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New Developments in Social Interdependence Theory

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ABSTRACT. Social interdependence theory is a classic example of the interaction of theory, research, and practice. The premise of the theory is the way that goals are structured determines how individuals interact, which in turn creates outcomes. Since its formulation nearly 60 years ago, social interdependence theory has been modified, extended, and refined on the basis of the increasing knowledge about, and application of, the theory. Researchers have conducted over 750 research studies on the relative merits of cooperative, competitive, and individualistic efforts and the conditions under which each is appropriate. Social interdependence theory has been widely applied, especially in education and business. These applications have resulted in revisions of the theory and the generation of considerable new research. The authors critically analyze the new developments resulting from extensive research on, and wide-scale applications of, social interdependence theory.

Key words: competition, cooperation, social interdependence

THIS REVIEW PROVIDES A CRITICAL EXAMINATION OF SOCIAL interdependence theory, tracing its development from its original formulation in 1949 to the present day. In section one, we summarize social interdependence theory and place it into a historical perspective. We discuss the dynamic nature of the theory, as research and application have extended and modified the theory throughout the past six decades. In section two, we give an overall review of the research. The breadth of the research and the variety of dependent variables studied have both extended and refined the theory, while also inspiring new studies and areas of interest. In section three, we will discuss two of the major applications of the theory, in education and in business. In such areas, the theory has been used to derive operational procedures for practitioners. In

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section four, we focus on the strengths and weaknesses of the theory. In addition, throughout the article, we point out aspects of the theory that are new, revised, or modified on the basis of the research and practices. Social interdependence theory has had a consistent influence on research and practice since Deutsch introduced it in 1949. It has unusual longevity, scope, and application. This is reflected in:

1. *The quality of the theory.* Since Morton Deutsch (1949a) introduced the basic theory of social interdependence (building on the work of Kurt Koffka [1935] and Kurt Lewin [1935]), the theory has provided a conceptual structure to organize and summarize the existing research, generated numerous new research studies, and guided practice in such fields as education and business.
2. *The amount of research conducted.* Over 750 research studies have been published. In these studies, researchers address a wide range of dependent variables from achievement to psychological adjustment. Although social interdependence theory was not the impetus for all these studies, the growing amount of research indicates that researchers' interest in cooperation and competition has substantially increased over the past 60 years.
3. *The number of research reviews.* During the last four decades, there have been systematic reviews of the research on social interdependence (e.g., Cohen, 1994b; D. W. Johnson, 1970; D. W. Johnson & Johnson, 1974, 1978, 1989, 1999a; D. W. Johnson, Johnson, & Maryuama, 1983; D. W. Johnson, Maruyama, Johnson, Nelson, & Skon, 1981; Michaels, 1977; Miller & Hamblin, 1963; Rohrbeck, Ginsburg-Block, Fantuzzo, & Miller, 2003; Sharan, 1980; Slavin, 1977, 1986). A number of critiques of competition have also been published (e.g., Kohn, 1992).
4. *The theory's influence on other theories.* Social interdependence theory plays a central role in a variety of other theories, including conflict (Deutsch, 1973; Tjosvold, 1991), integrative negotiations (D. W. Johnson & Johnson, 2003b), power (Coleman & Tjosvold, 2000; D. W. Johnson & F. Johnson, 2006), distributive justice (Deutsch, 1985), and social identity (Tyler & Blader, 2000) theories.
5. *The numerous applications of the theory to practice.* Researchers have written numerous books on the application of social interdependence to education (Cohen, 1986/1994a; D. W. Johnson, 1970; D. W. Johnson & Johnson, 1999a; Sharan & Sharan, 1976; Slavin, 1986) and business (e.g., Tjosvold, 1986, 1989b).

Given its longevity, scope, and application, there is a need for a comprehensive critique of social interdependence theory that notes the significant new developments and modifications resulting from the extensive research, additional theorizing, and widespread application.

SOCIAL INTERDEPENDENCE THEORY

Nature of Social Interdependence

Social interdependence exists when the outcomes of individuals are affected by each other's actions (D. W. Johnson & Johnson, 1989). There are two types of social interdependence: *positive*, when the actions of individuals promote the achievement of joint goals, and *negative*, when the actions of individuals obstruct the achievement of each other's goals. Social interdependence may be differentiated from social dependence, independence, and helplessness (see Figure 1). *Social dependence* exists when the goal achievement of Person A is affected by Person B's actions, but the reverse is not true. *Social independence* exists when the goal achievement of Person A is unaffected by Person B's actions and vice versa. The result is individualistic efforts. *Social helplessness* exists when neither the person nor others can influence goal achievement.

Social interdependence theory has its origins in Gestalt Psychology and Lewin's Field Theory. It was formally conceptualized by Morton Deutsch (1949a).

Kurt Koffka

The historical roots of social interdependence theory can be traced to a shift in physics from mechanistic to field theories (Deutsch, 1968; Deutsch & Krauss, 1965). This shift influenced the field of psychology, particularly 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, the *whole* (or *gestalt*) became 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 a summation of parts or properties. Perception occurs in a field and is organized into interdependent elements that form a system. Within the psychological field, certain states are

		Own actions facilitate one's goal achievement: Yes	Own actions facilitate one's goal achievement: No
Other's actions facilitate one's goal achievement	Yes	Interdependence	Dependence
	No	Independence	Helplessness

FIGURE 1. Interrelations among individuals.

simpler and more orderly than others, and psychological processes act to make the state of the field as good as prevailing conditions allow (Deutsch & Krauss). Thus, the whole is greater than the sum of its parts. One of the founders of the Gestalt school of psychology, Kurt Koffka (1935), proposed that, similar to psychological fields, groups were dynamic wholes in which the interdependence among members could vary.

Kurt Lewin

Building on the principles of Gestalt psychology and Koffka's notion, Kurt Lewin (1935, 1948) 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. For interdependence to exist, there must be more than one person or entity involved and the people or entities must impact each other, in that a change in the state of one causes a change in the state of the others. This impact occurs in the immediate situation, as each person's behavior is determined by how the situation is perceived, rather than by objective or historical factors (i.e., the principle of contemporaneity). The *principle of contemporaneity* states that the only determinants of behavior at a given time are the properties of the person and that person's psychological environment at that time. Thus, social behavior is inherently contextualized and cannot be understood outside of the current life space to which it is calibrated. Individuals' actions are determined by their representation of the world they assume they are contending with as their behavior unfolds. A person's life space is dynamic (not static), so that, as individuals interact and events occur, each individual's perceptions of the situation change. Within the life space, people's behavior is motivated by states of tension that arise as they perceive desired goals. It is this tension that motivates movement toward the accomplishment of the goals. The perception of common goals in conjunction with the joint motivation to achieve them is the source of interdependence among group members.

Morton Deutsch

Deutsch (1949a, 1962) extended Lewin's theory by examining how the tension systems of different people may be interrelated. He conceptualized two types of social interdependence—positive and negative (see Figure 2). *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 perceive that they can obtain

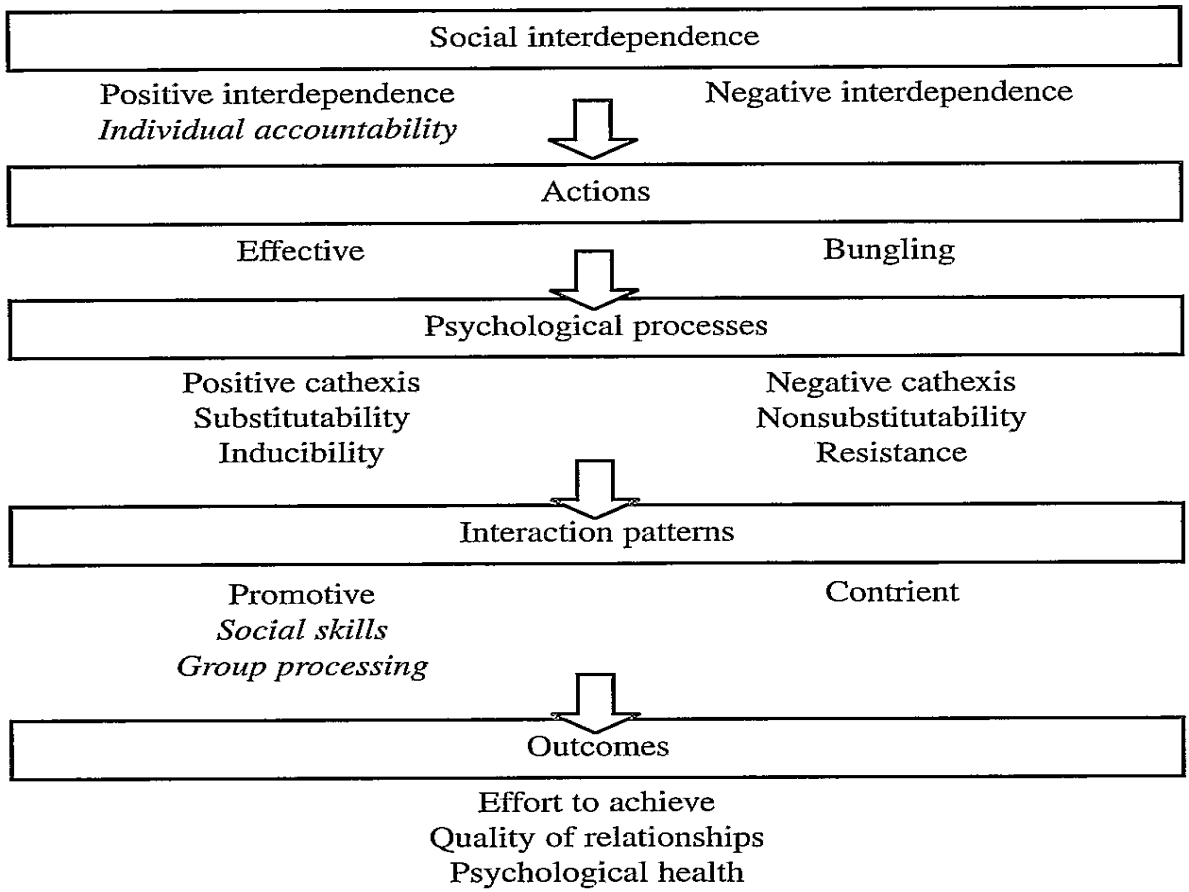

FIGURE 2. Overview of social interdependence theory.

their goals if and only if the other individuals with whom they are competitively linked fail to obtain their goals. No interdependence or individualistic efforts exist 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.

Deutsch's theory is based on two basic continua: one relating to the type of interdependence among the goals of the people involved in a given situation and one relating to the type of actions taken by the people involved. He identified positive and negative interdependence as the opposite ends of one continuum. As the ends of the second continuum, he identified two basic types of actions by an individual: *effective,* which improves the person's chances of obtaining a goal, and *bungling,* which decreases the person's chances of obtaining a goal. The two continua are combined to posit how they jointly affect (a) three psychological processes (substitutability, cathexis, and inducibility) and (b) the interaction patterns among individuals.

Substitutability

Substitutability is the degree to which actions of one person substitutes for the actions of another person (Deutsch, 1949a). An important aspect of Lewin's work is the way in which the tension systems arising around goals are released. Ovsiankina (1928) demonstrated that interrupted tasks were almost always resumed when the subjects were left free to do as they wished. Lissner (1933), Mahler (1933), and many others investigated the conditions under which one activity can substitute for and, hence, release the tension connected with another, interrupted activity. The substitute value was measured by the amount of decrease in resumption or recall of the interrupted original activity after a substitute activity had been completed. Helen Block Lewis (Lewis, 1944; Lewis & Franklin, 1944) demonstrated that cooperative work that is interrupted and not completed leads to a persisting force to recall the interrupted task similar to the pressure to recall induced by interrupted individual work. In other words, if a collaborator completes the original activity, that person's actions substitute for one's own, and the tension induced by being interrupted before completing the task is released. More recent evidence indicates that a collaborator's interrupted tasks are recalled more frequently than are his or her completed tasks (Hornstein, Marton, Rupp, Sole, & Tartel, 1980). However, Deutsch (1962) posits that, in a cooperative situation, ineffective actions by a collaborator do not substitute for one's own actions. Rather, one will have to extend extra effort to make up for the ineffective actions of others. In a relay race, for example, if one member of a team runs slowly, the others will have to run faster. Within a competitive situation, ineffective actions by a competitor do substitute for effective actions on one's part (i.e., having an opponent run slowly substitutes for a person running fast) but when the opponent engages in effective actions, those actions increase the amount of effort and skill required to win (i.e., the opponent's actions are nonsubstitutable).

Cathexis

Cathexis is an investment of psychological energy in objects outside of oneself, such as friends, family, and work (Deutsch, 1949a). Cathexis may be positive or negative. It gives rise to positive or negative evaluations and thus is the basis of attitude formation. On the basis of the assumption that, if an organism is to survive, it has to respond positively to events that enhance its well-being and respond negatively to events that reduce its well-being, Deutsch posits that, in cooperative situations, effective actions are cathected positively and bungling actions are cathected negatively, whereas the opposite is true within competitive situations. The cathexis attached to other individuals' actions tends to generalize to the person as a whole. Thus, when effective actions are cathected positively, liking for the person engaging in the effective actions tends to result. However, Deutsch notes that, just because the situation is structured cooperatively, does not

mean that all members will act in the best interests of the group or value the common good, and, when they do not, their actions are cathected negatively.

There is recent evidence that people's goals are an important reference for their affect system, so that people react positively when they make progress toward goals and negatively when they fail to reach their goals (Diener, Suh, Lucas, & Smith, 1999). Koestner, Lekes, Powers, and Chicoine (2002) reviewed nine studies on affect and goal achievement and found an overall effect size of 0.61 for individuals reporting significantly more positive affect and less negative affect over time as they make progress in achieving their goals. They also conducted two experiments that found a significant relationship between progress toward achieving goals and positive affect over time; progress toward achieving goals was negatively related to negative affect. These findings support Deutsch's (1949a) proposition that actions that effectively increase the achievement of a person's goals are cathected positively.

An issue that is not dealt with in Deutsch's theory is whether cathexis is contagious. There is recent evidence that emotions are transferred in a seemingly automatic way from one person to another (Neumann & Strack, 2000), and LeBon (1895) argued that emotions not only are contagious, but also become amplified in groups so that the level of emotion is intensified. Thus, cathexis may create an emotional interdependence among the individuals in the situation.

Finally, intergroup relations tend to be marked by preferential treatment of one's own group relative to outgroups (Brewer & Brown, 1998). The positive cathexis toward the actions of one's group members and the negative cathexis towards the actions of members of competing groups provides an explanation for why this effect takes place. Given that cathexis generalizes from reacting positively or negatively to a person's actions to feeling positively or negatively toward the person, cathexis may result in such dynamics as ingroup bias (Brewer & Brown), both in regard to the allocation of rewards (e.g., Tajfel, Billig, Bundy, & Flament, 1971; Turner, Brown, & Tajfel, 1979), and the attribution of positive personality traits (e.g., Lindeman, 1997). Such ingroup favoritism may lead to inappropriate nepotism (Deutsch, 1962).

Inducibility

Inducibility is the openness to being influenced and to influencing others (Deutsch, 1949a). Within a cooperative situation, collaborators easily induce each other to (a) engage in actions that promote goal achievement or (b) not engage in actions that would interfere with goal achievement. Inducibility provides the basis for both direct influence and normative control. It also provides the psychological basis for channeling individual efforts into a coordinated system of action to move the group toward goal attainment and maintain the viability of the cooperative system. There is evidence that mutual influence occurs more in cooperative than in competitive or individualistic situations (Crombag, 1966;

Deutsch, 1949b; Raven & Eachus, 1963), but most influence strategies within cooperative situations overwhelmingly tend to be supportive rather than coercive (Frank, 1984; D. W. Johnson, Johnson, Roy, & Zaidman, 1985), and influence attempts among members of a cooperative group are generally more successful than are influence attempts by outgroup members (e.g., Mackie & Cooper, 1984; Turner, 1991). In a competitive situation, competitors resist attempts to induce their assistance, work to prevent or obstruct a participant's effective actions, and will be willing to assist a participant's bungling actions.

