

---

# Creative Problem Solving and Communication Behavior in Small Groups

---

Roger L. Firestien and Richard J. McCowan  
*State University College of New York at Buffalo*

---

*ABSTRACT: This study investigated differences between communication behaviors of small groups trained in creative problem solving and groups not trained in creative problem solving. Communication behaviors investigated were: (a) amount of participation; (b) verbal indications of criticism; (c) verbal indications of support; (d) verbal indications of humor; and (e) non-verbal indications of humor. Groups were also evaluated on the quantity of ideas generated. Results indicated that groups trained in creative problem solving participated more, criticized ideas less, supported ideas more, exhibited more verbal and nonverbal indications of humor, and produced significantly more ideas than untrained groups.*

Many training programs on the market today are designed to teach small group communication skills, increase team involvement, and enhance participants' satisfaction with group

experiences (i.e., Training Resources, 1979; Pfeiffer & Jones, 1980; Xerox Learning Systems, 1982). This study was conducted to determine if a course in creative problem solving is an effective way to teach small group communication skills.

Many investigations have examined the effectiveness of creative problem solving training on participants' cognitive and affective abilities (Torrance, 1972) and on "real-life criteria" (Parnes, 1987). A significant proportion of this literature focuses on the brainstorming technique as an effective method to develop solutions to problems in group settings.

Alex Osborn (1963) described brainstorming as ". . . a conference technique by which a group attempts to find a solution for a specific prob-

---

Correspondence should be mailed to Roger L. Firestien, 216 Chase Hall, Buffalo State College, 1300 Elmwood Avenue, Buffalo, NY 14222.

lem by amassing all the ideas spontaneously contributed by its members" (p. 151). Osborn stressed that, "idea-producing conferences are relatively fruitless unless certain rules are understood by all present, and are faithfully followed" (p. 155). He described the rules for brainstorming as:

(1) Criticism is ruled out. Adverse judgment of ideas must be withheld until later; (2) "Free-wheeling" is welcomed. The wilder the idea the better; it is easier to tame down than to think up; (3) Quantity is wanted. The greater the number of ideas, the more the likelihood of useful ideas; (4) Combination and improvement are sought. In addition to contributing ideas of their own, participants should suggest how ideas of others can be turned into better ideas; or how two or more ideas can be joined into still another idea. (p. 156)

Implicit in Osborn's first three guidelines are suggestions for the communication behaviors required for developing solutions to a problem. His fourth guideline, however, is quite straightforward in emphasizing a group communication behavior necessary for generating ideas.

It should be stressed that brainstorming, while an extremely valuable tool for divergent thinking, is not the

entire creative problem solving process. The creative problem solving process investigated in this study emphasizes a balance between divergent and convergent thinking. These two types of thinking are integrated into a six-stage creative problem solving model. The six stages of this model consist of:

1. Mess Finding: isolating a concern or problem on which to work.
2. Data Finding: generating and selecting the most important data regarding the mess.
3. Problem Finding: generating and selecting a statement that captures the "essence" of the situation.
4. Idea Finding: generating and selecting the best available alternative(s) for solving the problem.
5. Solution Finding: using criteria to screen, select and support ideas selected in idea finding.
6. Acceptance Finding: generating ways to implement the solution and develop a plan for action.

It is important to recognize that the convergent thinking used in this process is based on the concept of "affirmative judgment." In other words, the purpose of this convergent thinking is to screen, select, and support options instead of focusing on the weaknesses of ideas. Isaksen and Treffinger (1985) describe affirmative judgment as:

---

[looking] for strengths or positive aspects of ideas. What intriguing new thoughts are suggested by some of your unusual ideas? What's good about some of the ideas? Affirmative judgment reminds us that evaluation and decision-making are constructive processes, not just destructive criticism. (Two-8)

### Linking Creativity and Communication

Some possible linkages exist between creative problem solving and communication. Isaksen and Treffinger (1985) emphasized the importance of communication in defining creativity as "making and communicating meaningful new connections". As mentioned earlier, Osborn (1963) emphasized the importance of specific small group communication behaviors in his guidelines for brainstorming.

In the field of communication, Collins and Guetzkow (1964) described the benefits of an effectively functioning group as the assembly bonus effect. This effect is an increase in group effectiveness resulting from efficient group interaction. Hill (1982) reported that in "learning and concept-attainment tasks, group performance was usually superior to individual performance because of the group's ability to pool resources, correct errors, and use qualitatively

different learning strategies" (p. 522). In complex problem solving tasks, the quality of group solutions was superior to that of individual solutions (Lorge, Tuckman, Aikman, Spiegel, & Moss, 1955).

