Team Training in China:

Testing and Applying the Theory of Cooperation and Competition

Jia-Fang Lu

Asia Pacific Center for Leadership and Change

Hong Kong Institute of Education, Hong Kong, China

Dean Tjosvold

Lingnan University, Hong Kong, China

Kan Shi

Chinese Academy of Sciences, Beijing, China

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Correspondence concerning this article should be addressed to Dr. Jia-Fang Lu, Asia Pacific Center for Leadership and Change, Hong Kong Institute of Education, 10 Lo Ping Road, Tai Po, Hong Kong SAR, China. E-mail: LUJF@ied.edu.hk

Abstract

The theory of cooperation and competition has the potential both to understand the conditions when organizational groups are productive and major ways to strengthen these groups. Work teams based in a high-technology company in Beijing, China, participated in a training workshop and a two-month follow of feedback and development. Structural equation analyses of data taken before and after the workshop support the hypotheses. In addition, results suggest that the training and follow-up activities developed cooperative goals and constructive controversy. Findings also indicate that relationships among groups affect the productivity of individual teams. Results were interpreted as suggesting that cooperative goals and constructive controversy contribute to potent, creative, and productive teams in China and perhaps other countries as well.

Keywords:

Cooperation and competition; team; training

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Leaders worldwide want to develop customer service, new product, and other types of teams to accomplish a wide range of significant organizational tasks (Banker, Field, Schroeder, & Sinhan, 1997; Denison, Hart, & Kahn, 1996). But developing effective teams has proved difficult. Knowledge of the nature of productive teamwork and how to develop it are needed to guide organizational members in their efforts (Katzenbach & Smith, 1993; Stewart, 2006; West, 2002). This study proposes that the theory of cooperation and competition is useful to identify the conditions that affect team performance and suggest important ways that organizational teams can be strengthened so that they perform confidently and productively (Deutsch, 1973). Specifically, it tests the model that cooperative, in contrast to competitive and independent, goals promote the open-minded discussion of opposing views (constructive controversy) that in turn results in confidence (potency), creative processes, and group productivity in China. It also tests the extent to which team training can develop cooperative goals, constructive controversy, potency, creativity, and group performance.

This study makes several contributions to the literature. It adds to the empirical base linking cooperative goals and constructive controversy to important organizational outcomes and suggests that these apply in China as well as in the West. The study provides an initial test whether the theory can also guide team training that helps organizational groups become more potent and productive. It helps to integrate the training literature with the research on cooperation and competition. Although random assignment to conditions was not used, the study examines the causal relationships proposed in the theory through structural equation analysis and pre and post-training comparisons. Teams are embedded within an organization and their relationships with each other may affect their performance. As the training occurred for the entire company, the study also tests the extent that the relationships among groups affect the performance and potency of individual groups. The study also contributes to the creativity literature by indicating that cooperative goals and constructive controversy are important antecedents of team creativity (Gilson & Shalley, 2004; Gilson, Mathieu, Shalley, & Ruddy, 2005; Oldham & Cummings, 1996; Shalley & Zhou, 2004; Taggar, 2002).

Theory of Cooperation and Competition

Although competition and independent work can be useful under certain conditions, research suggests that team members who have cooperative, compared to competitive and independent, goals develop the interaction dynamics that generally promote effectiveness (Chen & Tjosvold, 2002; Crown & Rosse, 1995; Tjosvold, Tang, & West, 2004; Tjosvold & Yu, 2007). This study proposes that cooperative goals promote constructive controversy that in turn results in confident, creative, and productive teamwork.

In developing the theory, Deutsch (1973) assumed that team members work to further their self-interests by striving to reach their goals. However, the pursuit of self-interests does not preclude the development of productive relationships and teamwork. Deutsch argued that it was the way goals were perceived to be structured that determines how people interact and these interaction patterns in turn determine outcomes (Deutsch, 1973; Johnson & Johnson, 1989; Johnson, Maruyama, Johnson, Nelson & Skon, 1981; Stanne, Johnson, & Johnson, 1999).

Goals may be considered cooperatively, competitively, or independently related. In cooperation, people conclude that their goal achievements are positively correlated; they believe that they can reach their goals if and only if the others also reach their goals. In competition, people believe their goal achievements are negatively correlated; each perceives that the achievement of one prohibits or at least makes it less likely that others will achieve their goals. With independent goals, achievements are thought to be unrelated.

Whether team members understand that their own goals are related cooperatively or competitively critically affects their expectations, interaction, and outcomes. With cooperative goals, team members believe that as one moves toward goal attainment, others move toward reaching their goals. They understand that others' goal attainment helps them; they can be successful together. As a consequence, people want each other to perform effectively as it helps each person be successful. They expect each other to use their abilities to work for mutual benefit (Lewicki, McAllister, & Bies, 1998). Three types of goal relationships are not necessarily independent from each other, the predominantly type of goal relationship will play a major role in affecting the interaction process.

Researchers have found that groups may rely on inadequate decision heuristics and fail to develop new and creative solutions because they often focus on consensus and shared information and do not discuss their dissenting views (Janis, 1972, Lott & Lott, 1965; Stasser & Titus, 2003, 1985; Zander, 1977). Studies indicate though that with cooperative goals, compared to competitive ones, group members engage in more deliberate and thorough information processing. The more team members perceived cooperative relationships, the more they shared information and discussed their differences of opinion directly and, consequently, the more they learned and the more effective they were (De Dreu, 2007; Johnson & Johnson, 1989, 2005; Tjosvold, 1988).

Studies indicate that cooperative goals develop constructive controversy, which is defined as the open-minded discussion of opposing views for mutual benefit (Tjosvold, 1988, 1998). With cooperative, rather than competitive and independent, goal interdependence, group members are likely to believe that they can rely upon each other, handle their diverse views more constructively, and benefit from these exchanges and discussions of information both as individual and as a team. People with cooperative, in contrast to competitive and independent, goals have been found to express their opposing views directly and work to integrate them so that they can develop high quality solutions (Tjosvold, 1998). Cooperative goals are a foundation by which team members, feeling that they can rely upon each other and will consider each other's ideas, discuss their own perspectives openly. As they are also trying to promote the interests of both, they work to develop a common, effective solution.

