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Edited by Rachel Hertz-Lazarowitz and Norman Miller

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An Overview of the Theoretical Anatomy of Cooperation in the Classroom

*Rachel Hertz-Lazarowitz, Valerie Benveniste Kirkus,
and Norman Miller*

Cooperative interdependence in classroom settings is the basis of many interventions designed to improve both academic achievement and social relations in schools and as such has been a primary focus in educational and social psychological literature for more than two decades. Each discipline, however, has given rise to a distinct line of research. The purpose of this volume is to bring together recent work from diverse areas to provide both educators and social psychologists with theoretical foundations for integrating the principles and processes that underlie the cognitive and affective outcomes of cooperative interaction. Its uniqueness lies in its attempt to connect concepts that stem from different approaches. We hope that such a theoretical “anatomy” will facilitate a general understanding of the fundamental conditions for promoting achievement and positive social relations in schools by means of cooperation.

The researchers who have contributed to this volume recognize that it is the natural tendency of children to grow and learn through social interaction, and share the belief that understanding cooperative interactions within school contexts will not only help children achieve educational goals but also create more long-term benefits for humankind. Each chapter examines in detail the dynamics of a specific area of cooperative interaction and its cognitive and/or affective correlates. Though there is some overlap in content, the chapters are organized into four general areas: (1) developmental foundations and the social construction of knowledge, (2) social skills and classroom factors influencing peer interactions, (3) the effects of task and reward structure on academic achievement, (4) factors influencing the promotion of positive intergroup relations.

This introduction provides a brief preview of key ideas discussed in each chapter. In our final chapter we attempt to integrate this research, including other pertinent literature from social, educational, and developmental psychology.

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Part I Developmental Foundations and the Social Construction of Knowledge

The first three chapters lay the developmental foundation for the examination of cooperative interactions. Central to each chapter is a social constructivist view of learning based largely on the theories of Piaget (1926) and Vygotsky (1980, 1986). To both theorists the social milieu is pivotal to cognitive growth and knowledge construction. Piaget described the interaction between the factors that are internal and external to the child as necessary for the formation and attainment of increasingly complex stages of cognitive ability. The internal factors are the child's maturational level and intrinsic need for equilibration. These work in concert with the external factors – the social transmission of knowledge and environmental experiences – to influence development. Central to the Vygotskian view is the role of a more knowledgeable other in guiding social interaction and providing the conceptual scaffolding for the gradual internalization of knowledge.

In their respective chapters McCarthy and McMahon, Bershon, and Nelson-Le Gall base their discussion of knowledge development and cognitive growth on the important role of social interactions, suggesting that schools and teachers ought not to fight against, but to work with, the innate tendency of children to interact verbally in social groups.

McCarthy and McMahon (Chapter 1) provide a general discussion of the contribution of social interaction to learning in which, within the context of developing children's writing skills in the classroom, they make clear Damon and Phelps's (1989) distinctions between tutorial, cooperative, and collaborative learning. They elaborate on the appropriateness of each form of group learning as viewed from the perspective of the individual, the purposes of instruction, and the nature of the task. These three components (personal, instructional, and task) influence interaction in distinct ways during each of three identified processes of writing: planning, drafting, and revising.

Operating in tandem with the three types of peer interaction are three process dimensions, each of which has several levels. These interdependent process dimensions are (1) role, (2) interactive structure, and (3) task. Levels of ability have an important influence on student roles, creating patterns of interaction that co-vary as a function of actual and perceived ability differences. For example, students of similar ability may collaborate or cooperate, whereas when one student is clearly more knowledgeable than another, a tutorial exchange will occur. The dimension of interactive structure is defined in terms of mutuality of interaction, which describes the directional flow of discourse. On this continuum, tutorial interaction, which is largely unidirectional knowledge transmission, represents the anchor point of "low mutuality" whereas collaboration represents the "high mutuality" anchor.

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Although all three process dimensions are important for understanding and setting the boundary conditions that will influence the type of peer interaction that is enacted, McCarthey and McMahon propose that the task dimension is critical to the others – that is, the nature of the task defines students' roles and interactive patterns. They explain that in the process of writing, 'the demands of the task frame the amount and type of discourse and influence who will have control over the text.' They interpret the three variables (role, interactive structure, task) from a social constructivist framework that delineates for practitioners ways to progress through the learning continuum, from static transmission of knowledge to dynamic transformation of knowledge.

