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Social Interdependence: Interrelationships Among Theory, Research, and Practice

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Social interdependence theory is a classic example of the interaction among theory, research, and practice. The premise of the theory is that the way in which goals are structured determines how individuals interact, which in turn creates outcomes. Over 750 research studies have been conducted in the past 11 decades on the relative merits of cooperative, competitive, and individualistic efforts and the conditions under which each is appropriate. These studies have validated, modified, refined, and extended the theory. Social interdependence theory has been widely applied, especially in education. The applications have resulted in revisions of the theory and the generation of considerable new research.

Many funding agencies have concerns about whether psychological research results in valuable practical applications. Too often there seems to be a lack of understanding of how psychology can help practitioners be more effective. The extent to which psychological theorizing results in more effective practice depends primarily on the relationship among theory, research, and practice. Ideally, theory guides and summarizes research, research validates or disconfirms theory (thereby leading to its refinement and modification), and effective practice is guided by validated theory yet reveals inadequacies that lead to further refine-

Editor's Note

David W. Johnson received the Award for Distinguished Contributions of Applications of Psychology to Education and Training. Award winners are invited to deliver an award address at the APA's annual convention. A version of this award address was delivered at the 111th annual meeting, held August 7–10, 2003, in Toronto, Ontario, Canada. Articles based on award addresses are reviewed, but they differ from unsolicited articles in that they are expressions of the winners' reflections on their work and their views of the field.

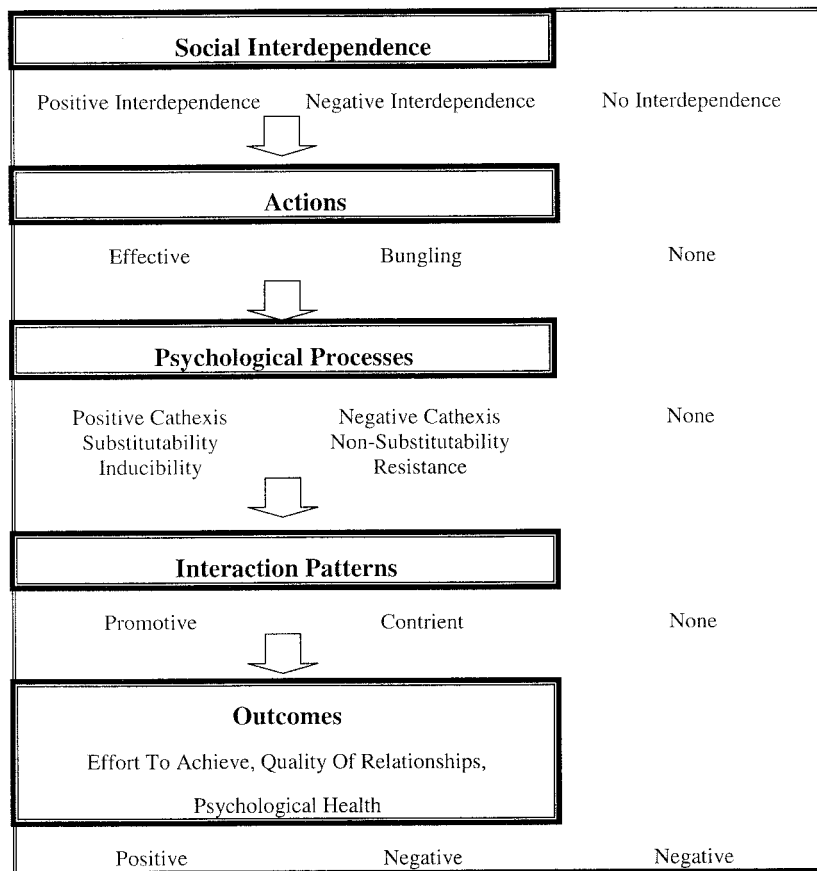
ment of the theory and new research studies. Increasingly, however, the culture of theoretical research appears to be isolating itself from practical application while the culture of research in practical settings seems to be divorcing itself from theory (Sternberg & Lyon, 2002).

Social interdependence theory provides an example of the potential contributions of psychology for effective practice in a wide range of settings through productive interactions among theory, research, and practice. Social interdependence theory has been used as a guide for creating concrete practical procedures in education (D. W. Johnson & Johnson, 1994; D. W. Johnson, Johnson, & Holubec, 1998), business (Tjosvold, 1989), individual and group psychotherapy (D. W. Johnson & Matross, 1977), family therapy (D. W. Johnson, 1983), mediation (Kessel, 2000), organizational and community development (D. W. Johnson & Johnson, 1994), international conflict and peace building (Deutsch, 1983), and the full range of types and levels of social systems. It is in education, however, that the most systematic and widespread applications have taken place. From a period of relative obscurity in the 1960s, cooperative learning has flourished and is now applied in schools and universities throughout most of the world in every subject area, from preschool through graduate school and adult training programs. Its use so pervades education that it is difficult to find a textbook on instructional methods, a teacher's journal, or instructional materials that do not discuss cooperative learning. The application of social interdependence theory represents one of psychology's success stories. The purpose of this article is to describe how psychology has contributed to more effective practice on a wide-scale basis by summarizing social interdependence theory, providing an overview of the relevant research, reviewing the application of the theory in education, and discussing the powerful interaction among social interdependence theory, research, and practice.