Based on the above ideas and research, this study hypothesizes that:

H1. To the extent that team members believe they have cooperative goals, they discuss their differences open-mindedly for mutual benefit.

H2. To the extent that team members believe they have competitive goals, they avoid discussing their differences open-mindedly for mutual benefit.

H3. To the extent that team members believe they have independent goals, they avoid discussing their differences open-mindedly for mutual benefit.

This study proposes that constructive controversy, by helping teams solve a variety of problems, result in confident, creative, and productive teams. Constructive controversy is expected to contribute to group potency; group potency is defined as the confident attitude that the group can be effective across tasks (Gully, Incalcaterra, Joshi, & Beaubien, 2002; Pescosolido, 2000). Constructive controversy would seem to be concrete evidence that the team has the resources and the capacity to combine and channel resources for productive purposes. Team members have grappled with issues through open-minded dialogues; they can see that team members have abilities and can integrate them to develop new alternatives. Constructive controversy should convince team members that they can pool their resources and combine their ideas to solve many problems. As they have frequent experiences in expressing and integrating their ideas and efforts (Tjosvold, 1998), they become confident that they are a team whose

members can pool their abilities and be successful over a range of tasks and, consequently, conclude that they have a potent team.

Group potency should be highly useful for teams. Researchers have developed some evidence that group potency results in effort and performance as well satisfaction (Lester & Meglino, & Korsgaard, 2002; Sosik, Avolio, & Khai, 1997). There is considerable evidence documenting the value of efficacy, the belief that one can use one's capabilities to execute a course of action that will result in performance (Earley, 1994; Lee & Bobko, 1994). Research has shown that individuals who believe they can perform needed actions exert effort are productive; those with little efficacy are unproductive and fail to contribute to the organization (Bandura, 1993; Wood, Bandura, & Bailey, 1990). Studies then suggest that group potency and productivity reinforce each other and both are developed by constructive controversy and creative processes.

Constructive controversy is also expected to foster team creativity (Deutsch, 1973). Creativity, as it involves developing novel ideas and practices, often depends upon teamwork where people together identify problems and opportunities and integrate old ideas into new ones (Gilson & Shalley, 2004; Oldham & Cummings, 1996; Shalley & Zhou, 2004). Cooperative goals and constructive controversy can very much contribute to creative interactions in that it encourages team members to express and integrate their best ideas into alternative approaches to their work. Competitive and independent goals discourage creative processes because team members withhold their ideas and are reluctant to combine them to develop new ways of working.

Constructive controversy can also foster group productivity. Productive teams are defined here as being able to serve the users of their products and services effectively (Pritchard, 1992). To be productive in the long-term, teams must be able to confront problems, develop high quality solutions, and be committed to implement them. Considerable research has documented that constructive controversy helps team members identify problems and integrate ideas to develop a variety of solutions (Tjosvold, 1998). Research suggests that open-minded interaction also develops team members' commitment to implement these solutions as they have had a chance to participate meaningfully in the decision (Glew, Griffin, & Van Fleet, 1995; Tjosvold, 1988). Constructive controversy should help teams develop and implement innovative, quality solutions and thus be able to serve their users productively.

Based on the above reasoning and research, this study hypothesizes that:

H4. To the extent that team members develop constructive controversy, their teams develop group potency.

H5. To the extent that team members develop constructive controversy, their teams are creative.

H₆. To the extent that team members develop constructive controversy, their teams are productive.

This study tests a model linking cooperative, competitive, and independent goals with constructive controversy and with group potency, creativity, and productivity. Specifically, cooperative goals are expected to promote constructive controversy that in turn results in group potency, creative processes, and productivity.

Training to Apply the Theory of Cooperation and Competition

Research summarized above suggests that developing cooperative interdependence can be an important foundation for helping group members discuss their various ideas open-mindedly and thereby develop a confident, creative, and productive team. This study further tests this idea by training groups within a company to strengthen their cooperative goals and constructive controversy both within and between their teams. This section argues that training research has emphasized that employees should know and be motivated by the target ideas and behaviors, participate in the training, be trained as a cohort, and develop ongoing development and feedback. The theory of cooperation and competition also suggests that these conditions facilitate effective cooperative team training.

Training research on learning and applying theory

Researchers have suggested that motivation and participation are major ingredients for successful training and identified approaches that can reinforce motivation and participation (Kanfer, 1990; Naylor, Pritchard, & Ilgen (1980). To be motivated, trainees should understand the target ideas and behaviors and believe that their applying them will be useful for themselves and others. Motivation is enhanced when people know their goals and believe that these goals are valuable (Hirschfeld, Jordon, Field, Giles, & Armenakis, 2005; Kanfer, 1990; Pritchard, Holling, Lammers, & Clark, 2002). Training should communicate the standards to strive for so that the participants have a clear and specific understanding of the conditions and behaviors they want to attain (Bobko & Colella, 1994). Setting specific, realistic but challenging levels for these learning goals as well as developing clear objectives and strategies to achieve them can further strengthen motivation and training (Pritchard et al., 2002; Frese & Zapf, 1994; West & Anderson, 1996).

Researchers have emphasized that employees should be actively involved in their own training (Pritchard, et al, 2002). They have proposed that participation, as it encourages the consideration of ideas and information, improves the quality of the decisions and individual knowledge of participants (Kanfer, 1990; West & Anderson, 1996). Participating trainees are also likely to feel greater group pressures to implement the decisions (Coch & French, 1949).

Training occurs within an overall organizational context that can very much affect its success. For example, the endorsement of top management can contribute to employee motivation as they recognize that the organization values and will reward targeted behaviors

(Pritchard, et al, 2002). Training all the individuals that depend upon each other as a cohort has been found to promote effective organizational change (Coch & French, 1949; Kanfer, 1990). Individuals realize then that they can gain the support of their colleagues to learn and apply the new behaviors.