Bershon (Chapter 2) discusses social learning from its earliest inception, focusing on the role of inner language in problem solving. She succinctly explains Vygotsky's view of how the transmission of social *interpsychic* knowledge becomes *intrapsychic* knowledge, which forms new cognitive structures that become a part of the child's problem-solving repertoire. Her discussion centers on the adaptive use of inner language as a natural cognitive tool in problem solving. Vygotskian theoretical distinctions between the development of speech from social to egocentric to inner serve as a springboard for her discussion. Social speech begins through parent-child discourse. From this interaction children learn volitional behavior. Interpersonal egocentric language evolves, again, in the service of directing behavior and solving problems. Inner language then emerges as the internalization of this problem-solving speech. The social *interpersonal* communicative tool becomes an *intrapersonal* communicative tool – cognitive thought.

In Bershon's detailed examination of inner speech she specifies four types that may occur during problem solving: task related, self related, other related, and task irrelevant. Further, she identifies a list of the cognitions concomitant with inner speech that, when identified and incorporated into classroom problem-solving tasks, will be useful in improving task performance and in fostering the development of the megacognitive skill of self-regulation. In this manner (and with reference to Marshall, 1988) Bershon envisions a shift of emphasis in the classroom from places of *work* to places of *learning*.

Nelson-Le Gall (Chapter 3) takes us further into the natural social learning strategies of children by examining their help-seeking behaviors. Her analysis of theory and research regarding adaptive and maladaptive perceptions of help-seeking in children (and adults) provides an insightful foundation for understanding the cognitive, motivational, and affective bases that influence situation-specific help-seeking behaviors. Previewing themes that emerge in later chapters, she also discusses impediments to learning inherent in the established organizational structure of schools.

Nelson-Le Gall refers to early literature (e.g., Beller, 1955) showing that negative affect often arises after (or while) seeking help, because help-seeking was interpreted as an indicator of dependency and thus deemed inappropriate beyond

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earliest childhood. This negative affect, in turn, acts as an obstacle to learning by disinclining further attempts to seek help. She discusses more recent literature, as well, that outlines situational determinants that serve as a barrier to the development of adaptive and appropriate (i.e., instrumental) help-seeking by students in school. Nelson-Le Gall also explains that under certain conditions help-seeking may lead to self-perceptions of low ability, embarrassment, or feelings of indebtedness and dependency.

Other relevant literature in social psychology supports the notion that those receiving help often show decreased liking toward their helpers. Circumstances associated with this and other similar outcomes include those in which the recipient of help does not foresee the opportunity to reciprocate (Castro, 1974; Gergen, Ellsworth, Maslach, & Seipel, 1975; Gross & Latané, 1974; Shumaker & Jackson, 1979), tasks in which performance is believed to reflect an individual's intelligence (Morse, 1972), ego-involving tasks such as those associated with one's personal self-concept (DePaulo & Fisher, 1980; Gergen, Morse, & Kristeller, 1973; Wallston, 1976), tasks in which the relevant experience of donor and recipient is perceived as similar (Fisher, Harrison, & Nadler, 1978; Fisher & Nadler, 1974; Nadler, Fisher, & Streufert 1974), and tasks in which the group or team experiences failure (Ashmore, 1970; Blanchard, Adelman, & Cook, 1975; Blanchard & Cook, 1976).

It is important to note, however, that Cook and Pelfrey (1985) found that a person who received help when working as a member of a cooperating group expressed more liking for a teammate who provided help. In discussing this reversal of the typical negative consequences of dependence, Cook and Pelfrey point to two features that distinguish cooperative group settings from the dyadic relations in which receiving help produces dislike of the helper. One difference is that group settings evoke norms of responsibility toward teammates and the collective, which act to minimize the negative effects that ordinarily occur when one is unable to reciprocate help that is received. A second feature is that help received in the context of group membership increases the recipient's view of his or her own value to the group, which, in turn, has positive consequences for liking of the group as well as the particular member who provided the help.

As indicated, Nelson-Le Gall integrates theories regarding the development of self-perceptions of ability and self-presentational concerns that can act together to deter students from seeking needed help. These are issues that we, also, explore in Chapter 11. Importantly, these factors can act as a barrier to a student's inclination not only to seek help from other students but also to seek help *from teachers*. Nelson-Le Gall's response to this observed dilemma is to reconceptualize help-seeking as a *positive* behavioral option that is instrumental to achievement, learning, and goal attainment. Rather than focus upon the negative costs of seeking help, the model presented here focuses upon the negative costs

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of *not* doing so. Further, she differentiates help-seeking in terms of dependency-oriented versus mastery-oriented interpersonal negotiation, in which person and task variables are important determinants of behavior. The theoretical orientation of this chapter offers the interventionist a foundation for creating a classroom social climate (by means of classroom norms, adult-sanctioned peer interaction, and teacher behaviors that support mastery orientation) that will help foster natural social learning through instrumental help-seeking.