Basic Premise

The basic premise of social interdependence theory is that the structure of the goals of the people in the situation determines how participants interact and the interaction patterns determine the outcomes of the situation (Deutsch, 1949a, 1962; D. W. Johnson, 1970; D. W. Johnson & Johnson, 1989). A goal is a desired future state of affairs. A *goal structure* specifies the type of interdependence among individuals' goals. The type of interdependence determines how individuals must interact to achieve their goals. It is within the interaction that the opportunity exists to (a) promote and facilitate the goal attainment of others or (b) obstruct and block others' goal attainment. *Interaction* is defined as individuals' simultaneous or sequential actions that affect the immediate and future outcomes of the other individuals involved in the situation. Interaction may be direct or indirect. Direct interaction takes place through such means as oral, written, or electronic communication. Indirect interaction occurs when a person acts in a way that increases or decreases the other persons' chances for successful goal accomplishment without actual interaction taking place. Thus, within a cooperative group, members may explain what they know to each other (thereby promoting each other's success through direct interaction) or may study late at night when no one else is around (the increase in knowledge and the acquisition of information promotes the success of all group members through indirect interaction). Within competition, interaction may be directly oppositional (such as in basketball), or may be indirect (such as in golf where golfers do not directly interact with each other, but when one makes a birdie, the chances of winning for other golfers are reduced). Outcomes are the consequences of the interaction. The way goals are structured determines the direct and indirect interaction patterns, which, in turn, determine outcomes.

Deutsch (1949a) posited that positive interdependence resulted in a process of promotive interaction, whereas negative interdependence resulted in a process of contrient or oppositional interaction. *Promotive interaction* is defined as individuals engaging in actions that increase the likelihood of each other's success in achieving the joint goal. It consists of a number of variables, including mutual help and assistance, exchange of needed resources, effective communication, mutual influence, trust, and constructive management of conflict. *Oppositional interaction* is defined as individuals engaging in actions that reduce the likeli-

hood of others' successful achievement of the joint goal; individuals focus both on increasing their own productivity and on preventing any other person from producing more than they do. It consists of such variables as obstruction of each other's goal achievement efforts, tactics of threat and coercion, ineffective and misleading communication, distrust, and striving to win in conflicts. *No interaction* is defined as individuals engaging in actions that promote the achievement of one's own goals without affecting the goal achievement of others; individuals focus only on increasing their own productivity and achievement and ignore, as irrelevant, the efforts of others.

There are three important implications of that basic premise. First, cooperation and competition only exist as people take action to achieve a goal. It is not enough to perceive positive or negative interdependence; cooperation or competition does not exist until individuals engage in promotive or contrient actions.

Second, appropriate action depends on the perception of goal interdependence, which is a person's cognitive representation of situational context. As people's behavior unfolds, it does so in response to their perceptions and assumptions about the current situation. These perceptions and assumptions are dynamic and change as the person's actions have impact on the current situation. Following Lewin's (1935) principle of contemporaniality, Deutsch (1973) states that people's behavior is determined by their perceptions of the situation, which is presumed to exist independently of themselves, not how objective observers define the situation. A person's perception of situational factors will match objective reality when the person has sufficient experience with the situation and the situational factors are straightforward and simple.

Finally, 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 help and assistance, exchange of needed resources, influence, 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. Deutsch's crude law has recently received support from a study by Sheldon and Houser-Marko (2001), who demonstrated that the relations are bidirectional from (a) personal commitment to achieving a goal to (b) progress in achieving the goal to (c) feelings of well-being. Using a two-cycle prospective design, Sheldon and Houser-Marko found that goal progress results in greater feelings of well-being, the enhanced well-being increases personal commitment to goals, and this commitment fosters further successful efforts to achieve the goals, which results in further enhancement of feelings of well-being.

Early Impact of Deutsch's Theorizing on Cooperation and Competition

Deutsch's (1949a) formulation of social interdependence theory had the immediate impact of (a) organizing and subsuming the previous research and (b) providing a rationale for opposing the social Darwinism that dominated thought about cooperation and competition at the time.

Prior to 1949, there had been two major reviews of the theory and research on cooperation and competition (May & Doob, 1937; Murphy, Murphy, & Newcomb, 1937). Although helpful at the time, the reviews were limited by their (a) lack of conceptual clarity as to what constituted cooperation and competition and (b) inconsistent use of the operational definitions used to create cooperation and competition among studies or even within the same study. In addition, the research at that time had a narrow focus on the effects of cooperation and competition on individual and group task completion. Other effects (i.e., interaction processes, relationships among participants, attitudes toward self and work) tended to be ignored, and the researchers did not identify mediating variables and situational influences. Deutsch's theory provided the conceptual framework needed to classify the operational definitions used in the previous studies and determined whether they were actually cooperation or competition.

The second influence on cooperation and competition theory was the movement in the 1930s and 1940s to prove that competition was necessary to create high levels of productivity and achievement. In the midst of American depression, a political groundswell in the business sector resulted in the formation of the Liberty League in 1934, which united with other organizations such as the National Association of Manufacturers to "sell free enterprise to people . . . to force the minds of public opinion back into the mold of Americanism" (Rippa, 1976). The Liberty League advocated interpersonal competition in schools as a way to improve achievement and train children to live in a free enterprise society (Pepitone, 1980). Researchers conducted a number of research studies to demonstrate the superiority of competition over cooperation in creating high achievement and productivity (D. W. Johnson & Johnson, 1989). Social Darwinism was used as the rationale to promote competition, which became the zeitgeist of the time. Deutsch's theory and research provided the rationale to refute social Darwinism and interject both a theoretical and empirical rationale on the utility of cooperation.

Cooperation Derived From Self-Interest

Solomon Asch (1952), a colleague of Kurt Lewin, posed the question of how community could develop if individuals were egocentrically motivated. In a critique of the Freudian and behavioral assumption that individuals are motivated only by personal pleasure and pain, Asch observed that, if individuals acted only

in self-interest, no society would be possible. Although everyone has to be concerned about their own interests, Asch noted that a person also needs to be a group member, to work with others, to count on others' lives, and to be an object of significance for others. Asch concluded that subordinating one's own interests to those of the community seems to be as intrinsic and powerful of a motive as acting on self-interests.

Left unanswered is how a person moves from self-interest to concern for others and for the community as a whole. To answer that question, Deutsch's original social interdependence theory started with the unstated assumption of feral, unsocialized individuals who are devoid of previous contact with any other humans (Deutsch, 1949a). The feral individuals are assumed to be (a) governed by self-interests, (b) able to perceive that there is an independent reality perceived by both oneself and others, and (c) able to recognize that other human beings with like experiences will perceive this reality in similar ways. Under these conditions, the movement from self-interests to mutual interests is determined by perceiving that there are positively interdependent goals that give rise to a common fate that, in turn, leads to redefining self-interests to include the interests of others. Self-interest becomes expanded to joint interest as (a) other people's actions substitute for one's own, (b) the cathexis in others' actions builds commitment to achieving goals that benefit others as well as oneself and builds commitment to caring and committed relationships, and (c) an openness to being influenced is produced so that joint efforts are more effective. Thus, new goals emerge that are social in nature. Demonstrating the transition from self-interest to mutual interest is perhaps one of the most important aspects of social interdependence theory. Social interdependence theory provides an answer to what Asch termed the "essential problem of social psychology—how individuals create the reality of groups and how the latter control their further actions" (Asch, 1952, p. 256).

Boundaries of Social Interdependence Theory

Social interdependence theory, as originally formulated by Deutsch, had specific boundaries. First, Deutsch (1949a) formed the theory with the assumption that only a single goal existed in the situation. In the real world, each person always has multiple goals and, therefore, situations are always mixed motive, with individuals often having cooperative, competitive, and individualistic goals in the same situation. Second, Deutsch assumed the size of the group was small. Although the theory has definite implications for larger systems, most of the research on it was conducted in small groups. Third, Deutsch assumed all participants had equal power. The theory was not constructed for situations in which there are power differences. Fourth, Deutsch assumed all participants were acting on their self-interests. This does not mean that they did not care for the well-being of collaborators. Solomon Asch (1952) makes the distinction between self-

interest and selfishness, stating that self-interest can include both one's own well-being and the well-being of other significant individuals, while selfishness is the total focus on self-benefit while ignoring the well-being of all others. Fifth, Deutsch developed the theory to be ahistoric. Deutsch assumed that the situation was independent of the past and the future. Therefore, much of the research on social interdependence theory involved participants who were strangers and had no history with each other. As described earlier, Deutsch (1949a) believed that a person's actions are based on the immediate perception of the situation, not the past and the future. These perceptions are dynamic and can change quickly from moment to moment.

Foundation for Other Theories

Social interdependence theory serves as a foundation for a number of other theories. Those theories, among other things, deal with trust, conflict, integrative negotiations, distributive (social) justice, positive power, and values. Trust is based on the belief that the other person will behave in a cooperative, not a competitive manner (Deutsch, 1962). Conflict resolution is based on restoring cooperation among disputants and reducing competitive behavior (Deutsch, 1973). Integrative negotiations are grounded in promoting a cooperative problem-solving (as opposed to a competitive) process of coming to an agreement (D. W. Johnson & F. Johnson, 2006; D. W. Johnson & Johnson, 2003b). Distributive (social) justice may be based on equality (cooperative rationale), equity (competitive rationale), or a need basis (altruistic rationale; Deutsch, 1985). Newly conceptualized views of positive power are based on the view that power is positive when it enhances the cooperative aspects of the situation and reduces the competitive aspects of the situation (Coleman & Tjosvold, 2000). Cooperation is the basis for social identity theory and procedural justice (Tyler & Blader, 2000). Recent discussions of inculcating values detail how cooperation tends to promote prosocial values while competition tends to promote more self-centered values (Deutsch, 2000; D. W. Johnson & Johnson, 1996, 1999b, 2000). Without social interdependence theory, these theories would not be as well formulated or as meaningful. Therefore, greater validation for social interdependence theory leads to more validation for these and other related theories.

Goal theory has many of the same dynamics as social interdependence theory (Covington, 2000). *Goal theory* divides goals into mastery or learning goals (i.e., striving to develop competence) and performance goals (i.e., striving to demonstrate competence relative to others). Mastery goals may be structured either cooperatively or individualistically, whereas performance goals are clearly competitive. Findings concerning performance goals may be subsumed under social interdependence theory, but many of the findings concerning mastery goals are ambiguous as to whether they apply to cooperative or individualistic situations.

Pathologies of Cooperation

Such an abundance of research demonstrates the constructive effects of cooperation that it may appear that there are no destructive effects. However, Deutsch (1962) noted that there are pathologies that may develop if cooperation is not carefully monitored and nurtured. First, it is very easy to move from cooperation to competition, but difficult to move from competition to cooperation (Deutsch, 1985). There is an inherent tendency of cooperation to fail because competitive actions undermine its effectiveness. Effective cooperation requires very active and sustained effort to prevent it from deteriorating into competition.

Second, cooperation can break down as the result of the very social psychological processes (i.e., substitutability, cathexis, and inducibility) that are central to its existence. Substitutability enables the work of one cooperator to replace the work of another so that they do not have to duplicate each other's efforts. It also may lead to specialization of function, which, in turn, gives rise to specialized terminology and language. A likely result of substitutability is a deterioration of group unity, as the members (each with their special interests) compete for scarce resources and communicate in a language that is not fully shared. Cathexis underlies the development of personal bonds among group members. The probable result is ingroup favoritism, clique formation, or nepotism. As cliques develop, ingroup favoritism grows, and nepotism increases, there is a lessening of group effectiveness and a weakening of overall group cohesion. Inducibility can lead to excessive conformity with the views of others so that members no longer make their own independent, unique contribution to the group, and the cooperative process is then deprived of the creative contributions that can be made by each of its members. This excessive conformity may be based on the belief that harmony must be kept at all costs (i.e., groupthink). In addition, those who suppress their individuality may feel inwardly alienated from themselves and their group despite their outer conformity. Being overly inducible results in agreeing too quickly and creates a false, superficial harmony, but too little inducibility can result in free riding or social loafing in which some members shirk their responsibilities to the group and seek to obtain the benefits of group membership without offering the contributions they are able to make to it.

Third, cooperation can be costly. There are two major costs of cooperation. The first set of costs is the considerable effort it takes to establish and maintain a cooperative system. These costs may be prohibitive when individual action is feasible and cooperation is not essential. In many situations, however, individual action is not enough and cooperation with others is needed. The effort required is the only sensible alternative to the failure resulting from inappropriate individualistic or competitive efforts. The second set of costs involves the social connectedness attached to cooperation. The more interdependent a person is with others, the less autonomous the person is, the more the person is socially attached, the more likely the person will incur social obligations, and the more

likely the person will be exposed to the stress of others. Whereas a positive, caring attitude toward others leads to well-being, a focus on others to the exclusion of the self is related to greater psychological distress (Fritz & Helgeson, 1998). Social attachments expose individuals to others' stress through the processes of stress contagion (Almeida & Kessler, 1998; Kessler, McLeod, & Wethington, 1985; Riley & Eckenrode, 1986) and the pressure-cooker effect (Holbfoll & London, 1986). More socially embedded individuals are likely to find themselves involved with others' lives in a way that increases their emotional and task burden. This translates to the fact that a more independent style may be more efficient for the self, but less effective for the group (Fukuyama, 1995; Yamagishi, 1994). In other words, a socially interwoven style would more efficiently protect the group, but could sacrifice the individual (Clark, Mills, & Powell, 1986; Yamagishi).

RESEARCH ON SOCIAL INTERDEPENDENCE

Amount 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) in the United States, Turner (1889, cited in Triplett) in England, and Mayer (1903) in Germany conducted a series of studies on the factors associated with competitive performance. Since then, researchers have conducted over 754 studies on the relative merits of cooperative, competitive, and individualistic efforts and the conditions under which each is appropriate (see D. W. Johnson & Johnson, 2003b), encompassing one of the largest bodies of research in psychology.

Characteristics of the Research

Table 1 shows the characteristics of the studies that had enough data to compute an effect size (there are many more studies from which an effect size cannot be computed). Even with this limitation, there was a very diverse and large set of studies.

Internal Validity

Many of the research studies have high internal validity because they were carefully conducted by skilled investigators under highly controlled, laboratory conditions. In 43.5% of the studies, researchers randomly assigned participants to conditions, and in 18.8%, researchers randomly assigned groups to conditions. Seventy-seven percent of the studies were published in journals. Researchers conducted 31% of the studies in laboratories. The studies were rated by at least two independent doctoral students or professors in social psychology

TABLE 1. General Characteristics of Studies on Social Interdependence

Characteristic	*N*	%
Year		
Unknown	3	0.4
1900–1909	0	0
1910–1919	1	0.1
1920–1929	7	0.9
1930–1939	6	0.8
1940–1949	5	0.7
1950–1959	25	3.3
1960–1969	80	10.6
1970–1979	183	24.3
1980–1989	285	37.8
1990–1999	138	18.3
2000–2009	21	2.8
Assignment		
Unknown	4	0.5
No random assignment	280	37.1
Randomly assigned subjects	328	43.5
Randomly assigned groups, participant unit of analysis	98	13.0
Randomly assigned groups, group unit of analysis	44	5.8
Age		
Unknown	4	0.5
Ages 3–4	8	1.1
Ages 5–9	85	11.2
Ages 10–12	182	24.1
Ages 13–15	106	14.1
Ages 16–18	55	7.3
Ages 19–22	278	36.9
Ages 23+	34	4.5
Publication		
Unknown	4	0.5
Journal article	578	76.7
Book	5	0.7
Master's thesis	11	1.5
Doctoral dissertation	75	9.9
Technical report	59	7.8
Unpublished	22	2.9
Testing conditions		
Unknown	27	3.6
Laboratory	234	31.0
Field	490	65.0
Clinical	3	0.4

(table continues)

TABLE 1. ***Continued***

Characteristic	*N*	%
Number of sessions		
Unknown	46	6.1
1	216	28.6
2–9	150	19.9
10–19	98	13.0
20–29	57	7.6
30–39	53	7.0
40–49	44	5.8
50–59	18	2.4
60–69	18	2.4
70–79	6	0.8
80–89	8	1.1
90–99	37	4.9
100+	3	0.4
Group conditions		
Unknown	27	5
Homogeneous	145	21
Mixed-gender groups	552	74
Total	754	100

Note. This table includes only the studies with enough data to enable computing of effect sizes. From *Cooperative, competitive, and individualistic efforts: An update of the research* by D. W. Johnson and R. Johnson, 2003a, Research report, Cooperative Learning Center, University of Minnesota. Copyright 2003 by D. W. Johnson. Reprinted with permission of the author.

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, and 51% of the studies met these criteria.

