures that were generalized (transferred) to other related conservation concepts (Perret-Clermont 1980).

Mugny and Doise (1978) had subjects pretested and placed into different dyadinal groups according to their spatial perspective taking ability indicated by pretests. Group compositions consisted of two spatial perspective takers, two non perspective takers, two intermediate perspective takers, a high and a low perspective taker, and pairs of subjects with intermediate perspective taking abilities. Results indicated that subjects need not be placed with more advanced partners for them to show individual improvement on post-test, and that children paired with less advanced partners did not experience diminished cognitive performance thereby indicating the unidirectionality of cognitive development. The most successful dyadic combinations were those in which children who functioned at intermediate levels of mastery worked together (Bearison 1982).

In these conditions, both more and less advanced partners progressed. In addition to the improved conservation task performance, a substantial number of subjects who participated in the social interaction treatment condition used logical arguments to which they were not even exposed to during the course of collective problem solving to justify their responses during individually administered post test. Also subjects progress generalized to other conservation concepts (Perret-Clermont 1980).

Perret-Clermont and her colleagues concluded that, "The cause of the cognitive development observed is to be found in the conflict of centrations which the subject experiences during social interaction. This interaction obliges the subject to coordinate their actions with those of others, and this brings about a centration in the encounter with other points of view which can only be assimilated if cognitive restructuring takes place", (Perret-Clermont 1980, P. 182). It is, therefore, unnecessary for subjects to experience exposure to correct solutions, but only to experience a conflict of centrations for cognitive development to occur. In several studies, cognitive development was experienced by exposing subjects to preoperatory centrations on conservation problems that were contrary to their own preoperatory centrations (Perret-Clermont, Mugny, Doise, and Perret-Clermont 1978-1979; Ames

and Murray 1982). To test this, Perret-Clermont, Mugny, Doise (1979), and Perret-Clermont, Ames, and Murray (1982) conducted studies involving the above paradigm in which some subjects were purposely, systematically exposed to arguments (socio-cognitive conflicts) that were contrary to their own preoperatory conceptions in a conservation of length problem. Significantly greater cognitive development still occurred even though subjects in the social interaction condition were never exposed to correct solutions.

If subjects are not merely internalizing and replicating correct concepts observed during social interaction what then is the determining factor resulting in cognitive growth? Is it as Perret-Clermont (1980), indicated equilibration and cognitive reconstruction promoted through the coordination of conflicts of conceptions? Is it merely having a peer simply agree with a more dominant persuasive peer? Or is it the modeling of more accurate, appropriate solutions from a more capable peer?

In order to isolate the critical factors resulting in the promotion of cognitive growth, Damon (1984) conducted an investigation in which 9-11 year old students were placed in a situation requiring them to solve a moral dilemma. Systematic observation of the subject's social interaction revealed cognitive conflicts and resistances that are missing in children's solitary attempts to solve problems

indicating that exposure to disagreement or controversy facilitates cognitive development more than solitary problem solving.

Socio-cognitive conflict, therefore, appears to be the determining factor during social interaction resulting in cognitive development. However, other behaviors occurring during social interaction, such as the observation of a correctly modeled response (Zimmerman 1985), concurrence (Smith, Johnson and Johnson 1981), and reinforcement (Slavin 1985) may also be the determining factors resulting in cognitive growth.

## CHAPTER III

THE RELATIONSHIP OF SOCIAL LEARNING THEORY TO SOCIO-  
COGNITIVE CONFLICT

In a somewhat contrasting view, social learning theorists have proposed that children who have shown cognitive gains following participation in collective problem solving situations have done so through the observation of a model who consistently demonstrates the correct solution (Bandura 1977, Zimmerman, and Rosenthal 1974). In a recent study, Bodlakova (1988) conducted an investigation in which 100 nonconservers and transitional kindergarten and first grade children were randomly assigned to no conflict, intermediate conflict, high conflict and control group modeling treatment conditions. Following a pretest and random assignment into treatment groups, subjects observed a videotape in which two female adults gave four responses which varied according to treatment conditions. In the no conflict situation both models responses were in consistent agreement with one another. In the intermediate conflict treatment condition both models agreed on the first and fourth responses and disagreed on

the second and third (a possible primacy and recency effect). Finally in the high conflict situation, both models disagreed on all four responses. Following observation of the videotaped treatment, a social learning phase was instituted requiring each child to predict the performance of both models on a parallel task. Immediately after the social learning phase, subjects were administered a post-test followed three weeks later by a second similar post-test employing materials involving conservation of weight. The amount of certainty and response latency were used as measures of internal conflict. The results of Bodlakova's (1988) study indicated that the no conflict modeling treatment was significantly more effective in generating the acquisition of conservation of weight than either of the two conflict treatments. Children who received nonconflicting modeling were able to predict models responses more accurately than children in two conflict groups. In addition, subjects who accurately predicted models' judgements and explanations attained significantly higher immediate and delayed post-test conservation on both training and transfer tasks. Bodlakova, therefore, concluded that the clear consistent presentation of correct conservation responses promotes rule abstraction and more effective learning than the opportunity of a first or second grade child to experience socio-cognitive conflict. However, several methodological differences exist between

Bodlakova's study (1988) and the Neo-Piagetian paradigm investigating the effects of socio-cognitive conflict making the comparison of these studies and their conclusions equivocal.

First, the observation of adults disagreeing about a task may not appear as conflictual to the child because he or she is not directly involved in the interaction but simply a passive observer. The child may not attend to the task presented closely enough to perceive the conflict or may simply accept the notion that each person has a different but equally correct point of view. The child does not have to prove his or her own point of view to a peer or adult, therefore the child may not attempt to assimilate and subsequently accommodate the other person's point of view resulting in minimal if any cognitive reconstruction. Therefore, subjects in the socio-cognitive conflict condition (who observed models disagreeing) is not necessarily equivalent to direct physical participation in a social interaction experience. In addition, the degree of certainty and response latency, the measures used to assess the existence of internal cognitive conflict, may, as Cantor (1985) indicated be unreliable because of their introspective nature.

The basic socio-cognitive conflict paradigm utilized by Neo-Piagetian theorists differs significantly from that used by social learning theorists. The Piagetian paradigm

requires that subjects actively, directly participate in the socio-cognitive conflict experience. Piaget (1950) states that it is through the active coordinations of actions that more advanced schemas and higher forms of thought are constructed. Subjects who participate rather than observe attempt to prove their point of view to another who may or may not agree. Such interaction and dialogue can not occur through the observation of a videotape thereby making comparison of the two tasks equivocal. In addition, to say that the videotape in which the models always agree is nonconflictual may be somewhat inaccurate. The critical dynamic factor is not the amount of conflict observed, but the socio-cognitive conflict experience by the person interacting with the videotape. It may have been easier for the child to experience socio-cognitive conflict in the no conflict modeling situation because the child only has to coordinate two points of view, his or her own and the collective viewpoint of the two models, whereas in the high conflict and intermediate conflict treatment conditions the coordination of three different viewpoints may be required.

Social learning theorist utilizing the modeling paradigm state that cognitive skills are affected more by the clarity and consistency of presented rules than by internal disequilibrium created through exposure to inconsistent and conflicting information. Other investigators (Smith, Johnson, and Johnson 1981), also

pondered the possibility that agreement without controversy may be a more effective determinant of cognitive growth and problem solving than socio-cognitive conflict. In order to determine if concurrence or agreement without controversy contributed equally or more significantly than controversy (socio-cognitive conflict) to cognitive growth during social interaction, Smith, Johnson, and Johnson (1981) assigned 84 sixth grade students to either controversy, concurrence seeking, or individual learning groups. In all three groups, subjects studied two controversial issues (e.g. the advisability of slope mining of coal) with materials representing both pro and con views. In the concurrence seeking condition, each dyad could study the material any way they wished, with the stipulation that they discuss the topic and come to an agreement without arguing. In the controversy condition, each dyad was to come to an agreement on each issue. Controversy was defined to occur when the person's ideas, information, conclusions, theories or opinions are incompatible with those of another and the two seek to reach an agreement. In the individualistic condition, subjects were told to learn the material on their own without interaction with other students. All conditions were monitored to ensure that instructions were adhered to. After treatment, achievement tests were administered to determine the cognitive understanding of each unit of study. Attitude towards subject matter, peers, and controversy were

also measured along with a self report on an independent follow-up study after the training period.

The results indicated that controversy compared with concurrence seeking and individualistic study promoted significantly higher achievement and retention, a greater search for information, more cognitive rehearsal, continuing motivation, and a more positive attitude towards controversy and classmates (Smith, Johnson, and Johnson 1981). Concurrence or agreement without controversy was not as effective in promoting achievement as controversy (socio-cognitive conflict). In fact, subjects in the concurrence seeking group did not differ significantly from those subjects who performed the task alone. This is probably due to the fact that subjects in the concurrence seeking and individualistic group were fixated with and became satisfied with only one point of view. Smith, Johnson, and Johnson (1981) demonstrated that controversy can promote high achievement, motivation to continue study, and positive interpersonal relationships. Coming to agreement after controversy significantly increased subjects positive feelings toward their partner to a much greater extent than that experienced by subjects in the concurrence seeking groups. Concurrence seeking not only proved to be less effective in promoting cognitive development but seemed to inhibit group discussion and increase avoidance of the

realistic appraisal of alternative ideas and causes of action. (Smith, Johnson, and Johnson 1981).

During controversy, the students realize that others have a different conclusion, and that their conclusion is being tested and challenged. Students become uncertain about the correctness of their conclusions and try to resolve this uncertainty.

Bearison (1982) and others (Bearison, Magzamon, and Filardo 1986; Weinstein and Bearison 1985) have conducted studies systematically analyzing subject behaviors during social interaction episodes. By carefully coding both nonverbal and verbal behavior, it was possible to determine which factors significantly promoted cognitive growth. In a study using five to seven year old subjects, (Bearison, Magzamen, and Filardo 1986), pairs of children worked collaboratively on spatial perspective taking problems, while a control group worked individually on the same problems. Among experimental subjects, particular interaction strategies, such as the predominant use of position, predominant use of orientation, use of both strategies, and use of no strategy were analyzed. All interactions were videotaped and measured for the verbal, enactive, and verbal and enactive relevant disagreements between partners. In this way it was possible to determine what kinds of peer interaction promoted development and why cognitive gains are sustained by some partners and not by

others. Results indicated that a positive curvilinear relationship exists between the expression of socio-cognitive conflict and cognitive change.

A second set of analyses identified critical aspects of the process of social interaction that distinguished among experimental subjects (dyads) who made significant cognitive gains and those who failed to do so. Dyads that generated verbal disagreements with explanations (in the medial range) had significantly higher pre and post-test change scores than than control groups who performed the tasks individually. Dyads with less than four disagreements and more than nine failed to do significantly better than control subjects. Therefore, an intermediate, optimal level of socio-cognitive conflict is necessary for optimal cognitive growth. A curvilinear relationship existing between conflict and cognitive change is consistent with several theories about the motivational role of conflict on human curiosity and attention arousal (Berlyne p. 196, 1970), achievement motivation (McClelland, Atkinson, Clarke, and Lowell 1953) and operational memory (Case 1984). According to these positions, individuals seek an intermediate level of conflict in favor of no conflict or excessive levels of conflict. Therefore an optimal level of socio-cognitive conflict promotes cognitive growth to a greater extent than working alone or working on a task lacking in or inundated in controversy.

In order to determine this, Weinstein and Bearison (1985) pretested eighty first graders on a variety of conservation tasks. Subjects who were either nonconservers or intermediate conservers were randomly assigned to one of three conditions: social interaction, social observation, and individual control. Subjects in the social interaction condition worked collaboratively on conservation tasks with a same sex partner. Subjects in the social observation treatment condition observed pairs of subjects working together, and control subjects worked individually on conservation tasks. All subjects were individually post-tested on conservation tasks of the same type as, but different content than, the present items. Subjects in the social interaction condition had significantly greater cognitive change scores than subjects in the social observation and individual control conditions. There were no differences in the change scores of subjects in the social observation and individual control conditions. During the the post-test, subjects in the social interaction condition gave significantly more novel explanations to which they were not exposed to conservation judgements than subjects in the social observation condition. These findings support a socio-cognitive conflict model of cognitive development. Therefore cognitive gains could not be attributed to subjects simple exposure to task relevant information expressed during interaction, but was a function

of the dialogical confrontations and reciprocal coordination of mutual perspectives that were interactively generated in the process of social discourse (Weinstein and Bearison 1985). These results thereby support the explanation that cognitive development more efficaciously promoted reciprocal coordination of mutual perspectives between subjects during social interaction more than did passive observation of models performing the same tasks.