Communication scholars have also developed inventories to evaluate the effectiveness of interactions that occur in groups. This work includes the *SYMLOG Adjective Rating Form* (Bales & Cohen, 1979), *Interpersonal Communication Orientation* inventory by Burgoon (1983), and inventories published by Bales in *Interaction Process Analysis: A Method for the Study of Small Groups* (1950). Additional inventories developed by Van Gundy (1984) and Ekvall, Arvonen, and Waldenstrum-Lindblad (1983) assess the climate that occurs in small groups and organizations. Bales' (1950) *Interaction Process Analysis* divides group members' behaviors into 12 different categories. These categories consist of six negative and positive task behaviors and six negative and positive socio-emotional behaviors. The categories are: (a) shows solidarity, (b) shows tension release, (c) agrees, (d) gives suggestions, (e) gives opinion, (f) gives orientation, (g) asks for orientation, (h) asks for opinion, (i) asks for suggestions, (j) disagrees, (k) shows tension, and (l) shows antagonism. In using the interaction process analysis technique, the method for analyzing

the content of communication behaviors is to break down the whole of the interaction into its component acts.

Van Gundy (1984) developed a self-report questionnaire designed to assess group creative climate. He included the following descriptors of individual group member behaviors: (a) curious, (b) independent, (c) able to defer judgment, (d) able to test assumptions, (e) optimistic, (f) humorous, (g) self-confident, (h) open to new ideas, (i) persistent when problem solving, (j) able to concentrate, (k) tolerant of ambiguity, (l) self-aware, (m) committed, (n) flexible, (o) willing to take risks, (p) disciplined, (q) use imagery to help solve problems, (r) able to toy with ideas, and (s) impulsive.

Van Gundy's (1984) questionnaire also included items designed to measure the quality of interpersonal relationships in groups. These items were: (a) high degree of interpersonal trust, (b) acceptance of deviant behaviors, (c) willingness to listen for understanding, (d) friendliness toward one another, (e) spirit of cooperation, (f) open confrontation of conflicts, (g) respect for each other's feelings, (h) lack of defensiveness, and (i) very definite attempts at including all members in group discussions.

A report by Ekvall et al. (1983) detailed the construction and validation of a 50-item questionnaire used

to assess organizational climate in organizations. The instrument was validated by several companies in Sweden. The validation showed that items on the instrument correlated positively with successful organizations that were defined as effective, profitable companies. Ten dimensions were found to exist as a result of a factor analysis of this and subsequent instruments including: (a) challenge, (b) freedom, (c) idea support, (d) trust/openness, (e) dynamism, (f) playfulness/humor, (g) debates, (h) conflicts, (i) risk-taking, and (j) idea time.

These inventories were consulted as guides to determine which communication behaviors would be examined and evaluated in the problem solving groups. Although not all of the items listed in the inventories developed by Bales (1950), Van Gundy (1984), and Ekvall et al. (1983) were included in the analysis of the small groups examined in this study, one can infer that the following behaviors are related to more inclusive communication concepts. Thus, the communication behaviors investigated consisted of the following: (a) greater participation, (b) verbal indications of criticism of ideas, (c) verbal indications of support of ideas, (d) verbal indications of humor evidenced by laughter, (e) nonverbal indications of humor evidenced by smiles, and (f) quantity of ideas generated.

Participation behaviors evaluated

would assess Ekvall et al.'s (1983) dimension of trust/openness and Van Gundy's (1984) attribute, "Very definite attempts at including all members in group discussions."

Verbal criticism of ideas would measure Bales' (1950) negative task dimension, "Disagreeing with other group members" and Ekvall et al.'s (1983) "conflicts" dimension.

Verbal support of ideas would measure Bales' (1950) positive task dimensions, "Gives suggestions, gives opinion, asks for suggestions," Ekvall et al.'s (1983), "Idea support," and Van Gundy's (1984), "Able to defer judgment; able to test assumptions; open to new ideas; acceptance of deviant behaviors; a willingness to listen for understanding; friendliness toward one another; a spirit of cooperation, and a lack of defensiveness."

Verbal and nonverbal indications of humor would assess Bales' (1950), "Positive socio-emotional categories of showing tension release," Van Gundy's (1984), "Humorous, friendliness toward one another; a spirit of cooperation, and a lack of defensiveness," and Ekvall et al.'s (1983), "Playfulness/humor."