Indeed, as teamwork is typically highly interdependent, individuals realize that for them to change and improve, the people they depend upon must also change. For example, studies have found that role conflicts where individuals receive inconsistent expectations very much undermine job performance and satisfaction (Fisher & Gitelson, 1983; Jackson & Schuler, 1985). Less recognized is that training all the teams in an organization that depend upon each other can also be very useful because for individual teams to improve often requires that the teams they depend upon also improve.

One-time training has limited effects; people need to consider and experiment with new skills and ways of working (Halpern & Hakel, 2002). Considerable education and training research underlines that re-phrasing ideas in one's own words (practice at retrieval) is a powerful determinant of long term learning and transfer (Halpern & Hakel, 2002). Trainees should not be expected to hear an idea or demonstrate a skill once or twice and then perform. They need to continue to deepen their understanding and experiment and strengthen their abilities over time.

Specifically, considerable research has underlined the value of feedback for helping people improve their work and strengthen their ongoing learning (Guzzo, Jette, & Katzell, 1985; Kluger & DeNisi, 1996; Taylor, Fisher & Ilgen, 1984). Feedback is expected to help individuals focus their attention on the targeted abilities as well as provide them specific directions on how they can improve and reach standards. Feedback can increase motivation as people are more informed and confident that they can succeed and more aware that others want them to perform well (Carter & West, 1998). However, feedback has to be appropriately and skillfully delivered to have such beneficial effects (Kluger & DeNisi, 1996). Feedback should be informative, clear, specific, regular, and accepting of the other so as not to provoke defensiveness (Kopelman, 1986; Taylor et al., 1988).

Cooperation research on learning and applying theory

Consistent with training research, research on cooperation and competition indicates that employees should be motivated and knowledgeable of the target ideas and behaviors, actively participate in the training, be trained as a cohort, and engage in ongoing development and feedback for effective cooperative team training. Hundreds of studies have clarified the concepts of cooperation and competition and demonstrated their value. Findings, summarized in metaanalyses, consistently indicate that cooperative goals facilitate not only task accomplishment but also relationships and individual development over a wide range of conditions (Johnson, et al, 1981; Stanne, Johnson, & Johnson, 1999). As they study and understand the theory, employees can appreciate that they will benefit as people as well as promote their organizational work to the extent that they develop cooperative goals.

From a cooperation and competition theory perspective, participation and cohort training are needed because to be effective, team members must collectively believe that their important aspirations and interests are positively related (Deutsch, 1973). What counts is how team members conclude they are interdependent. Team members must also supplement their cooperative goals with such promotive interaction as constructive controversy to result in productive work (Deutsch, 1973). Team members need to have and use these skills and procedures so that they express and integrate their ideas and efforts. Cooperative teamwork is interdependent action that team members themselves do together.

Cooperative goals should be strengthened over time and supported by ongoing feedback. Unresolved disputes, promotion opportunities, ineffective interaction, and many other developments may lead team members to emphasize that their goals are negatively or independently related (Deutsch, 1973). Competition and independence are both possible, and at times highly appealing alternatives.

A major advantage of cooperative team training is that using cooperative groups can themselves facilitate training (Johnson & Johnson, 2002). Findings suggest that people trained in cooperative groups will learn ideas and skills more effectively than those in competitive and independent settings (Johnson, et al, 1981; Kelley and Thibaut, 1969). Team members can become more knowledgeable and skilled in working cooperatively through team training and follow-up activities. The method of cooperative team training reinforces the message.

Cooperative experiences can improve feedback processes that stimulate learning. People have been found to be more accepting, open, and respectful of feedback when they are working cooperatively rather than competitively (Tjosvold et al., 2004).

Training for cooperative teamwork

Training and cooperation and competition research considered together suggest the following features for effective cooperative teamwork training. Team members:

- Form cooperative learning teams to study and understand the theory and review the research to appreciate the value for them and their organization of strengthening cooperative goals. They also learn major ways to reinforce cooperative goals and reduce competitive and independent ones.
- Use constructive controversy to debate and decide whether they want to invest in developing cooperative teamwork.
- 3. Participate in post-workshop follow-up activities to assess and receive feedback on their teamwork within and between groups and develop concrete ways to strengthen them.
- 4. Commit themselves to ongoing development of their cooperative teamwork.

Cooperative team workshop and two-month follow-up of team feedback and development were conducted in a high technology company based in Beijing, China. This study reports the results of this demonstration and provides a test whether cooperative teamwork training can heightened beliefs that goals are positively related, foster constructive controversy, and result in potency, creativity, and group productivity. All the teams in the company participated in the workshop. This designed allowed the measuring of the effects of the workshop and follow up activities on the relationships and interaction among the teams as well as within teams.

METHOD

Participants

The research site was a software company in Beijing, China, engaged in supplying application software and information solutions in call center and customer relationship management. It was listed as 77th largest company within the Asia Pacific region in the 2004 Deloitte Technology Fast 500 ranking.

Employees are asked to work as a team with both those within their departments as well as across them. 146 employees from 13 functional departments participated in this training project. The department size ranged from 2 persons with the Commerce Department to 31 persons with the Project Implementation Department, with a mean team size of 11.2 persons. Participants' average age was 29.6 years old, 73.1% male and 26.9% female. Regarding education, 0.7% of them received high middle school education, 16.4% college education, 64.4% with bachelor degree, 17.8% master degree, and .7% doctoral degree. They worked with this company on average just over 21 months.

Before the training, employees were asked to complete a questionnaire distributed through the human resource department to the employees and told to return it directly to the

research team in order to assure them of confidentiality. They provided their telephone extension numbers at the end of the survey. 59 employees returned completed pre-training questionnaires.

The workshop was conducted on Friday afternoon and all-day Saturday in December, 2005. All 146 employees were asked to attend; 95 actually participated. Those who could not were asked to consult with their group members about what they had learned. In the next two months, employees had regular reflection sessions guided by a prepared workbook in which each time's discussion topic and activities were explicitly proposed. Departments averaged 26 reflection sessions over the two months. We then distributed another survey using the same procedure. 73 employees completed the post-training questionnaire. Based on the telephone extension numbers they provided, we matched 42 pre- and post-training cases.