In a similar study, Ames and Murray (1982) subjected nonconservers to conflicting nonconserver judgements in one of the following situations: social interaction, modeling, in a pretense situation, and in a non-social information presentation situation. Ames and Murray (1982) found that social interaction, and social modeling had significant effects on nonconservers. Virtually all the children changed their responses to one out of 5 presented, but only a few children (12%) changed only to conservation. Most (57%) changed to a different nonconservation judgement; 31% changed to conservation on some tasks and to another nonconservation judgement on other tasks. The changes to conservation on the post-test were virtually all from children in the social interaction treatment group. It therefore requires more than just the presentation of useful and correct information to develop conservation competence. Information, even incorrect information must directly challenge the child's beliefs. These challenges appear to

be most effective when they strike the child in social settings in intermediate frequencies (Murray 1982).

## CHAPTER IV

### MOTIVATIONAL THEORIES AND SOCIO-COGNITIVE CONFLICT

In addition to the social learning (modeling) explanation of cognitive development during social interaction, motivation theorists propose another alternative rationale. Motivational theories of cooperative learning emphasize that rewarding groups on the basis of the individual learning of all group members creates peer norms and sanctions favoring achievement related efforts and active helping of peers. According to motivation theorists, motivation is crucial to enhancing learning outcomes.

In a review of cooperative learning studies, Slavin (1987) compared developmental and motivational perspectives on cooperative learning. According to the developmental perspective, based on Piagetian and Vygotskian theories, task-focused social interaction among students enhances learning by creating cognitive conflicts and by exposing students to higher quality thinking that is within their zone of proximal development. Students will learn from one another because in their discussion of content, cognitive conflicts will arise, inadequate reasons will occur, and higher quality thinking will emerge. In contrast, motivational theories of cooperative learning emphasize that

rewarding students on the basis of the individual learning of all group members creates peer norms and sanctions favoring achievement related efforts and active helping of peers. Developmentalists, such as Damon (1984) believe that extrinsic incentives for group learning are unnecessary and may even diminish motivation, while in the motivationists view they are crucial to enhance the learning outcome.

In order to determine the impact of each view on cooperative learning, Slavin (1983) carefully reviewed 46 studies in which a cooperative learning method was compared with a control group that could be considered equivalent. Overall the findings of these 46 studies consistently demonstrated significantly greater gains for experimental subjects placed into cooperative learning treatment conditions (1985). Twenty-nine of the studies (63%) found such effects. Of the 46 studies used in this review, Slavin (1985) found 28 of them to have used group rewards based on the sum of individual performances. Slavin (1987) therefore reported that individual accountability and group rewards are needed for cooperative learning to be maximally effective.

Though while consistent evidence in the Piagetian tradition found that peer interaction alone (without rewards) can lead to cognitive growth. Slavin (1987) argues that in classroom application peer interaction alone is not sufficient to increase student learning. This difference in

perspective may be due to the experimental paradigm used. In cooperative learning research used by motivation theorists, the control groups were generally taught by a teacher, and were not left to struggle with concepts on their own. There is a considerable difference in the kinds of tasks used in Piagetian and Motivationalists research. Piagetian research focused primarily on conservation tasks, the mastery of which requires disequilibrium. Cognitive conflict is most likely to accelerate the disequilibrium process. However, according to Slavin (1987), very few classroom learning tasks require disequilibrium. Such classroom tasks may be more often linked to direct instruction and rote learning rather than toward a more mature solution. Therefore, in light of more fundamental differences in setting, subjects, tasks and research paradigms, developmental perspectives on cooperative learning do not squarely address each other (Slavin 1987).

In an effort to determine how these theories intersect, David and Roger Johnson (1981), conducted several investigations in which subjects engaged in controversy about a topic. Their results (1981) indicate that controversy results in greater achievement than when subjects engage in other forms of discussion. However, controversial conversation may not occur at optimal levels naturally. Math computation tasks and spelling tasks may not lend themselves as well to cognitive conflict. However,

if cognitive conflict does occur, learning is enhanced (Webb 1982). Therefore the facilitation of cognitive conflict may be induced by group rewards and individual accountability.

Slavin (1987) concludes that socio-cognitive conflict does enhance and facilitate cognitive development, but that for certain subject areas cognitive conflict may not occur naturally at the levels necessary for cognitive development to occur without some form of motivation. Under the right motivational conditions, peers can and will provide explanations in one another's zone of proximal development and will engage in the kinds of cognitive conflict needed for disequilibrium and cognitive growth to occur. However, it may not be necessary to provide external forms of motivation if the task is structured in such a way that students see the need and utility of developing these cognitive concepts. Some social interaction situations, such as the interpretation and discussion of written texts, which can occur naturally in the classroom, easily lend themselves to socio-cognitive conflict without the need for extrinsic forms of reinforcement. Therefore it appears that further investigation of the socio-cognitive conflict model in non-conservation academic settings and tasks is needed to determine to what extent cognitive conflict during social interaction promotes more sophisticated forms of thought.

In order to determine if controversy during social interaction was necessary or more efficacious than other

social interactive behaviors, Smith, Petersen, Johnson, and Johnson (1985) conducted an investigation comparing the effects of controversy and concurrence seeking on group problem solving with 36 junior and senior engineering students. Controversy was operationally defined to exist when one person's ideas, information, conclusions, theories, or opinions were incompatible with those of another person, and the two seek to reach an agreement. Concurrence seeking was defined to occur when members of a group making group decisions inhibited discussion to avoid any disagreement or arguments while still coming to an agreement.

Subjects were randomly assigned to either the controversy or concurrence seeking groups. Subjects worked in two-two person advocacy teams on trying to resolve a problem. Each team had two hours to read and discuss material. Then each team presented their perspective to another advocacy team using the same approach. Then each team's solution was assessed for level of sophistication. This assessment indicated that subjects placed into the controversy condition made higher quality decisions than did those placed in the concurrence seeking treatment condition. Post-tasks interviews indicated that subjects placed into the controversy group had more curiosity, felt more influential, had a more positive attitude toward controversy, and a more supportive, caring relationship with other group members than subjects placed into the

concurrency seeking group. Smith et. al (1987) stated that controversy led to more effective decision making than concurrency seeking during problem solving interactions. Therefore, the experience of socio-cognitive conflict, more than any other activity occurring during social interaction, may promote cognitive growth during several different periods of human development, even adulthood.

## CHAPTER V

FACTORS AFFECTING COGNITIVE GROWTH DURING SOCIAL INTERACTION

However, does social interaction always result in cognitive growth and if so what conditions are necessary for such cognitive development to occur? In order to determine possible answers to these questions, Mugny, DePaolis, and Carugati (1987) conducted an intensive investigation studying the various dynamics of social interaction that may lead to cognitive development. One of the major findings of this investigation was the realization that social interaction is not automatically a source of cognitive progress. For cognitive progress to occur, a certain number of requirements must be fulfilled. The one central condition emerging from this investigation as necessary for the development of higher quality thought was that the interaction entail opposition of divergent cognitive responses. A determination was made based on observation that socio-cognitive conflict can arise for a variety of reasons in a variety of situations. First, it can arise when the participants in the social encounter are at different cognitive levels, giving rise to relatively divergent responses or actions with respect to the to the concept involved in the interaction. Second, socio-

cognitive conflict can also emerge during social discourse between individuals who are at the same cognitive level and therefore possess the same operational schemas, but who make opposing centrations (Mugny 1978, Giroud and Doise 1978-1979). Finally, socio-cognitive conflicts can occur between participants who are at the same cognitive level but who are occupying positions or points of view that generate divergent responses despite application of the same schema (Doise and Mugny 1979, Mugny et. al. 1987).

During their investigation, Mugny and his colleagues (1981) demonstrated that such socio-cognitive conflict may be a source of cognitive progress for several reasons. First, the plasticity found in immature thought allows the young child to make successive changes in response without experiencing contradiction. Then only the simultaneous and more or less consistent opposition of another can bring the child to question his own responses and help him elaborate more advanced cognitive instruments, allowing a more complete integration of contrasting points of view. Thus through the introduction of different responses of peers or adults, the child may become conscious of other points of view. To resolve this social disequilibrium, the child utilizes points occurring in the social interaction as points of anchorage for new constructions (Mugny et. al. 1981). Thus the disagreement of others may give the child

information which can be relevant to such an elaboration, which is often a collective one.

A second reason that socio-cognitive conflict promotes cognitive development is the fact that socio-cognitive conflict may lead the person to be especially involved in the situation, essentially because the apparent cognitive problem that the person faces may entail a social regulation, as does the acknowledgement, transposed to the cognitive level of an asymmetrical or symmetrical relationship between two or more participants. Therefore, cognitive development may result from the social necessity of regulating a social situation characterized by an opposition of responses (Perret-Clermont 1985)

On the other hand, Mugny, et. al. (1981) indicates that there may be some other social events which may prevent such conflict from being a way to progress. For example, certain prerequisites are necessary for a person to benefit from social interaction. First, prerequisite schemas must have been elaborated in other social interactions on previous occasions. If these prerequisite schemas are lacking then equilibration may not occur. Conflictual social interaction is most likely to induce cognitive progress at the point of initial elaboration (Mugny and Doise 1979). This is the point at which initially isolated schemas are ready to be combined into the first outline of coordination.

A person who is less advanced with respect to some concept may require stronger more constraining collective situations than those who are intermediate (Mugny 1979). For example, in a spatial perspective taking task, subjects who were functioning at the intermediate levels consistently improved to a significantly greater extent than those subjects who began the task at low levels of spatial perspective taking (Doise and Mugny 1979).

A second cognitively inhibiting factor occurring during social interaction is the existence of certain interindividual dynamics which may hinder the progress of socio-cognitive conflicts. A person may not attempt to coordinate his or her actions or points of view with another; he or she may simply deny that the difference exists and juxtapose them. A person may attribute any difference of opinion to their own incompetence and may subordinate their own equally correct perspective to that of another who is preoccupied with solving the problem alone. This may occur when one member of an interaction is assertive and denies the other a part in the social interaction leading to a failure to progress by the subordinate partner (Mugny and Doise 1979, Mugny 1984). In such situations, isomorphism between cognitive and social responses would constitute an obstacle to cognitive development.

On the other hand, the occurrence of social marking during social discourse may enhance the effect of social interaction on cognitive development. Certain forms of correspondence will favor cognitive progress because it induces a conflict between the child's spontaneous response deriving from social necessity and because the correct response is isomorphic with such social necessity. Social marking connects relations of a cognitive order, relations which can be activated in the absence of a direct relation with one another (in a purely symbolic fashion)(Mugny 1984).

## CHAPTER VI

KINTSCH'S READING MODEL

Reading is one of the categories of knowledge which is controlled by an individual's internal representational organization or schema (Bartlett 1932, Kintsch 1978). Bartlett (1932) suggested that readers develop schemata of what stories are like. He found that stories which deviated from culturally shared schemata were distorted in recall. According to Bartlett (1932), the central meaning of a textual passage is stored in memory in schematic form. Based on this underlying theme, recall of the story is accomplished by an active process of reconstructions. In more recent years schema theory has again been the focus of numerous research efforts in prose processing (Bruce 1978, Byrd and Gholson 1984, Kintsch 1979, Mandler 1984, and Rumelhart 1979). Several researchers (Kintsch 1975, Mandler 1984, and Rumelhart 1979), have conducted detailed analysis of propositional models of story structure. According to Kintsch's (1980) processing model, a reader approaches a text with a schema, an internal mental representation of the macro-structural organization of conventional text and a purpose and goal for reading. Each individual's schema is

based on his or her prior experiences with oral and printed materials (Kintsch 1980, Byrd and Gholson 1984).

Students generally approach textual material with some previously constructed, internally represented schema about the structure and content of stories (Anderson and Barnitz 1984, Bartlett 1932). Each person's schemas may vary according to the particular experiences to which they have been exposed, and the particular cultural group to which they belong (Anderson and Barnitz 1984). Based on this conceptualization, the prior knowledge of the reader is seen to be organized in hierarchical units (schemas) which are activated or inhibited by environmental contextual stimuli (Byrd and Gholson 1984). The schema serves the reader as a blueprint, a framework in which to logically organize and integrate new incoming information. The schema that a reader utilizes in order to comprehend a text depends upon the type of material being read and the schema presently available to the reader.