Social Interdependence Theory

The historical roots of social interdependence theory can be traced to a shift from mechanistic to field theories in physics (Deutsch, 1968; see Figure 1). This shift especially influenced the emerging school of gestalt psychology at the University of Berlin in the early 1900s. As the "field" became the unit of analysis in physics, so did the "whole" or "gestalt" become the focus of the study of perception and behavior for gestalt psychologists. Gestalt psychologists posited that humans are primarily concerned with developing organized and meaningful views of their world by perceiving events as integrated wholes rather than as a summation of parts or properties. One of the founders of the gestalt school of psychology, Kurt Koffka, proposed that similar to psychological fields, groups are dynamic wholes in which the interdependence among members can vary.

Figure 1
Overview of Social Interdependence Theory



Building on the principles of gestalt psychology, Kurt Lewin proposed that the essence of a group is the interdependence among members, which results in the group being a dynamic whole so that a change in the state of any member or subgroup changes the state of any other member or subgroup. Group members are made interdependent through common goals. As members perceive their common goals, a state of tension arises that motivates movement toward the accomplishment of the goals.

Deutsch (1949, 1962) extended Lewin's notions by examining how the tension systems of different people may be interrelated. He conceptualized two types of social interdependence—positive and negative. *Positive interdependence* exists when there is a positive correlation among individuals' goal attainments; individuals perceive that they can attain their goals if and only if the other individuals with whom they are cooperatively linked attain their goals. *Negative interdependence* exists when there is a negative correlation among individuals' goal achievements; individuals engaged in such processes perceive that they can obtain their goals if and only if the other individuals with

whom they are competitively linked fail to obtain their goals. *No interdependence* exists when there is no correlation among individuals' goal achievements; individuals perceive that the achievement of their goals is unrelated to the goal achievement of others. Social interdependence thus creates three psychological processes and determines the interaction patterns among individuals.

Deutsch (1949) specified three psychological processes resulting from interdependence: *substitutability* (i.e., the degree to which actions of one person substitute for the actions of another person), *cathexis* (i.e., the investment of psychological energy in objects outside of oneself, such as friends, family, and work), and *inducibility* (i.e., the openness to being influenced and to influencing others). He also posited that positive interdependence results in *promotive interaction* (i.e., individuals encourage and facilitate each other's efforts to complete tasks in order to reach the group's goals), whereas negative interdependence results in oppositional or *contriient interaction* (i.e., individuals discourage and obstruct each other's efforts to complete tasks in order to reach their goals).

The basic premise of social interdependence theory is that the ways in which participants' goals are structured determine how they interact, and the interaction pattern determines the outcomes of the situation (Deutsch, 1949, 1962). According to this premise, cause and effect can go both ways. Deutsch's (1985) crude law of social relations states that the characteristic processes and effects elicited by a given type of social interdependence also tend to elicit that type of social interdependence. Thus, cooperation tends to induce and be induced by mutual assistance, exchange of needed resources, and trust. Competition tends to induce and be induced by obstruction of each other's success, tactics of coercion and threat, enhancement of power differences, deceptive communication, and striving to "win" conflicts. Individualistic efforts tend to induce and be induced by an avoidance of other people. Each process tends to be self-confirming. Any part of the social interdependence process elicits the other parts of the process. Because each component can induce the others, they are likely to be found together.

Research on Social Interdependence

Social interdependence theory has a long history and has been carefully formulated to explain cooperative and competitive relations among individuals. Theory, however, tends to be of limited value unless it adequately subsumes the existing research into a meaningful conceptual framework and generates further research that validates or disconfirms the theory and establishes the conditions under which the hypothesized relationships occur. Social interdependence theory has done both. The relationship between theory and research, however, is not unidirectional (Merton, 1957). Empirical research can shape the development of theory through the discovery of valid results that are unanticipated, the accumulation of research findings that the theory does not adequately explain, the clarification of the nature of theoretical concepts, and the demonstration of the relationship between the theory and new dependent variables. In this section, the number and characteristics of the research studies focusing on social interdependence are described, their results are presented, and the variables mediating the relationship between social interdependence and its outcomes are discussed.