As requested by the company, we tried to minimize interference with participants' regular work. Many employees were unavailable to complete the survey due to working in implementation sites and other travel obligations. Almost all employees available when the HR staff distributed the survey finished the questionnaires. The low response rate was not much caused by voluntary withdrawal from a study; the available informants should be a representative sample.

Measures

Goal interdependence. The project team members indicated the goal interdependence in the project teams. Scales for cooperative, competitive and independent goal interdependence were developed from a previous questionnaire study conducted in North America (Alper, Tjosvold, & Law, 1998). The five cooperative goal items measured the emphasis on mutual goals, shared rewards, and common tasks. A sample item for the cooperative goal scale was "Our team members seek compatible goals". Participants were asked to rate on a 5-point scale (1=strongly

agree, 5=strongly disagree) their degree of agreement to the different statements of the goal interdependence scale. The five competitive goal items measured the emphasis on incompatible goals and rewards. A sample item was "Team members' goals are incompatible with each other". The independent goal scale had five items with similar anchors to measure the emphasis on unrelated goals and rewards. A sample item was "One team member's success is unrelated to others' success".

The scales all demonstrated acceptable reliability. In pre-training, the coefficient alphas for the within team cooperative, competitive and independent goal scales were .93, .80, and .84 respectively. In post-training, the coefficient alphas for the within team cooperative, competitive and independent goal scales were .90, .77, and .84 respectively. In pre-training, the coefficient alphas for the between team cooperative, competitive and independent goal scales were .82, .76, and .83 respectively. In post-training, the coefficient alphas for the between team cooperative, competitive and independent goal scales were .91, .71, and .89 respectively.

Constructive controversy, the open-minded discussion of diverse ideas for mutual benefit, can be measured by the extent that team members seek a mutually beneficial solution, take each other's perspectives, directly and openly discuss their opposing views, and try to integrate them for the best solution. We developed the 8-item instrument from a set of experimental studies (Tjosvold, 1998) and a questionnaire study in North America (Tjosvold, Wedley & Field, 1986) that focused on measuring the social interaction of team members when the team was engaged in problem-solving. Team members were asked to rate their degree of agreement with eight statements on a 5-point scale ranging from 1 (strongly agree) to 5 (strongly disagree). A sample item was "We use our opposing views to understand the problem." At the within team level, the coefficient alpha of the instrument on the pre-training was .77 and on the post-training, .73. At

the post-training, .78.

Group potency is the confident attitude that the group can be effective in different situations with different tasks (Gully, et al, 2002; Pescosolido, 2000). Team members were asked to rate on a 5-point scale (1=strongly agree, 5=strongly disagree) the potency of the team on a scale developed by Guzzo, Yost, Campbell and Shea (1993). The 8-item scale measured the project team's shared belief that it can be effective. A sample item was "Our team expects to be known as a high-performing team." In pre-training, the scale had a Cronbach alpha of .78.

Group creativity is the extent that team members are able to develop innovative ways of working (Gilson & Shalley, 2004; Oldham & Cummings, 1996; Shalley & Zhou, 2004). Group members rated on 3 items on a 5-point scale (1=strongly agree, 5=strongly disagree) the creativity of the team on a scale developed by Denison et al. (1996). A sample item was "Our team is highly imaginative in thinking about new or better ways we might perform our task." In pre-training, the scale had an alpha of .66; in post-training, .68.

Group productivity. As with other work team research (Alper, Tjosvold & Law, 2000; Cohen & Ledford, 1994; Goodman, Devadas, & Griffith-Hughson, 1988), obtaining objective work outcome measures proved very difficult despite the organization being willing to provide them. This company, like many others, did not track the performance of its teams. Moreover, the data that could be obtained were not comparable across different types of teams. Therefore, we used team members' ratings of the team's performance as the effectiveness measures. Team members indicated on a 5-point scale ranging from 1 (strongly agree) to 5 (strongly disagree) their beliefs on the extent that the team achieves a high standard of task accomplishment on measure taken from Van Der Vegt, Emans, and Van De Vliert (2000). A sample item was "Most of our tasks are accomplished quickly and efficiently". In pre-training, the 5-item scale had an

alpha of .80 and in post-training, .76.

Two members of the research team who are native Chinese translated the questionnaires originally written in English into Chinese. To ensure conceptual consistency, the questionnaires were back translated into English to check for possible deviation (Brislin, 1970). The questionnaires were pre-tested to make sure that respondents clearly understood every phrase, concept, and question. To prevent and eliminate potential concern for being involved in evaluating others, participants were assured that their responses would be held totally confidential.

Analyses

Scale validation. We conducted a series of confirmatory factor analyses to test whether the respondents' rating would load on 6 distinct factors at the within team level, namely cooperative, competitive, independent goals, constructive controversy, group potency, creativity, and productivity to ensure that the items were measuring distinct constructs.

The confirmatory factor analyses were conducted using EQS for Windows (Bentler & Wu, 1995). The effective sample size for the present study was 132 cases (pre-training and post-training). The indicators to sample size ratio hence was favorable with 7 latent constructs. In order to reduce the number of parameters estimated and to develop parallel test forms (Nunnally, 1978), we simplified the structural model in the present study by reducing the number of indicators for the constructs. Specifically, we combined the items with the highest and lowest loading by averaging until we yielded three indicators for each construct. That is, the items with the highest and the lowest loadings were averaged to form a first new indicator. This is a common approach in the literature of structural equation analysis and was used in Mathieu and Farr (1991) and Mathieu, Hofmann and Farr (1993).