Part II Social Skills and Classroom Factors Influencing Peer Interactions

Hertz-Lazarowitz (Chapter 4) provides a comprehensive foundation for understanding social interactions in the classroom. She presents a multidimensional model in which unique patterns of social interaction are dependent on six inter-related classroom “mirrors.” These mirrors include the physical organization of the classroom, the learning task, teacher instructional behavior, teacher communicative behavior, student social behavior, and student academic behavior. Each mirror contains a continuum of type of learning, which varies from solitary to interactional to collaborative. Together they provide a model for analyzing activity within a given classroom in terms of the reflections created by its unique combination of mirrors.

Hertz-Lazarowitz describes the conditions that facilitate each type of learning, providing teachers with a practical pathway for the progression from a traditional classroom to one that is interactive and, further, to one that is cooperative. She states that movement along this continuum does not require the discarding of one strategy and substitution of another but, rather, a restructuring of teacher behaviors.

The introduction of four key concepts provides researchers with an organizational tool for observing, describing, and analyzing classrooms within different contexts. The first pivotal notion is that of classroom multidimensionality and the different stages within each dimension. Second is the developing nature of multidimensional complexity, which progresses within each mirror from noninteractive to interactive to cooperative. Third is the sense of harmony or optimal effectiveness that may be established by creating a convergence across mirrors in the stages or levels at which a class operates. And last is the interdependence of these mirrors in producing the combined social and cognitive outcomes that emerge.

Equally pertinent is her discussion of negative outcomes. Low-level, irrelevant interactions suffer from procedural, repetitive, almost “ritualistic” processes, thus lacking the content elaboration associated with effective learning. Also, her research shows that even within the context of cooperatively structured

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learning, noninteractive behaviors frequently occur and helping behaviors are not always automatic. Hertz-Lazarowitz suggests that looking at *combinations of behaviors* is the key to broadening understanding of the processes that underlie cooperative interaction.

Following this general model for understanding classroom interactions, Webb (Chapter 5) focuses more specifically on interactions among students. Her model of peer interaction describes the types of help-giving and help-receiving interactions that lead to positive or negative learning outcomes and the kinds of responses group members provide when one member experiences difficulty. Based on a taxonomy of type of help exhibited in students' verbal exchanges, which ranges from the offering of information to the presentation of complex elaborations, she analyzes spontaneous student exchanges (in groups of four mixed-ability students) during their learning of mathematics.

Not surprisingly, her data suggest that giving help in the form of supplying information without explanation is weakly correlated with achievement gains. When peer interaction includes elaboration and/or explanations, however, achievement improves correspondingly. Within mixed-ability groups, distinct patterns of interaction and achievement emerge for those at each ability level (low, medium, high). High-ability students always verbalized their thinking, even when incorrect or experiencing difficulty. Medium- and low-ability students sometimes remained silent during problem solving. Silent medium-ability students, however, in general performed well on the delayed posttest, whereas silent low-ability students did not. Webb offers plausible speculations to account for these findings and also refers to the model offered by Nelson-Le Gall to understand possible process variables that may be influential in these patterns of verbal interaction.

Webb's findings regarding the effect of ability status on the social interaction of students should be kept in mind when reading Chapters 9 and 10. Status factors and concomitant perceptions of self-identity (that are partially based on such factors) are powerful determinants of patterns of participation (Berger, Cohen, & Zelditch, 1972; Cohen, 1982, Cohen, Lotan, & Catanzarite, 1990) and of interpersonal and intergroup acceptance (Miller and Harrington, 1990; Tajfel, Flament, Billig, & Bundy, 1971).

Webb's use of both immediate and delayed posttest measures allows for achievement-related inferences about long-term retention as well as short-term recall. She ends her chapter with general principles for shaping student interaction into patterns that optimize achievement in the classroom and provides a list of conditions that will facilitate the exchange of high-level elaboration in groups, which, in turn, promote metacognitive skills that are task general rather than task specific – a central theme in Chapter 6.