External Validity and Generalizability

When research can withstand more variations in people, places, and procedures and still yield the same findings, its conclusions are more externally valid. The research on social interdependence has an external validity and a generalizability rarely found in the social sciences. The research has been conducted in 12 different historical decades (see Table 1). Eight of the studies were conducted before 1930, 6 were conducted in the 1930s, 5 were conducted in the 1940s, and 25 were conducted in the 1950s. Eighty studies were conducted in the 1960s, 183 were conducted in the 1970s, 285 were conducted in the 1980s, 138 were conducted in the 1990s, and 21 were conducted since 2000. Over these 12 decades,

many different researchers working in different settings have conducted the research with markedly different theoretical and practical orientations. Researchers used a wide variety of research tasks, ways of structuring social interdependence, and measures of the dependent variables.

Participants in the studies ranged from ages 3 to postcollege adults (see Table 1). Twelve percent of the studies were conducted with participants under the age of 10, 24% with participants ages 10 to 12, 14% with participants ages 13 to 15, 7% with participants ages 15 to 18, 37% with participants ages 19 to 22, and 5% were nonstudents age 23 or older. The research participants have varied in age and gender, but also in economic class and cultural background. The studies also were conducted with different durations (see Table 1). Twenty-eight percent of the studies lasted only for one session, 40% lasted for 2 to 29 sessions, and 32% lasted for 30 sessions or more. Seventy-four percent of the studies involved mixed-gender groups. The diversity of these studies gives social interdependence theory wide generalizability and considerable external validity.

Multidisciplinary Research

Researchers in numerous disciplines have studied cooperation and competition. Most of the research has been conducted in psychology (Deutsch, 1949b, 1962; D. W. Johnson, 1970; D. W. Johnson & Johnson, 1974, 1989; May & Doob, 1937; Triplett, 1898). Yet, research has been conducted in anthropology (Madsen, 1967; Mead, 1936/1961; Montagu, 1966) and sociology (Coleman, 1961; Michaels, 1977). It is central to economics (Smith, 1976; Von Mises, 1949), ethnology (Lorenz, 1963), political science, and other social sciences.

Research Conducted in Variety of Cultures

Research on social interdependence has been conducted in numerous countries and cultures. In North America, researchers have conducted studies with Caucasian, African American, Native American, and Hispanic participant populations. In addition, researchers have studied cooperation in Asia, Southeast Asia, the Middle East, Africa, Europe, and many other countries. Essentially, the findings have been consistent. The amount of research conducted in a wide variety of cultures adds to the validity and generalizability of the theory.

However, the critical cross-cultural research has not been conducted. Although the basic findings are consistent across cultures and countries, it seems reasonable that, given cultural differences such as economic systems, different cultures have different definitions of (a) cooperation and competition and (b) the conditions under which each is appropriate. Within the United States, different Native American tribes have quite different views of cooperation and competition and different ways (D. W. Johnson & Johnson, 1989) to express them. Given the hundreds of studies that have established the basic theory of cooperation and

competition, there is a need for research on the cultural nuances of how cooperative and competitive efforts are conducted.

Variety of Dependent Variables

In the research on social interdependence, a wide variety of dependent measures have been studied. Social interdependence is a generic human phenomenon that has a simultaneous impact on many different outcomes. Over the past 12 decades, researchers have focused on diverse dependent variables (e.g., individual achievement and retention, group and organizational productivity, higher-level reasoning, moral reasoning, achievement motivation, intrinsic motivation, transfer of training and learning, time on task, job satisfaction, interpersonal attraction, social support, interpersonal affection and love, attitudes toward diversity, prejudice, self-esteem, personal causation and locus of control, attributions concerning success and failure, psychological health, and social competencies). The wide variety of dependent variables affected by social interdependence gives the theory a generalizability unusual in the social sciences.

Combination of Theoretical and Demonstration Studies

The research on social interdependence includes both theoretical and demonstration studies. There is a scientific and a demonstrative literature on cooperative, competitive, and individualistic efforts. The scientific literature, which represents the majority of the studies, is made up of carefully controlled research studies conducted to validate or disconfirm theory. Most of the studies are either laboratory or field experiments. Although researchers conducted many of these studies in psychological laboratories, the scientific studies also include field-experimental studies, in both college classes and in elementary and secondary school classes. A few field experimental studies were conducted in business settings. However, a problem with theoretical studies is that they lack credibility with many practitioners. Most of the theoretical studies on social interdependence were conducted in social psychology laboratories using college students as participants (D. W. Johnson & Johnson, 1989). Although they clarified the power of cooperative efforts, the researchers did not demonstrate the practicality of cooperative procedures.

The demonstrative literature is made up of field quasiexperimental or correlational studies demonstrating that cooperative efforts are effective in real-life settings such as schools, businesses, hospitals, and airplane cockpits. However, researchers formulated most of these studies in ways that have little or no theoretical relevance and, therefore, have not contributed directly to the refinement and reformulation of the basic theory. Instead, demonstration studies tend to focus on external validity. The demonstration studies may be grouped into four categories: (a) summative evaluations aimed at determining whether a particular

cooperative, competitive, or individualistic program produces beneficial results, (b) comparative summative evaluations comparing two or more cooperative methods, (c) formative evaluations aimed at improving ongoing implementations, and (d) survey studies aimed at examining the correlates of cooperative, competitive, and individualistic efforts.

When the results of the demonstration studies agree with and support the results of the theoretical studies, the demonstration studies strengthen the validity of the theory and make it more credible. In addition, demonstration studies provide a model for practitioners who wish to implement identical programs.

There are five weaknesses of demonstration studies.

1. Demonstration studies simply indicate that a certain method worked at a certain time in certain circumstances.
2. Demonstration studies are always in danger of being biased, because the researchers typically are evaluating programs they have developed themselves and have a professional and, sometimes, financial stake in their success. Reviews of demonstration studies suffer from the same limitation because they are most often conducted by the researchers who invented the social interdependence programs.
3. What is labeled as a cooperative effort is not always cooperation. In many cases of demonstration studies, the cooperative method being evaluated was only one element of a broader application program and, therefore, was confounded with other variables. The original jigsaw procedure (Aronson, Blaney, Stephen, Sikes, & Snapp, 1978), for example, is a combination of resource interdependence (cooperative) and individual reward structure (individualistic). It is difficult to interpret the results of studies that evaluate the effectiveness of such mixtures, because it is impossible to know which elements contributed which part of the found effects.
4. Demonstration studies often lack methodological rigor, focusing far more on external validity (such as the setting or length of study) than on internal validity (such as experimental control). In many demonstration studies, the comparison has been with an ambiguous and unknown traditional grouping. When researchers find differences, it is not clear what has been compared with what. The lack of methodological quality creates doubts about the value of the results.
5. Researchers have conducted most demonstration studies in elementary schools, and very few have been conducted at the secondary or college levels, or in noneducational settings, which reduces their relevance.

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 & Johnson, 1989, 2003a): (a) effort to achieve, (b) positive interpersonal relationships, and (c) psychological health (see Table 2 and Figure 3). We will review and discuss each of these outcomes, the essential elements that mediate the impact of interdependence and these outcomes, and the conditions under which competitive and individualistic efforts are effective.

Outcome 1: Effort to Achieve

In a meta-analysis of all studies (D. W. Johnson & Johnson, 1989), we found that the average person cooperating performed at about two thirds of a standard deviation above the average person performing within a competitive (effect size = 0.67) or individualistic situation (effect size = 0.64; see Table 2). However, not all the research has been carefully conducted (D. W. Johnson & Johnson, 1989). The methodological shortcomings within many research studies may significantly reduce the certainty of the conclusion that cooperative efforts produce higher

TABLE 2. Mean Effect Sizes for Impact of Social Interdependence on Dependent Variables

Characteristic	Cooperative vs. competitive	Cooperative vs. individualistic	Competitive vs. individualistic
Dependent variable			
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			
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
Condition			
Mixed operationalizations achievement	0.45	0.13	—
Pure operationalizations achievement	0.74	0.61	—

Note. From *Cooperation and Competition: Theory and Research* by D. W. Johnson and R. Johnson, 1989. Copyright 1989 by Interaction Book Company. Reprinted with permission of the author.

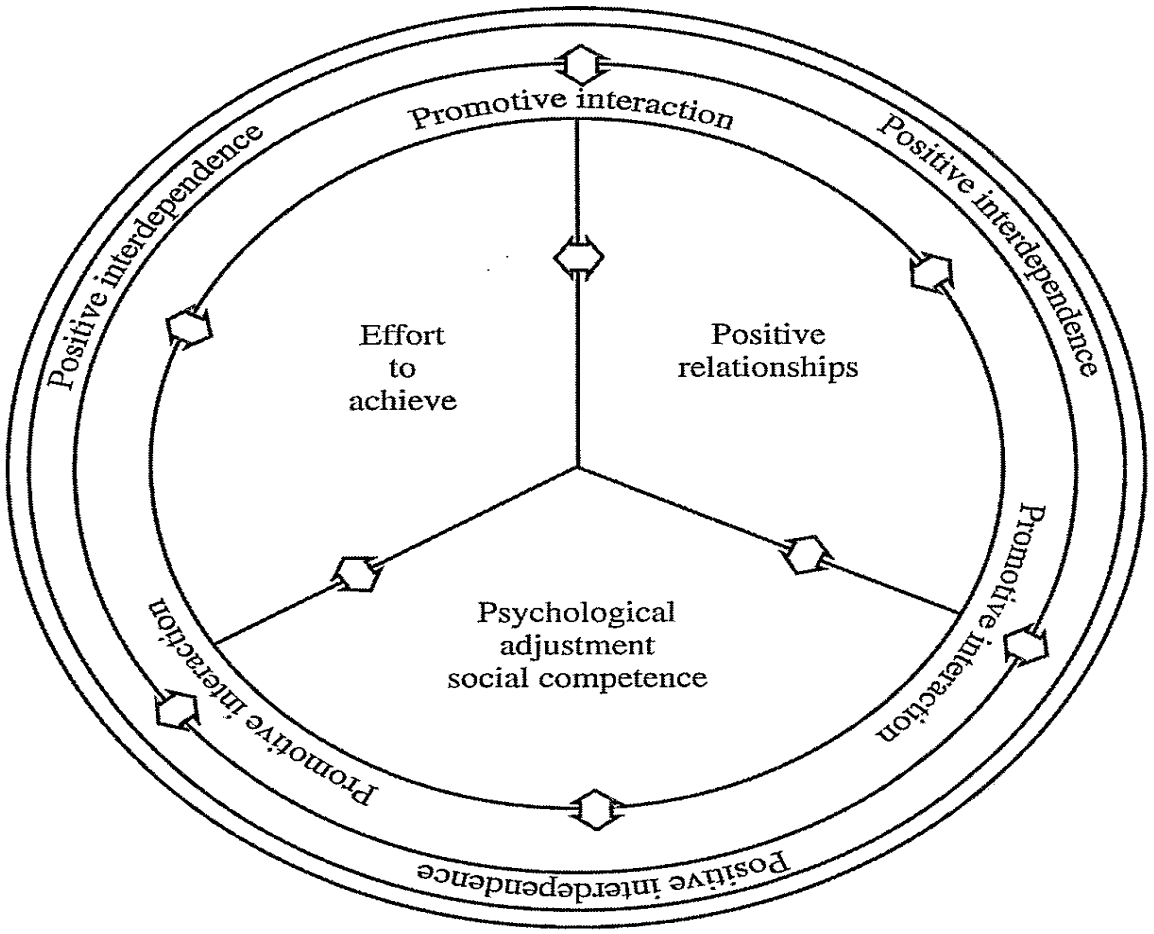

FIGURE 3. Outcomes of cooperative learning. From *Cooperation and Competition: Theory and Research* by D. W. Johnson and R. Johnson, 1989, p. 6. Copyright 1989 by Interaction Book Company. Reprinted with permission of the author.

achievement than do competitive or individualistic efforts. When we include only studies with high internal validity in the analysis, the effect sizes were 0.88 and 0.61, respectively. Further analyses revealed that the results held constant (a) when researchers included group measures of productivity as well as individual measures, (b) for short-term as well as long-term studies, and (c) when researchers used symbolic as well as tangible rewards.

A number of the conducted studies operationally defined cooperation in a way that included elements of competition and individualistic work. Aronson et al. (1978) operationalized cooperation as a combination of positive resource interdependence and an individualistic reward structure. DeVries and Edwards (1974) and Slavin (1986) operationalized cooperation as a combination of in-

group cooperation and intergroup competition. Slavin operationalized cooperation as a mixture of cooperative and individualistic efforts. When we compared such mixed operationalizations with pure operationalizations, the effect sizes for the cooperative versus competitive comparison were 0.45 and 0.74 respectively, $t(37) = 1.60$, $p < 0.06$ (D. W. Johnson & Johnson, 1989). The effect sizes for the cooperative versus individualistic comparisons were 0.13 and 0.61 respectively, $t(10) = 1.64$, $p < 0.07$. There is also correlational evidence that being cooperative and willing to share resources with classmates is associated with academic achievement (Wentzel, 1989, 1991, 1993).

Besides higher achievement and greater retention, cooperation (compared with competitive or individualistic efforts) also results in the following (D. W. Johnson & Johnson, 1989):

1. *Willingness to take on difficult tasks and persist, despite difficulties, in working toward goal accomplishment.* In addition, cooperation tends to promote greater intrinsic motivation, higher expectations for success, higher incentive to achieve because of mutual benefit, higher epistemic curiosity and continuing interest in learning, and higher commitment to achieve.
2. *Higher-level reasoning, critical thinking, and metacognitive thought.* Cooperation tends to promote a greater use of higher level cognitive and moral reasoning strategies and critical thinking than do competitive (effect size = 0.93) or individualistic (effect size = 0.97) efforts. Even on writing assignments, participants working cooperatively showed more higher-level thought.
3. *Transfer of learning from one situation to another* (i.e., group-to-individual transfer). *Group-to-individual transfer* occurs when individuals who learned within a cooperative group demonstrate mastery on a subsequent test taken individually. As early as the 1930s, Thorndike (1938) considered the superiority of group to individual problem solving to have been proven. However, there is disagreement over whether the superior productivity of groups extends to situations in which individuals collaborate on preparing for a task that they complete individually. In numerous studies (D. W. Johnson & Johnson, 1989), researchers indicated that the superior performance of groups did not result in later superior individual achievement in individual testing situations, whereas numerous other studies indicated that individuals in cooperative groups performed better in later individual testing situations (D. W. Johnson & Johnson, 1989). The latter studies typically involved carefully structured cooperative situations. Researchers often conducted the former studies on unstructured groups. Thus, the conclusion tends to be that, in carefully structured cooperative situations, there is greater group-to-individual transfer than individual-to-individual transfer.

4. *Positive attitudes toward the tasks being completed.* Cooperative efforts result in more positive attitudes toward the tasks being completed and greater continuing motivation to complete them than do competitive (effect size = 0.57) or individualistic (effect size = 0.42) efforts (D. W. Johnson & Johnson, 1989; see Table 2). Such positive attitudes extend to the work experience and the organization as a whole.
5. *Time on task.* Researchers in over 30 studies measured time on task (D. W. Johnson & Johnson, 1989). Generally, they found that cooperators spent more time on task than did competitors (effect size = 0.76) or participants working individualistically (effect size = 1.17), and competitors spent more time on task than did participants working individualistically (effect size = 0.64). These effect sizes are quite large, indicating that members of cooperative groups seem to spend considerably more time on task than do participants working competitively or individualistically.

Process Gain or Loss

There has been some debate over whether process loss or process gain occurs in cooperative groups (Hill, 1982). *Process loss* occurs when participants generate fewer ideas, fewer solutions, and less effort on a learning or problem-solving task within groups than do persons working individually. *Process gain* occurs when interaction within groups generates greater efforts, resulting in a higher quantity of and more novel ideas and problem solutions than results from those working individually. The meta-analysis results indicate that not only do groups outperform individuals on most tasks and under most conditions (indicating process gain rather than process loss), but also that individuals perform higher on individual measures of achievement after learning in cooperative groups than after learning alone (indicating greater group-to-individual transfer than individual-to-individual transfer; D. W. Johnson & Johnson, 1989). Correspondingly, there is evidence that cooperative groups engage in collective induction, which is the induction of general principles that none of the group members could induce alone (Ames & Murray, 1982).