If a topic is unfamiliar to a reader, a framework will not be available in which to organize and interpret a propositional sequence in order to make inferences from it. Short term memory will become overloaded because the reader is trying to process too many propositions in it at one time, in order to organize the information. Kintsch and Monk (1972) and King and Greene (1974) found that unfamiliar material has to be processed in smaller chunks than familiar

material with the same number of propositions. The number of propositions being processed each cycle is inversely related to familiarity.

According to Kintsch's model (1980), when a person reads a Western story, he or she is usually aware that what is being read is a story rather than some other kind of text. Stories are highly conventionalized text types which if processed in accordance with the conventions result in well defined conventions and schemata which are shared by members of a cultural group. These schemata specify both the categories of the text as well as the information in each section relevant to the macrostructure. In order for the reader to make predictions about what should be included in the macrostructure, he or she must have an appropriate schema (Kintsch 1977, Kintsch 1980, Kintsch and premack 1979). Story schemas are built around "actors" and major story relevant actions that change a story from one state to another. There is a requirement for continuity on the actor's part, but the actions may change throughout the story. The order of actions cannot be fixed, however the category to which an action belongs forms a sequence consisting of an exposition, followed by a complication, followed by a resolution. In an exposition, a reader is introduced to the main characters and to the setting of the story. The complication consists of a problem that the main characters encounters, an unexpected twist in the plot or an

interesting event. The resolution returns the story to a stable state, leaving no unresolved elements. As the reader attempts to derive meaning from the text, he or she will search for information that will fill in these organizational categories in his or her presently existing schemas. The reader takes as input propositions which are derived from the surface structure of discourse in a progressive manner. Propositions are composed of two or more words or concepts, one of which serves as a predicate and specifies a relationship between the remaining words or concepts which are called arguments (Kintsch 1980). Predicates may be verbs, adjectives, adverbs, or sentence connectives. Arguments may function as agent, object, or goal. In order to derive meaning from a text, the reader analyzes these propositions and the text as a whole at the microstructural and macrostructural levels. Propositions are kept in working memory during each cycle and proceed with the next input of a proposition. If there is no argument overlap, a search of long term memory is initiated. These searches and the construction of inferences are demanding on cognitive reserves. Kintsch and Keenan (1973) demonstrated that the number of propositions in a sentence, rather than the number of words determines reading time. Reading time was found to increase monotonically with the number of propositions in the text base, although the number of words remained the same.

At the microstructural semantic level, the reader analyzes the structure of individual propositions and their relations, while at the macrostructural semantic level, the reader analyzes the text as a whole with fewer propositions. These two levels are connected by the reader who uses a set of macrorules to reduce the microstructures to a macrostructure. These rules operate under the direction of the reader's schema. They are used to help the reader organize the meaning elements of a text into a coherent whole in order to determine the general gist of a story. Successively higher levels of macrostructures can be obtained in this way resulting in progressively shorter summaries. This is accomplished when the reader fills in categories in his or her organizational schema such as: who is the main character? (exposition), What is his problem? (complication) and, how is it resolved? (resolution).

The schema directs attention to various aspects of the input. It provides a summary that increases predictability for the rest of the story, and it helps the reader determine what information from the text should be stored. The operational rules which perform this function are deletion, generalization, and construction. Deletion removes redundant irrelevant information that does not fit into the schema from further processing; generalization substitutes category names for category arguments; and constructions generalize from subordinate to superordinate, summarizing a

sequence of actions by introducing a name that refers to the sequence as a whole. Through these micro and macro operations, the elements of a text become organized into a coherent whole.

In a text base, the propositions are ordered in the same way that they are found in the text itself. One of the criteria for semantic coherence which the text base must meet is referential coherence, which in Kintsch's notational system corresponds to argument overlap among propositions. (Kintsch 1980)

Kintsch and van Dijk (1978) hypothesize that the first step in forming a coherent textbase is the checking of its referential coherence. Since the text base as a whole is too large to check for referential coherence, due to the limitations of working memory, the text is processed sequentially in chunks of propositions. The number of propositions included in a chunk depends both on the surface characteristics of a text and on reader characteristics. It is accepted for further processing if there is argument overlap among the propositions. If gaps are found, or more propositions are added to the text base, inferences involving further processing may need to be made.

When a chunk of propositions is processed, the capacity of the short term memory buffer of them is selected and stored in the buffer. Only these propositions are available for connecting the new chunk with the previously processed

material. If there is overlap between the new proposition and the contents of the short term memory buffer, the input is accepted as coherent with the previous text. If not, a search is made of all the previously processed propositions. If the search is not successful, an inferential process is initiated, adding to the text base one or more propositions which connect the input and the already processed propositions (Kintsch 1980).

Kintsch and van Dijk (1978) report various experiments in which subjects read the same text at their own speed, and after varying attention intervals, were asked to write a recall protocol and then a summary of between 60 and 80 words. One group of 31 subjects was tested immediately after reading the material, another group of 32 subjects after one month, and 24 other subjects after three months. In the recall protocols, the proportion of reproductive propositions declined from 72% to 48% as the retention interval increased. As less material from the text was reproduced, proportionately more material was added by reconstructions and generalized statements, indicating that recall does not only reflect what is stored in memory.

Reading is therefore a problem solving task in which existing schemas about the structure of prose raises expectancies or hypothesis which are tested during an attempt to achieve a solution (Bruner and Goodman 1974, Gholson 1980). These hypothesis are then evaluated

systematically through the utilization of a set of organized cognitive processes. The efficiency of the evaluation process partly depends on the child's ability to integrate conceptual (schema driven) with data driven sources of information (Friedman 1979, Frederickson 1979, Byrd and Gholson 1984, Kintsch 1979).

It is hypothesized that the child's level of operative development (Inhelder and Piaget 1964, Pascual-Leone 1978) determines both how efficiently information is integrated into ongoing behavior and the complexity of the hypothesis that are formulated through the construction of more hierarchically sophisticated stable schemas (Case 1975, Inhelder and Piaget 1958, Gholson, O'Conner and Stern 1976, Tumblin and Gholson 1981). Byrd and Gholson (1984) and Chall (1979) demonstrated that concrete operations are a necessary condition for the child to integrate information derived from data driven and conceptual processes during reading. The efficiency with which appropriate hypothesis are generated depends on the extent to which the reader can match what is written to previously existing schemas (Gholson 1980, Pearson 1986, McConaughy 1985, Rodriguez 1985, Meyer, Brandt, and Bluth 1986).

If readers, when reading a text, form macrostructures under the direction of story schemata, scrambled stories should take longer to comprehend than conventionally ordered stories, but the resulting macrostructures should be the

same. Extra time would be needed to reorganize the scrambled story. In 1975, Kintsch and van Dijk (cited in Paulson, Kintsch and Premack 1979) tested this by giving twenty-four subjects two stories in either scrambled or normal order, and allowed the subjects as much time as needed to read them. The average reading time was significantly greater for the scrambled stories than for the ordered ones. In order to determine if the macrostructures were equivalent, the subjects summaries were analyzed into propositional units. A third group of twenty-eight new subjects read the stories with limited time, giving them less time to organize the macrostructures. When reading times were subject controlled, judges could not distinguish between the normal and scrambled version, but the summaries of the stories that had been read with limited time were much easier to sort correctly.

In order to establish and maintain coherence, the reader may construct a specific text base containing some propositions that are not in the specific text base. Inferences needed to connect propositions are made on the basis of general or contextual knowledge of the facts. Facts occurring in the story are used by the reader to infer other necessary facts. Propositions of a text must be connected in a meaningful whole, characterized by the topic, as well as related locally.

In order to determine the effect of text complexity on the ability of readers to make inferences, Kintsch and Monk (1972) gave subjects either a simple or a complex version of paragraphs, each containing the same number of propositions but differing in the directness with which they were expressed. Both versions had the same number of inferences which needed to be made. It was found that subjects needed more time to read the complex versions, and the probability that correct inferences would be made did not differ. When reading time was restricted, more errors in making accurate inferences were made indicating that making inferences does require more time.

The structure of a story is, therefore, schematically specified by a set of rules of formation and transformation. These recursive macro-rules order the categories and reduce the categories to the simplest schema. Macro-rules require general information for their operation which is controlled by the schema

Schema, therefore, play an extremely important role in the formation of the macrostructures. Subjects reading stories that do not conform to their story schema create more arbitrary macrostructures than would readers of stories that have a conventional schema. To test this Green (reported in Kintsch 1977) gave subject eight stories, four of which were Alaskan Indian myths which deviate from the story schema of our culture. Although the episodes were intrinsically coherent, it was found that subjects wrote more informative summaries when they have an appropriate schema to organize the story than when no appropriate schema is available. In another similar experiment, a Grimm's fairy tale and another Indian story were then read to subjects who then wrote summaries. These protocols were then read to another group of subjects. The same process was repeated several times. By the fifth recall, whole episodes of the Indian story were lost. Lack of appropriate story schema, therefore, appears to result in deficiencies or inaccuracies in comprehension of textual material.

## CHAPTER VII

GOOD AND POOR READER DIFFERENCES

Several researchers (Byrd and Gholson 1984, Meyer, Brandt and Bluth 1986, McConoughly 1985, Friedman 1979, and Frederickson 1979) have indicated that good and poor readers approach the reading task differently (see Figure 2). Byrd and Gholson (1984) have indicated that poor readers approach the reading task utilizing a data driven approach in which they try to remember verbatim all propositions occurring in the story, while good readers approach textual material with conceptual preplanned expectancies and an internal representational organization of the story which is used by the reader to fill in expected variable slots. Meyer, Brandt, and Bluth (1986) conducted a study investigating comprehension strategy. One hundred and two ninth graders of good, average, and poor reading comprehension were administered well organized text materials with well defined conceptual structures and variables signaling story structures. The results indicated that good readers at the ninth grade level employ top level structures in their recall summaries of the same type as those found in well organized structures, while poor readers would not. Good readers approached text with a schematic knowledge about how

texts are conventionally organized and a strategy to seek and use a particular schema when using a particular text. Use of a top level (schema-driven) approach by good readers was positively correlated to the amount of information (number of propositions) remembered. In contrast to good readers, (Meyer et. al 1986) poor readers appear to approach text without knowledge of text organization and no effective strategy for utilizing the top level structure of a passage. A third group, labeled comprehension underachievers, with average full scale reading scores (Stanford Achievement Test), vocabulary test scores close to those of good readers, but comprehension test scores similar to those of poor readers appeared to possess adequate story schema, but would fail to utilize them without prodding or some sort of signaling that pointed out aspects of the structure of content in a text (Meyer 1975). Good readers were, therefore, able to follow the text's superordinate structure focusing on the text's message and how it relates to supporting details (Anderson 1976, Kintsch and Van Dijk 1978).

Prose processing activities of good readers emphasize a search for interrelationships among chunks of complex propositions in a text. These processing activities of the structure strategy focus on a search for major text based relationships among propositions, that is a search for relationships which can subsume all or large chunks of this

information, summarize it and tie it into a comprehensible whole. Readers employing a schema based strategy approach text look for patterns which will tie together the propositions contained in the text. In addition, Good readers search for the author's primary thesis which will provide the content to be bound by these patterns or schemata. Each subsequent proposition is related back to the problem.

## CHAPTER VIII

### KINTSCH'S READING MODEL AND SOCIO-COGNITIVE CONFLICT

Although Piaget's and Kintsch's theories about learning may appear unrelated, involving work in different fields, several major similarities about individual conceptual development, such as interaction with prior knowledge and constructivism exists between them, making them more compatible than one might expect. First, both theories subscribe to the ideology that a person comes to understand the world he or she is interacting in through an attempt by the person to integrate new information with old information stored within the individual as schema. For Piaget (1970), schemas are internal structures or organizations of actions and thoughts as they are transferred or generalized by repetition in similar or analogous interactions with the environment. For Kintsch (1980), a schema is an internal mental representation of the macro-structural organization of conventional text and a purpose or goal for reading. There appears to be little difference between each theorist's description of schema. Second, both theorists propose definitions of schema which indicate that once external knowledge is interiorized in an organizational

hierarchical structural form that can be applied to comprehend and resolve problems in future situations. Third, both declare that each individual's schema is based on his or her prior experiences with the world (Kintsch 1982, Byrd and Gholson 1984, Piaget 1970). The major difference that exists between these two theorists' description of schema is the fact that Kintsch (1980) restricts his definition of schema to reading (the derivation of meaning from textual material), while Piaget's schema encompasses all areas of cognition (Piaget 1958). Schemas are, therefore, according to Kintsch (1980) and Piaget (1970), internalized plans or blueprints ready to be used whenever an individual encounters environmental stimuli.