Amount and Characteristics of Research

The study of cooperative, competitive, and individualistic efforts is commonly recognized as the oldest field of research in American social psychology. In the late 1800s, Triplett (1898) conducted a study on the variables associated with competitive performance. Since then, over 754 studies have been conducted on the relative merits of cooperative, competitive, and individualistic efforts and the conditions under which each is appropriate. This is one of the largest bodies of research within psychology, and it pro-

vides sufficient empirical research to test the propositions of social interdependence theory.

The characteristics of the 754 studies that contain enough data to compute an effect size (there are many more studies from which an effect size cannot be computed) are as follows: Many of the research studies have high internal validity, having been carefully conducted by skilled investigators under highly controlled laboratory (31%) and field (65%) settings (see Table 1). When rated on the variables of random assignment to conditions, clarity of control conditions, control of the experimenter effect, control of the curriculum effect (same materials used in all conditions), and verification of the successful implementation of the independent variable, 51% of the studies met the criteria.

The research on social interdependence has an external validity and a generalizability rarely found in the social sciences. As a rule, the more variations in places, people, and procedures that the research can withstand and still yield the same findings, the more externally valid are the conclusions. Exemplifying such diversity, the research on social interdependence has been conducted over 12 decades by numerous researchers with markedly different theoretical and practical orientations working in varied settings. A wide variety of research tasks, ways of structuring social interdependence, and measures of the dependent variables have been used. Participants in the studies varied from three years old to postcollege age and have come from different economic classes and cultural backgrounds. The studies were conducted with different durations, ranging from 1 to 100 sessions or more. Social interdependence has been investigated in numerous cultures in North America (with Caucasian, African American, Native American, and Hispanic populations) and in countries from North, Central, and South America, Europe, the Middle East, Asia, the Pacific Rim, and Africa. The research on social interdependence includes both theoretical and demonstration studies conducted in educational, business, and social service organizations. The diversity of these studies gives social interdependence theory wide generalizability and considerable external validity.

Research Findings

The many diverse dependent variables examined in studies on social interdependence over the past 110 years may be subsumed within three broad categories (D. W. Johnson & R. T. Johnson, 1989, 2003b): effort to achieve, positive interpersonal relationships, and psychological health (see Table 2).

Effort to achieve. A meta-analysis of all studies found that the average person engaged in cooperative behavior performed at about two thirds of one standard deviation above the average person operating within a competitive (effect size = 0.67) or individualistic (effect size = 0.64)

Table 1
General Characteristics of Studies

Characteristic	No.	%	Characteristic	No.	%
Years			Form of report (<i>continued</i>)		
1900–1909	0	0.0	Book	5	0.7
1910–1919	1	0.1	MA theses	11	1.5
1920–1929	7	0.9	PhD dissertations	75	9.9
1930–1939	6	0.8	Technical report	59	7.8
1940–1949	5	0.7	Unpublished	22	2.9
1950–1959	25	3.3	Unknown	4	0.5
1960–1969	80	10.6	Type of study		
1970–1979	183	24.3	Laboratory	234	31.0
1980–1989	285	37.8	Field	490	65.0
1990–1999	138	18.3	Clinical	3	0.4
2000–2009	21	2.8	Unknown	27	3.6
Unknown	3	0.4	No. sessions		
Group assignment			1	216	28.6
No random assignment	280	37.1	2–9	150	19.9
Randomly assigned participants	328	43.5	10–19	98	13.0
Randomly assigned groups, participant unit of analysis	98	13.0	20–29	57	7.6
Randomly assigned groups, group unit of analysis	44	5.8	30–39	53	7.0
Unknown	4	0.5	40–49	44	5.8
Ages (years)			50–59	18	2.4
3–4	8	1.1	60–69	18	2.4
5–9	85	11.2	70–79	6	0.8
10–12	182	24.1	80–89	8	1.1
13–15	106	14.1	90–99	37	4.9
16–18	55	7.3	100+	3	0.4
19–22	278	36.9	Unknown	46	6.1
23+	34	4.5	Gender of groups		
Unknown	4	0.5	Homogeneous	145	21
Form of report			Mixed gender groups	582	74
Journal article	578	76.7	Unknown	27	5
			Total	754	100

Note. Only those studies providing enough data for computation of effect sizes are included in this table.

situation. When only studies with high internal validity were included in the analysis, the effect sizes were 0.88 and 0.61, respectively. Cooperative experiences promote more frequent insight into and use of higher level cognitive and moral reasoning strategies than do competitive (effect size = 0.93) or individualistic (effect size = 0.97) efforts. Cooperators tend to spend more time on task than do competitors (effect size = 0.76) or participants working individually (effect size = 1.17), and in turn, competitors tend to spend more time on task than do participants working individually (effect size = 0.64).