Insert Table 1 about here

Table 1 shows the results of these series of confirmatory factor analyses. Model M₀ shows that our proposed 7-factor model fits the data quite well. The CFI and the NNFI are .96 and .95. This 7-factor model was then tested against 4 different 6-factor measurement models and the one-factor measurement model. Each of these 6-factor models was formed by merging two of the seven factors into one aggregate factor. These four alternative 6-factor models were selected based on the theoretical considerations that the antecedents could be distinguished from each other and that the tentative causal relationships among these variables were not attributable to one factor. Results in Table 1 show that model chi-squares increase significantly when we move from the 7-factor model to any of the five alternative models. Given that the alternative 6-factor models did not have better fit indices measures than the 7-factor model and there is theoretical support for the different scales, we concluded that the seven factors are distinct measures of the constructs in our study.

Hypotheses testing. We first tested the hypothetical model at the within team level, using correlation analyses as an initial test. Structural equation analyses tested the model connecting cooperative, competitive and independent goals, group potency, creativity, and productivity. Due to relatively small sample size, we used a single indicator to represent each latent variable, thus the analysis involved only the structural model, not the measurement model. The covariance structure analysis of the inter-relationship among these constructs was analyzed using EQS for Windows (Bentler & Wu, 1995).

To examine whether the results obtained from the full sample were invariant across pre-

training and post-training, we conducted both within- and between-group analyses. We first computed the hypothetical model separately for pre-training and post-training to see if there was a good fit in each group. To examine whether the magnitude or direction of each hypothesized relationship was invariant across at both time points, we conducted model comparison by specifying two simultaneous between-group models. The first between-group model did not contain any cross-group invariance constraints. In other words, all of the parameter estimates were freely estimated within pre-training and post-training groups. The second between-group model, however, constrained each of the 6 hypothesized relationships to be invariant across different time points. If the chi-square for the constrained model is not significantly larger than the chi-square for the unconstrained model, the assumption of invariance is tenable. Otherwise, if the overall chi-square difference test revealed a lack of invariance, we needed to examine the univariate modification indices to locate specific parameters that significantly differed across two groups (Bentler, 1989; Bollen, 1989). After testing the hypothetical model at the within team level, we tested the hypothetical model at the between team level. We used procedures similar as to those described above for the within team level analysis.

RESULTS

Within teams

Zero-order correlations provide an initial examination of the hypotheses relating within team cooperative, competitive and independent goals, within team constructive controversy, group potency, creativity, and productivity (Table 2 & Table 3.). Two wave results provide strong support for the hypotheses that to the extent that teams believe they have constructive controversy they feel potent, are creative, and perform productively. For both pre-training and post-training data, constructive controversy was positively and significantly correlated with group potency (.60, p < .01; .49, p < .01), creativity (.57, p < .01; .40, p < .01), and productivity

(.59, *p* < .01; .52, *p* < .01).

Insert Table 2 & 3 about here

Results for both the pre-and post-training survey also provide support for the three hypotheses that goal interdependence affects constructive controversy. Cooperative goals were significantly and positively correlated with constructive controversy (.56, p < .01; .45, p < .01), whereas competitive goals and independent goals were negatively and significantly correlated with constructive controversy (-.38, p < .05; -.43, p < .01; and -.30, p < .05; -.28, p < .05).

Structural equation analyses through EQS were used to explore the underlying relationship among the variables. Figure 2 shows the path estimates for the model tested in the study's hypotheses.

Insert Figure 2 about here

For the pre-training data, the hypothetical model had a chi-square of 116.02 with 15 degrees of freedom. The NFI and CFI for the model were .93 and .94 respectively. Both fit indices were considered as indicating satisfactory model fit, given the usually accepted critical value of .90 (Bentler & Bonnett, 1980). The path coefficients of the accepted hypothesized model help to explore the findings more specifically. Results indicate that cooperative goals had significant positive effects on constructive controversy (β = .46, p< .01). Competitive goals had positive but not significant effects on constructive controversy (β =-.18, p=n.s.) whereas independent goals had negative, non-significant effects on constructive controversy (β =-.04,

p=n.s.). Constructive controversy in turn had significant effects on teams' group potency (β = .55, p< .01), creativity (β = .53, p< .01), and productivity (β = .52, p< .01).

For the post-training data, the accepted model had a chi-square of 130.09 with 15 degrees of freedom. The NFI and CFI for the model were .94 and .95 respectively. The path coefficients of the accepted model indicate that cooperative goals had significant positive effects on constructive controversy (β = .31, p< .01). Competitive goals had negative, significant effects on constructive controversy (β =-.40, p< .01.) whereas independent goals had negative but not significant effects on constructive controversy (β =.17, p=n.s.). Constructive controversy in turn had significant effects on teams' group potency (β = .47, p< .01), creativity (β = .38, p< .01), and productivity (β = .51, p< .01).

The comparison of unconstrained between-group model and constrained between-group model (Table 4) suggests that imposing the additional restrictions of six equal path coefficients across the two time points did not result in a statistically significant worsening of overall model fit (Chi-square = 6.44 with 6 DF, p = .38). Therefore, we concluded that both the pre-training and post-training data supported the hypothesized model.

Insert Table 4 about here.

Between teams

Zero-order correlations also provide an initial examination of the hypotheses relating between team cooperative, competitive and independent goals, between team constructive controversy, within team group potency, creativity, and productivity (Table 2 & Table 3). Results for both the pre-and post-training survey also provide support for the three hypotheses that goal interdependence between teams affects constructive controversy. Cooperative goals were significantly and positively correlated with constructive controversy (.54, p< .01; .49, p < .01), whereas competitive goals were negatively and significantly correlated with constructive controversy (-.36, p < .05; -.40, p < .01). Independent goals were not significantly correlated with constructive constructive controversy (-.12, p = n. s.; -.16, p = n. s.).

Pre-training data does not provide significant support for the hypotheses relating between team constructive controversy and team outcomes. Although between team constructive controversy are positively correlated with within team creative strategy (.20, p = n. s.), group potency (.37, p = n. s.) and group performance (.37, p = n. s.), they are not statistically significant. However, post-training data do provide strong support for the hypotheses that to the extent that teams believe they have constructive controversy with other teams, they feel potent, are creative, and perform satisfactorily. For post-training data, between team constructive controversy was positively and significantly correlated with group potency (.52, p < .01), creativity (.31, p < .05), and productivity (.52, p < .01).