Generation of Creative Ideas: Brainstorming

There is evidence that individuals generate more ideas when they work alone rather than when they work in groups, perhaps because of production blocking or the reduction in productivity as a result of group members taking turns describing their ideas (Diehl & Stroebe, 1991), and the reduced motivation of groups as well as group members not to share unique information fully (e.g., Mullen, Johnson, & Salas, 1991). Thus, it was generally agreed that unstructured groups left on their own would not be very effective in developing creative ideas. However, in more recent studies, researchers focused attention on the generation

of ideas by retrieving relevant information from one's long-term conceptual memory (Brown & Paulus, 2002). When asked to brainstorm, individuals usually suggest concepts closely connected to currently active and accessible concepts. Thus, there is a tendency for convergent thinking, in which a person thinks of ideas from one category and keeps generating ideas from that category. Conversely, divergent thinking involves jumping among categories to generate ideas and generally results in more ideas. Two critical factors in promoting divergent thinking are priming and attention.

Priming involves presenting a brainstormer with ideas from low-accessible categories. To generate ideas from a conceptual category, the category must be accessible (Brown & Paulus, 2002). Accessible categories are categories that reflect a person's experiences, whereas inaccessible categories deal with concepts unrelated to a person's experiences. For example, when brainstorming ways to improve the quality of life, a wealthy person from the United States is unlikely to start generating ideas for preventing starvation, but if another brainstormer from a third-world country mentions starvation (i.e., an inaccessible category), the wealthy American might have relevant ideas, perhaps on the basis of his or her reading or travel. Presenting a brainstormer with ideas from low-accessible categories increases the number of ideas generated from those categories and also increases the total number of ideas generated overall (Brown & Paulus). Therefore, groups outperform individuals on brainstorming tasks when group members prime each other by suggesting ideas from categories unlikely to be used by the other group members. Furthermore, those group members would not access the inaccessible categories if they were brainstorming alone and, therefore, would suggest fewer, less creative ideas.

Priming by other members is effective only to the extent that group members pay attention to each other's ideas. *Attention* is defined as the probability that a group member will use the current speaker's ideas as the basis for generating his or her next idea (as opposed to continuing his or her own internal train of thought). Generally, when individuals pay more attention to fellow group members, the group performs better on brain storming tasks (Brown & Paulus, 2002). This is especially true when members are heterogeneous, with differing knowledge of and perspectives on the issue.

Outcome 2: Positive Relationships and Social Support

Since 1940, researchers in over 180 studies have compared the impact of cooperative, competitive, and individualistic efforts on interpersonal attraction (D. W. Johnson & Johnson, 1989). Cooperative efforts, compared with competitive and individualistic experiences, promoted considerably more liking among individuals (effect sizes = 0.67 and 0.60, respectively; see Table 2). When we examine only the methodologically high quality studies, the effect sizes go up to 0.82 and 0.62. Pure cooperation results in greater effects than do mixtures of cooper-

ative, competitive, and individualistic efforts (cooperative vs. competitive, pure = 0.79 and mixed = 0.46; cooperative vs. individualistic, pure = 0.66 and mixed = 0.36).

Much of the research on interpersonal relationships has been conducted on relationships between Caucasian and minority participants and between non-handicapped and handicapped participants (D. W. Johnson & Johnson, 1989). There have been over 40 experimental studies comparing some combination of cooperative, competitive, and individualistic experiences on cross-ethnic relationships and over 40 similar studies on mainstreaming of handicapped participants (D. W. Johnson & Johnson, 1989). The results consistently show working cooperatively creates far more positive relationships among diverse and heterogeneous participants than does working competitively or individually.

An extension of social interdependence theory is *social judgment theory,* which focuses on relationships among diverse individuals (D. W. Johnson & Johnson, 1980, 1989; D. W. Johnson, Johnson, & Maruyama, 1983, 1984). Contact among diverse individuals results in social judgments that either increase or decrease the liking or hostility they feel toward each other. Contact always carries the risk of making relationships more destructive rather than constructive. Whether hostility or liking result from contact depends on whether a process of acceptance or a process of rejection takes place (D. W. Johnson & Johnson, 1980, 1989; D. W. Johnson, Johnson, & Maruyama, 1983, 1984). The process of acceptance is based on the individual's promotion of mutual goal accomplishment as a result of their perceived positive interdependence. The psychological processes of substitutability, positive cathexis, and inducibility result. The promotive interaction tends to result in frequent, accurate, and open communication (including self-disclosure of personal information and experiences); accurate understanding of each other's perspective, which leads to empathy; differentiated, dynamic, and realistic views of each other, which leads to decategorization and individualization; high self-esteem, which provides people with the confidence to form new relationships; success and productivity, which creates a positive cathexis toward collaborators, regardless of diversity; and expectations for positive and productive future interaction, which also creates positive cathexis towards diverse group members. The process of rejection results from oppositional or no interaction on the basis of perceptions of negative or no interdependence. The psychological processes of nonsubstitutability, negative cathexis, and resistance to influence result from negative interdependence. Competitive and individualistic efforts lead to a lack of or inaccurate communication; egocentrism; monopolistic, stereotyped, and static views of others; low self-esteem; overall lower achievement and productivity; and expectations of distasteful and unpleasant interaction with others. The processes of acceptance and rejection are self-perpetuating. Any part of the process tends to elicit all the other parts of the process. Social judgment theory may be contrasted with other models of intergroup contact, such as the Personalization Model (Brewer & Miller, 1984; Miller, 2002), which emphasizes self-

other comparisons that create an awareness of the individual distinctiveness of each group member; the Mutual Intergroup Differentiation Model (Hewstone & Brown, 1986), which emphasizes the differences in contact when interpersonal relations are salient as opposed to when intergroup relations are salient, and the Common Ingroup Identity Model (Gaertner & Dovidio, 2000), which emphasizes the change in a person's perceptions of an intergroup context from one that involves members of different groups to one that involves members of a single superordinate group.

The positive relationships among members promoted by cooperative efforts have considerable impact on a wide variety of variables. Generally, more positive relationships between group members (i.e., group cohesiveness), results in lower absenteeism; fewer dropouts; and a greater likelihood that participants will (a) commit effort to achieve goals, (b) feel personally responsibility for achieving, (c) take on difficult tasks, (d) be motivated to learn, (e) persist in working toward goal achievement, (f) have high morale, (g) be willing to endure pain and frustration on behalf of achieving, (h) listen to and be influenced by classmates and teachers, (i) commit to each other's achievement and success, and (j) achieve produce (D. W. Johnson & F. Johnson, 2006).

Besides liking each other, cooperators give and receive considerable social support, both personally and academically. Since the 1940s, researchers have conducted over 106 studies comparing the relative impact of cooperative, competitive, and individualistic efforts on social support (D. W. Johnson & Johnson, 1989). Social support may be aimed at enhancing another person's success (task-related social support) or at providing support on a more personal level (personal social support). Cooperative experience promoted greater task-oriented and personal social support than did competitive (effect size = 0.62) or individualistic (effect size = 0.70) experiences. When we examine only the methodologically high quality studies, the effect sizes go up to 0.83 and 0.72. Pure cooperation results in greater effects than do mixtures of cooperative, competitive, and individualistic efforts (cooperative vs. competitive, pure = 0.73 and mixed = 0.45; cooperative vs. individualistic, pure = 0.77 and mixed = 0.02). Social support tends to promote achievement and productivity, physical health, psychological health, and successful coping with stress and adversity (D. W. Johnson & F. Johnson, 2006).

Outcome 3: Psychological Health and Self-Esteem

Several researchers have directly measured the relationship between social interdependence and psychological health (Crandall, 1982; Hayes, 1976; N. James & Johnson, 1983; S. James & Johnson, 1988; D. W. Johnson, Johnson, & Krotee, 1986; D. W. Johnson & Norem-Heibeisen, 1979; Norem-Hebeisen, Johnson, Anderson, & Johnson, 1984). The samples studied included university students, older adults, suburban high school seniors, juvenile and adult prisoners,

step-couples, and Olympic hockey players. The results indicated that (a) working cooperatively with peers and valuing cooperation result in greater psychological health than does competing with peers or working independently, (b) cooperative attitudes are highly correlated with a wide variety of indexes of psychological health, (c) competitiveness was in some cases positively and in some cases negatively related to psychological health, and (d) individualistic attitudes were negatively related to a wide variety of indexes of psychological health. Cooperativeness is positively related to a number of indexes of psychological health, such as emotional maturity, well-adjusted social relations, strong personal identity, ability to cope with adversity, social competencies, and basic trust in and optimism about people. Personal ego strength, self-confidence, independence, and autonomy are all promoted by being involved in cooperative efforts. Individualistic attitudes tend to be related to a number of indexes of psychological pathology, such as emotional immaturity, social maladjustment, delinquency, self-alienation, and self-rejection. Competitiveness is related to a mixture of healthy and unhealthy characteristics. Whereas inappropriate competitive and individualistic attitudes and efforts have resulted in alienating individuals from others, healthy and therapeutic growth depends on increasing individuals' understanding of how to cooperate more effectively with others. Cooperative experiences are not a luxury. They are absolutely necessary for healthy development.

Inherent in most discussions of psychological health is self-esteem. Since the 1950s, there have been over 80 studies comparing the relative impact of cooperative, competitive, and individualistic experiences on self-esteem. Cooperative experiences promote higher self-esteem than do competitive (effect size = 0.58) or individualistic (effect size = 0.44) experiences (D. W. Johnson & Johnson, 1989). When only the methodologically high quality studies are examined, the effect sizes go up to 0.67 and 0.45. Pure cooperation results in greater effects than do mixtures of cooperative, competitive, and individualistic efforts (cooperative vs. competitive, pure = 0.74 and mixed = 0.33; cooperative vs. individualistic, pure = 0.51 and mixed = 0.22). Closely related to the work on social interdependence and self-esteem is *self-worth theory* (Covington, 1998, 2000), which assumes that efforts to achieve goals reflects a life-spanning struggle to establish and maintain a sense of worth and belonging in a society that values competency and doing well. When individuals adopt mastery goals, they define self-worth in terms of becoming the best they can be, irrespective of the accomplishments of others, and they tend to value hard work and be success oriented. When individuals adopt performance goals, they define self-worth in terms of doing better than others and they tend to value ability and be failure avoidant. Because only a few people can win, according to self-worth theory, most individuals seeking performance goals will have lower self-worth than will individuals seeking mastery goals. That prediction is congruent with the above data.

Social interdependence theory has been extended through the self-acceptance theory (D. W. Johnson & Johnson, 1989). *Self-acceptance theory* posits that self-

esteem is largely determined through either a process of self-acceptance or a process of self-rejection. The process of self-acceptance is based on (a) internalizing perceptions that one is known, accepted, and liked as one is, (b) internalizing mutual success, and (c) evaluating oneself favorably in comparison with peers. A process of self-rejection may occur from (a) not wanting to be known, (b) low performance compared with others, (c) overgeneralization of self-evaluations, and (d) the disapproval of others. Cooperative experiences tend to promote the process of self-acceptance, whereas competitive and individualistic experiences tend to promote the process of self-rejection. Support for the theory comes from Norem-Hebeisen and Johnson (1981). These studies involved 821 Caucasian, middle-class, high school seniors in a midwestern suburban community. The researchers found that cooperative experiences tended to be related to people's beliefs that they are intrinsically worthwhile, others see them in positive ways, their attributes compare favorably with those of their peers, and they are capable, competent, and successful people. Therefore, in cooperative efforts, participants tend to (a) realize that they are accurately known, accepted, and liked by their peers, (b) know that they have contributed to their own, others', and group success, and (c) perceive themselves and others in a differentiated and realistic way that allows for multidimensional comparisons developed from complementarity of their own and others' abilities. Competitive experiences tended to be related to conditional self-esteem from winning or losing. Individualistic experiences tended to be related to basic self-rejection. Both of these findings tend to be related to the process of self-rejection.

Essential Elements of Cooperation

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

Interdependence

Lewin (1935) and Deutsch (1949a) claimed positive and negative interdependence result from mutual goals. However, a number of researchers demonstrated that positive and negative interdependence may be structured through complementary roles (Thomas, 1957), group contingencies (Skinner, 1968), and dividing

information into separate pieces (Aronson et al., 1978). Various researchers and practitioners have structured interdependence in other ways, such as divisions of labor, mutual identity, environmental spaces, and simulations involving fantasy situations (D. W. Johnson & Johnson, 1992). The different ways in which positive and negative interdependence can be structured may be divided into three categories (D. W. Johnson & Johnson, 1989): outcome, means, and boundary. First, when people are in a cooperative or competitive situation, they are oriented toward a desired outcome, such as a goal or reward. Goals can be real or imaginary (such as surviving on a desert island). Second, the means through which the mutual outcomes are to be accomplished specify the actions required on the part of group members. Means interdependence includes resource, role, and task interdependence, which are overlapping and not independent of each other. Third, the boundaries existing among individuals and groups can define who is interdependent with whom. Koffka (1935) pointed out that abrupt discontinuity produces segregating forces between the parts of a visual field that it separates, as well as unifying forces within the separated parts. On the basis of this principle of perceptual organization (Koffka; Wertheimer, 1923), boundary interdependence may exist from abrupt discontinuities among individuals who segregate others into separate groups. The discontinuity may be created by environmental factors (different parts of the room or different rooms), similarity (all seated together or wearing the same color shirt), proximity (seated together), past history together, expectations of being grouped together, and differentiation from other competing groups. Thus, boundary interdependence includes outside enemy (i.e., negative interdependence with another group), identity (which binds them together as an entity), and environmental (such as a specific work area) interdependence. These are overlapping and not independent of each other.

Structuring positive outcome interdependence (i.e., mutual goals or joint rewards) into a situation tends to result in increased achievement and productivity (Hagman & Hayes, 1986; Jensen, 1996; Jensen, Johnson, & Johnson, 2002; Matsui, Kakuyama, & Onglatco, 1987; Scott & Cherrington, 1974; Slavin & Tanner, 1979; Wodarski, Hamblin, Buckholdt, & Ferritor, 1973). Researchers conducted a series of studies to clarify the impact of positive interdependence on productivity and achievement. First, it is necessary to demonstrate that positive interdependence has effects greater than do group membership or interpersonal interaction. There is evidence that group membership, in and of itself, does not seem sufficient to produce higher achievement and productivity—positive interdependence is required (Hwong, Casswell, Johnson, & Johnson, 1993). Knowing that one's performance affects the success of groupmates seems to create responsibility forces that increase one's efforts to achieve. There is also evidence that interpersonal interaction is insufficient to increase productivity—positive interdependence is required (Lew, Mesch, Johnson, & Johnson, 1986a, 1986b; Mesch, Johnson, & Johnson, 1988; Mesch, Lew, Johnson, & Johnson, 1986). Individuals achieved more under positive goal interdependence than they did when they

worked individualistically but had the opportunity to interact with classmates. When people clearly perceive positive interdependence, individuals realize that their efforts are required for the group to succeed, that it is not possible to get a free ride (Kerr, 1983), and that they make a unique contribution to the group's efforts. When members of a group see their efforts as dispensable for the group's success, they may reduce their efforts (Kerr, 1983; Kerr & Bruun, 1983; Sweeney, 1973); when group members perceive their potential contribution to the group as being unique, they increase their efforts (Harkins & Petty, 1982).

Given the impact of positive interdependence above and beyond group membership and interpersonal interaction, a number of studies have been conducted contrasting the impact of various ways of inducing positive interdependence. Researchers have found:

1. Positive goal interdependence promotes higher achievement and greater productivity than does resource interdependence (D. W. Johnson, Johnson, Ortiz, & Stanne, 1991).
2. Positive goal and reward interdependence tend to be additive. Although positive goal interdependence is sufficient to produce higher achievement and productivity than do individualistic efforts, the combination of goal and reward interdependence tends to increase achievement more than does goal interdependence or individualistic efforts 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).
3. Resource interdependence by itself may decrease achievement and productivity compared with individualistic efforts (D. W. Johnson, Johnson, Stanne, & Garibaldi, 1990; Ortiz et al., 1996). When individuals need the resources of other group members, but do not share common goals, the emphasis tends to be on obtaining resources from others without sharing one's own resources with them. The result tends to be an interference with each other's productivity.
4. 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 no significant difference between working to achieve a reward and working to avoid a loss.
5. Positive interdependence does more than simply motivate individuals to try harder; it facilitates the development of new insights and discoveries through promotive interaction (Gabbert, Johnson, & Johnson, 1986; D. W. Johnson & Johnson, 1981; D. W. Johnson, Skon, & Johnson, 1980; Skon, Johnson, & Johnson, 1981). Cooperative group members use higher level reasoning strategies more frequently than do individuals working individualistically or competitively.
6. The more complex the procedures involved in interdependence, the longer it will take group members to reach their full levels of productivity (Ortiz

et al., 1996). The more complex the teamwork procedures, the more members have to attend to teamwork and the less time they have to attend to taskwork. However, once they have mastered teamwork procedures, members concentrate on taskwork and outperform individuals working alone.