Positive relationships and social support. Since 1940, more than 180 studies have compared the impact of cooperative, competitive, and individualistic efforts on interpersonal attraction. Cooperative efforts, compared with competitive (effect size = 0.67) and individualistic (effect size = 0.60) experiences, promoted considerably more liking among individuals. This remains true when only the methodologically high-quality studies are examined (effect

sizes = 0.82 and 0.62, respectively) and when those studies are included that focused on relationships between White and minority participants (effect sizes = 0.52 and 0.44, respectively) and relationships between participants with and without disabilities (effect sizes = 0.70 and 0.64, respectively). These results validate *social judgment theory* (D. W. Johnson & Johnson, 1989), an extension of social interdependence theory. The social judgments individuals make about each other engender either a process of acceptance, resulting in mutual liking and respect, or a process of rejection, resulting in mutual dislike and lack of respect. Furthermore, since the 1940s, more than 106 studies comparing the relative impact of cooperative, competitive, and individualistic efforts on social support have been conducted. The cumulative findings indicate that cooperative experiences promoted greater task-oriented and personal social support than did competitive (effect size = 0.62) or individualistic (effect size = 0.70) experiences. This remained true when only the methodologically high-quality

Table 2
Mean Effect Sizes for the Impact of Social Interdependence on Dependent Variables

Dependent variable	Cooperative vs. competitive	Cooperative vs. individualistic	Competitive vs. individualistic
All studies			
Achievement	0.67	0.64	0.30
Interpersonal attraction	0.67	0.60	0.08
Social support	0.62	0.70	-0.13
Self-esteem	0.58	0.44	-0.23
Time on task	0.76	1.17	0.64
Attitudes toward task	0.57	0.42	0.15
Quality of reasoning	0.93	0.97	0.13
Perspective taking	0.61	0.44	-0.13
High-quality studies only			
Achievement	0.88	0.61	0.07
Interpersonal attraction	0.82	0.62	0.27
Social support	0.83	0.72	-0.13
Self-esteem	0.67	0.45	-0.25

Note. Data are from *Cooperation and Competition: Theory and Research* by D. W. Johnson and R. T. Johnson, 1989, Edina, MN: Interaction Book. Copyright 1989 by Interaction Book. Adapted with permission.

studies were examined (effect sizes = 0.83 and 0.72, respectively).

Psychological health and self-esteem. Seven studies directly measured the relationship between social interdependence and psychological health (see D. W. Johnson & Johnson, 1989). Participants studied included such diverse samples as university individuals, older adults, suburban high school seniors, juvenile and adult prisoners, step-couples, and Olympic hockey players. The results indicate that working cooperatively with peers and valuing cooperation result in greater psychological health than does competing with peers or working independently. Cooperative attitudes were highly correlated with a wide range of indexes of psychological health, competitiveness was in some cases positively and in some cases negatively related to psychological health, and individualistic attitudes were negatively related to a wide variety of measures of psychological health.

One aspect of psychological health is self-esteem: Since the 1950s, over 80 studies have compared the relative impact of cooperative, competitive, and individualistic experiences on self-esteem. Cooperative experiences promoted higher self-esteem than did competitive (effect size = 0.58) or individualistic (effect size = 0.44) experiences, even when only the methodologically high-quality studies were examined (effect sizes = 0.67 and 0.45, respectively). Norem-Hebeisen and Johnson (1981) conducted four studies involving 821 White, middle-class, high school seniors in a midwestern suburban community. These authors found that cooperative experiences tend to be related to beliefs that one is intrinsically worthwhile, others see one in positive ways, one's attributes compare favorably with those of one's peers, and one is a capable, competent, and success-

ful person. Competitive experiences tend to be related to conditional self-esteem that is based on whether one wins or loses. Individualistic experiences tend to be related to basic self-rejection.

Essential Elements of Cooperation

Applications of social interdependence theory are required to operationalize either positive or negative interdependence in order to create promotive or oppositional interaction that will lead to the desired outcomes. Operationalizations of positive interdependence have focused both on the relative efficacy of the ways in which it may be structured and on increasing the forces for responsibility through individual accountability procedures. Operationalizations of promotive interaction have included an emphasis on social skills and group processing. Although the basic theoretical premise focuses on three variables (interdependence, interaction, and outcomes), the operationalizations of positive interdependence and promotive interaction have resulted in the emphasis of five variables (interdependence, individual accountability, interaction pattern, social skills, and group processing).