Each inventory mentioned above focuses on interactions that occur in group settings. Because group interactions are central to this study, the small group, not the individual, was used as the unit of analysis.

In reviewing findings of scholars in creativity and communication literature, one can conclude that: (a) groups are an important and effective method for problem solving, (b) creative problem solving is an effective method for solving problems in groups, and (c) inventories have been developed to assess group interactions.

This study attempted to bridge the closely related fields of creativity and communication and find some answers to the question: What benefit is there to training in creative problem solving upon the interactions that occur in problem solving groups?

## **Method**

### *Subjects*

One hundred and ten trained subjects were randomly selected from the Introduction to Creative Studies undergraduate courses taught at the State University College at Buffalo during the Spring semester of 1986. Ninety untrained subjects were randomly sampled from undergraduate courses in the Business Department, Interdisciplinary Sciences Department, and the Consumer Studies and Home Economics Department.

### *Materials and Procedure*

When subjects entered the observ-

ation area to be videotaped, they were seated around a circular table. Pencils, pads of paper, and a written copy of a case problem were provided for all subjects. A numbered pad of paper was provided to record the group list of ideas. Three television cameras mixed into a single image recorded interactions that occurred in groups.

Data were collected for the trained and untrained groups near the end of the semester, during the 14th week of classes in a 16 week semester. Trained subjects had attended 26 classes, 1 hr and 15 min in duration (32.5 hr of instruction). Subjects were randomly assigned to groups, resulting in 40 groups of five members each (22 trained groups and 18 untrained groups).

Group members were presented with an actual case problem on which they were instructed to generate ideas. Groups had 5 min in which to generate ideas. The case problem involved getting groups and large professional organizations to stay at a seasonal resort hotel on a year-round basis (i.e., not just during the peak season). When the case problem was presented, a participant was asked to record the ideas generated by the group on the numbered pad of paper. The person who gave the instructions and read the case did not know if the groups to which the case was presented were trained or untrained. This

person introduced the problem and solicited a recorder for each of the 40 groups.

To evaluate communication behaviors, subjects were videotaped while they worked in groups of five. The tapes of the groups were analyzed by trained raters to gather the data on the communication behaviors that occurred in the groups.

Raters scored behaviors exhibited by subjects, not the effect of the behavior on other group members. The videotapes were analyzed by persons who did not know if the groups they viewed were trained or untrained.

Communication behaviors investigated were: (a) amount of participation; (b) verbal indications of criticism; (c) verbal indications of support; (d) verbal indications of humor; (e) nonverbal indications of humor; and (f) quantity of ideas. The quantity score on the number of ideas generated was obtained from the list of ideas written down by the group recorder.

To obtain the communication behavior data, raters were trained to count the number of times subjects responded. These data were then broken down into specific categories: (a) verbal criticisms of ideas; (b) verbal support of ideas; and (c) verbal indications of humor. For example, responses like, "No that will not work" and, "That is a silly idea" were counted as criticisms. An example of a

verbal indication of support would be, "That is a good idea," or "I like that." The number of times subject laughed was counted as verbal indications of humor. Because nonverbal communication factors are also important to group communication and may indicate tension or tension release, playfulness, or humor, raters were asked to observe nonverbal indications of humor (i.e., the number of times subjects smiled).

## Results

A multivariate analysis of variance (MANOVA) and subsequent univariate tests (ANOVAs) on each dependent variable were performed to test the hypothesis that groups trained in creative problem solving will exhibit more positive communication behaviors than untrained groups, as shown by:

1. greater participation;
2. less verbal criticism of ideas;
3. more verbal indications of support of ideas;
4. more verbal indications of humor evidenced by laughter;
5. more nonverbal indications of humor evidenced by smiles; and
6. higher quantity of ideas.

Box's test for univariate homogeneity of variance yielded  $F$  values that were not significant for any of the

variables. Therefore, the hypothesis of homogeneity of variance was retained. Guttman split-half reliability between the two raters was high (.995). This analysis was performed using the mean scores of both raters.

Table 1 presents means and standard deviations for the six variables classified by treatment or control group. For each variable the difference favored the treatment group. Five of the variables had substantially higher means, while one, verbal criticism, as hypothesized, was lower.