7. Studies on identity interdependence involving social dilemmas have found that when individuals define themselves in terms of their group membership, they are more willing to take less from common resources and to contribute more toward the public good (Brewer & Kramer, 1986; De Cremer & Van Kijk, in press; De Cremer & Van Vjugt, 1999; Kramer & Brewer, 1984).

Entitativity

The degree of positive interdependence influences the perceived entitativity of the group. *Entitativity* is the perception that a group is a unified and coherent whole in which the members are bonded together (Campbell, 1958). Stronger interdependence (e.g., common goals, common outcomes, interpersonal bonds, promotive interaction, behavioral influence, communication) leads to greater perceived entitativity of a group (Gaertner & Schopler, 1998; Lickel et al., 2000; Welbourne, 1999). Perceived entitativity influences both group members and nonmembers, with group members perceiving the group as a unified and coherent whole and nonmembers perceiving the group to be a single entity.

Perceived Entitativity by Group Members

Positive interdependence, and the resulting entitativity, affects members' perception of the ingroup in numerous ways. Stronger positive interdependence leads to stronger identification with the group (Castano, Yzerbyt, Paladino, & Sacchi, 2002). The stronger the social identity derived from group membership (Tajfel, 1981; Tajfel et al., 1971; Tajfel & Turner, 1986), the stronger the self-esteem and self-worth derived from group membership (Brewer & Silver, 2000; Ellemers, Spears, & Doosje, 1997; Luhtanen & Crocker, 1992), the more qualities of the group incorporated into members' self-definitions (Schmader & Major, 1999), the greater the group's influence on the member's perspective (D. W. Johnson & F. Johnson, 2006), the greater the differentiation and clarity of boundaries between ingroup and outgroups (Turner, 1975), the greater the ingroup bias (e.g., Feather, 1994; Gaertner & Schopler, 1998; Lindeman, 1997), the higher the vulnerability of self-esteem from attacks on the ingroup (i.e., prejudice against the ingroup may be seen as a threat to one's self-esteem; McCoy & Major, 2003), the more empathy members feel for one another (Cialdini, Brown, Lewis, Luce, & Neuberg, 1997), and the greater the helping and promotive actions of group members (e.g.,

Aronfreed, 1970; Batson, 1991; Carlson & Miller, 1987; Dovidio, Allen, & Schroeder, 1990; Eisenberg & Miller, 1987; Staub, 1978).

Potential disadvantages of the entitativity created by positive interdependence are that it is easier for group leaders to (a) manipulate members' perceptions of outgroups (thereby creating and escalating intergroup competition and conflict) and (b) reject and punish group members who are viewed as lacking sufficient commitment to the intergroup conflict (e.g., patriotism; Campbell, 1965; Pruitt & Rubin, 1986; M. Sherif, 1966; Stein, 1976). Thus, in intergroup conflicts, group members who contribute to victory are seen as heroes, whereas group members who contribute to losing or accommodation may be seen as traitors (Blake & Mouton, 1962, 1983). Another potential disadvantage of entitativity is that it induces expectations of trustworthy relations among group members and fair, if not favorable, treatment by fellow group members (Brewer, 1981; Kramer, Brewer, & Hanna, 1996; Tajfel & Turner, 1986). These expectations quickly become perceived as rights because group members believe they are entitled to such treatment (Wentzel, 2000, 2001).

Perceived Entitativity by Outgroup Members

The entitativity created by positive interdependence affects not only group members' perception of their group, but also nonmembers' perceptions of the group. The higher a group's perceived entitativity, the more group membership influences the traits ascribed to members by nonmembers (Hamilton, Sherman, & Castelli, 2002). Stereotypes and discriminatory behavior are built on such impressions (Brown, 2000; Oakes, Haslam, & Turner, 1994; Tajfel & Turner, 1986). In addition, entitativity tends to result in perceived collective responsibility of ingroup members, either through commission (i.e., encouraging the member to engage in the behavior) or omission (i.e., failing to prevent the member from engaging in the behavior; Lickel et al., 2000; Lickel, Schmader, & Hamilton, 2003; Lickel & Snow, 2002). Collective responsibility exists when members of a group are held responsible and are sanctioned for the actions of a single member of a group. Highly interdependent groups are seen as highly responsible for the actions of any individual member. Finally, greater perceived entitativity of a group leads to conflicts based on incompatible goals (i.e., realistic conflicts; M. Sherif, 1966). Realistic conflict, in turn, increases a group's entitativity because members band together against an outside threat.

Risks of Membership

There are risks involved in being a member of a group with high positive interdependence and entitativity. Just as positive group qualities may be incorporated into a member's identity, so may negative group qualities, resulting in a decrease of self-esteem and self-worth. The group boundaries may be inappropri-

ately closed, so that needed new members and coalitions with other groups may be rejected, thereby decreasing group effectiveness. The ingroup bias may result in nepotism and favoritism of ingroup members that reduces group effectiveness; group members may even expect to be given favorable treatment over nonmembers. Group leaders may be able to manipulate members by creating a compelling outside enemy, creating a number of internal dynamics, such as focusing attention away from internal problems and labeling dissenters as traitors to minimize internal debate and opposition. Group members may be subject to stereotyping and discrimination; simply being identified as a member of a group can result in nonmembers making assumptions about a person's traits and behavioral patterns, triggering mistreatment and discrimination. Perspectives and definitions of reality are socially constructed within membership groups and, therefore, membership in a group results in accepting the group's view of reality, which may be inaccurate and misleading. Finally, the behavior of any group member can endanger all other group members; collective responsibility means that all members may be subject to retaliation and aggression when one member misbehaves. For these and other reasons, membership in a group with high positive interdependence and entitativity carries some risk.

Individual Accountability and Personal Responsibility

Within groups, there may be a tension between the collective interest of the group and the interests of individual members. The benefits resulting from group action may accrue to all group members regardless of their individual contributions to the group's efforts (Rapoport & Bornstein, 1987). Because contributions entail personal costs involving time and physical and mental effort, group members may have a rational incentive to free ride on the contributions of others. The problem is, if every group member decides to free ride, the group will be unsuccessful and everyone will suffer. One of the factors preventing free riding is a sense of responsibility to the group and the other group members.

Positive interdependence is posited to create responsibility forces that increase group members' feelings of responsibility and accountability for (a) completing their share of the work and (b) facilitating the work of other group members (Deutsch, 1949a, 1962). When people's performance affects the outcomes of collaborators, they feel responsible for their collaborators' welfare as well their own (Matsui et al., 1987). Failing oneself is bad, but failing others, as well as oneself, 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 responsibility increase a person's motivation to perform well. Furthermore, the more people are liked and respected by groupmates, the more responsibility they will feel toward groupmates (Wentzel, 1994).

Responsibility forces increase when there is group and individual accountability. Group accountability exists when the overall performance of the group is assessed and the results are given to all group members to compare with a standard of performance. Individual accountability exists when the performance of each individual member is assessed, the results are given to the individual and the group to compare with a standard of performance, and members are held responsible by groupmates for contributing their fair share to the group's success. Hooper, Ward, Hannafin, and Clark (1989) found that cooperation resulted in higher achievement when individual accountability was structured than when it was not. Archer-Kath, Johnson, and Johnson (1994) found that, by increasing individual accountability, perceived interdependence among group members might also be increased.

Lack of individual accountability could reduce a person's feelings of personal responsibility. Members might reduce their contributions to goal achievement when the group works on tasks where it is difficult to identify members' individual contributions, when there is an increased likelihood of redundant efforts, when there is a lack of group cohesiveness, and when there is lessened responsibility for the final outcome (Harkins & Petty, 1982; Ingham, Levinger, Graves, & Peckham, 1974; Kerr & Bruun, 1981; Latane, Williams, & Harkins, 1979; Moede, 1927; Petty, Harkins, Williams, & Lantane, 1977; Williams, 1981; Williams, Harkins, & Latane, 1981). However, if there is high individual accountability and it is clear how much effort each member is contributing, redundant efforts are avoided, every member is responsible for the final outcome, and the group is cohesive, then the social loafing effect vanishes.

Generally, as the group gets larger, members are less likely to see their own personal contribution to the group as important to the group's chances of success (Kerr, 2001; Olson, 1965). As group size increases, individual members tend to communicate less frequently, which may reduce the amount of information used to make a decision (Gerard, Wilhelmy, & Conolley, 1965; Indik, 1965). The communication may also be less truthful, because members may alter their statements to conform to the perceived beliefs of the overall group (Gerard et al.; Rosenberg, 1961). However, social loafing increases with the size of the group. Conversely, smaller group size leads to greater individual accountability (Messick & Brewer, 1983). Morgan, Coates, and Rebbin (1970) found that group performance actually improved when one member was missing from five-person groups, perhaps because members believed that their contributions were more necessary.

The research on group and individual accountability has focused on situations in which positive interdependence presumably existed. In situations in which negative interdependence presumably exists, group and individual accountability might also affect the degree to which individuals are motivated to achieve. In group competitions, for example, social loafing may occur when it is difficult to identify the contributions of any one group member. In individual

competitions, as the number of participants increases, the motivation of any one person to win may be reduced. Furthermore, without group and individual accountability, the commitment to abide by the rules may decrease, thus leading to psychological withdrawal from the competition or even cheating. The conditions under which negative interdependence creates responsibility forces need to be clarified by further research.

Interaction Patterns

We posit that interdependence results in specific interaction patterns among participants. Positive interdependence results in promotive interaction and negative interdependence results in oppositional or contrient interaction. The way individuals interact depends on how interdependence is structured in the situation.

Positive interdependence results in individuals promoting each other's productivity and achievement. Promotive interaction occurs as individuals encourage and facilitate each other's efforts to accomplish the group's goals. Although positive interdependence directly affects outcomes, its main influence may be fostering face-to-face promotive interaction among individuals that in turn influences outcomes. Individuals focus both on being productive and on promoting the productivity of their groupmates. Examples of promotive interaction include the following (D. W. Johnson & Johnson, 1999a):

1. Providing each other with efficient and effective help and assistance (e.g., D. W. Johnson & Johnson, 1981; Rosenbaum et al., 1980; Webb & Cullian, 1983).
2. Exchanging needed resources, such as information and materials, and processing information more efficiently and effectively (e.g., Crawford & Haaland, 1972; D. W. Johnson, 1974; Laughlin & McGlynn, 1967).
3. Providing each other with feedback to improve the subsequent performance of assigned tasks and responsibilities (Pittman, Davey, Alafat, Wetherill, & Kramer, 1980; Ryan, 1982).
4. Challenging each other's conclusions and reasoning to promote higher quality decision making and greater insight into problems (e.g., D. W. Johnson & Johnson, 1979, 1995b).
5. Advocating the exertion of effort to achieve mutual goals (e.g., Pallak, Cook, & Sullivan, 1980; Wicklund & Brehm, 1976).
6. Influencing each other's efforts to achieve the group's goals (e.g., Crombag, 1966; Deutsch, 1949b; D. W. Johnson et al., 1985; Raven & Eachus, 1963).
7. Acting in trusting and trustworthy ways (e.g., Deutsch, 1958, 1960, 1962; D. W. Johnson, 1974; D. W. Johnson & Noonan, 1972).
8. Being motivated to strive for mutual benefit (Deutsch, 1949b; D. W. Johnson & Johnson, 1989).

9. Having a moderate level of arousal characterized by low anxiety and stress (e.g., Blau, 1954; Haines & McKeachie, 1967; Naught & Newman, 1966).
10. Taking the perspectives of others more accurately than individuals engaged in competitive or individualistic efforts (effect sizes of 0.61 and 0.44 respectively, see Table 2); thus, exploring different points of view.

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 on both being productive themselves and preventing any others from being more productive than they are. No interaction occurs when individuals work independently without any interaction with each other. Instead, individuals focus only on being productive and ignore as irrelevant the efforts of others.

Appropriate Use of Social Skills

Group members must have or be taught the interpersonal and small group skills needed for high quality cooperation, and must be motivated to use them. To coordinate efforts to achieve mutual goals, participants must (a) get to know and trust each other, (b) communicate accurately and unambiguously, (c) accept and support each other, and (d) resolve conflicts constructively (D. W. Johnson, 2006; D. W. Johnson & F. Johnson, 2006). Interpersonal and small group skills form the basic nexus among individuals, and if individuals are to work together productively and cope with the stresses and strains of doing so, they must have a modicum of these skills: When groups function on a long-term basis and concurrently engage in complex, free exploratory activities, the interpersonal and small group skills of the members may determine the level of members' achievement and productivity.

In studies on the long-term implementation of cooperative teams, researchers 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 achievement and productivity (Lew et al., 1986a, 1986b; Mesch, Johnson, & Johnson, 1988; Mesch et al., 1986). Archer-Kath et al. (1994) found that giving participants individual feedback on how frequently they engaged in targeted social skills was more effective in increasing participants' achievement than was group feedback. Thus, the more socially skillful participants are, the more social skills are taught and rewarded, and the more individual feedback participants receive on their use of the skills, the higher tends to be the achievement and productivity in cooperative groups.

Social skills not only promote higher achievement but also contribute to building more positive relationships among group members. Putnam, Rynders, Johnson, and Johnson (1989) demonstrated that, when participants were taught

social skills, observed, and given individual feedback as to how frequently they engaged in the skills, their relationships became more positive.

Group Processing

Promotive interaction may be enhanced by group members periodically reflecting on how well the group is functioning and planning to improve their work processes (i.e., the sequence of events instrumental in achieving the group's goals). *Group processing* occurs when group members (a) reflect on which member actions were helpful and unhelpful and (b) make decisions about what actions to continue or change. The purpose of group processing is to clarify and improve the effectiveness with which members carry out the processes necessary to achieve the group's goals.

Yager, Johnson, Johnson, & Snider (1986) found that high-, medium-, and low-achieving participants achieved higher on daily achievement, postinstructional achievement, and retention measures in the cooperation with group processing condition than did participants who engaged in cooperation without any group-processing or individualistic efforts. Furthermore, participants in the cooperation-without-group-processing condition achieved higher on all three measures than did the participants in the individualistic condition. Putnam et al. (1989) found that more positive relationships developed between handicapped and nonhandicapped participants when they were taught social skills and engaged in group processing than when participants worked cooperatively without social skills training or group processing. These positive relationships carried over to postinstructional free-time situations. D. W. Johnson, Johnson, Stanne, and Garibaldi (1990) found that participants performed better on problem-solving tasks when they worked cooperatively with both instructor processing (instructor specified cooperative skills to use, observed participants, and gave the whole class feedback about how well participants were using the skills) and participant processing (the instructor specified cooperative skills to use, observed, gave the whole class feedback as to how well participants were using the skills, and had groups discuss how well they interacted together) compared with cooperation with instructor processing only, cooperative with group processing only, and individualistic efforts. All three cooperative conditions performed higher than did the individualistic condition. Finally, Archer-Kath et al. (1994) found that group processing with individual feedback was more effective than was group processing with whole group feedback in increasing participants' (a) achievement motivation, actual achievement, uniformity of achievement among group members, and influence toward higher achievement within cooperative groups, (b) positive relationships among group members and between participants and the teacher, and (c) self-esteem and positive attitudes toward the subject area.

In addition to the improvement in the efficiency and effectiveness of group efforts that result from group processing, reflecting on the actions of group mem-

bers that enhance or hinder the group's success may also result in other dynamics such as the compensation effect (i.e., an increase in performance occurring when group members work harder to compensate for the real or imagined shortcomings of other group members; Williams & Karau, 1991), the reduction of social loafing through highlighting the unique and indispensable contributions of each group member (Kerr & Bruun, 1983), the clarification of the nature of the group's goals (Weldon & Weingart, 1993) and their importance (Karau & Williams, 1993), the awareness that the group has the resources needed to succeed (thereby increasing collective efficacy; Guzzo, Yost, Campbell, & Shea, 1993; Little & Madigan, 1997; Spink, 1990), and involvement in the group's efforts (Brickner, Harkins, & Ostrom, 1986).