O'Donnell and Dansereau (Chapter 6) depart from Webb's model of *sponta-*

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neous peer interaction to examine the effects of experimentally manipulated *scripted* interaction between student dyads. Whereas the preceding chapters examined cooperative learning in classroom settings with preschool or elementary school children, O'Donnell and Dansereau (as do Miller and Harrington, and Maruyama, Knechel, and Petersen in Chapters 9 and 10) work with college students in a laboratory setting. In so constraining their research they strive for a level of experimental control that provides for a more exact understanding of process variables that underlie the outcomes of cooperative interactions. Working from a perspective similar to the developmental approach presented in the first part of this book, learning is again construed in terms of metacognitive skills that facilitate learning across a wide variety of content areas. Their model is comprehensive in that it includes both cognitive and affective correlates of cooperative interaction. The full model comprises cognitive, affective, metacognitive, and social variables (CAMS). They delineate the optimal task and process conditions for effective implementation of dyadic cooperative learning, as defined by enhanced student achievement and motivation. Also, their work offers the unique contribution of analysis of *processing* activities engaged in by students, rather than simply the achievement *outcomes* that result from them.

Their *Scripted Cooperation* procedure includes five generic components, many of which have been identified by cognitive psychologists as critical factors for facilitating learning (e.g., Anderson, 1985): (1) dividing a text into discrete and meaningful subsections, (2) having both members of the dyad read the text a section at a time, (3) requiring one partner to recall the pertinent details and information, (4) requiring the other partner to monitor this oral recall to detect errors and omissions (these two roles are evenly interchanged throughout the text), and (5) having both members of the dyad elaborate on this information with methods that may include developing analogies and generating images. Scripted Cooperation encourages the development of metacognitive learning strategies – that is, learning strategies that are content independent or readily transferable from one domain of learning to another, such as skills useful in the content areas of history, science, literature, and so on. O'Donnell and Dansereau contend that content-independent affective outcomes simultaneously develop as a result of observational learning during scripted interaction. For example, one member of the dyad may model a positive affective strategy such as overcoming frustration when confronting a difficult task. The other may model effective ways of coping with anxiety that may occur when confronted by potential evaluation or public performance. In this way, each member of the dyad brings to the cooperative interaction a repertoire of cognitive and affective skills that may be acquired through social modeling and strengthened by rehearsal.

This chapter also notes conditions of cooperative interaction that are associated with possible negative outcomes. Further, it parallels many aspects of the

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applied field settings described in earlier chapters. For example, CAMS interactions that result in *automatic* information processing promote little new learning; thus, O'Donnell and Dansereau structure their laboratory learning tasks to be moderately challenging to enhance both content-dependent and content-independent learning. This is compatible with the notion of the zone of proximal development advocated by developmentalists (see Chapters 1 and 2). Another negative affective outcome may be a decline in motivation when the learner perceives highly discrepant ability differences between group members. This idea is complementary to, and may help explain, Webb's findings with regard to silent, low-ability students. O'Donnell and Dansereau discuss other differences between individuals that may have negative consequences and inhibit learning (e.g., high anxiety during social interaction that interferes with attention to task).

Overall, however, 10 years of research on Scripted Cooperation shows that it effectively promotes academic success. Although it emphasizes cognitive consequences, it also reports important and interesting results with respect to interpersonal attitudes. Those who participated in experimenter-generated cooperative scripts expressed more positive attitudes toward working with future partners in cooperative situations than those who did not. The combined cognitive and affective measures of CAMS scripted cooperative learning offer a practical basis for understanding process variables underlying these correlates of cooperative interactions in classrooms.

Part III The Effects of Task and Reward Structures on Academic Achievement

Although the chapters by Slavin and D. W. Johnson and R. T. Johnson discuss some of the process variables (e.g., student interaction and motivation) that were examined in detail in Parts I and II, Part III primarily focuses on the influences of task and reward structures on student achievement.

Slavin (Chapter 7) reviews the literature and theory about the relationship between cooperation and achievement and analyzes the effects of different task and outcome measures in laboratory and field research. Differences in the definition or measurement of achievement may lead to opposing recommendations regarding optimal ways to maximize it, partly because the benefits of cooperative learning result from more than a single theoretical construct. He points out that achievement as measured by individual scores on an exam differs greatly from achievement as measured by the creation of a group product. He argues that measuring the advantage of cooperative over individual achievement on the basis of group performance or problem solving may be misleading, as these reflect *pooled* knowledge or problem-solving ability, which, when measured by the creation of a single product, gives groups an advantage over a single individual.