In addition, although not usually classified as a cognitive developmental theory, Kintsch's model involves several components that are clearly constructive. One of these components is the requirement that for truly accurate comprehension to occur, several cognitive concepts or task dimensions be coordinated simultaneously (Kintsch 1980, Byrd and Gholson 1986). The ability to coordinate data driven micropropositions with conceptually (schema) driven macropropositions is analogically parallel to the kind of understanding that occurs when the child develops the ability to simultaneously coordinate height and width on conservation task (Chall 1980). Accurate performance on both of these tasks requires the ability to maintain several dimensions in working memory simultaneously (Case 1986). Text comprehension, like cognitive development in general, is a cyclical process constrained by the limitations of working memory.

Previous knowledge about problems and events stored in a reader's story schema keeps readers searching for causal relationships among descriptive information about the problem. Thus each problem and its causes are retrieved from long term storage, compared to the reader's text schema, and then compared to the reader's short term memory buffer for relating to the subsequent proposition in the

passage. This same schema driven textual processing approach is also employed by readers to guide retrieval and reproduction of recall protocol (Meyer et. al. 1986). In contrast to good readers, poor readers follow a default list strategy (Frederickson 1984). Poor readers may lack adequate story schemas or may fail to utilize them appropriately, approaching the reading task without focus. These readers simply try to remember everything from the text (Frederickson 1984, Byrd and Gholson 1984, Meyer et. al 1986). Recall summaries of poor readers, after reading a text appear as a list like description about the passage topic with no attempt to relate them (Meyer et. al 1986).

Reading comprehension, like the ability to conserve, is accomplished through logical operations which occur under the control of an ever evolving schema. Both reading comprehension and conservation require the construction of superordinate schemas in which several dimensions can be coordinated simultaneously. In both situations, increased understanding occurs only as the result of the construction of hierarchically more complex internal organizational systems through interaction with objects, specifically others in the environment, which induces equilibration. The accurate interpretation of a story requires the coordination of an exposition, complication, and resolution. A reader, especially a poor reader, may approach the reading text without a clearly defined story schema, resulting in a

centration on only one or two of these dimensions terminating in less than optimal comprehension. Kintsch (1978) states that external cues, including verbal discussion or comments from other readers may result in creating doubt in the reader about the accuracy of his or her own reading schema. This doubt may result in a decentering of the reader on any one aspect of the text resulting in the internalization of several aspects of the task through cognitive reconstruction of presently existing schema into hierarchically more complex schemas. Schema control can most easily be observed when the comprehension strategies of good and poor readers are compared.

Poor readers who experience a paucity of socio-cognitive conflict may remain focused on only one dimension or proposition that may be insufficient for the the accurate comprehension of a text. Exposure to opposing points of view may force students to decenter, to consider other dimensions or propositions which may be coordinated with those already existing. Through consistent, frequent interaction involving the reading and discussion of textual material, the student may incorporate other dimensions or propositions of the text, constructing more complex macrostructures which when coordinated by the student may lead to enhanced comprehension of textual material.

Young and poor readers with inadequate schemas may therefore need to modify an existing schema or construct a

hierarchically more complex schema because the ideas or propositions of the text may fail to match the reader's present internal representational organization of the text. They may therefore be unable to understand the story or how to integrate new information with previously stored information without changing his or her ideas about how the story and its information are organized.

Reading is therefore a hypothesis testing cognitive process in which a reader attempts to assimilate data driven information into previously existing conceptual schemas. A reader's comprehension of a passage and a response to a passage may therefore be affected by the completeness or accuracy of his or her presently existing textual schema, and his or her ability to coordinate data driven and conceptual information (Byrd and Gholson 1984). Story schemas range in complexity according to the number of propositions requiring processing, the number of dimensions involved, and the amount of inference required on the part of the reader (Byrd and Gholson 1984). Therefore a student (e.g. a poverty Indian child) reading a story with an unfamiliar schema (e.g. about an American millionaire's life) may lack an appropriate textual schema (Bruner 1982) or may have an incomplete schema into which propositions from the text can not be immediately assimilated without modification. If the story is too discongruent with the other reader's internal representational organization,

assimilation and accommodation may not occur resulting in the reader's inability to comprehend the text. If however two or more students with incomplete schemas or differing viewpoints verbally discuss a text and the answers to the questions that accompany it, each student may incorporate the others viewpoints and methodologies integrating them with his or her own, resulting in the construction of a more complex, more complete internal representational organization of the story producing an enhancement in reading comprehension.

Many studies of reading comprehension indicate that reading comprehension gain is enhanced through social interaction (Bloom 1983, Rouse and Linton 1984, Thomas 1985, Bloom 1985 and Palinscar 1986). Bloom (1983) and Thomas (1985) suggest that through social interaction during the reading process, participants construct the meaning that the text will have and the ways to think about the text. Thomas (1985) states that it is through social interaction that children learn culturally appropriate ways of interacting with and interpreting written material. Adults and peers guide children in the kinds of linguistic and social processes used in reading (Thomas 1985).

Recently, Larson and Dansereau (1986) conducted a cooperative learning investigation involving a reading task. Cooperative learning was defined as an equal partnership in which paired students studied together with the mutual goal

of mastering academic information. Dyads read 500 words of a 2500 word passage. One student served as recaller, attempting to summarize from memory what has been learned. The other person served as listener/facilitator who tried to correct errors in the recall (socio-cognitive conflict) and to facilitate the organization (schema construction) and mental storage of the material. Partners alternated roles. Each dyad was required to exchange multiple oral summaries. These subjects were compared to dyads who performed the same task alone or as fixed recallers. Alternating teams outperformed fixed teams. Active listeners outperformed passive listeners. Dyads outperformed individuals. Larson and Dansereau (1986) reported that their results indicated that to learn specific text materials, cooperative learners should focus on metacognitive activities, but for later transfer of learning to other materials, elaborative activities by the listener should be emphasized. Request for further elaboration may suggest disagreement producing doubt. These results suggest that active participation in correcting one another's summaries produces increased comprehension and transfer to other novel situations. This may in fact be due to the socio-cognitive conflict (disagreement) that occurs during discussion of one another's summary rather than simply an elaboration of a previous statement.

But is socio-cognitive conflict the primary causal factor in promoting reading comprehension development during reading? Several theorists, (Palinscar 1986, Baker and Brown 1987), subscribe to an alternative ideology. These theorists have conducted investigations that indicate that the development and application of a metacognitive reading strategy will result in increasingly more efficacious reading comprehension gain than traditional reading instruction methodologies. Metacognition is defined as the knowledge and control that a person has over his or her own thinking and learning activities, including reading. Linda Baker (1979, 1987) has identified three types of reading failure. The first type exists when the appropriate schema are not available. The reader does not have enough knowledge about the topic to impose an interpretation upon the text. A second type of reading failure exist when the appropriate schemata are available, but the author has not provided sufficient cues for their identification. A final type of comprehension failure occurs when the reader finds a consistent interpretation of the text, but not the one the author intended. Readers who experience one of these three types of reading comprehension failure have much the same feelings as readers who understand correctly (Baker 1987). Hence, they can hardly be expected to take remedial action when comprehension fails, since they don't realize that comprehension has in fact failed.

Palinscar (1986) states that it is not sufficient for teachers to merely instruct learners about strategies that enhance learning; students must monitor and regulate their own use of these strategies (Brown, Armbruster, Baker 1987). These strategies should be taught in a way that they will be applied across content areas and so that students will use these strategies without prompting. Reading for meaning, therefore, involves the metacognitive activity of comprehension monitoring, which entails keeping track of the extent with which one's comprehension is succeeding and taking remedial action when necessary (Palinscar 1986).

To accomplish this, Palinscar, (1986), and Brown and Baker (1987) suggest the utilization of a methodology which they entitle, "Reciprocal Teaching." Reciprocal teaching is defined as a dialogue between teachers and students for the purpose of jointly constructing the meaning of a text. There are four activities which make up reciprocal teaching. They are : summarizing, question generating, clarifying, and predicting. These activities are defined by Palinscar (1987) in the following way:

1. Summarizing is the process in which main ideas in the text are identified and paraphrased.

2. Question generating is self questioning about the type of question that is generally tapped on tests of comprehension and recall.

3. Clarifying is the activity in which a participant discerns when there has been a breakdown in comprehension and takes the necessary action to restore meaning.

4. Predicting is when a hypothesis is constructed about what the structure and content of the text to be presented next should be.

In reciprocal teaching, students and teachers take turns leading a dialogue concerning each segment of a text. The teacher models the appropriate activities and students are forced to participate at whatever level he or she can. Teachers provide feedback and guidance at the appropriate level for each student (Palinscar 1986).

Palinscar (1986) conducted a study in which 27 junior high school students from remedial reading classes worked in dyads with an adult tutor or in groups of five with developmental reading teachers. The groups read expository passages from basal readers written at the seventh grade level. Reciprocal teaching was employed for 20 school days. Transcripts were taken of the dialogue that occurred each day. Following reciprocal teaching each subject read a 450 word passage silently and answered ten comprehension questions. At the conclusion of the treatment period, subjects were given a reading comprehension test using passages from their social studies classes. Analysis of the transcripts revealed substantial changes in student-teacher dialogue. Subjects became increasingly more sophisticated

in their ability to employ the strategies independently of the teacher. On test of comprehension, all but one of the 27 students achieved 70% accuracy for 4 out of 5 days. Students reading achievement improved from the 40th percentile to the 50th percentile following reciprocal teaching.

However, the reciprocal teaching model was not compared to the socio-cognitive conflict model and there is no indication to do so because in actuality reciprocal teaching's effectiveness may be primarily due to the socio-cognitive conflict that it promotes during social discourse. For more careful analysis, let us now examine a portion of a transcript recorded during a reciprocal teaching session (Palinscar 1987-reprinted from Instructor 1987).

Teacher: (reading) There are many different creatures in the sea. Many of the fish you see will be swimming in schools. They are looking for food. Most of them are friendly. But you might see some unusual fish. You might see a big, flat fish. It looks as if it has wings. You might see a sea horse. It swims with its head up and its tail down. It carries baby sea horses in a pocket on its front. Who will be a teacher and ask a question about the information we have just heard? Ron?

Ron: How do the sea horses carry their babies?

Lou: In their pouches.

Ron: Ok and why?

Lisa: Um, that's the only way they can carry them. They don't have hands or anything.

Carlos: Or they might not be able to swim and drown.

Teacher: You are right in all your answers and in your thinking. Ron's question was a good one because it got us thinking about why sea horses have pouches and why they carry babies there. But you are going a little further than the written word. You were pretty smart to figure that out. Can you summarize now, Ron?

Ron: This is about sea horses and how they carry their babies.

Teacher: Right. The paragraph topic is about unusual fish in the sea, and then the author tells us about one of these unusual fish--the sea horse. Are there any clarifications we need to make?

Carlos: Them going to school. Why do fish go to school.

Lisa: A big pile of fish is called a school.

Teacher: Is it the kind of school we are in? We come to school to learn, don't we? But in this story, school means a big gathering of fish. Are there any predictions?