Positive interdependence. In the studies on positive outcome interdependence, positive interdependence may be confounded with perception of group membership or interpersonal interaction. The evidence indicates, however, that neither group membership nor interpersonal interaction in and of itself seems sufficient to generate higher achievement and productivity; instead, positive goal interdependence is also required (Hwong, Caswell, Johnson, & Johnson, 1993; Lew, Mesch, Johnson, & Johnson, 1986a, 1986b; Mesch, Johnson, & Johnson, 1988; Mesch, Lew, Johnson, & Johnson, 1986). Knowing that one's perfor-

mance affects the success of one's group mates seems to create forces for responsibility that increase one's efforts to achieve.

A series of studies conducted on the relative efficacy of types of positive interdependence found that positive goal and reward interdependence tend to be additive: Whereas positive goal interdependence is sufficient to generate higher achievement and productivity than are engendered by individualistic efforts, the combination of goal and reward interdependence tends to increase achievement more than does goal interdependence alone (D. W. Johnson, Johnson, Stanne, & Garibaldi, 1990; Lew et al., 1986a, 1986b; Mesch et al., 1988; Mesch et al., 1986; Ortiz, Johnson, & Johnson, 1996). Positive goal interdependence tends to promote higher achievement and greater productivity than does resource interdependence (D. W. Johnson, Johnson, Ortiz, & Stanne, 1991). Resource interdependence by itself may decrease achievement and productivity compared with individualistic efforts (when individuals need the resources of other group members but do not share common goals, they try to obtain resources from others without sharing their own resources; D. W. Johnson et al., 1990; Ortiz et al., 1996). Both working to achieve a reward and working to avoid the loss of a reward produced higher achievement than did individualistic efforts (Frank, 1984). There is evidence that positive interdependence tends to motivate individuals to try harder, use higher level reasoning strategies more frequently, and develop new insights and discoveries more frequently (Gabbert, Johnson, & Johnson, 1986; D. W. Johnson & Johnson, 1981; D. W. Johnson, Skon, & Johnson, 1980; Skon, Johnson, & Johnson, 1981). The more complex the procedures involved in interdependence, however, the longer it will take group members to reach their full levels of productivity (Ortiz et al., 1996). Finally, identity interdependence (i.e., defining oneself in terms of group membership), results in a greater willingness to take less from common resources and to contribute more toward the common good (Brewer & Kramer, 1986; De Cremer & Van Vjagt, 1999; Kramer & Brewer, 1984).

Individual accountability and personal responsibility.

Positive interdependence is posited to create forces for responsibility that increase group members' feelings of responsibility and accountability for (a) completing one's share of the work and (b) facilitating the work of other group members. When a person's performance affects the outcomes of collaborators, the person feels responsible for their welfare as well as his or her own (Matsui, Kakuyama, & Onglatco, 1987). Failing oneself is bad, but failing others as well is worse. The shared responsibility created by positive interdependence adds the concept of "ought" to group members' motivation—one ought to do one's part, pull one's weight, contribute, and satisfy peer norms (D. W. Johnson & Johnson, 1989). Such feelings of re-

sponsibility increase a person's motivation to perform well. Responsibility forces are increased when there is group and individual accountability. Hooper, Ward, Hannafin, and Clark (1989) found that cooperation resulted in higher achievement when individual accountability was structured than when it was not. Similarly, Archer-Kath, Johnson, and Johnson (1994) found that increasing individual accountability resulted in increases in perceived interdependence among group members.

Promotive interaction. Positive interdependence is posited to result in promotive interaction, and negative interdependence is posited to result in oppositional or contri-ent interaction. Promotive interaction is characterized by individuals engaging in such actions as providing each other with efficient and effective help and assistance and exchanging needed resources such as information and materials. Negative interdependence typically results in individuals opposing each other's success. Oppositional interaction occurs as individuals discourage and obstruct each other's efforts to achieve their goals; individuals focus both on being productive and on preventing any other person from being more productive than themselves. Conditions of no interaction occur when individuals work independently without any interchange with each other; individuals focus only on being productive and ignore as irrelevant the efforts of others. Promotive interaction requires the appropriate use of interpersonal and small group skills and regular group processing.

Appropriate use of social skills. Promoting the success of other group members requires participants to have (or to be taught) the interpersonal and small group skills needed for high-quality cooperation as well as to be motivated to use them (D. W. Johnson, 2003; D. W. Johnson & F. P. Johnson, 2003). In their studies on the long-term implementation of cooperative efforts, Lew, Mesch, and their colleagues (Lew et al., 1986a, 1986b; Mesch et al., 1988; Mesch et al., 1986) found that the combination of positive goal interdependence, a contingency for high performance by all group members, and a social skills contingency promoted the highest levels of achievement and productivity. Giving participants individual feedback on how frequently they engaged in targeted social skills was more effective in increasing participants' achievement and creating more positive relationships than was group feedback (Archer-Kath et al., 1994; Putnam, Rynders, Johnson, & Johnson, 1989).