Finally, during group processing, members are expected to express respect for each other and each other's contributions to the group efforts. A group leader's expression of respect for a group member tends to increase the group member's self-esteem (Smith, Tyler, Huo, Ortiz, & Lind, 1998). The expression of respect among group members tends to increase (a) members' efforts to achieve group goals when the group is devalued by an outgroup (Branscombe, Spears, Ellemers, & Doosje, 2002), (b) beliefs one is valued as a group member (Emler & Hopkins, 1990; Tyler & Smith, 1999), (c) commitment to the group and adherence to ingroup norms (Smith & Tyler, 1997; Tyler, Degoey, & Smith, 1996), and (d) collective identification and group-serving behavior (Simon & Sturmer, 2003).

Conditions for Constructive Competition

There is considerable evidence that cooperation promotes higher achievement and greater productivity than does competition (D. W. Johnson & Johnson, 1989). There are many reasons why competitors achieve less than they would if they were working cooperatively. One reason is that, when working toward competitive goals, individuals tend to engage in self-protective strategies such as self-worth protection, self-handicapping, and defensive pessimism. Self-worth protection involves withholding effort so that failure can be attributed to not trying rather than to incompetency (Mayerson & Rhodewalt, 1988; Rhodewait, Morf, Hazlett, & Fairfield, 1991; Thompson, Davidson, & Barber, 1995). Self-handicapping involves creating an impediment to one's performance (e.g., procrastination and unrealistically high expectations) so that an excuse is ready if one fails (Covington, 1992; McCown & Johnson, 1991). Defensive pessimism involves unrealistically low (a) expectations for succeeding and (b) valuing of the task, to minimize anxiety about succeeding (Cantor & Harlow, 1994; Cantor & Norem, 1989; Norem & Illingworth, 1993). Such strategies tend to lower achievement in competitive situations. Furthermore, many discussions of competition portray it as so destructive that its elimination is recommended, especially from the school and the workplace (Kohn, 1992, 1993; Maehr & Midgley, 1991).

However, other social scientists have argued that competition can be constructive and should be encouraged when it is appropriately structured (D. W. Johnson & Johnson, 1978; Sherif, 1978). Social interdependence theory has expanded in the past few decades to include the conditions under which competition may be constructive (D. W. Johnson & Johnson, 1974, 1978, 1989, 1999a; R. Johnson & Johnson, 1979; Stanne, Johnson, & Johnson, 1999). Indicators of constructive competition include effectiveness in completing the task, perceiving one's participation in the competition as being personally worthwhile above and beyond winning (i.e., increasing self-confidence, social support, and achievement), increasing willingness to take on more challenging tasks, strengthening relationships with other competitors, improving morale, improving the ability of competitors to work together cooperatively in the future, insistence on participating in the competition, and enjoyment of the competition. Researchers attempting to identify the factors contributing to the potential constructiveness of competition have theorized that competition tends to be more constructive when (D. W. Johnson & Johnson, 1974, 1978, 1989, 1999a) the following points are true:

1. *Winning is relatively unimportant.* If winning is too important, high levels of anxiety result, which interferes with performance, especially on motor tasks (Blau, 1954; Deutsch, 1949a; Haines & McKeachie, 1967; Naught & Newman, 1966; Tseng, 1969); most individuals are likely to perceive their performance as a failure (Fait & Billings, 1978; C. Sherif, 1978); and losing promotes the development of competition learned-helplessness, whereas winning can promote the development of psychological burnout (Roberts, 1980).
2. *All participants have a reasonable chance to win.* Motivation to achieve depends on the perceived likelihood of being able to achieve a challenging goal (Atkinson, 1964). Those who believe they cannot win will cheat, avoid challenge, not try, use superficial and effort-minimizing strategies, engage in impaired problem solving, use other self-handicapping strategies, or have less interest in and enjoyment of the experience (Anderman, Griesinger, & Westerfield, 1998; Butler, 1987; Deci & Ryan, 1985; Graham & Golan, 1991; Halisch & Heckhauser, 1977; Hurlock, 1927; Lepley, 1937; Matthews, 1979; Meece, Blumenfeld, & Hoyle, 1988; Nolen, 1988; Pintrich, 1989; Utman, 1997).
3. *There are clear and specific rules, procedures, and criteria for winning.* Ambiguity in competition interferes with achievement because energy is directed toward worrying about what is fair and unfair (D. W. Johnson & Johnson, 1974, 1989).

In two field studies of business and industry, Tjosvold, Johnson, Johnson, and Sun (2003, 2006) found variables that related to constructive competition included the fairness of the rules, motivation to compete and win, the perception that one's chances of winning were good, a strong positive relationship among

competitors, fair play during the competition, and a history of confirming each other's competence. By controlling these factors, group leaders can enhance the constructiveness of competition.

Competition is the underlying basis for a number of other theories, such as realistic conflict theory and social dominance theory. *Realistic conflict theory* maintains that intergroup conflicts are rational in the sense that groups have incompatible goals and are in competition over scarce resources (Campbell, 1965; M. Sherif, 1966). *Social dominance theory* assumes that resources are limited and, therefore, individuals, groups, and species compete to acquire scarce resources (Charlesworth, 1996; Darwin, 1859). The competition for scarce resources results in a hierarchy of individuals within and of groups themselves. Researchers use social dominance theory to explain such dynamics as ingroup bias (Sidanius & Pratto, 1999) and bullying in schools (Pellegrini, 2002). Therefore, social interdependence theory may be linked to realistic conflict and social dominance.

Conditions for Constructive Individualistic Efforts

Perhaps the least developed aspect of social interdependence is the conditions under which individualistic efforts are appropriate and effective. Social interdependence theory relies on the assumption that there are conditions under which individualistic efforts are more effective than are cooperation and competition. Being able to work individualistically when it is appropriate is an important competence. Individualistic efforts may be most appropriate when (D. W. Johnson & Johnson, 1974, 1978, 1989, 1999a):

1. Cooperation is too costly, difficult, or cumbersome because of the unavailability of skilled potential cooperators or resources needed for cooperation to take place.
2. The goal is perceived as important, relevant, and worthwhile.
3. Participants expect to be successful in achieving their goals.
4. Unitary, nondivisible, simple tasks need to be completed, such as learning specific facts or acquiring or performing simple skills.
5. The directions for completing the task are clear and specific so participants do not need further clarification on how to proceed and how to evaluate their work.
6. What is accomplished is used subsequently in a cooperative effort. Individualistic efforts can supplement cooperative efforts through a division of labor in which each person learns material or skills to be subsequently used in cooperative activities. Learning facts and simple skills to be used in subsequent cooperative efforts increases the perceived relevance and importance of individualistic tasks. The overall cooperative effort provides the meaning to individualistic work, because it is contributing to the cooperative effort that makes individualistic goals important.

Impact of Research on Theory

The existing research has affected social interdependence theory in a number of ways.

1. The amount of research (over 750 studies with effect sizes and many more without) testifies to the importance of the theory and the interest in it.
2. Researchers have empirically tested and largely validated the major propositions of the theory because the known facts and observations generally agree with the theory. Positive interdependence tends to have positive influences on a wide range of dependent variables, compared with negative or no interdependence.
3. The theoretical definitions have been successfully operationalized in a wide variety of research situations (i.e., there are clear lines of correspondence).
4. The amount of research conducted and the diversity of studies result in high internal and external validity, which give the theory considerable generalizability.
5. Researchers of social interdependence have considerably expanded the range of dependent variables investigated. There are so many different dependent variables that are affected by social interdependence that a complete listing would be difficult to present here. The variables include communication patterns, accuracy and completeness of communication, friendliness, helpfulness, coordination of effort, feelings of agreement, similarity of ideas, perceptions of others, liking and trust for each other, orientation toward conflict, systems of distributive justice, psychological health, self-esteem, self-efficacy, social support, attitudes toward diversity, time on task, quality of decision making, quality of problem-solving, learning, retention, level and quality of reasoning, achievement motivation, intrinsic motivation, continuing motivation, epistemic curiosity, and persistence. The theory's wide and expanding scope is relatively unmatched in social psychology. Furthermore, as the number of dependent variables studied has multiplied, they have been categorized into (a) promotive versus oppositional (i.e., contrient) actions and (b) three outcome areas (effort to achieve, quality of relationships, and psychological health).
6. The research on social interdependence has given attention to the internal dynamics of cooperation. Effective cooperation may depend on positive interdependence, individual accountability, promotive interaction, the appropriate use of interpersonal and small group skills, and the processing of how effectively the group is functioning.

There are also issues that researchers have not studied enough. One is the conditions under which competitive and individualistic efforts are more effective than cooperation. Another is the variables that mediate the effectiveness of com-

petitive and individualistic efforts. A third is the examination of the relationships among positive interdependence, promotive actions, and outcomes within the same study. In most studies, correlations among promotive actions and outcomes are lacking because both are treated as dependent variables. Researchers have tended to focus on the impact of social interdependence on interaction patterns and outcomes, but have not statistically tested the mediating role of promotive interaction. Path analyses that include the correlations among positive interdependence, promotive interaction, and outcomes tend to be lacking.

APPLICATION OF SOCIAL INTERDEPENDENCE THEORY

Considerable research has indicated that (a) cooperative efforts tend to promote greater efforts to achieve, more positive relationships, and greater psychological health than do competitive or individualistic efforts and (b) the power of cooperation depends on the presence of clear, positive interdependence (including individual accountability) that results in promotive actions and interaction (including the appropriate use of social skills and group processing). Because the research is so diverse and generalizable, it strongly confirms social interdependence theory. However, having a validated theory does not mean 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 theories at all (i.e., through trial and error or luck). Effective practice can be derived from validated theory only if the theory states, with sufficient precision, that effective procedures can be deduced for practitioners to use. Once practical procedures are deduced, they must be implemented in a wide range of settings and evaluated. However, a number of conditions, such as inertia, resistance to change, economic conditions, prejudice, and cultural resistance, can result in effective practices not being implemented or institutionalized. At the University of Minnesota, the Cooperative Learning Center has worked with school districts and universities throughout the world to implement cooperative learning. Such widespread and diverse cooperative learning policies have resulted in modifications and extensions of social interdependence theory and numerous new research studies.

Education

The application of social interdependence theory in education is one of the most successful and widespread applications of social psychology to practice. From social interdependence theory, researchers have created practical procedures for structuring cooperative, competitive, and individualistic efforts in education in both the individual classroom and schoolwide levels (D. W. Johnson, Johnson, & Holubec, 1998a, 1998b; D. W. Johnson, Johnson, & Smith, 1998). From being relatively unknown and unused in the 1960s, cooperative learning is now incorpo-

rated into schools and universities throughout most of the world in every subject area and from preschool through graduate school and adult training programs. Its use is so pervasive in education that it is difficult to find a textbook on instructional methods, teachers' journal, or instructional materials that does not discuss cooperative learning. To understand the impact of social interdependence theory on educational practice, it is necessary to define cooperative learning, explain why it has flourished, and detail how the implementation of cooperative learning has contributed to the development of social interdependence theory.

Cooperative Learning and the Cooperative School

Cooperative learning is the instructional use of small groups for students to work together, maximizing their own and each other's learning (D. W. Johnson, Johnson, & Holubec, 1998a, 1998b). Any assignment in any curriculum for a student of any age can be done cooperatively. There are three types of cooperative learning: (a) formal cooperative learning, which is used for assignments that last from one class period to several weeks, (b) informal cooperative learning, which is used with direct teaching for quick discussions that last from a few minutes to one class period, and (c) cooperative base groups, which last for a semester or year to provide members with the support, help, encouragement, and assistance they need to progress academically. The three types of cooperative learning can be integrated to form an overall instructional program. Other ways of structuring cooperative learning include teams-games-tournament (DeVries & Edwards, 1974), student teams achievement divisions (Slavin, 1986), group investigation (Sharan & Sharan, 1976), academic controversy (D. W. Johnson & Johnson, 1979, 1995b), jigsaw (Aronson et al., 1978), team assisted individualization (Slavin, Leavey, & Madden, 1986), complex instruction (Cohen, 1994a), the structural approach (Kagan, 1985), and the Cooperative Integrated Reading and Composition Program (CIRC; Stevens, Madden, Slavin, & Farnish, 1987). At the school level, faculty and staff can meet weekly in teaching teams or study groups, engage in school-based decision making, and structure faculty meetings and school events cooperatively (D. W. Johnson & Johnson, 1994).

The implementation of cooperative learning (and the cooperative school) has flourished for a number of reasons (D. W. Johnson & Johnson, 1989), including the amount of research validating cooperative learning's effectiveness (when there is discussion of effective education practice, cooperative learning is always noted), the simultaneous accomplishment of multiple educational goals (increases academic learning and retention, improves relationships among students, and enhances students' social and cognitive development and psychological adjustment), the accommodation of individual differences, the solution of current social problems, and the requirement for active involvement in learning situations. Furthermore, the principles of social interdependence theory have been applied in not only cooperative learning, but also communities of learners (Brown, 1994;

Gamson, 1984), peer tutoring (Greenwood, Delquadri, & Hall, 1989; Simmons, Fuchs, Fuchs, Hodge, & Mathes, 1994), reciprocal teaching (Palinscar & Brown, 1984), and collaborative learning (Palinscar, Stevens, & Gavelek, 1988).

The implementation of cooperative learning resulted in several contributions to social interdependence theory, including the operationalization of each type of social interdependence in diverse situations, identification of the variables mediating the effectiveness of each type of interdependence, expansion of documented outcomes of cooperation, identification of the values inherent in types of social interdependence, clarification of theoretical controversies concerning interdependence, the interaction between interdependence and type of task, the nature of predispositions for cooperation and competition, and the constructive use of conflict.

Operationalizing Conceptual Definitions

The successful use of cooperative learning by many teachers and instructors in different settings, countries, and cultures with varied tasks and students validates the clarity of the conceptual definitions and the rules of correspondence linking the conceptual and operational definitions. The correspondence between Deutsch's (1949a) theoretical definitions and the procedures highlights one of the major strengths of social interdependence theory. It is noteworthy that, after all the research and application of social interdependence, the original definitions have not been revised or modified.

Identification of Mediating Variables

The need to train educators in effective cooperative learning requires the examination of the internal dynamics of cooperation and the variables that mediate its effectiveness. In Deutsch's (1962) original theory, a person structures cooperation by creating positive goal interdependence and ensuring that promotive interaction takes place. However, the implementation of cooperative learning has indicated that a better understanding of how cooperation works is needed to implement cooperative learning more effectively.

For cooperation to take place, group members must perceive that positive interdependence exists (i.e., all group members are working to achieve joint goals). However, the day-to-day use of cooperative learning in a goal-imposed setting (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 create a perception of positive interdependence. As inventive teachers struggled with how to strengthen students' sense of positive interdependence, it became clear that the definition of interdependence used in the theory was too narrow. Researchers developed a variety of ways to supplement and strengthen positive goal interdependence such as assigning group roles, dividing resources among group members, assigning each group a spe-

cific workspace, and giving rewards for group as well as individual performance. The variety of ways teachers implemented positive interdependence has resulted in the theoretical distinctions among outcome, means, and boundary interdependence.

In cooperative efforts, a sense of personal responsibility to do one's fair share of the work presumably motivates action to achieve the joint goals. However, in schools, many students do minimal work and others do no work at all. When placed in learning groups, such students let others do the work while they loafed. Simply creating positive interdependence was sometimes not enough to motivate students to learn. Teachers developed procedures to ensure that each student was overtly held individually accountable for (a) learning the assigned material and (b) promoting the learning of collaborators. Thus, structuring individual accountability has become an important issue in the successful use of cooperative learning.

In implementing cooperative learning, educators found that many students did not know how to promote the achievement of their groupmates. They found that cooperative learning is inherently more complex than competitive or individualistic learning because students have to engage simultaneously in taskwork and teamwork actions. To ensure that promotive interaction actually occurred, educators assigned each group member a role, such as encourager of participation (responsible for ensuring all members feel good about their participation) and checker for understanding (ensuring that all members can explain the processes needed to complete the assignment). In addition, they began to overtly teach the interpersonal and small group skills needed to promote each other's success, such as leadership, decision making, trust building, communication, and conflict-management skills (D. W. Johnson, 2006; D. W. Johnson & F. Johnson, 2006).

Finally, in implementing cooperative learning, educators began to realize that each learning group needed time to reflect on how effectively members were working together and to take corrective action to improve their collaborative efforts. The continuous improvement of cooperative efforts depended on reflecting on the processes used to (a) achieve the group's goals, (b) maintain effective working relationships among members, and (c) determine how the effectiveness of the processes could be enhanced. Educators found that the long-term effectiveness of cooperative efforts depended on group members identifying and solving problems members had in working together.