Now let's examine the transcript according to the four reciprocal teaching strategies to determine if in actuality

socio-cognitive conflict is the dynamic being promoted. Socio-cognitive conflict is a disagreement by a student about an answer to a question or a statement made by another student. After the reading of the story by the teacher, Ron is requested to ask a question. Ron asks, "How do sea horses carry their babies?" Such a question may be asked for several reasons. Ron may be certain of the answer, or Ron may be uncertain of the answer because he is unfamiliar with the schema of sea horses and may be searching for reassurance or concurrence. Following an answer to his question, Ron asks, "Why?" which leads to a discussion involving disagreement or socio-cognitive conflict between Lisa and Carlos about why sea horses carry their offspring in their pouch. This process, clarifying in effect is one of the dynamics occurring in socio-cognitive conflict. Lisa's response produces doubt in Carlos whose statement indicates disagreement with Lisa about the primary reason why sea horses carry their offspring in their pouches (complication). Each of these readers may be faced with disequilibrium because they are not sure that their inference can be assimilated into an existing schema. They may have to coordinate their own ideas with those of another in order to understand offspring care. A schema may presently exist for the resolution of this complication (care of offspring in a pouch) and modification of presently existing schemas or construction of new schemas may be

necessary. Such coordination may have been observed if students had been allowed to discuss their ideas further. However, additional discussion between these two students was inhibited and attention refocused by the teacher onto the skill being fostered, finding the main idea. The teacher then asked for a summarization which is basically an examination of the students superordinate story schema being applied to the present text. If the students were able then to summarize, further disequilibrium may have occurred resulting in continued socio-cognitive conflict. The teacher then asked, "Are there any clarifications that we need to make?" This in fact fostered further socio-cognitive conflict because Carlos was unable to assimilate fish into his concept of "school" and asked, "Why do fish go to school?". Lisa's schema for fish and school differed leading her to voice her disagreement about the concept. So out of the seven statements made, at least 2 involved disagreement. Such disagreement appears to be the critical dynamic for reading comprehension development. Reciprocal teaching does not appear to be an alternative methodology, but simply a different way of fostering socio-cognitive conflict with more constraint than the model proposed in this paper.

In general, younger and poorer readers have little awareness that they must attempt to make sense out of the text. They focus on reading as a decoding process (Myers

and Paris 1978). Socio-cognitive conflict provides a system of external monitoring and regulation that is gradually internalized and coordinated with presently existing schema resulting in cognitive reconstructions that can be applied to other texts.

It is through social interaction, specifically disagreement during or following the reading of a text that readers have an opportunity to share and evaluate their ideas about the story, using not only their own criteria but also those of others (Bloom 1985). Each reader may contribute a viewpoint or schematic information about the text that the other person does not have, or is not focusing on at that moment. Through discussion, especially disagreement, each reader may come to experience disequilibrium or doubt about his or her understanding of the story. He or she may then come to see how, with some modification, the other person's ideas about the story may supplement or be more accurate than their own ideas. Each reader may then rearrange or reconstruct his or her own ideas about how this story is organized and internalize the ideas of the other into their own schema. Therefore, it is through social interaction, specifically socio-cognitive conflict that children and adults learn culturally appropriate ways of interacting with and interpreting written text (Bloom 1985, and Thomas 1985). This can be demonstrated by analyzing pre and post written summaries of

subjects for the frequency of story schema propositions correctly identified and by correlating this figure with the frequency of socio-cognitive conflict.

As a result of cognitive schema reconstruction, the reader may acquire an increased capacity for simultaneously processing data driven and conceptual information, resulting in an increase in reading comprehension achievement. It is therefore proposed that when socio-cognitive conflict occurs it may result in the facilitated construction of hierarchically more complex story schemas.

## CHAPTER IX

### HYPOTHESIS

In this investigation, the main purpose was to examine what role if any socio-cognitive conflict and ability grouping have on children's reading schema development and reading comprehension gain. Presently two major sources of social interaction occur in the classroom that may result in equilibration. These are student-teacher interaction and student-student interaction. Most educational research has focused on student-teacher interactions. However, recently several researchers have examined student composition and its effect on learning (Good and Marshall 1984, and Rowan and Miracle 1983). Basically most students are placed into homogeneous classes according to standardized tests scores. In two reviews of ability grouping literature, both Good and Marshall (1984) and Rowan and Miracle (1983) have concluded that the placement of less skilled readers into homogeneous classes results in lower reading comprehension achievement gains than similar students placed into heterogeneous classes. In addition, more skilled readers placed into heterogeneous classes performed as well or better than similar students placed into homogeneous classes. Good and Marshall (1984) state that this differential performance may

be due to teacher expectations, differential instruction, or student peer socialization patterns (Webb 1983). I propose that a contributing factor to the significantly greater reading comprehension gains of less skilled readers placed into heterogeneous groups may be the amount of socio-cognitive conflict that students experience. Generally students with low reading achievement scores are placed into homogeneous classes with infrequent opportunity for discussion about the interpretation of textual material, and therefore little opportunity to experience socio-cognitive conflict (Webb 1982).

I therefore propose the following hypothesis:

1. The total amount of conversation alone will not be significantly different between homogeneous high, homogeneous low and heterogeneous social interaction dyads and will be positively correlated with reading comprehension gains.

2. Students who are placed into heterogeneous dyads will experience significantly greater frequencies of socio-cognitive conflict than students placed in homogeneous dyads.

3. Social modeling will have no significant effect on reading comprehension gains.

4. Students placed in heterogeneous dyads will achieve significantly greater reading comprehension gains than both

high and low readers placed in homogeneous groups and individuals who perform the tasks alone.

5. Students who are placed in heterogeneous groups will have significantly more propositions in their story summaries than homogeneously grouped students and individuals who performed the tasks alone.

6. Socio-cognitive conflict will be positively correlated with the number of correct propositions written in the story summary post test.

7. Low ability readers will have significantly greater reading comprehension achievement gains than high ability readers and individuals performing the tasks alone.

8. Reading comprehension gains will be positively correlated with the frequency of socio-cognitive conflict experienced.

## CHAPTER X

### METHODS

#### SUBJECTS

The subjects consisted of 120 male ninth grade high school students from a large Long Island public school. The subjects all came from high middle income homes and ranged in age from 14 years, 7 months to 16 years, 1 month. Sixty of these subjects were from high academic tracks, while an additional sixty subjects were from low academic tracks. All subjects were pretested on reading comprehension using the Gates McGinite Reading Comprehension Subtest Level F Form 1. In addition, utilizing Kintsch's (1976) Story Summary Approach, the subjects were pretested on reading comprehension and their knowledge of story schema (see Appendix A). Following evaluation of these pretests, using the criteria stated below, the subjects were classified as high or low readers and then placed into treatment groups. Sixty of the 120 subjects were randomly matched, according to reading pretest scores, with the subjects that were to be placed into the control group in order to insure reading ability equivalence in both the control and treatment groups. These sixty subjects were then then subdivided into thirty high level readers and thirty low level readers.

They were then randomly selected and placed into one of the three possible socio-cognitive conflict treatment groups in which the assigned reading tasks were performed by thirty pairs of subjects. Subjects selected for this treatment condition were assigned to one of the following dyad groups: twenty low level readers, twenty high level readers, and ten low and ten high level readers. Sixty other male ninth grade subjects were also randomly selected and matched according to their reading pretest comprehension scores. These subjects were then placed into homogeneous high, homogeneous low, or heterogeneous control groups in which they performed the reading tasks alone as individuals, without social interaction. The control group was necessary to determine if the reading tasks alone, without opportunity for socio-cognitive conflict, accounted for equivalent post-test reading comprehension gains. Criteria for placement into high and low reading groups were determined by comparing each individual's raw score to a standardized percentile conversion chart, and were as follows: high level readers scored above the 80th percentile on the reading comprehension subtest, while low ability readers scored at or below the 40th percentile on the same test. Students scoring between these ranges and all Special Education students were excluded from the study.

### Procedure

Students in the dyadinal treatment conditions were randomly assigned a partner. Ten learning teams (dyads) represented each treatment condition according to the following combinations: high-high readers, low-low, and high-low. Sixty male, ninth, grade subjects were randomly assigned to high, low, and heterogeneous reading dyads based on their pretest reading comprehension scores. Twenty students were placed into each group (see Table 1).

All subjects were pre and post-tested on their reading comprehension using Level F Form 1 of the Gates-McGinite reading comprehension test. In addition, subjects were also pre and post-tested on their knowledge of story schema using the story summary approach utilized by Kintsch (1976, 1980)). This assessment required the subjects to read and then summarize a given text from memory. The evaluator then recorded the number of propositions covered in the summary. Following these pretests, students were then shown a videotape of a person reading them standard instructions according to the treatment condition to which they were assigned. Students in the socio-cognitive conflict condition received the following instructions: "Hi, today we are going to read a story and then write short answers to the questions on the answer sheets. Part of the story will

be read along with a tape and the remainder you will read silently. Then you and your partner will read each question and then discuss what you think is the correct answer to that question. After you and your partner both agree on an answer you think is correct, then write your answer down on your paper. Then you will do the same for the next question". Students then observed a videotape of 2 models demonstrating this approach.

Instruction for the students in the individual treatment condition were as follows:"Hi, today you are going to read a short story and then write answers to the questions on the answer sheet. Part of the story will be read along with a tape and the remainder will be read silently. Then you will read each question and think about what the answer should be. Then write down what you think is the best answer. Do the same for each question". Students then observed a videotape of a model demonstrating this approach.

Students performed this task for forty-five minutes, three days a week for nine weeks. Fifteen minutes of this time were spent reading the passage and approximately thirty minutes were spent answering ten comprehension questions. Students received nonverbal feedback (the number correct) following each session. The reading passages used were from Kintsch's previous studies and from McDougal Littell's Reading Literature orange, and blue edition's

All passages used were based on American stories with varying degrees of story schema complexity and reading level, beginning with less complex, 9.1 reading level selections and ending with more complex 10th grade selections. Students were then observed in their individual dyads in a separate partitioned part of the room, while their statements were recorded on audio cassette tape every three weeks by two teachers blind to the experimental treatment condition. Printed transcripts (see Appendix A for an example) were made of the students conversation from these cassette tapes and referred to by the observers later to help them confirm their coding. During each observation, the frequency of socio-cognitive conflict and modeling were recorded and then checked after reviewing the transcripts. If the two raters blind to the treatment condition could not agree on how to code a statement, a third rater was asked to listen to the audio tape and read the transcript. The statement was coded according to majority agreement. The experimenter was not an administrator or a rater in this study. Interrater reliability (KR20) was .89.

### MEASURES

Each dyad was observed and audio-taped for one, forty-five minute period every three weeks during the nine weeks of treatment for a total of three observations. All observers were trained prior to these sessions. A record of

each individual's statements and actions was written down. During each observation, the total number of verbal statements made by each person and by each dyad as a whole was recorded. The total number of modeled statements were recorded for each individual and each dyad in order to determine if modeling was the primary causal change factor in improving reading comprehension. Modeling was defined as the repetition of a statement made by the other student previously without disagreement of any part of the original statement. The frequency of verbal disagreement about an answer or a story structure was recorded as a measure of socio-cognitive conflict. This frequency was recorded for each individual and for each dyad as a whole during each observation. Individual socio-cognitive conflicts were determined by recording the total (raw score) number of disagreements made by his or her partner. For example, when a high ability reader in a heterogeneous dyad made a statement that disagreed with a previous one made by a low ability partner, then that statement made by the high ability reader was coded as a socio-cognitive conflict statement experienced by the low reader. Therefore in that situation, the low ability reader was coded as experiencing socio-cognitive conflict. The frequency was later added up across the three observations, averaged, and then used for analysis. Socio-cognitive conflicts for each dyad as a whole were recorded by adding up the the the total (raw

score) number of task related verbal disagreements that occurred during each dyad's interaction. Verbal disagreement was defined as any statement that indicated a disagreement or a different answer to a previously stated one. Verbal disagreements were statements made by a partner that disagreed with the one the subject just made.

The third measure consisted of the raw score difference between equivalent pre (Form F1) and post (Form F2) test forms of the Gates McGinite reading comprehension test (see Appendix B for reliability and validity information). This analysis was conducted in order to determine the improvement of the students' reading comprehension. The Pretest raw score was subtracted from the post test raw score to determine the amount of reading gain or loss.

The fourth measure used in this study was the pre and post-test difference between the pre and post story summaries (see Appendix C for an example of story summary analysis). The pre test number of correct propositions stated were subtracted from the post-test number of propositions to determine the amount of story schema gain (see Figure 1 for model and list of measures).