Structural equation analyses through EQS were again used to explore the underlying relationship among the variables. Figure 3 shows the path estimates for the model tested in the study's hypotheses.

Insert Figure 3 about here

For the pre-training data, the hypothetical model had a chi-square of 114.31 with 15 degrees of freedom. The NFI and CFI for the model were .92 and .93 respectively. The path coefficients of the accepted hypothesized model help to explore the findings more specifically. Results indicate that cooperative goals had significant positive effects on constructive controversy (β = .42, p < .01). Competitive goals had negative but not significant effects on

constructive controversy (β =-.50, p < .01) whereas independent goals had positive effects on constructive controversy (β =.45, p < .01). Constructive controversy in turn had significant effects on teams' group potency (β = .54, p< .01), creativity (β = .46, p< .01), and productivity (β = .48, p< .01).

For the post-training data, the accepted model had a chi-square of 96.47 with 15 degrees of freedom. The NFI and CFI for the model were .95 and .96 respectively. The path coefficients of the accepted model indicate that cooperative goals had significant positive effects on constructive controversy (β = .46, p< .01). Competitive goals had negative, significant effects on constructive controversy (β =-.30, p< .01.) whereas independent goals had significant positive effects on constructive controversy (β =.31, p< .01). Constructive controversy in turn had significant effects on teams' group potency (β = .53, p< .01), creativity (β = .30, p< .01), and productivity (β = .30, p< .01).

The comparison of unconstrained between-group model and constrained between-group model (Table 5) suggests that imposing the additional restrictions of six equal path coefficients across the two time points did not result in a statistically significant worsening of overall model fit (chi-square = 6.11 with 6 df, p = .41). Therefore, we concluded that, at the between team level, both the pre-training and post-training data supported the hypothesized model.

Insert Table 5 about here.

Training effects

Employees appear to have been involved in the training. On a 7-point scale, participants reported an average score of 5.26 with a standard deviation of 1.28.

Insert Table 6 about here.

Although the change with three types of goals and constructive controversy at the within team level were in the expected direction, the paired sample t test results were not statistically significant: difference between pre-training and post-training for cooperative goals is .10 (t =.99, p=n. s), competitive goals is -.04 (t =-.29, p=n. s.), independent goals is -.03 (t =-.24, p=n. s.), and constructive controversy is .06 (t =.53, p= n. s.). The paired sample t test did indicate significant changes in the outcome variables between pre-training and post test: participants reported higher levels of group potency (mean difference=.27, t = 2.54, p<.05), creative strategy.70 (t = 5.30, p<.01), and group productivity (mean difference=.33, t = 3.42, p<.01).

The paired sample t test indicated significant changes in cooperative goals at the between team level (Table 7). They reported difference in cooperative goals from pre-training to post-training is .50 (t = 2.72, p<.01). The differences between team competitive goal and independent goals are -.29 and -.29, but these differences are not statistically significant (t = -1.69, p=n. s.; t = -1.81, p=n. s.). Participants reported differences in between team constructive controversy of .36 (t = 2.99, p<.01) from the pre to the post-training.

Overall, these results indicate that the training strengthened between team cooperative goals and constructive controversy and within team potency, creativity, and productivity.

Insert Table 7 about here.

DISCUSSION

Despite its origins in the West, the theory of cooperation and competition proved useful for analyzing and strengthening teamwork both within and between teams in a Chinese

organization. Results support the reasoning that cooperative goals and constructive controversy provide a foundation upon which to understand and develop productive teamwork in organizations. Team members with strong cooperative links where they believed their goals are positively related were also able to discuss their diverse opinions open-mindedly and use these discussions for mutual benefit. This open-mindedness in turn was found to predict to group potency, creatively developing innovative ways of working, and productive work.

Team members not only have to work effectively with each other as individuals, but their teams must also coordinate (Jackson, Joshi, & Erhardt, 2003). As they depend upon each other for information and assistance, how they work with each other can affect their team attitudes and effectiveness. The theory of cooperation and competition also proved useful for understanding the relationship dynamics between teams within the organization. When teams believed that their goals were cooperative rather than competitive or independent, they were able to discuss their opposing views openly and constructively and this interaction in turn helped teams feel potent and work creatively and productively.

Results support the reasoning that the theory of cooperation and competition can be used to develop as well as to understand within and between team dynamics. In conjunction with the training literature (Pritchard, et al., 2002), cooperation and competition research suggested the program of training teams as cohorts to learn to the theory and review the research to appreciate the value for them and their organization of strengthening cooperative goals, to use constructive controversy to decide if they want to strengthen their cooperative teamwork, to engage in ongoing reflection upon their teamwork as they work to improve their cooperative work on the job, and to commit themselves to ongoing strengthening of their cooperative teamwork. Findings taken after the two-day workshop and two-month follow up program suggested that participants developed stronger levels of cooperative goals and constructive controversy between their teams, and the teams felt more potent and worked more creatively and productively.

Although differences between levels of cooperative goals and constructive controversy within teams from the pre to the post-training were in the expected direction, only the differences from pre to post-training for cooperative goals and constructive controversy between teams were statistically significant. Previous research suggests that often teams within an organization feel competitive and developing cooperative links between them is difficult (Jackson, et al, 2003). It may be that teams in organizations generally have more daily opportunities to develop personal, cooperative relationships whereas teamwork training is especially valuable for strengthening intergroup relations. Research is needed to test this speculation.

It is also interesting that the differences between pre and post-training suggest that the strengthened intergroup relationships facilitated within team potency, creativity, and productivity. Teams within an organization depend upon each other; when teams withhold information and support, teams can feel powerless and unable to proceed with their own work efficiently (Kozlowski & Klein, 2000; Marks, DeChurch, Mathieu, Panzer, & Alonso, 2005). These results are consistent with the meta-analyses results that intergroup cooperation is more facilitative of within group productivity than intergroup competition (Johnson, et al, 1981). Although intergroup cooperation is often thought to stimulate within group cohesion, intergroup cooperation generally provides a more productive foundation for teams, especially it would seem within organizations where teams are highly interdependent.