Group processing. Promotive interaction may be enhanced by group members periodically reflecting on how well they are functioning and how they might improve their work processes. Within cooperative groups, group processing (compared with cooperation without group processing and individualistic efforts) has been found to increase the achievement of high-, medium-, and low-achieving individuals' problem-solving success, achieve-

ment motivation, uniformity of achievement among group members, and attempts to influence group mates toward higher achievement (Archer-Kath et al., 1994; D. W. Johnson et al., 1990; Yager, Johnson, Johnson, & Snider, 1986). Group processing also resulted in more positive relationships between participants with and without disabilities (which carried over to post-instructional free-time situations), greater self-esteem, and more positive attitudes toward the subject area (Archer-Kath et al., 1994; Putnam et al., 1989).

Conditions for constructive competition and individualistic efforts. Social interdependence theory has been expanded in the past few decades to include the conditions under which competition may be constructive (D. W. Johnson & Johnson, 1974, 1978, 1989, 1999; R. T. Johnson & Johnson, 1979; Stanne, Johnson, & Johnson, 1999; Tjosvold, Johnson, Johnson, & Sun, 2003). Competition tends to be more constructive when winning is relatively unimportant, in situations in which all participants have a reasonable chance to win, and under circumstances in which there are clear, specific, and fair rules, procedures, and criteria for winning. Individualistic efforts may be most appropriate when cooperation has high costs, the goal is perceived to be important, participants expect to be successful, the task is unitary and nondivisible, directions for completing the task are simple and clear, and what is accomplished will be used subsequently in a cooperative effort.

Application of Social Interdependence Theory

There is considerable evidence, therefore, that cooperative efforts tend to promote greater efforts to achieve, more positive relationships, and greater psychological health than do competitive or individualistic efforts. Furthermore, the power of cooperation has been shown to depend on the presence of clear, positive interdependence (which includes individual accountability) that results in promotive interaction (which includes appropriate use of social skills and group processing). These results provide strong confirmation of social interdependence theory, as the validating research encompasses considerable diversity and generalizability. Having a validated theory, however, does not signify that it will direct or even influence practice. Effective practices can be derived from sound theories, but they can also be validly derived from unsound theories or from no theory at all (i.e., through trial and error or luck). Moreover, effective practice can be derived from validated theory only if the theory is stated with sufficient precision that effective procedures can be deduced for practitioners to use. Social interdependence theory has such precision.

Once practical procedures are deduced from a theory, they must be implemented in a wide range of settings and evaluated. A number of conditions, such as inertia, resistance to change, economic conditions, prejudice, and cultural resistance, can preclude implementation or institution-

alization of effective practices. At the University of Minnesota, Twin Cities Campus, the Cooperative Learning Center has worked with school districts and universities throughout the world in implementing cooperative learning. Such widespread and diverse use of cooperative learning has resulted in modifications and extensions of social interdependence theory and numerous new research studies.

There is a two-way relationship between theory and practice. Practice is guided by validated theory. Operationalizing the theory in practical situations can reveal inadequacies in the theory that lead to its modification and refinement (which then requires new research studies to validate the changes). Social interdependence theory is an example of how a good theory can change the course of everyday life. The clarity of the theory, the amount and quality of the research, and the successful application of the theory indicate that social interdependence theory is strategic (i.e., has implications for and applications to a wide range of problems and situations), profound (i.e., individuals who know the theory understand more about the real world and can behave more effectively than can those who do not know the theory), and powerful (i.e., has considerable validity and generalizes across a wide range of individual differences, situational variables, and historical periods).

Whereas small group learning has been used since the beginning of human existence, the modern use of cooperative learning primarily began in 1966 with the training of teachers at the University of Minnesota in the effective instructional use of small groups. Since that time, the application of social interdependence theory to education has become one of the most successful and widespread applications of social psychology to practice. Practical procedures have been created from social interdependence theory for structuring cooperative, competitive, and individualistic efforts at both the classroom and school levels (D. W. Johnson & Johnson, 1994; D. W. Johnson et al., 1998). Cooperative learning is the instructional use of small groups designed to encourage students to work together to maximize their own and each other's learning (D. W. Johnson et al., 1998). The widespread implementation of cooperative learning by countless teachers and professors throughout the world has resulted in a number of contributions to social interdependence theory. Some of the more important are as follows.

1. Operationalization of cooperative learning by multiple teachers, in a variety of subject areas and settings, from preschool through adult education, across varied tasks and diverse students, in many different countries and cultures, serves to validate the theory and the clarity of the conceptual definitions. The correspondence between Deutsch's (1949) theoretical definitions and the practical procedures highlights a major strength of social interdependence theory. It is noteworthy that after extensive research on social

interdependence and multiple applications of its principles, the original definitions have not been revised or modified.