Figure 1

<u>Model</u>			
Ability Grouping			
Treatment	H-H	L-L	H-L
SOCIO-COGNITIVE	10 dyads	10 dyads	10 dyads
CONFLICT			
NO CONFLICT	n=20	n=20	n=20

Measures

**Pretests:** Gates McGinite Reading subtests form F1  
raw score

Kintsch's Story Summary 1976 study

**Posttest:** Gates McGinite Reading subtest form F2

Kintsch's Story Summary 1976 study

**Encouragement 1.** # verbal statements made

**Variables:** 2. # of socio-cognitive statements  
made

3. # of Modeling statements made

## CHAPTER XII

### Results

To examine the main and interaction effects of different treatments on the development of reading comprehension achievement of ninth grade students, a series of oneway, and two way analyses of variance were performed. The strength of found relationships were then examined using several correlational analyses. Seperate analyses were conducted for: (a) socio-cognitive conflict, (b) reading comprehension scores, (c) story summary scores, and (d) modeling scores.

#### Conversation Effects

To determine if the total amount of conversation experienced by subjects was significantly different in different treatment groups, a ONEWAY analyses of variance was conducted using reading comprehension ability grouping (homogeneous low, homogeneous high, and heterogeneous) as the independent measure and the average frequency of conversation (over 3 observations) as the dependent measure. The group means (see Table 1) and the results  $F(2, 27)=2.63$  (see Table 2) indicate that reading comprehension pretest ability grouping had no significant effect on the amount of conversation subjects experienced in each dyad.

In addition, a Pearson Product-Moment correlation analysis was conducted in order to determine the strength of the relationship between the frequency of oral statements made and the amount of reading comprehension gain achieved. The results,  $r(1, 28) = .189$ ,  $p > .05$  (critical value = .296) indicate no significant relationship between these two variables.

TABLE 1

Group Means by Treatment for the Number of Statements

Made by Group Dyads

---

Treatment Group

	<u>LOW-LOW</u>	<u>LOW-HIGH</u>	<u>HIGH-HIGH</u>
# STATEMENTS	25.9	21.8	26.5
SD	6.15	3.66	5.98

---

an=10 dyads per treatment group

N=30 dyads (analysis conducted at the dyad level)

TABLE 2

ANOVA (ONEWAY) of the Effect of Ability Grouping on  
the Average Number of Statements Experienced In Each  
Dyad

---

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Grouping	2	130.87	165.44	2.63
Error	27	669.0	248.0	

$F(2,27)=3.35$

NO SIGNIFICANCE

---

Note: N=30 dyads (analysis conducted at the dyad level)

Group Composition Effects on Socio-Cognitive Conflict

Hypothesis 2 states that students placed in heterogeneous groups will experience greater frequencies of socio-cognitive conflict than students placed in homogeneous groups. In order to determine this, a ONEWAY ANOVA was

conducted using ability grouping as the independent variable (high and low reading pretest scores) and the average frequency (over 3 observations) of socio-cognitive conflict for each dyad as the dependent variable. The means for each treatment group as presented in Table 3 appear to indicate that subjects placed in homogeneous groups may have experienced greater frequencies of socio-cognitive conflict than subjects placed into heterogeneous groups suggesting that subjects placed in the homogeneous dyad group experienced greater frequencies of socio-cognitive conflict than homogeneously high and heterogeneously placed subjects indicating that hypothesis two may be incorrect.

TABLE 3

Group means by Treatment for Socio-Cognitive Conflict

---

<u>Groups</u>	<u>LOW-LOW</u>	<u>LOW-HIGH</u>	<u>HIGH-HIGH</u>
* STATEMENTS	25.90	21.80	26.50
Dyad	19.50	15.40	14.80
SD	1.87	2.15	4.02

---

$n=10$  dyads per group

Note.  $N=60$  Dyads (analysis conducted at the dyad level)

Results (see Table 4) indicate a significant treatment effect due to group composition at the dyad level,  $F(2, 28)=18.98, p<.01$ . Group composition had a significant main effect on the amount of socio-cognitive conflict experienced. Preplanned pairwise comparisons were conducted to determine if differing levels of individual pretest reading ability in different treatment groups affected the amount of socio-cognitive conflict experienced by subjects.

In the first preplanned analyses, high ability readers from homogeneously grouped dyads were compared with high readers from heterogeneous treatment groups. Results,  $t(1, 28)=.89$ , indicate that no significant difference existed between high ability reader's from different treatment groups in the amount of socio-cognitive conflict. A second preplanned analyses was conducted comparing low homogeneously grouped readers with low heterogeneously grouped readers. Results,  $t(1,28)=47.17, p<.01$  indicate that group composition had a significant main effect. Low ability readers in the heterogeneous groups experienced a great deal more socio-cognitive conflict than low ability readers in the homogeneous groups. Low ability readers in the heterogeneous treatment group heard significantly

greater frequencies of disagreement statements from their high ability partners than did low ability readers from their partners in the homogeneous treatment condition.

TABLE 4

ANOVA (ONEWAY) of Socio-Cognitive Conflict Experienced  
by Dyads in Different Treatment Groups

---

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Conflict	2	1093.57	546.79	18.98 **
Error	57	1641.36	28.80	

F(2, 57)=3.17 at .05 sig level and 5.01 at .01 level

\*\*= sig at .01 level

---

Note. N=60 (Analysis was conducted at the dyad level)

### Modeling Effects

Hypothesis 3 states that social modeling will not differ significantly between socio-cognitive conflict dyad treatment groups have no significant effect on reading comprehension gains. In order to test this hypothesis, a ONEWAY ANOVA was conducted on homogeneous high, homogeneous low, and heterogeneous dyads using social modeling as the dependent variable. Modeling was defined as the direct repetition of a statement or the paraphrase of a previous statement made by the other person without disagreement as part of that statement. Group Means (Table 5) demonstrate that little modeling alone occurred and that the frequency of modeling differed little between treatment groups. Results,  $F(2,28)=1.24$  indicate that very little modeling occurred and that no significant difference in the amount of modeling was observed between the different groups. In addition modeling was also correlated with reading achievement gain using a Pearson Product Moment correlation. Results,  $r(1, 28)=.19$   $p>.05$  do not indicate that a strong positive relationship exists between social modeling and reading achievement gain.

TABLE 5

Group Means of Modeling Experienced by Dyads in theDifferent Treatment Groups

---

<u>Phase</u>	<u>LOW-LOW</u>	<u>LOW-HIGH</u>	<u>HIGH-HIGH</u>
MODELING	4.3	3.9	3.8
SD	1.67	1.5	1.52

---

Group Composition, and Socio-Cognitive Conflict Effects

Hypotheses 4 states that students placed in heterogeneous dyads will achieve significantly greater reading comprehension gains than both high and low readers placed in homogeneous groups and individuals who perform the task alone. In order to test this hypotheses a 2 (conflict or no conflict) X 3 (homogeneous high, homogeneous low, or heterogeneous low-high group composition) ANOVA was conducted using reading comprehension gain scores as the dependent measure. The group means for this test are presented in Table 6. The means suggest a greater gain in reading comprehension for subjects who worked together in dyads than control subjects who performed the task alone without conversing. Results,  $F(1,124)=52.94$ ,  $p<.01$ , (see Table 7) indicate that socio-cognitive conflict had a main effect on reading comprehension gain. Group composition,  $F(1, 124)=4.79$ ,  $p<.05$  also had a significant main effect on reading comprehension gain, while no significant  $F(2,124)=1.92$  interaction effect was observed.

In order to determine if a significant differential effect existed, due to treatment, between the heterogeneous socio-cognitive conflict group and the homogeneous high and the homogeneous low socio-cognitive conflict groups, two post hoc comparisons were conducted. The first comparison,

conducted using the Scheffe' method with individual reading comprehension gain as the dependent measure, indicated  $F(1, 28)=28.8$ ,  $p<.05$ , that the heterogeneous treatment group experienced significantly greater reading comprehension achievement gain their high ability peers who performed the same tasks in homogeneous treatment groups. Similarly, in a second post-test analysis, subjects from the heterogeneous socio-cognitive conflict condition demonstrated significantly greater reading comprehension gain  $F(1,28)=38.6$ ,  $p<.05$ , than their peers who performed the same tasks in homogeneous low dyads. These results indicate that the heterogeneous placement had a significantly greater positive effect on reading comprehension gain than homogenous placement.

Table 6

Group Means by Treatment for Reading Comprehension


---

Phase	LOW-LOW		LOW-HIGH		HIGH-HIGH	
	Con	Treatment	Con	Treatment	Con	Treatment
	Pretest	14.55	12.18	13.98	41.88	42.32
Posttest	16.26	17.01	15.92	48.90	43.56	45.44
Gain	1.71	4.83	1.93	7.02	1.32	4.08
SD	.67	.24	.92	.37	.21	.63

---

Note. N=120 (analysis conducted at the individual level)

TABLE 7

ANOVA of Reading Comprehension Gain Scores


---

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Conflict	1	20.11	20.11	52.92 **
Grouping	2	3.61	1.8	4.74 *
C x G	2	1.46	.73	1.92
Error	114	43.634	.38	
Comp 1				28.8*
Comp 2				38.68*

F(1, 124)=3.92 at .05 sig level and 6.84 at .01 level

F(2, 120)=3.07 at .05 sig level

\*\*= sig at .01 level

\*= sig at .05 level

---

Note. N=120 (analysis conducted at the individual level)

Hypotheses 5 states that students who are placed in heterogeneous groups will have significantly more propositions in their story summaries than students placed in homogeneous groups and students who worked alone. To test this hypothesis a 2 (conflict or no conflict) X 3 (group composition-same as above) was conducted with the raw score total story schema gain as the dependent variable. The group means as presented in Table 8 again show greater positive gain for subjects in the socio-cognitive conflict treatment condition than for those subjects placed in the control groups. The results,  $F(1,124)=75.24$ ,  $p<.01$ , (see Table 9) confirm that socio-cognitive conflict had a significant positive effect on story schema gain, while neither group composition  $F(1,124)=.67$ , nor its interaction with socio-cognitive conflict had any significant effect on story proposition gain.

TABLE 8

Group Means by Treatment for Story Summaries


---

Phase	LOW-LOW		LOW-HIGH		HIGH-HIGH	
	Con	Tre	Con	Tre	Con	Tre
	Pretest	6.4	5.9	8.35	9.6	9.4
Posttest	7.2	10.0	10.3	14.6	10.6	13.5
Gain	1.2	4.1	2.0	5.0	1.2	4.9
SD	.97	1.9	.62	1.89	1.3	2.7

---

Note. N=120 (analysis conducted at the individual level)

TABLE 9

ANOVA of Story Summary Gain Scores


---

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Conflict	1	381.63	381.63	75.27 **
Grouping	2	6.45	3.23	.67
C x G	2	2.62	1.31	.26
Error	114	577.6	5.07	

F(1,120)=3.92 at .05 sig level and 6.84 at .01 level

F(2, 120)=3.07 at .05 sig level

\*\*= sig at .01 level

---

Note. N=120 (analysis conducted at the individual level)

Hypotheses 6 states that the frequency of socio-cognitive conflict will be positively correlated with the story schema proposition gains. In order to test this hypothesis, a Pearson Product Moment correlation analysis was computed for the frequency of socio-cognitive conflict

and story proposition gain at the dyad level. The results,  $R(1, 28) = .77$  ( $p < .01$  level) indicate that a positive correlation exists between these two variables, suggesting that greater socio-cognitive conflict appears to be related to greater reading schema gain.

Hypotheses 7 states that low ability readers working in socio-cognitive conflict dyads will experience significantly greater reading comprehension gains than high ability students and students who worked alone. To test this hypotheses, a 4 (Group Composition--homogeneous dyad, heterogeneous dyad, homogeneous control, and heterogeneous control) X 2 (Pretest reading ability--high or low) was conducted using raw score reading comprehension gain as the dependent variable. Group means (see Table 10) indicate that subjects in the socio-cognitive conflict dyad treatment condition experienced greater reading comprehension achievement gain than control group subjects. In addition, these means seem to suggest that low ability subjects both in the homogeneous and heterogeneous socio-cognitive conflict condition benefitted more than high ability readers. Results (presented in Table 11),  $F(1, 112) = 9.6$ ,  $p < .05$ , for pretest reading group, and  $(3, 112) = 25.12$ ,  $p < .01$ , for reading group composition indicate a positive main effect on reading achievement gain. Also a positive

interaction effect,  $F(4, 112)=24.318$ ,  $p<.01$  was observed between these two variables.