Cross-cultural researchers have traditionally argued that as collectivists Chinese people are oriented toward avoiding conflict and have developed data indicated that they may more likely to endorse conflict avoidance than people from the West (Ting-Toomey & Oetzel, 2001; Tse, Francis, & Walls, 1994). However, findings from this study underline that Chinese people, when they believe that their goals are cooperative, are prepared to discuss their opposing views

openly and are able to use these kinds of discussions productively. Consistent with these findings, Leung (Leung, 1996; Leung, Koch, & Lu, 2002) has argued that the Chinese value of harmony can take on quite different forms and motivational backgrounds. In superficial harmony, Chinese people avoid conflicts to pursue other ends, but, when they seek genuine harmony to strengthen the relationship itself, they are willing and able to discuss their differences openly and constructively. Recent experiments and field studies further support the reasoning that with cooperative goals Chinese people welcome conflicting discussions and can use them to understand and develop solutions to problems as well as strengthen their relationships (Tjosvold & Sun, 2000; Chen & Tjosvold, 2005). This study indicates that developing the collective organization as a whole to strengthen cooperative goals and to endorse and encourage open discussion of differences can be a foundation for Chinese people to make effective use of their opposing views.

Group potency, creativity, and productivity were all found to be outcomes of cooperative goals and constructive controversy. It would seem that they reinforce each other. Continued productive work is a complex, demanding task, perhaps especially in rapidly changing conditions such as the high technology company in China in which the study was conducted. To be productive, teams need to have the reassurance and confidence that they can persist to overcome obstacles and feel confident that they have the wherewithal to work creatively. Discussing differences openly and integratively appears to be concrete evidence to team members that they can work creatively and productively. Without this kind of open-minded, supportive interaction, team members may feel skeptical about each other and lack confidence in their ability to combine their efforts and ideas to overcome obstacles.

Creativity has long been considered valuable for organizations but research is needed to identify the conditions that stimulate it (Gilson & Shalley, 2004; Oldham & Cummings, 1996;

Shalley & Zhou, 2004). West (2002) has proposed that groups are fertile ground for innovation in organizations. Results of this study identify the open-minded discussion of diverse ideas as an important antecedent for teams to develop creative processes.

Chinese people have long argued that relationships are key to leadership, teamwork, and indeed to organizational work and business. Personal relationships, *quanxi*, promotes mutual exchange and is needed to supplement rules and roles that are often limited and ineffective (Hui & Graen, 1997). Western theorists have recently agreed that the nature of relationships critically affect work, especially in the today's open, networked organizations and economies (Kramer & Tyler, 1996; Miles, Snow, Mathews, Miles, & Coleman, 1997; Lewicki & Wiethoff, 2000; Rousseau, Sitkin, Burt, & Camerer, 1998). This study provides an empirical documentation of the contribution of relationships for team innovation.

The theory of cooperation and competition, despite its origins in the West, proved useful for understanding teamwork in China (Deutsch, 1973). The research approach of identifying conditions that impact organizational dynamics and outcomes in China with a theory with universalistic aspirations may be a viable addition to the traditional alternatives of comparing samples from different cultures and exploring a cultural variable with an indigenous theory (Leung, 1997). The research approach used in this study can both probe general theories and improve understanding of organizational dynamics in nonwestern cultures.

Limitations

The sample and operations limit the results of this study. The data are self-reported and subject to biases and may not accurately describe the relationships, although recent research suggests that self-reported data are not as limited as commonly expected (Spector, 1992). These data are also from a single source and, as they are correlational, do not provide direct evidence of causal links between goal interdependence, constructive controversy, group potency, creativity,

and productivity. Although the trading data provide data over time, these data suffer from threats to internal validity. A true experimental design with random assignment would very much help overcome recall and other methodological weaknesses (Spector & Brannick, 1995).

Practical Implications

Managers around the world are structuring teams to solve a range of organizational problems but research has documented that dynamics such as social loafing, free riders, and inability to share diverse information and discuss their diverse views openly can very much frustrate groups (George, 1992; Janis, 1972; Karau & Williams, 1993; Lott & Lott, 1965; Stasser & Titus, 2003; Zander, 1977). Indeed, developing teamwork has been thought to be a key competitive advantage for this capability is not easily imitated by competitors (Barney, 2001, 1992, 1991; Katzenbach & Smith, 1993). In addition to developing theoretical understanding, support for the study's hypotheses may have important practical implications for developing teamwork both within and between groups, especially in China and other collectivist cultures.

As with previous research (Tjosvold, et al, 2004), this study emphasizes the value of developing cooperative goals to strengthen the foundation of teamwork in organizations. Results further suggest that a practical investment in developing cooperative teamwork of a two day workshop and two month follow up activities can increase the level of cooperative goals and constructive controversy at least between teams in an organization, dynamics that in turn empower and help teams work productively and creatively.

Teams in one organization must often work with teams in other organizations and in this increasingly global economy these organizations may be based in a different country and culture (Zeng & Chen, 2003). Not only should our theories be relevant for within and between groups but also across cultural and organizational divides. Research is needed examine the extent that the theory of cooperation and competition, as it has been developed both within and between

teams and in China as well as in the West, can be a foundation to develop these cross-

organization, cross-cultural relationships.