Thus, the implementation of cooperative learning focused attention on five mediating variables: (a) positive interdependence, (b) individual accountability, (c) promotive interaction, (d) social skills, and (e) group processing (D. W. Johnson & Johnson, 1989, 1999a). Researchers use these mediating variables to implement cooperative learning; solve problems students have in working together; and adapt cooperative learning to different student populations, subject areas, and changing conditions. In addition, the research and application of these mediating variables resulted in an expansion and clarification of social interdependence theory.

Expansion of Dependent Variables

Educators implemented cooperative learning to accomplish a wide range of educational goals (D. W. Johnson & Johnson, 1999a). Cooperative learning is used not only to increase academic achievement and retention, but also to facilitate positive relationships among diverse students, reduce risk factors associated with at-risk students (such as isolation, loneliness, and social rejection), increase intrinsic and continuing motivation to learn, increase students' self-esteem, enhance character development, prevent violence and bullying, and achieve many more goals. Such expanded use has resulted in research on a wide variety of dependent variables, thus expanding social interdependence theory.

Values Inherent in Interdependence

Inherent in cooperative, competitive, and individualistic efforts are value systems taught by the ebb and flow of daily life within schools (D. W. Johnson & Johnson, 1999b). The values inherently taught by teachers using cooperative efforts include commitment to others' success and well-being, commitment to the common good, the view that all group members are equals, and the view that promoting the success of others is a natural way of life. Engaging in competitive efforts inherently teaches the values of getting more than others, beating and defeating others, the importance of winning, and that opposing and obstructing the success of others is a natural way of life. The values inherently learned from individualistic experiences are commitment to one's own self-interest and viewing other peoples' well-being as irrelevant. Schools are responsible for inculcating numerous values in students, including the democratic values needed to be responsible citizens in society and the prosocial values needed for work and community life.

Bungling or Inept Actions Versus Effort

Deutsch (1949a, 1962) hypothesized that, within cooperative situations, effective actions are cathected positively and bungling actions are cathected negatively; in competitive situations, the opposite is true. Within individualistic situations, the actions of others are presumably irrelevant and provoke neither positive nor negative reactions (Deutsch, 1962). There is some supporting evidence for this hypothesis because group failure negatively affects the evaluations of a low performer (Ames, 1981; Stephan, Kennedy, & Aronson, 1977). Furthermore, individuals like those who facilitate their goal accomplishment and dislike those who obstruct their goal accomplishment (Ashmore, 1970; Berkowitz & Daniels, 1963; Burnstein & McRae, 1962; Deutsch, 1949b; Goranson & Berkowitz, 1966; D. W. Johnson & S. Johnson, 1972; S. Johnson & Johnson, 1972; Lott & Lott, 1960; Secord & Backman, 1964; Zajonc & Marin, 1967).

Researchers found that, within classrooms, low-performing group members are liked just as much as are high-performing group members (Armstrong, Johnson, & Balow, 1981; R. Johnson, Johnson, Scott, & Ramolae, 1985), indicating that the relationship between goal interdependence and interpersonal attraction may be more complex than Deutsch hypothesized for a number of reasons. First, D. W. Johnson and S. Johnson (1972; S. Johnson & Johnson, 1972) found that the expectation of goal facilitation promoted liking for another person, even when the other person frustrated the subject's goal attainment. Second, Deutsch (1949a) assumed that individuals are solely focused on the performance of another person when cathexis occurs. Within cooperative situations, individuals tend to form multidimensional impressions of each other and base their judgments on a variety of attributes, not just their level of performance (Armstrong et al.; R. Johnson et al.).

Third, previous experience with the other person may result in a personal commitment that influences liking regardless of the person's level of performance. For example, D. W. Johnson, Johnson, and Scott (1978) found that, after individuals worked together cooperatively for 10 weeks and were given a choice of future partners, people chose low-achieving peers as frequently as they chose high-achieving peers. Personal commitment to low-performing peers may be built through actively working together to achieve mutual goals, especially when help and assistance is given to the low-performing individuals (D. W. Johnson, Johnson, Tiffany, & Zaidman, 1983).

Fourth, perhaps liking is a result of perceived effort rather than actual goal facilitation. For example, Tjosvold, Johnson, and Johnson (1981) varied ability and effort in a study in which college undergraduates worked with a partner (a confederate of the experimenters) who was portrayed as either high or low ability and who exerted high or low effort. After completing the task, Tjosvold et al. informed participants that their pair had failed because of the low performance of the partner. The results indicated, when future contact in work or social settings was assumed, high-effort partners were better liked than were low-effort partners regardless of ability.

Finally, Deutsch (1949a) assumed that accurate perceptions of others' level of performance are possible. In many cooperative situations, the tasks are sufficiently complex and the contributions of group members so varied that whether a person's actions help or hinder may not be immediately clear or, for that matter, ever known.

What became apparent in classroom applications of cooperative learning is that, although Deutsch's (1949a) original formulation of the relationship between social interdependence and interpersonal attraction is valid under a certain set of conditions, there are other conditions under which the bungling effect does not hold. Thus, we extended social interdependence theory and formed a more complex view of the relationship between social interdependence and interpersonal attraction (D. W. Johnson & Johnson, 1989).

Type of Task

Numerous researchers investigated the interaction between social interdependence and type of task. Miller and Hamblin (1963) reviewed 24 studies on cooperation and competition and concluded that on very simple, over-learned, unitary tasks, competition will promote higher achievement than will cooperation, but on complex, problem-solving tasks, the opposite will be true. Zajonc (1965) reviewed the social facilitation literature and concluded that competition enhances performance on very simple, over-learned, unitary tasks but interferes with performance on complex, new tasks. Later researchers have not found consistent support for these conclusions (D. W. Johnson & Johnson, 1974, 1989; D. W. Johnson et al., 1981; R. Johnson & Johnson, 1979; Stanne et al., 1999). In schools, on every type of task studied, cooperation tends to promote as high or higher achievement than do competitive or individualistic efforts (D. W. Johnson & Johnson, 1989).

Predispositions for Cooperation and Competition

Theoretically, cooperation and competition are conceptualized as opposite ends of a single continuum. Yet, predisposition toward engaging in cooperation or competition may in fact be somewhat independent of each other. D. W. Johnson and Norem-Hebeisen (1979) found that many respondents had positive or negative attitudes toward both cooperation and competition. 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 likes to interact with others in a variety of ways, whereas a person who is low on both will generally be a social isolate who wishes to avoid other people no matter what the situation. Such results also indicated that there is a negative correlation between the cooperative and individualistic scales. Although wishing to work alone is obviously and negatively correlated with wishing to work cooperatively with others, the size of the negative correlation between these two scales is not high enough to support the view that they are opposite ends of a single dimension. It is also logical that there is some relationship between the competitive and individualistic scales because many competitive activities are performed alone. The results indicate that the predisposition toward the three types of social interdependence are not mutually exclusive and are not different points on a single dimension.

Resolving Conflict Constructively

The frequency and severity of conflicts in schools appears to be increasing (Elam, Rose, & Gallup, 1994). Considerable instructional, administrative, and learning efforts are often lost because students and faculty poorly manage conflicts. Eliminating conflicts does not seem to be possible because students are fascinated

by and drawn to conflicts—they like to start them, watch them, hear about them, and discuss them (Opotow, 1991). Social interdependence theorists note that both positive and negative interdependence create conflicts among individuals (Deutsch, 1973; D. W. Johnson & Johnson, 1995a, 1995b; Tjosvold, 1991). In cooperative situations, conflict occurs over how best to achieve mutual goals. In competitive situations, conflict occurs over who will win and who will lose. Conflict is resolved constructively when both parties are satisfied with the outcome, their relationship is undamaged or improved, and their ability to resolve future conflicts with each other is improved (D. W. Johnson & F. Johnson, 2006). Social interdependence theory predicts that conflicts are resolved more constructively within a cooperative than a competitive context (Deutsch, 1973). Direct support for this prediction is provided by research on two conflict resolution programs implemented in schools: (a) the teaching students to be peacemakers program, in which students are taught how to resolve conflicts constructively by engaging in integrative negotiations and peer mediation (D. W. Johnson & Johnson, 1995a) and (b) the academic controversy program, in which students are taught how to intellectually challenge and disagree with each other's conclusions and reasoning (D. W. Johnson & Johnson, 1979, 1995b; D. W. Johnson, Johnson, & Tjosvold, 2000). The research on both programs indicates that positive interdependence results in constructive conflict resolution with a wide variety of positive outcomes (such as higher achievement, more integrative agreements, greater liking for each other, more positive attitudes toward conflict, more accurate perspective-taking, and more frequent use of higher-level reasoning). These findings considerably strengthen the relationship between social interdependence theory and constructive conflict resolution.

Business

A second area in which social interdependence theory is applied is within business and industry (Tjosvold, 1989b). Although there is a long history of discussing the importance of cooperation within organizations (Katz & Kahn, 1966), the advent of the team-based organization highlighted the importance of social interdependence theory for organizational functioning (Tjosvold, 1989b). In team-based organizations, work is performed not by individuals acting alone, but by small teams of 2 to 12 individuals. The teams are organized into interdependent units (such as departments), which are then organized into an even higher level of interdependent units (such as divisions), which in turn are organized into one interdependent unit (the organization as a whole). Teams, rather than individuals, then become the basic organizational building blocks. However, in many cases, teams perform at less than an optimal level. Researchers have developed a number of ways to improve team performance on the basis of social interdependence theory (e.g., Tjosvold, 1989b), which resulted in new research and thinking about the theory, including the clarification of the relationship between cooperation and power, the clarification of the relationship between coop-

eration and conflict, the acknowledgement of the existence of multiple goals, the consideration of the impact of cultural values on cooperation within organizations, and the use of group-based reward systems.

Power

In business and industrial organizations, an ever-present reality is authority hierarchies in which power may be used either coercively (i.e., force subordinates to do what the superiors want) or promotively (i.e., facilitate the success of subordinates in completing their tasks and reaching their goals; Tjosvold, 1986). Whether power is used coercively or promotively depends on whether the organizational environment is dominated by negative or positive interdependence.

When the organizational environment is dominated by negative interdependence, negative cathexis and resistance to influence will dominate. The assumption is that individuals at each level of authority and power have different interests that are in competition with each other (Weber, 1947). Power is viewed as primarily flowing one way (down the authority hierarchy but not up). Holders of power tend to use it for personal advantage and obstruct the efforts of others to achieve their goals. Thus, to direct the behavior of the less powerful, the more powerful must overcome the less powerful members' resistance to influence, mainly by instilling fear of the consequences of noncompliance (Dahl, 1957; Emerson, 1962; Kipnis, 1997; Weber). The competitive use of power tends to be viewed negatively (Tjosvold, 1986).

When the organizational environment is dominated by positive interdependence, members positively cathect to each other's actions and there is high inducibility (i.e., openness to being influenced by and influencing others). Power is viewed as positive because it helps group members achieve their mutual goals (Coleman & Tjosvold, 2000; Deutsch, 1949a, 1962, 1973; D. W. Johnson & F. Johnson, 2006; D. W. Johnson & Johnson, 1989). Individuals are open to being influenced by others and willing to exert influence on collaborators, and power flows both from superiors to subordinates and from subordinates to superiors.

A cooperative, compared with a competitive, context tends to induce greater support, more persuasion, and more trusting and friendly attitudes between high and low power persons, as well as assistance and supportive comments from the superior to the subordinates (Tjosvold, 1981, 1985a, 1985b, 1989a; Tjosvold, Andrews & Struthers, 1991; Tjosvold, Coleman, & Sun, 2003; Tjosvold & Sun, 2000b). Superiors and subordinates were more likely to discuss their opposing views directly, which tends to result in high productivity, the subordinates perceiving the superior as democratic, and the superior and subordinates perceiving themselves and each other as powerful (Tjosvold, Hui, & Law, 1998).

Deutsch (1949a, 1962) formed his original theory assuming that power would be equal among group members. The examination of the impact of positive and negative interdependence on the use of power in an authority hierarchy

indicates that the concept of inducibility and the positive use of power within a cooperative context need to be described more precisely in social interdependence theory. In addition, the theory needs a more detailed description of how unequal power functions in a cooperative and competitive context.

Conflict

Organizations are filled with conflicts (Tjosvold, 1991; Tjosvold & Johnson, 1983). How constructively the conflict is managed determines the long-term health and overall effectiveness of the organization (Tjosvold, 1991). Managing conflict is increasingly recognized as central to the development and maintenance of effective work relationships (De Dreu & Van de Vliert, 1997; Tjosvold, 1991). There is considerable evidence that conflict tends to be managed more constructively within a cooperative than a competitive context (Deutsch, 1973; D. W. Johnson & F. Johnson, 2006; Tjosvold, 1991). Greater positive interdependence leads to conflicts that are characterized by open-minded, respectful discussion of diverse views (Tjosvold, 1991). Within business and industry, the considerable research on the management of conflict indicates that greater positive interdependence in a situation leads to more high- and low-power people using persuasion and support to resolve conflicts, directly expressing opposing views, and respecting and trusting each other in resolving conflicts (Tjosvold, 1991, 2002; Tjosvold et al.,1998; Tjosvold & Sun, 2000a, 2000b, 2003). Thus, the application of social interdependence theory in business and industry indicates that, to manage conflicts constructively, it is important to highlight the positive interdependence among disputants' goals and the need of effective cooperation for disputants to achieve future, as well as present, goals. This application and the resulting research not only highlights the impact of social interdependence on conflict management, but also further validates social interdependence theory because much of the research was conducted in Hong Kong and China, suggesting cross-cultural effectiveness.

Multiple Goals

In his original theory, Deutsch (1949a, 1962) assumed that individuals were focused on a single goal. However, the application of social interdependence theory to business and industry organizations highlights that, in most situations, there are a variety of mutual goals, goals in opposition to each other, and independent goals that are simultaneously pursued. For example, any two members of an organization may wish to cooperate to achieve the organization's goals, compete for promotions and benefits within the organization, and individualistically seek to achieve personal goals that are unrelated to the goals of others. Which goals are most salient define the situation as cooperative, competitive, or individualistic. However, there are diverse distractions and obstacles that complicate the achievement of the multiple goals (Gollwitzer, 1999). For example,

Struch and Schwartz (1989) found that incompatibility of goals (i.e., competition) predicted unwillingness to have contact with members of the outgroup, hypothetical voting against the interests of the outgroup, and endorsement of legal but antinormative behavior. When there are mixed goals in a situation, at any moment, the priority of the goals can shift and the behavior of organizational members changes accordingly. Thus, the implementation of social interdependence theory in business and industrial organizations has highlighted the need to expand the theory to take into account multiple goals that reflect positive, negative, and no interdependence in the same situation.

Cultural Values

In today's global marketplace, people with distinct cultural and national backgrounds are required to work together. Value and attitude differences among cultures create obstacles and barriers to cross–cultural collaboration (Adair, Okumura, & Brett, 2001; Hofstede, 2001; Rao & Hashimoto, 1996; Thomas & Ravlin, 1995). For example, Chinese scholars have argued that, because Chinese people are imbued with a strong sense of duty and hierarchy, they are expected to see themselves in the context of others and understand the need for reciprocity, obligations, and sensitivity to social face (Liu, 1986a, 1986b). Recent research, however, has shown that confirming social face can promote cooperative goals and open-minded discussions as well as lead to cooperative and productive discussions of frustrations (Tjosvold, 1989b; Tjosvold & Sun, 2000b). When faced with conflicts with other members of their organization, Chinese individuals engaged in persuasive influence that resulted in feelings of respect, cooperative relationships, and openness to the other person and the other position (Tjosvold & Sun, 2001). Furthermore, expressing warmth, compared with coldness, tended to promote cooperative, mutually beneficial relationships with opposing discussants (Tjosvold & Sun, 2003). Overall, values are not likely to have uniform effects on whether diverse people develop cooperative goals and promotive interaction patterns (Smith, Wang, & Leung, 1997; Tjosvold, 1989b, 1991). How values are actualized in a situation determines whether cooperative, competitive, or individualistic efforts result. The implementation of social interdependence theory in business organizations of different cultures has indicated both the universality of social interdependence theory and the need to operationalize cooperation and competition somewhat differently in different cultures. Social interdependence theory also needs to be expanded to include the various ways that values may affect how people from the same culture and diverse cultures actually work together.