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As do the authors of previous chapters, Slavin briefly discusses circumstances in which achievement may be negatively affected by cooperative interaction. He classifies these conditions under the construct of diffusion of responsibility, a specific source of dysfunction that social psychologists include in the process loss that often accompanies group problem solving (e.g., Steiner, 1972). Slavin emphasizes the role of a cooperative reward structure in conjunction with a cooperative task structure to protect against this negative outcome. The processes by which cooperation acts to enhance achievement are examined from six perspectives: (1) motivation (reward and/or goal structure), (2) social cohesion, (3) developmental level, (4) cognitive elaboration, (5) rehearsal or practice, and (6) classroom organizational efficiency. Slavin's interpretation of the motivational components is largely *extrinsic*. That is, he sees increases in motivation to achieve as driven by strivings for symbolic or tangible external rewards such as certificates, grades, or increases in free-time activities. Similarly, he views motivational gains from social cohesion, such as increased helping behaviors, to be a consequence of creating social norms that make helping appropriately instrumental to the group in their quest to attain extrinsic rewards. His analysis argues for the need for both group rewards and individual accountability to maximize achievement.

Slavin's summary of achievement in cooperative settings reviews some of the constructs described in earlier chapters, such as elaboration (Chapter 6) and practice via verbalization (Chapter 2). To this, he adds the idea of increased organizational efficiency in teachers' use of time. This occurs during cooperatively structured activities because students can assume responsibility for checking each other's work and thereby free the teacher – whether for more direct one-on-one instruction or for other activities. He concludes with an integrative model of these six perspectives. Because each is “demonstrably ‘correct’ in some circumstances, but none are probably both necessary and sufficient in *all* circumstances,” his model describes complementary relations among them that enhance academic achievement.

Reward structure is discussed again by D. W. Johnson and R. T. Johnson (Chapter 8). Whereas a major concern for Slavin was the differences among operational definitions of *achievement*, this chapter focuses on the differences among operational definitions of *cooperation*. Like Slavin, D. W. Johnson and R. T. Johnson acknowledge that cooperation in learning is not always the optimal method for attaining maximal achievement and briefly discuss the conditions under which social loafing is likely to undermine the positive achievement effects of cooperation.

D. W. Johnson and R. T. Johnson describe the effects of task and reward structures on academic achievement by means of a typology of “positive social interdependence.” Positive interdependence includes two major types of inter-

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dependence: *means* interdependence and *outcome* interdependence. With positive means interdependence a task is structured such that two or more individuals are required to coordinate their efforts to successfully complete it. Outcome interdependence can include either or both *goal* interdependence and *reward* interdependence. In goal interdependence, as previously described by Deutsch (1949), one can attain one's goals if, and only if, other members also attain their goals. Reward interdependence exists when each group member receives an equivalent reward for successful completion of the joint task (e.g., the same grade). Importantly, they noted that it is difficult to assess the relative benefits of reward versus goal interdependence. Although goal interdependence can be structured without reward interdependence, the converse is not true; reward interdependence cannot be structured and/or measured independently of goal interdependence.

Their typology delineates the essential components and boundary conditions of cooperative intervention that will lead to increases in academic achievement. This chapter, as well as Slavin's chapter, provides a framework for understanding causal antecedents to both increases and decreases in learning. A section of Chapter 8 is also devoted to the social benefits of interdependence in cooperative learning.

Part IV Factors Influencing the Promotion of Positive Intergroup Relations

This section considers cooperative learning from a social psychological perspective. Whereas educational psychologists emphasize the cognitive correlates of cooperation, social psychologists focus on its affective consequences as viewed from intrapersonal, interpersonal, and intergroup perspectives. In our view, academic achievement and interpersonal processes and outcomes are of equal importance: allocating fewer chapters here that are concerned solely with social psychological issues should not be construed as an indication of lesser perceived relevance or significance. Rather, as mentioned previously, we see this lack of balance as a reflection of normative perceptions of the purposes of schooling. The traditional purpose of schools in Western culture has been transmission of academic knowledge, skills, and information. Socialization of children has, by and large, been considered to be the responsibility of the family. As argued in many of the earlier chapters, however, it is self-evident that socialization processes and academic learning are inextricably intertwined and that the formation and nature of interpersonal and intergroup attitudes, as well as the acquisition of social skills, are major components of each child's school experience. Indeed, this is a basic assumption underlying the purpose of this collection.

Miller and Harrington (Chapter 9) lay the foundation for understanding the social psychological processes at work in classroom interactions. Their approach