TABLE 10

Group Means for Pretest Reading Score (High or Low) by Treatment Condition (Homogeneous Dyad, Heterogeneous Dyad, Homogeneous Control, Heterogeneous Control) Using Reading Comprehension Gain As the Dependent Variable

	<u>Pretest Reading Ability</u>			
	<u>HIGH</u>		<u>LOW</u>	
	<u>x</u>	<u>SD</u>	<u>x</u>	<u>SD</u>
Homogeneous Dyada	.95	.63	1.5	.67
Heterogeneous Dyadb	1.05	.69	2.8	.76
Homogeneous Controla	.33	.21	.75	.24
Heterogeneous Controlb	.15	.25	.33	.4

Note.  $N=120$  (analysis conducted at the individual level).  $a_n=20$  each group.  $b_n=10$  each group.

TABLE 11

ANOVA (2 x 4) of Reading Comprehension Gain by PretestReading Score (High or Low) and Group Composition(Homogeneous Control, Heterogeneous Control,Homogeneous Dyad, Heterogeneous Dyad)


---

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Rdg. Grp.	1	3.067	3.067	9.3 **
Grp. Comp.	3	24.8	8.3	25.12 **
Interaction	3	32.16	8.025	24.316 **
Within	112	36.4	.33	

---

F(1,112)=3.94 at .05 sig level and 6.9 at .01 level

F(3,112)=2.46 at .05 sig level and 3.98 at .01 level

F(4,112)=2.46 at .05 sig level and 3.98 at .01 level

\*\*= sig at .01 level

---

Note. N=120 (analysis conducted at the individual level)

Preplanned comparisons were conducted for the following groups:

1. homogeneously grouped high readers, with heterogeneously high readers,  $t(1,128)=.89$ -non significant.
2. homogeneously grouped low readers with heterogeneously grouped low readers,  $t(1, 28)=47.26$ ,  $p<.01$ .

These results indicate that low ability readers placed into heterogeneous groups with high readers improved significantly more than low readers placed into either homogeneous low dyads or low ability readers who worked alone in the presence of either high or low readers without the opportunity for socio-cognitive conflict. Therefore group composition had a positive significant effect on reading comprehension achievement. Since low ability readers placed into heterogeneous groups received a significantly greater amount of socio-cognitive conflict, this may be the causal factor for achievement.

This same 4 (group composition) X 2 (pretest reading ability) paradigm was also used to analyze individual's reading schema proposition gain as the dependent variable. Group means (see Table 12) indicate that subjects in the socio-cognitive conflict condition experienced greater reading schema gain than subjects in the control condition with subjects in the low heterogeneous dyad condition

benefitting the most. Results (see Table 13),  $F(1,112)=.83$  indicate that reading pretest ability had no effect on story proposition gain, while group composition  $F(1,112)=35.31$ ,  $p<.01$  did. Results,  $F(4, 112)=5.56$ ,  $p<.01$ , also indicate that an interaction effect existed between pretest reading ability and group composition (Dyad or Control).

TABLE 12

Group Means of Story Summary Gains According to Group  
Composition and Pretest Reading Ability (high or Low)

	Pretest Reading Ability			
	HIGH		LOW	
	x	SD	x	SD
Homogeneous Dyada	4.95	2.68	4.1	1.9
Heterogeneous Dyadb	2.9	2.1	7.0	3.5
Homogeneous Controla	1.1	.21	1.9	.24
Heterogeneous Controlb	1.1	.25	1.0	.4

Note.  $N=120$  (analysis conducted at the individual level).  $a_n=20$  each group.  $b_n=10$  each group.

TABLE 13

ANOVA (2 x 4) of Story Summary Gain by Pretest Reading  
Score (High or Low) and Group Composition (Homogeneous  
Dyad, Heterogeneous Dyad, Homogeneous Control, and  
Heterogeneous Control)

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Source	df	SS	MS	F
Rdg. Grp.	1	3.29	3.29	.83
Grp. Comp.	3	420.6	140.216	35.31**
Interaction	3	88.29	22.073	5.56**
Within	112	444.69	3.971	

$F(1, 112) = .83$  non significant

$F(3, 112) = 35.31$  significant at .01 level

$F(3, 112) = 5.56$  significant at .01 level

\*\* significant at  $p < .01$  level

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Note. N=120 (analysis conducted at individual level)

Preplanned pairwise comparisons were conducted. No significant difference,  $t(1,30)=2.05$  was found in reading schema gain between homogeneous high dyad subjects and heterogeneous high dyad subjects, while a significant difference,  $t(1, 30)=9.92$  was observed between homogeneous low and heterogeneous low pretest reading ability subjects in story schema gain. Low heterogeneously grouped readers experienced greater story schema gain.

Hypothesis 8 states that reading comprehension gains will be positively correlated with the frequency of socio-cognitive conflict (Table 10). To test this hypotheses, a Pearson Product Moment correlation was computed. Results,  $r(1,28)=.70$  ( $p<.01$ ) indicating that a significant positive relationship may exist between socio-cognitive conflict and reading comprehension gain.

Finally, a Pearson Product Moment Correlation was computed at the dyad level to determine the strength of the relationship of reading schema gain with reading comprehension gain. Results,  $r(1, 28)=.88$ ,  $P<.01$  indicate that a strong relationship may exist between these two variables.

In summary the analyses conducted in this investigation indicate that socio-cognitive conflict had a significant effect on the development of reading comprehension skills in ninth grade male students, along with an increase in their story summary post-test schemas. Coming to agreement in dyads about answers to comprehension questions seemed to benefit all students in their development of reading skills no matter what group they worked in when compared with their peers who worked alone.

### Discussion

The main purpose of this study was to examine the role of socio-cognitive conflict and ability grouping on children's reading schema development and reading comprehension achievement gain. The results obtained provide relatively little support for a modeling explanation of learning, but instead provide support for the Socio-Cognitive Conflict Model (Bearison 1982). This indicates that cognitive disagreement between peers can cause internal conflict which may facilitate reorganization and construction of schema that result in cognitive growth.

Eight hypotheses were formulated at the outset which will now be considered in light of the data. As hypothesized, the amount of conversation alone did not significantly differ between the three socio-cognitive conflict treatment groups, indicating that the amount of social discourse alone was not a factor in influencing the amount of socio-cognitive conflict or reading comprehension gain observed. Most dyads seemed to exhibit a similar number of statements, on the average, during the given period of time. This indicates that it is not the quantity of conversation, but what occurs during social discourse that facilitates cognitive growth. Because part of each story was played aloud for the subjects on audiotape and the

reading passages were short, the time available for discussion for subjects in each treatment condition was similar. However, without reading along with the audiotape and the limitation of the part of the passage to be read silently to two pages, students in the low reading ability dyads may have had significantly less time available in the given forty-five minute period for discussion than the other dyadinal treatment groups.

The second hypothesis proposed that students placed into heterogeneous groups will experience significantly greater frequencies of socio-cognitive conflict than students placed in homogeneous dyads. At first glance, the data seem to indicate that this hypothesis is unsupported, with students placed in heterogeneous groups actually experiencing less socio-cognitive conflict than those placed in homogeneous groups. However, when preplanned comparisons were conducted, low ability readers placed in the heterogeneous treatment condition actually experienced significantly greater frequencies of socio-cognitive conflict than low ability readers placed in the homogeneous low dyad. This seems to be due to the different nature of conversation and disagreement that existed in the heterogeneous group. Informal post hoc categorization of statements made during treatment indicated that subjects in the heterogeneous group (involving high ability readers)

seemed to have disagreement in several different areas. Disagreement was centered around: what was being asked, story content—whether correct or incorrect, and strategy of finding answers to questions. In opposition, subjects in the homogeneous low treatment condition disagreed mostly about the correct answers to questions with less discussion and controversy involving story structure and the nature of the question.

In a second preplanned comparison, high ability homogeneously grouped readers were compared with high ability readers who were placed in heterogeneous dyads with low readers. No significant difference existed between the high ability readers in these two groups, failing to support the hypothesis that heterogeneously grouped readers would experience a greater frequency of socio-cognitive conflict than their peers placed in homogeneous groups. In fact, homogeneously placed high ability readers seemed to have experienced a higher but non-significant frequency of disagreement. Maybe in a longer study this trend would have become significant. Further investigation is suggested. Also, after careful analysis of the social discourse of the homogeneously grouped high ability readers, it appears that more sophisticated argumentation (metacognitive structural) was involved with more critical reading than that occurring

in the heterogeneous groups. A separate investigation may be necessary to investigate these differences.

In a third hypothesis, it was stated that modeling alone, without disagreement would have no significant effect on reading comprehension gains. Based on a ONEWAY analysis of variance conducted and reported earlier the frequency of modeling alone did not seem to differ between groups. In addition, when modeling alone without socio-cognitive conflict was correlated with reading comprehension gain, a strong positive relationship was not indicated. Therefore, evidence from the present study seems to support hypothesis 3. Modeling, the straight copying of an answer or strategy without disagreement and clarification did not seem to transfer to gains in the reading comprehension achievement test situation. Modeling may contribute to the development of higher order learning if it leads to socio-cognitive conflict and schema reorganization and development.

Hypothesis 4 of this study states that students placed in heterogeneous dyads will achieve significantly greater reading comprehension gains than both high and low ability readers placed in homogeneous groups and than students who performed the tasks alone. Based on the data recorded in this investigation, hypothesis 4 was supported. Students in both the the homogeneous and heterogeneous treatment groups acquired greater reading comprehension gains than their

peers who performed the same task working alone in control groups. Post-tests comparing the homogeneous high subjects who worked in dyads with the heterogeneously grouped dyad subjects indicates that the heterogeneously grouped subjects made significantly greater reading achievement gains than their homogeneously grouped peers. Similarly in a second post-test, homogeneously grouped low subjects, who worked in dyads, seemed to make significantly greater reading comprehension achievement gains than subjects who worked in homogeneous low dyad treatment groups. This investigation, therefore, seems to support the theory of socio-cognitive conflict, which states that working together with the requirement of coming to agreement before responding facilitates learning to a greater extent than performing the same tasks alone (Bearison 1982). Social discourse, specifically disagreement, seemed to result in assimilation and accommodation of cognitive structures that were internalized and transferred to the new but similar reading situations. In addition, the second part of this hypothesis which states that heterogeneously grouped students will achieve significantly greater reading comprehension gains than homogeneously grouped students is also supported. This appears to be due to the greater gains made by the low ability readers in the heterogeneous group. Their reading comprehension gains were significantly greater than both the

low pretest readers and high pretest readers who worked on the tasks in homogeneous groups. This difference in reading comprehension gain may be related to the similar resultant gains, made by low pretest readers from heterogeneous dyads, in their story summary schema as indicated in the results section.

Hypothesis 5 states that students who are placed in heterogeneous groups will have significantly more propositions in their story summaries than students in homogeneous groups and control subjects who performed the tasks alone. Based on the results of my analysis, hypothesis 5 is only partially supported. Subjects who were placed in the socio-cognitive conflict condition had significantly greater story summary schema gains than subjects who performed the tasks alone in the control group. Social discourse involving socio-cognitive conflict seems to have facilitated story schema development or expression of it leading to these resultant gains which were generalized and applied. Control groups who performed the tasks alone were only exposed to their own point of view and may not have questioned the completeness of the story schema that they were using while searching for answers to the comprehension questions. This may have diminished the amount of disequilibrium that they experienced reducing the frequency of assimilation and accommodation that occurred,

resulting in less cognitive reconstruction than the treatment groups.

On the other hand, the second part of hypothesis 5 was only partially supported. Subjects who were placed in heterogeneous treatment groups did experience significantly (20%) greater story summary gains than subjects placed in homogeneous low treatment groups (10%), but not significantly more than subjects placed in homogeneous high groups (25% gain). This difference between the heterogeneous group and the homogeneous low group may be due to the greater frequency of verbal disagreement discourse involving story structure in the heterogeneously grouped readers. The homogeneously grouped readers also had a high frequency of verbal disagreement involving story schema information. No significant interaction effect between socio-cognitive conflict and grouping was observed in the analysis. A possible explanation for this lack of interaction may be due to the high frequency of gain among all of the groups from involvement of socio-cognitive conflict.

Hypothesis 6 states that the average frequency of socio-cognitive conflict will be positively correlated with the average frequency of story summary proposition gain in the story summary post-test. This hypothesis was clearly supported with a positive correlation of .77. A

relationship between socio-cognitive conflict and story proposition schema development seems to have occurred, with greater frequency of socio-cognitive conflict experienced resulting in greater story schema development.