Group-Based Reward Systems

Group-based reward systems have been developed and implemented in business and industrial organizations (Tjosvold, 1989b), although the results of the

practice have not been used to generate controlled research studies or to modify relevant theory. Balderston (1930) investigated group-incentive plans by collecting written descriptions of such plans from a number of companies. In each instance, the pay of all members depended on the achievement of the group as a whole. Balderston found that this method of work doubled the efficiency of the workers, increased their pay about 25%, and reduced their costs, as compared with the flat rate previously paid to each individual. The users of group incentives stated that their plans were valuable because they increased cooperation and team spirit among members, reduced monotony on the job, and caused workers to focus on a common goal. Educational and laboratory studies show group contingencies result in higher performance than do individual contingencies (Hagman & Hayes, 1986; Jensen, 1996; Jensen et al., 2002; Matsui et al., 1987; Scott & Cherrington, 1974; Slavin & Tanner, 1979; Wodarski et al., 1973). Members of groups that are evaluated as a unit become more highly motivated than do members of groups in which the members are evaluated as individuals (Berkowitz, 1957; Berkowitz & Levy, 1956).

Whatever system of reward distribution a group uses, it has to be perceived as just by group members. The evidence indicates that, before a task is performed, there is a general perception that an equity or competitive reward system is fairest, but after a task is completed, an equality or cooperative reward system in which all group members receive the same reward is viewed as the fairest (Deutsch, 1985; D. W. Johnson & Johnson, 1983; D. W. Johnson, Johnson, Buckman, & Richards, 1986; Wheeler & Ryan, 1973).

Thus, although team-based reward systems are used in business and industry and the research evidence generally supports their use, there is little direct research relating social interdependence theory to the use of team-based reward systems. Therefore, there is a need for more careful evaluation of the implementation of team-based reward systems in business and industry.

STRENGTHS AND WEAKNESSES OF SOCIAL INTERDEPENDENCE THEORY

Strengths of Social Interdependence Theory

There are a number of strengths of social interdependence theory. Social interdependence theory includes clear conceptual definitions of cooperative, competitive, and individualistic efforts. In the 1920s and 1930s, researchers operationalized cooperation and competition in numerous ways, with little consistency from study to study (May & Doob, 1937; Murphy et al.,1937). In some studies, operational definitions changed from one phase of the study to the next. There was conceptual confusion as to what constituted cooperation and competition and there was no standard that could be used to classify studies according to their operational definitions, rather than what the researchers labeled the conditions. Deutsch's (1949a) definitions, using positive, negative, or no correlation

among goals, (a) brought considerable clarity to the nature of the types of social interdependence, (b) helped operationalize the types of social interdependence in future studies (i.e., the rules of correspondence were clear), and (c) helped reorganize past studies by creating a framework from which it was possible to classify the operational definitions in previous studies to the actual type of social interdependence created. In addition, to be defined clearly, concepts must be differentiated from related concepts. Deutsch's definitions make it easy to differentiate interdependence from dependence and independence.

Social interdependence theory is well formulated. A theory is well formulated when it summarizes complex observations in abstract logically related propositions that explain causal relationships in the subject matter. Through precisely formed hypotheses, Deutsch (1949a, 1962) related social interdependence to the psychological consequences of social interdependence (i.e., substitutability, cathexis, inducibility), interaction patterns (i.e., communication, leadership, decision making), and outcomes (i.e., productivity and positive interpersonal relations). Deutsch introduced a conceptual structure that logically relates propositions and explains the causal relationships among interdependence, interaction patterns, and outcomes.

Social interdependence theory presents cooperation and competition as relationship, not individual, variables. Interdependence exists among individuals, not within individuals (although it is possible to conceptualize two separate parts of an individual that are in a competitive or cooperative relationship with each other). Most psychologists have traditionally focused on individual variables by (a) searching for laws that govern the behavior of a single individual and (b) looking inside the individual for the causes of an individual's behavior (e.g., personality traits, attitudes, values, attributions, aptitudes, skills, genes). Researchers often posit that these causes have a physical (often neurophysical) representation of some kind. However, psychologists who focus on relationship variables seek to identify laws governing individuals' interactions with each other and the causal conditions responsible for a pattern of interaction. The pattern (a) may be revealed only over time (i.e., relationships are inherently temporal rather than static), (b) does not have a direct physical representation, and (c) is invisible (i.e., the existence of a relationship variable can be discerned only by observing its effects). Cooperation and competition are exhibited in a pattern of interaction that may be measured over time and may be determined by the outcomes they generate within a situation.

The theory identifies the psychological processes inherent in social interdependence. Before 1949, there was a narrow focus on the effects of cooperation and competition on individual and group task performance. As Deutsch (2003) notes, the simplistic assumption was made that individual output would be an uncomplicated function of the degree of motivation induced by competition as compared with cooperation. This black box approach seemed inadequate to Deutsch (1949a), who hypothesized that substitutability, cathexis, and inducibil-

ity were psychological processes inherent in social interdependence. Subsequent research verified that these processes do exist within cooperative situations (Deutsch, 1962; D. W. Johnson & Johnson, 1989), clarifying the psychological processes of individuals engaged in cooperative efforts. Going beyond the black box approach also stimulated thinking about the mediating variables and situational influences on the effectiveness of cooperation and competition.

There is a history of continually expanding the dependent variables studied in the research on social interdependence theory. Before 1949, the research focused almost exclusively on individual and group task output as the dependent variable. Deutsch (1949a, 1949b) enlarged the focus on the effects of cooperation and competition to other effects (e.g., interaction processes, relationships among participants, attitudes toward self and work). Since Deutsch opened the door, many other researchers expanded the number and type of dependent variables investigated in the research on social interdependence, both for theoretical reasons and for application purposes (see D. W. Johnson & Johnson, 1989).

Social interdependence theory provides a framework with which to organize and subsume the research on cooperation and competition. The clear conceptual definitions and logical framework provided by Deutsch (1949a) enabled subsequent reviewers to organize the research on social interdependence in a more thorough and understandable way (D. W. Johnson & Johnson, 1974, 1978, 1989, 1999a; Tjosvold, 1989b). Deutsch's definitions enabled reviewers to consider the operational definitions used in research studies and to determine whether cooperation or competition were truly implemented. More precise reviews of the previous research resulted.

Social interdependence theory has generated hundreds of new research studies (D. W. Johnson & Johnson, 1989). These studies have focused on identifying the internal dynamics of cooperation that mediate its effectiveness and expanding the dependent variables studied. There has been a consistent body of research on social interdependence throughout the past four decades. Few areas within social psychology have generated as much research consistently over such a long period of time.

Finally, Deutsch's (1949a, 1962) conceptual definitions of cooperation and competition have resulted in the application of social interdependence theory to a wide range of applications. It became possible to operationalize cooperation and competition in education settings, in business settings, in family therapy sessions, in international relations, in conflict situations, and in many other settings.

Weaknesses of Social Interdependence Theory

There are a number of problems with social interdependence theory. First, the central assumption has not been challenged. There is considerable evidence that positive interdependence leads to promotive actions and negative interdependence leads to oppositional or contrient actions (D. W. Johnson & Johnson,

1989). There is also considerable evidence that positive interdependence leads to greater achievement and productivity, more positive relationships, and greater psychological health than does negative interdependence. However, the correlations among interdependence, interaction patterns, and outcomes have not been included in the same study. The path analyses that would demonstrate the mediating effect of interaction patterns have not been conducted. In the future, researchers should measure the relationship among all three parts of the assumption and establish the mediating role of action patterns.

Second, there is insufficient conceptual clarity and detail about how the central psychological processes of the theory (substitutability, cathexis, inducibility) affect dependent variables such as communication, trust, power sharing, productivity, psychological health, and self-esteem. There have been few attempts to clarify the nature of substitutability, cathexis, and inducibility; delineate the conditions under which they enhance or lessen the effectiveness of cooperation; or disconfirm them as psychological processes of cooperation. For the theory to advance, more critical examination of these psychological processes may be necessary.

Third, researchers have focused primarily on cooperation, and relatively neglected competitive and individualistic efforts. Although comparing cooperation with competition has generated knowledge about competition, researchers have not subjected competition to the same conceptual analysis and critical scrutiny as cooperation. There is little doubt that competition among individuals trying to outperform each other is prevalent and widespread in most societies, despite the advocates and critics who have debated its value for hundreds of years (D. W. Johnson & F. Johnson, 2006; D. W. Johnson & Johnson, 1989, 1999a; Kohn, 1992). Besides the debate over the value of competition, there is relatively little research clarifying the nature of constructive competition or demonstrating there are conditions under which competition can be constructive. In the future, researchers should pay more attention to the conditions under which competition is constructive and destructive.

Social interdependence theorists have spent little conceptual effort understanding individualistic efforts and the nature of self-interest. Even though individuals presumably act on self-interest without regarding the interests of others in individualistic situations, there is little evidence that this actually is the case. Gordon, Welch, Offringa, and Katz (2000) found that, in individualistic reward conditions, 31% of the participants declared they were predominantly competitive, 27% declared themselves to be cooperative, and only 18% felt they were self-interested. The conditions under which no interdependence results in self-interest and the resulting self-oriented actions leads to positive outcomes are relatively neglected by the theory.

Fourth, for the past 55 years, researchers have continually expanded the dependent variables related to social interdependence. There are so many variables impacted by social interdependence that the net effect may be skepticism and doubt. When cooperation has demonstrated positive effects on almost everything, its ef-

fectiveness may lose credibility. What is now needed is a conceptual framework to organize the wide variety of dependent variables into a system that provides more insight and indicates the conditions under which cooperation is ineffective.

Fifth, there are related theories in psychology, such as Thibaut and Kelley's (1959) social exchange theory of cooperation and competition and Bandura's (2000) social learning theory of group agency. Researchers have made no attempt to identify the similarities and differences of social interdependence theory with these other related theories.

Sixth, social interdependence theory integrates with and serves as a foundation for theories focusing on relationship variables (i.e., trust, conflict, and distributive justice) and others focusing on goals and motivation to achieve goals (e.g., Covington, 2000). However, social interdependence theory has not been integrated with other major theories in psychology. The theory would clearly benefit from being integrated with theories in areas such as learning, perception, cognition, motivation, and self-development. Social interdependence theory also needs to be integrated with theories in other social sciences, such as economics and political science.

Seventh, because in many, if not most, situations, goals are imposed on participants, the issue of inducing commitment to goals is of considerable importance and needs to be better understood. Social interdependence theory, in assuming that individuals are intrinsically committed to achieving the joint goal, does not address this issue. In the general literature on motivation and decision making, there is evidence of at least three ways to induce commitment to goals. The first is to increase ownership of the goals by involving individuals in (a) setting of the goals (French & Coch, 1948; Lewin, 1943; Radke & Klishurich, 1947) or (b) planning the paths for achieving the goals (Koestner et al., 2002). The second is to highlight the congruence of the goal with the internal interests and values of the participants (Koestner et al.; Sheldon & Elliot, 1999; Sheldon & Houser-Marko, 2001). The third is to highlight the person or group's progress in achieving the goal, which also increases self-efficacy (Austin & Vancouver, 1996). Once commitment has been induced, it must be maintained. Commitment to attaining goals is maintained by (a) planning how a goal is to be accomplished and (b) linking each step with environmental cues. Environmental cues remind the person of the goal and aspects of oneself that support achieving the goal. An important source of such environmental cues is the behavior of other people. As other people take action, certain aspects of oneself become salient and the goal is maintained in one's consciousness (Kuhl & Fuhrmann, 1998). The focus of others on the goal serves as a continuing prompt that the goal is meaningful and maintains the goal in consciousness (Gollwitzer, 1999). In cooperative situations especially, participants protect each other from interruptions and competing demands while working to achieve common goals. Researchers should pay more attention to this issue in social interdependence theory.

Last, social interdependence theory is built on the assumption that there is only one goal in the situation and it is structured cooperatively, competitively, or individualistically. However, in applied situations, there are always multiple goals, and the relative salience of the goals determines interaction patterns and the resulting outcomes in the situation. Researchers should further investigate the impact of multiple goals on interaction patterns and outcomes.

SUMMARY AND CONCLUSIONS

The importance of social interdependence theory is reflected in the quality of the theory, the amount of relevant research, the widespread application of the theory, and the general balance of its strengths and weaknesses. Since Morton Deutsch (1949a) formed the basic theory of social interdependence (building on the work of Koffka [1935] and Lewin [1935]), the theory has (a) brought considerable conceptual clarity to the nature of social interdependence, (b) created a framework for reorganizing the research, (c) generated considerable new research studies, (d) provided a foundation for many other social science theories, and (e) created clear rules of correspondence that made it possible to operationalize the types of social interdependence in practical situations.

Over 750 studies have been conducted on social interdependence, of which 97% were conducted subsequent to Deutsch's development of the basic theory. The studies addressed a wide range of dependent variables that may be subsumed within three broad categories: (a) effort to achieve, (b) positive interpersonal relationships, and (c) psychological health. The breadth of the research and the variety of dependent variables studied have both extended and refined the theory, while inspiring new studies and areas of interest.

The application of social interdependence theory in education and business has resulted in a plethora of research studies that extended the theory and focused attention on the variables that mediate the relationship between positive interdependence and desired outcomes. Furthermore, the worldwide application of cooperative efforts has resulted in much of the interest in and development of social interdependence theory, and has generated most of the hundreds of research studies that have been conducted in the past 40 years. There is nothing more important to a good theory as the demonstration of its application in an effective practice.

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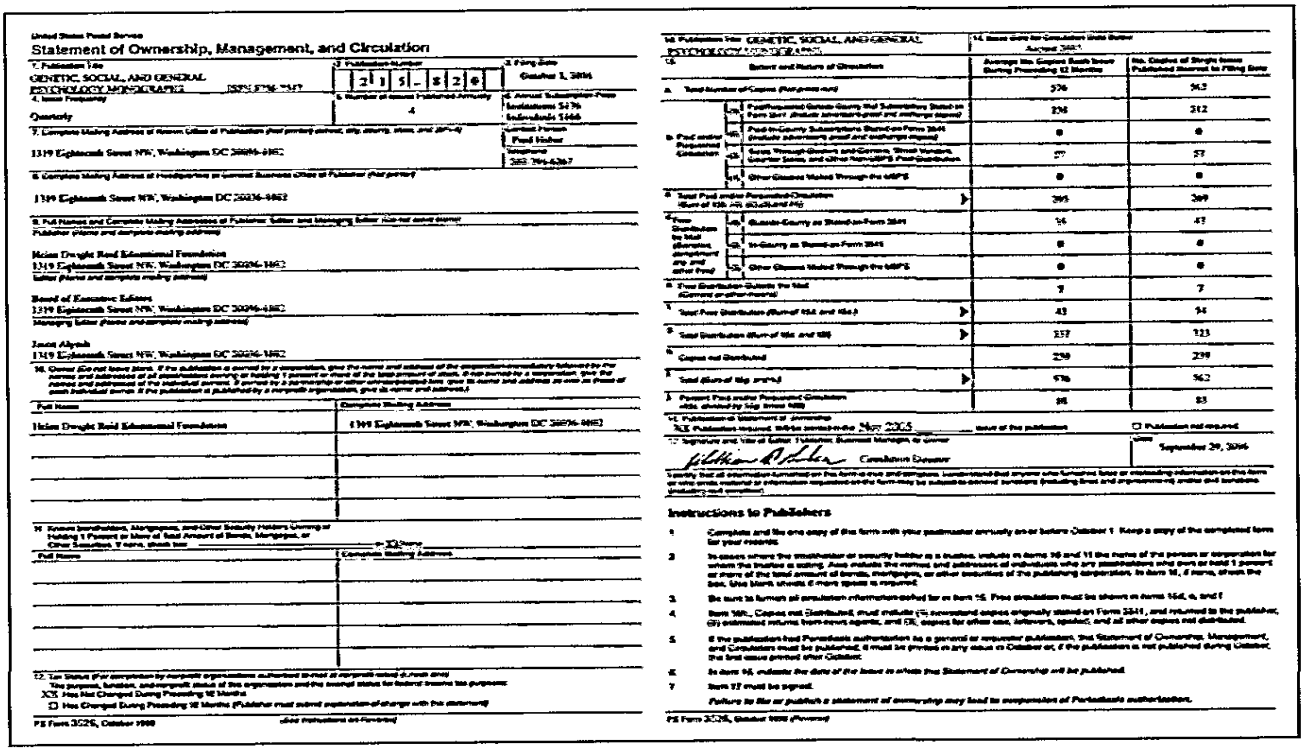

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