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FIGURE 1

Hypothesized Model



TABLE 1

Scale validation --- Confirmatory Factor Analysis (N=132)

	df	Model χ^2	$\Delta\chi^2$	NFI	NNFI	CFI
Baseline 7-factor Model (M0)	168	221.59		.98	.99	.99
Combined Coop Goal and Comp goal (M1)	174	431.79	210.2	.96	.96	.97
Combined Coop Goal and Inde goal (M2)	174	449.66	228.07	.96	.96	.97
Combined Coop Goal and Constructive Controversy (M3)	174	314.27	92.68	.97	.98	.98
Combined Cooperative Goal and Group Performance (M4)	174	329.06	107.47	.97	.98	.98
One-Factor Solution (M5)	189	754.23	532.64	.93	.93	.94

TABLE 2

Results of Pre-training Correlations

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1. Cooperative goal between teams	5.32	0.77	(.82)										
2. Competitive goal between teams	3.16	0.90	37*	(.76)									
3. Independent goal between teams	2.92	0.89	36*	.78**	(.83)								
4. CC between teams	4.91	0.46	.54**	36*	12	(.58)							
5. Cooperative goal within teams	5.87	0.71	.45*	06	.06	.45*	(.93)						
6. Competitive goal within teams	2.51	0.92	.18	.39*	.33	.04	29*	(.80)					
7. Independent goal within teams	2.61	0.84	.24	.12	.10	.18	20	.71**	(.84)				
8. CC within teams	5.36	0.71	.19	00	.25	.56**	.56**	38**	30*	(.77)			
9. Group potency within teams	5.45	0.75	.19	.05	.18	.37	.62**	36**	31*	.60**	(.86)		
10. Creative strategy within teams	5.23	0.77	02	.28	.42*	.20	.53**	33*	31*	.57**	.70**	(.66)	
11. Group performance within teams	5.36	0.56	.33	11	.03	.37	.69**	39**	22	.59**	.59**	.48**	(.80)

Note: ^a N=59

^b Values in bracket are reliability (Cronbach's alpha) estimates.

° **p<.01

TABLE 3

Results of Post-training Correlations

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1. Cooperative goal between teams	5.64	0.72	(.91)										
2. Competitive goal between teams	2.85	0.78	54**	(.71)									
3. Independent goal between teams	2.56	0.91	53**	.65**	(.89)								
4. CC between teams	5.17	0.61	.49**	40**	16	(.78)							
5. Cooperative goal within teams	6.04	0.53	.49**	47**	39**	.48**	(.90)						
6. Competitive goal within teams	2.48	0.73	44**	.71**	.55**	41**	48**	(.77)					
7. Independent goal within teams	2.64	0.81	37**	.57**	.63**	20	39**	.82**	(.84)				
8. CC within teams	5.38	0.59	.39**	41**	18	.58**	.45**	43**	28*	(.73)			
9. Group potency within teams	5.83	0.49	.30*	23*	21	.52**	.46**	34**	33**	.49**	(.78)		
10. Creative strategy within teams	5.23	0.77	.30**	19	24	.31*	.29*	17	18	.40**	.19	(.68)	
11. Group performance within teams	5.36	0.56	.34**	21	25	.52**	.39**	30*	28*	.52**	.56**	.44**	(.76)

Note: ^a N=73

^b Values in bracket are reliability (Cronbach's alpha) estimates.

° **p<.01

FIGURE 2

Standardized Path Coefficients for within Team Pre-Training and Post-Training

Structural Models



Note:

The first values represent the standardized path coefficients for pre-training model; the values in parentheses represent the coefficients for post-training model.

TABLE 4

Goodness-of-Fit Summary

Models	χ^2	df	р	NFI	NNFI	CFI
Pre-training model	116.02	15	0.00	.93	.88	.94
Post-training model	130.09	15	0.00	.94	.90	.95
Unconstrained between-group model	271.22	36	0.00	.93	.90	.94
Constrained between-group model	277.66	42	0.00	.93	.92	.94
χ^2 difference	6.44	6	.38			

Note:

NFI = normed fit index; NNFI = nonnormed fit index; and CFI = comparative fit index.

FIGURE 3

Standardized Path Coefficients for between Team Pre-training and Post-training

Structural Models



Note:

The first values represent the standardized path coefficients for pre-training model; the values in parentheses represent the coefficients for post-training model.

TABLE 5

Goodness-of-Fit Summary

Models	χ^2	df	р	NFI	NNFI	CFI
Pre-training model (N=48)	114.31	15	0.00	.92	.87	.93
Post-training model (N=73)	96.47	15	0.00	.95	.92	.96
Unconstrained between-group model	233.225	36	.00	.93	.91	.94
Constrained between-group model	239.336	42	.00	.93	.92	.94
χ^2 difference	6.11	6	.41			

Note:

NFI = normed fit index; NNFI = nonnormed fit index; and CFI = comparative fit index.

		Cooperative Goal	Competitive Goal	Interdependent Goal	Constructive Controversy
Between teams	М	1.71	-1.39	-1.52	1.44
	SD	0.70	0.91	0.89	0.65
	t	18.27	-11.27	-12.73	16.25
	df	55	54	54	54
	Sig.	.000	.000	.000	.000
Within teams	M	1.91	-1.48	-1.33	1.60
	SD	0.72	0.99	1.04	0.65
	t	19.57	-10.94	-9.38	18.23
	df	53	53	52	54
	Sig.	.000	.000	.000	.000

TABLE 6

Self-Reported Changes in Antecedent Variables

TABLE 7

Paired Sample t-Test between Pre-Training and Post-Training Variables

		Pre Test		Post Test		Paired Sample Te		est
Variables	Ν	Mean	SD	Mean	SD	Difference	t	Sig.
Cooperative goal between teams	28	5.18	0.80	5.69	0.62	0.50	2.72	.01
Competitive goal between teams	28	3.04	0.82	2.75	0.74	-0.29	-1.69	.10
Independent goal between teams	28	2.93	0.70	2.64	0.80	-0.29	-1.81	.08
CC between teams	28	4.85	0.46	5.21	0.55	0.36	2.99	.01
Cooperative goal within teams	42	5.98	0.71	6.07	0.54	0.10	.99	.33
Competitive goal within teams	42	2.41	0.91	2.37	0.71	-0.04	29	.78
Independent goal within teams	42	2.63	0.89	2.60	0.82	-0.03	24	.81
CC within teams	42	5.40	0.64	5.46	0.60	0.06	.53	.60
Group potency within teams	42	5.51	0.67	5.78	0.48	0.27	2.54	.02
Creative strategy within teams	42	4.70	0.77	5.40	0.61	0.70	5.30	.00
Group performance within teams	42	5.06	0.66	5.40	0.45	0.33	3.42	.00