Hypothesis 7 states that low ability readers working in socio-cognitive conflict dyads will experience significantly greater reading comprehension gains than high ability readers and students who worked alone. The results of this investigation clearly support this hypothesis. Pretest reading ability, and experimental group composition seem to make a difference in subjects' reading achievement gains. Preplanned comparisons indicate that high ability readers experienced equivalent reading comprehension gain whether placed in homogeneous or heterogeneous socio-cognitive conflict groups. However, in regard to everyday classroom productivity and ultimate cognitive gain, the actual average amount of comprehension questions answered correctly suggest that possibly over a longer period of time that homogeneously high ability readers might complete more work and have greater comprehension gain than heterogeneously placed high ability readers (see Table 11). This may be due to the presence of more complete story schema and a greater metacognitive awareness of how to use this schema (Flavell 1984).

Preplanned comparisons made between homogeneously grouped pretest low ability readers and heterogeneously grouped low pretest ability readers strongly indicate that placement into a heterogeneous groups resulted in significantly greater reading comprehension gain. After analyzing the data, it seems that not just the quantity of socio-cognitive conflict (69%-heterogeneous group and 39% homogeneous low group) is responsible for this gain but something about the nature or quality of the socio-cognitive conflict seems to make a difference. For example, low ability heterogeneously grouped readers may have experienced greater socio-cognitive conflict involving story schema structure than their homogeneously grouped peers. Therefore further investigation needs to be conducted in order to explore this issue.

In a third preplanned comparison, homogeneously grouped low readers were compared with homogeneously grouped high ability readers in order to determine if either group experienced greater gain. The data clearly indicates that homogeneously grouped low ability readers experienced significantly greater gain than their homogeneously grouped high reading ability peers. This may be due to the initial incompleteness of the low ability groups reading schema and the dramatic effect of the internalization and construction of more complete schema on finding reading comprehension

answers, whereas high ability readers seemed to already possess a fairly complete story schema resulting in less dramatic growth. In addition, in regard to reading comprehension gain, low ability readers had much lower scores initially so that it was much easier to acquire greater gain, at least mathematically, than high ability readers because of high ability readers already high initial scores and a ceiling effect.

This same ANOVA 4(group composition) X 2(pretest reading ability) was conducted in order to determine if reading pretest ability, group composition, or their interaction had any effect on story composition gain. It was hypothesized that the interaction of pretest reading ability and group composition would have a significant effect on reading comprehension gain. This hypothesis was clearly supported. Results indicated that heterogeneously grouped low ability readers had significantly greater story structure gain than homogeneously grouped low pretest readers. This seems to have been the result of the greater frequency of socio-cognitive conflict that existed in the heterogeneous group situation and the greater frequency of that socio-cognitive conflict involving story structure.

No significant story structure gain seemed to exist between high ability readers in either the homogeneous or the heterogeneous groups. This was probably due to the high

pretest story structure schema that they already possessed. Homogeneously grouped low ability readers had significantly greater frequency of story schema gain than homogeneously grouped high ability readers. This was probably due to the high amount of socio-cognitive conflict and the low degree of story schema that they initially had. Low ability readers probably had different, incomplete story schemas, and experienced disequilibrium when they were exposed to each others schemas (Doise 1980) resulting in accommodation and reconstruction of already existing structures into more complete schemas. All subjects placed into socio-cognitive conflict groups had significantly greater story structure schema gains than subjects who performed the task alone. This result was probably due to the inability of control group subjects to check the validity of their own story schemas and the lack of exposure to opposing or different cognitive structures through socio-cognitive conflict.

Hypothesis 8 states that reading comprehension gains will be positively correlated with the average frequency of socio-cognitive conflict. This hypothesis was supported showing a positive relationship in which greater frequencies of socio-cognitive conflict were accompanied by greater reading comprehension gains showing that a positive relationship exists between them.

Finally, a correlation was computed to determine if reading schema gain would be positively correlated with reading comprehension gain. A strong positive relationship was observed indicating to me that greater socio-cognitive conflict resulted in the development of more complete, better organized schema resulting in greater reading comprehension gain.

#### Educational Implications

The findings in this research are of importance to researchers for several reasons. First the study indicates that students can learn from each other when given the opportunity to discuss and try to resolve problems together. Carefully designed socio-cognitive conflict learning activities may be an effective, alternative, supplementary learning methodology for promoting learning and thinking skills. By requiring students to discuss and come to agreement on answers to school tasks, students will have an opportunity to test the validity of their own thinking and try to prove the arguments for their answers to peers. If they encounter doubt, they can reorganize and coordinate their ideas incorporating parts of each others viewpoint into their own schemas. This dyadinal socio-cognitive conflict methodology will allow all students to actively test their ideas and hear the ideas of others instead of the

few children that get a chance to speak during a traditional class period. Teachers can circulate around the room observing many students comprehension of passages and concepts providing greater, richer feedback.

A second educational implication of this research is that students may come to see themselves as determiners of their own learning engaging more frequently in spontaneous academic conversation and in independent research to support their views. They will become aware that they can learn from one another as well as the teacher, and that working together can produce higher quality work than performing the same tasks alone. Working together is an important skill involving the possible enhancement of the students future lives.

A third implication of this study is that heterogeneous grouping may be a better way to promote learning of lower functioning students than homogeneous tracking without detriment to the learning of other, higher functioning students. After all we don't live in a homogeneous world, working in heterogeneous groups is more representative of how people interact with one another in real life and such interaction early on may better prepare students for adulthood.

### Suggestions for Further Research

The present investigation explored the possibility of using socio-cognitive conflict as a supplementary educational strategy to develop learning and thinking skills in homogeneous and heterogeneous classroom situations. As reported a positive reading comprehension gain was observed across dyads when compared to the control group students who worked alone. However, longitudinal studies should be conducted in order to determine if this positive trend would continue and to rule out a purely short term novelty effect.

In addition, in the present study homogeneous low reading pretest subjects experienced greater than expected reading comprehension gain. Further research should be conducted to determine if these results would be repeated and to identify any other variable which might account for this gain (e.g. interhemispheric transfer through overt verbalization of their ideas).

Thirdly, could similar results be obtained with larger treatment groups such as three and four students? Which would be the ideal number and combination for what tasks?

Finally, could the socio-cognitive conflict model be used in similar results in other educational subject areas such as math or science? These are just a few suggestions for further research; many more may be possible.

## CHAPTER XVI

**Appendix A**  
**Transcript Sample**  
**Socio-cognitive conflict Coding**

Below is a portion of a transcript of conversation between subjects following the reading of the short story, *God Sees The Truth But Waits*, by Leo Tolstoy. The subjects are from a heterogeneous dyad. S1 is the low ability reader and S2 is the high ability reader. Following is an excerpt of their dialogue involving their discussion as they work on answering question number 1.

- S1: Okay let's read the question.  
S2: Aright, I'll read it;  
S1: Ivan's wife tries to persuade him not to go to the fair. Why?  
S2: She doesn't want him to spend the money. They don't have a lot of money and she's afraid he'll waste it all.\*  
S1: No that's not it she had a bad dream about him.\*  
S2: So what, anybody can have a dream, big deal. She just said that, but that wasn't the real reason.\*  
S1: No, look here (reading), it says, "I do not know what I am afraid of. All that I know is that I had a bad dream. I dreamed that you returned from town and when you took off your cap your hair was gray>" She's dreaming about him going away to prison, only she doesn't know it yet. She's afraid something's going to happen to him.\*  
S2: Yeah, maybe, but I think she's afraid, he might get into a fight, because it says here that he used to drink, not just because of her dream.\*  
S1: That's true, but I still think it was her dream. You know how you wake up after a bad dream, like you fell off a cliff and you pinch yourself to see if it's a dream. I think she was afraid something was going to happen to him.\*  
S2: Okay, but I think that she's only afraid because he used to drink and get into fights.  
S1: Okay let's put down that she tries to persuade him to stay home because of her dream and his past history of drinking.

Coding: Each statement above with an asterisk was coded as a socio-cognitive conflict statement for the subject who was hearing it because it in some significant way disagreed with the statement made directly before it, either because the statement included no or but and added new and different information.

**CHAPTER XVII****Appendix B  
Gates-MacGinitie  
Reliability and Validity Information**

In a critical review of the Gates-MacGinitie Reading Comprehension subtest Form F, Level 1, (Mitchell, 1985) Professor Robert Calfee found the tests to be fairly reliable with coefficients for internal consistency (KR20) ranging from .88 to .94.

In regard to test validity for comprehension subtest F, no statistical data are listed in the publishers technical manual. However, a detailed description was given as to how passages were selected for the comprehension subtests along with guidelines for teachers to assess validity of the tests in relation to their school curriculum. All passages were selected from already published sources representing the wide range that students are likely to read for assigned or recreational reading. These passages were chosen according to a plan specified for each test, with proportions set for poetry, natural sciences, science, art, and fiction. Two experienced reading supervisors read each passage and, on the basis of its maturity and content, judged the grade levels for which each passage would be appropriate. Their judgements guided the choices of passages that were included in each test.

## CHAPTER XVIII

## Appendix C

Example of Kintsch's Propositional Story Summary  
 Analysis Used to Measure Story Schema In This Investigation

## Text

A series of violent, bloody encounters between police and Black Panther Party members punctuated the early summer days of 1969. Soon after, a group of Black students I teach at California State College, Los Angeles, who were members of the Panther Party, began to complain of continuous harrassment by law enforcement officers. Among their many grievances, they complained about receiving so many traffic citations that some were in danger of losing their driving privileges. During one lengthy discussion we realized that all of them drove automobiles with Panther Party signs glued to their bumpers. This is a report of a study that I undertook to assess the seriousness of their charges and to determine whether we were hearing the voice of paranoia or of reason (Kintsch 1980).

## Sample Analysis of Part of Above Text

<u>Proposition #</u>	<u>Proposition</u>
1	(SERIES, ENCOUNTER)
2	(VIOLENT, ENCOUNTER)
3	(BLOODY, ENCOUNTER)
4	(BETWEEN, ENCOUNTER, POLICE, BLACK PANTHER)
5	(TIME: IN, ENCOUNTER, SUMMER)
6	(TIME: IN, SUMMER)
7	(TIME: IN, SUMMER, 1969)
8	(SOON, 9)
9	(AFTER, 4)

This is just a sample of how the above text would be analyzed. All together , the above text contains 46 propositions. Propositions are numbered and are listed consecutively according to the order in which their predicates appear in the text. Each proposition is enclosed by parentheses and contains a predicate (written first) plus one or more arguments. Arguments are concepts (which are written in capital letters to distinguish them from regular words) or other embedded propositions, which are referred to by their number. For example (SOON, 9) is shorthand for (SOON, AFTER BETWEEN, ENCOUNTER, POLICE, BLACK, PANTHER).

Subjects written recall of the above text were analyzed for the number of correct propositions included from the list of propositions that accompanies this text. The number of correct propositions was recorded for each subject as his story summary test score.

## CHAPTER XIX

### Appendix D

#### Observation Guidelines

Following are a few of the guidelines followed by each trained observer, during each observation. Two trained observers unfamiliar with the subjects and blind to the experimental groups were present at the same time during each observation. Both had a standard coding sheet and a standard set of instructions to follow. All observers were previously trained by the experimenter using standard instructions, video tape of two students interacting and transcripts of them from a previous pilot study also investigating socio-cognitive conflict.

Observations occurred in a separate walled off part of the classroom in which only the dyad observed and the two raters sat. Observations occurred every three weeks at roughly the same time. All subjects were given a special code in addition to their first name on the coding and transcript sheet in order to avoid any confusion. All conversation was recorded on two audio cassette tape recorders during the entire observation period.

Transcripts were made of these conversations for later review by each observer. During each observation period, each observer, recorded with a d each socio-cognitive conflict statement heard by a subject, (that is a statement that disagreed with his own previously made statement) and an m for each modeled (repeated) statement that occurred. A statement was defined as the verbal remarks made by one person up until a pause exists and the next person begins to speak or the second person's speech causes the other to pause.

Following each coding session, usually the next day, each observer would review the audiotape using a dictaphone as they read the written transcripts. Each observer would then review their coding sheets and independently make any changes that they saw fit. When statements were coded differently by each observer, a third observer also blind to the experimental treatment would review the transcript and audiotape and code the questionable section. The statement would then be recorded in the data as recorded by 2 or more observers.

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