2. To implement cooperative learning successfully, educators have focused attention on the identification of mediating variables. The need to increase the effectiveness of cooperative learning in dealing with a variety of educational issues, such as increasing achievement, improving relationships among diverse peers, and improving self-esteem, has led to examination of the internal dynamics of cooperation and the variables that mediate its effectiveness. Five mediating variables have been identified (positive interdependence, individual accountability, promotive interaction, social skills, and group processing; D. W. Johnson & Johnson, 1989). The mediating variables have been used and refined to structure cooperative learning more effectively, to solve problems students have in working together, and to adapt cooperative learning to different student populations, subject areas, and conditions. Subsequently, the theory has been modified to include all five of these variables.

3. The implementation of cooperative learning has expanded the outcomes considered by social interdependence theory. Issues of school integration, inclusion of those with disabilities, and the increased diversity of immigrants have led to a focus among schools on the use of cooperative learning to create positive relationships among diverse students. The emphasis on solving social problems has expanded the dependent variables to the use of positive peer pressure to increase prosocial and decrease antisocial behavior (e.g., preventing drug abuse, inculcating academic values in at-risk students, enhancing self-esteem, preventing violence). These and other factors have resulted in the expansion of the theory to include new dependent variables, fermenting considerable new research.

4. The implementation of cooperative learning has highlighted the values inherent in social interdependence. Cooperative, competitive, and individualistic efforts have inherent value systems that are instilled by the flow of day-to-day life within schools (D. W. Johnson & Johnson, 2000). The values inherently taught by cooperative efforts include a commitment to one's own and others' success and well-being, a commitment to the common good, and the view that facilitating and promoting the success of others is a natural way of life. Engaging in competitive efforts inherently teaches the values of obtaining more than others and beating and defeating others, the importance of winning, and the view that opposing and obstructing the success of others is a natural way of life. The values inherently taught by individualistic experiences are a commitment to one's own self-interest and the view that the well-being of others is irrelevant. Schools inculcate numerous values in students, and the instructional methods used influence the values that students develop.

5. The implementation of cooperative learning has focused attention on predispositions for cooperation and competition. In educational situations, some students appear more predisposed toward cooperation, and other students seem more comfortable with competition. Theoretically, cooperation and competition are conceptualized as opposite ends of a single continuum. Yet predispositions toward engaging in cooperation or competition may in fact be somewhat independent of each other (D. W. Johnson & Norem-Hebeisen, 1979). Because both cooperative and competitive situations involve interaction with other people, it may be assumed that a person who is high on both will be a highly social person who enjoys interacting with others in a variety of ways, whereas a person who is low on both will generally be more socially isolated, tending to avoid others across a range of situations.

6. The implementation of cooperative learning has directed attention to the relationship between cooperation and conflict. Social interdependence theorists have noted that both positive and negative interdependence creates conflict among individuals (Deutsch, 1973; D. W. Johnson & Johnson, 1995a, 1995b; Tjosvold, 1991). In cooperative situations, conflicts arise over how best to achieve mutual goals. In competitive situations, conflict occurs over who will win and who will lose. Two of the conflict resolution programs implemented in schools to teach students how to manage conflicts constructively are (a) the Teaching Students to Be Peacemakers Program, in which students are taught how to resolve conflicts of interests constructively by engaging in integrative negotiations and peer mediation (D. W. Johnson & R. T. Johnson, 1995b, 2003a), and (b) the Academic Controversy Program, in which students are taught how to intellectually challenge each other's ideas, reasoning, and conclusions (D. W. Johnson & Johnson, 1995a). The research on both programs indicates that conflicts that occur within the context of positive (as opposed to negative) interdependence may result in a wide variety of positive outcomes (such as higher achievement, more frequent use of higher level reasoning, more accurate perspective-taking, more integrative agreements, greater liking for each other, and more positive attitudes toward conflict). These findings considerably strengthen the relationship between social interdependence theory and constructive conflict resolution.

Return to Theory, Research, and Practice

Social interdependence theory is an example of how psychological theorizing and research have resulted in valuable practical applications and how theory, research, and practice interact in ways that enhance all three. The relationship between theory and research has long been understood. Theory identifies, clarifies, and defines the phenomena of interest and their relationships with each other. In the 1920s and 1930s, some research on cooperation and competition was conducted, but it was disjointed,

involved a variety of definitions of cooperation and competition (even within the same study), and provided little conceptual clarity as to the nature of cooperation or competition. Deutsch's (1949) definitions utilizing positive and negative correlation among goals as well as the absence of such correlations (a) brought considerable conceptual clarity to the nature of the types of social interdependence, (b) helped reorganize the previous studies by creating a framework from which to classify the operational definitions in previous studies as to the actual type of social interdependence created, and (c) helped operationalize the types of social interdependence in future studies (i.e., the rules of correspondence were clear). Thus, social interdependence is a well-formulated theory that clearly defines the relevant concepts, summarizes the research, and generates new research.