Table 1

*Means and Standard Deviations for the Experimental (n = 22) and Control (n = 18) Groups*

Variable	Group	Mean	SD
Number of Responses	Treatment	56.84	14.71
	Control	38.36	6.74
Verbal Criticism	Treatment	0.11	0.38
	Control	3.22	3.47
Verbal Support	Treatment	5.21	3.35
	Control	2.00	1.41
Laughter	Treatment	12.64	6.67
	Control	4.50	4.54
Smiles	Treatment	14.36	6.46
	Control	6.06	4.08
Quantity of Ideas	Treatment	27.32	7.23
	Control	14.00	5.64

The MANOVA showed that the difference between the treatment and control groups was significant in the multivariate test ( $F_{(6,33)} = 11.02, p <$

.001), and the univariate tests of number of responses ( $F_{(1, 28)} = 24.16, p < .001$ ), verbal criticism ( $F_{(1, 28)} = 17.56, p < .001$ ), verbal support ( $F_{(1, 28)} = 14.34, p < .001$ ), laughter ( $F_{(1, 28)} = 19.37, p < .001$ ), smiles ( $F_{(1, 28)} = 22.42, p < .001$ ), and quantity of ideas ( $F_{(1, 28)} = 40.72, p < .001$ ).

## Discussion

These findings demonstrate that groups trained in creative problem solving performed far more effectively than untrained groups. Groups trained in creative problem solving participated significantly more than groups not trained in CPS. Additionally, groups trained in CPS criticized ideas less, verbally supported ideas more, laughed more, smiled more, and generated ideas significantly more than groups not trained in CPS.

Parnes (1987) and Parnes and Noller (1973) found that the creative studies course was beneficial in helping participants in a number of cognitive and affective measures. This study found that such a course had a significant impact on positive communication behaviors that occur in small groups. The results also indicate that there is a synergistic relationship between the field of creative problem solving and communication. Combined studies involving both fields would further expand knowledge of these dynamic areas.

However, this research was conducted in courses in creative problem solving taught at the State University College at Buffalo. Therefore, it is difficult to generalize these findings to the overall population. Further studies with other types of populations, such as managers in business and industry and other working professionals should be conducted to replicate these findings. Other programs designed to teach creative problem solving should also be investigated. This study showed that the introductory creative studies course taught at the college impacted positively on group communication behavior. A question that could be investigated is: Will other courses in creativity taught by other persons impact as strongly on communication behaviors with different groups?

## REFERENCES

- Bales, R. F. (1950). *Interaction process analysis: A method for the study of small groups*. Cambridge, MA: Addison-Wesley.
- Bales, R. F., & Cohen, L. (1979). *Symlog: A system for multiple level observation of groups*. New York: Holt.
- Burgoon, J. K. (1983). Interpersonal communication inventory. In S. W. Littlejohn (Ed.), *Theories of human communication* (pp. 132-134). Belmont, CA: Wadsworth.
- Collins, B. E., & Guetzkow, H. (1964). *A social psychology of group processes for decision-making*. New York: Wiley.
- Ekvall, G., Arvonen, J., & Waldenstrom-Lindblad, I. (1983). *Creative organizational climate*. Stockholm, Sweden: The Swedish



- Council for Management and Organizational Behavior.
- Hill, G. W. (1982). Group versus individual performance: Are  $n+1$  heads better than one? *Psychological Bulletin*, 17, 517-539.
- Isaksen, S. G., & Treffinger, D. J. (1985). *Creative problem solving: The basic course*. Buffalo, NY: Bearly Limited.
- Lorge, I., Tuckman, J., Aikman, L., Spiegel, J., & Moss, G. (1955). Problem solving by teams and individuals in a field setting. *Journal of Educational Psychology*, 46, 160-166.
- Osborn, A. F. (1963). *Applied imagination* (3rd ed.). New York: Scribner.
- Parnes, S. J. (1987). The creative studies project. In S. G. Isaksen (Ed.), *Frontiers in creativity research: Beyond the basics* (pp. 156-188). Buffalo, NY: Bearly Limited.
- Pfeiffer, J. W., & Jones, J. E. (1980). *Annual handbook for group facilitators*. San Diego, CA: University Associates.
- Parnes, S. J., & Noller, R. B. (1973). *Toward supersanity: Channeled freedom*. East Aurora, NY: DOK.
- Torrance, E. P. (1972). Can we teach children to think creatively? *Journal of Creative Behavior*, 6, 114-143.
- Training Resource Corporation. (1979). *Session builders*. Harrisburg, PA: Author.
- Van Gundy, A. G. (1984). How to establish a creative climate in the work group. *Management Review*, 73, 24-38.
- Xerox Learning Systems. (1982). *Leading meetings*. Stanford, CT: Author.