Research validates or disconfirms the theory. More than 754 studies have been conducted on social interdependence in the past 100 years or so, and 97% of them were conducted following Deutsch's development of the basic theory. Thus, there is sufficient research to test the theory, and the studies conducted have both high internal and high external validity. The amount, quality, and generalizability of the research provide strong confirmation of the basic propositions of the theory and the effectiveness of cooperative relative to competitive and individualistic efforts. In addition, these studies have demonstrated relationships between the theoretical constructs and new dependent variables and have contributed research findings about originally underdeveloped aspects of the theory.

In discussions of the relationship among theory, research, and practice, the role of practice has sometimes been neglected. Social interdependence theory has been applied in many diverse areas, but the most systematic, widespread, and long-term applications have been in education. The implementation of cooperative learning has had profound effects on social interdependence theory and research in at least four ways. First, in the mid-1960s, when I first started training teachers in the use of cooperative learning, there was considerable cultural resistance due to the widespread beliefs in social Darwinism (which advocated the use of competition in schools) and operant conditioning (which advocated individualistic learning and behavioral modification). The need for a persuasive rationale for the use of cooperative learning led to comprehensive reviews of the research (D. W. Johnson, 1970; D. W. Johnson & Johnson, 1974; D. W. Johnson, Maruyama, Johnson, Nelson, & Skon, 1981; D. W. Johnson, Johnson, & Maruyama, 1983), which organized the existing research and focused attention on the variety of dependent variables that had been investigated. These reviews tended to move the debate about the efficacy of cooperative learning from an ideological focus to an empirical basis and stimulated re-

search conducted in actual classrooms as opposed to psychological laboratories.

Second, in the 1960s and 1970s, there was considerable pressure on schools (a) to increase achievement in basic subject areas such as math and reading and (b) to solve social problems through such efforts as desegregation, inclusion of students with disabilities in the regular classroom, prevention of drug abuse, and raising the low self-esteem of many at-risk pupils. The application of social interdependence theory in education has resulted in the demonstration that cooperation may be used to involve students actively in learning situations and to achieve multiple educational goals simultaneously while accommodating individual differences and addressing a variety of social problems. What resulted was a plethora of research studies with new dependent variables that extended the theory. It is primarily the application of social interdependence theory that has generated the numerous research studies conducted on this topic in the past three decades.

Third, to increase the effectiveness of cooperative learning, researchers focused attention on the variables that mediate the relationship between positive interdependence and desired outcomes (such as increased learning and retention of academic material and positive relationships among diverse students). Investigation of the day-to-day use of cooperative learning in a setting in which goals are imposed (i.e., students are required to learn how to read and do math whether they want to or not) revealed that in many cases, simply presenting mutual learning goals did not in and of itself create a perception of positive interdependence. Inventive teachers supplemented and strengthened positive goal interdependence by giving rewards for group as well as individual performance, assigning group roles, dividing resources among group members, assigning each group a specific workspace, and encouraging groups to develop their own names and logos. This resulted in theoretical distinctions among outcome (goals and rewards), means (roles, resources, task), and boundary (identity, environmental, outside enemy) interdependence. As the focus of education is on the learning of each individual student, teachers also focused on ways to increase the responsibility forces generated within cooperative efforts. Emerging from these emphases were new ways to establish each group member's individual accountability for learning the assigned material and promoting the learning of collaborators. In implementing cooperative learning, furthermore, teachers found that many students did not know how to promote the achievement of their group mates. To teach them how to do so, teachers emphasized the importance of providing students with the necessary interpersonal and small group skills (such as leadership, decision-making, trust-building, communication, and conflict-management skills; D. W. Johnson, 2003; D. W. Johnson & F. P. Johnson, 2003). Teachers also found that the long-term effec-

tiveness of cooperative efforts depends on identifying and solving problems members have in working together. Group processing was structured to ensure that students discussed how well they were achieving their learning goals and maintaining effective working relationships among group members. Further research studies were conducted to determine the impact of these innovations on the effectiveness of cooperative learning.

Fourth, the viability of cooperative learning may have strengthened the confidence individuals have in social interdependence theory.

Thus, in the interrelationships among social interdependence theory, research, and practice, it may be practice that has been the most powerful link in the chain. The worldwide application of cooperative learning may have fueled much of the interest in and development of social interdependence theory and generated most of the hundreds of research studies that have been conducted in the past 30 years. There is nothing so important to a good theory as the demonstration of its application in an effective practice.

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