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The effect of level autonomy and group size on group performance and satisfaction

Simi Ambardar
San Jose State University

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performance and satisfaction**

Ambardar, Simi, M.S.

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**THE EFFECT OF LEVEL OF AUTONOMY AND GROUP SIZE ON GROUP
PERFORMANCE AND SATISFACTION**

A Thesis

Presented to

the Faculty of the Department of Psychology

San Jose State University

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

by

Simi Ambardar

December, 1993

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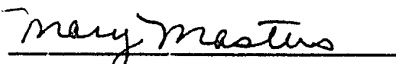
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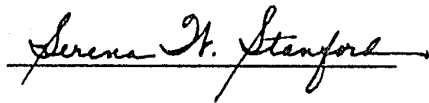


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Mary Masters, Ph.D.

APPROVED FOR THE UNIVERSITY



ABSTRACT

THE EFFECT OF LEVEL OF AUTONOMY AND GROUP SIZE ON GROUP PERFORMANCE AND SATISFACTION

by Simi Ambardar

The purpose of the study was to determine the effect of level of autonomy and group size on group performance and satisfaction. The study tested the hypothesis that semi-autonomous groups of smaller size would produce greater group performance and higher levels of satisfaction than autonomous and non-autonomous groups. In this study a 3 (autonomy: autonomous, semi-autonomous and non-autonomous) \times 2 (group size: four and eight) randomized group design was used. Ninety-six undergraduate psychology students created moon tents in a laboratory setting. Results suggest that regardless of level of autonomy average production per individual was greater small groups than large groups. For measures of satisfaction, subjects in the semi-autonomous condition had a significantly higher satisfaction level than those in the autonomous condition. The findings are discussed in terms of the effect autonomy and group size have on work groups in organizations.

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The Effect of Level of Autonomy and Group Size on Group Performance and Satisfaction

Simi Ambardar

San Jose State University

Running head: EFFECTS OF AUTONOMY AND GROUP SIZE

The Effect of Level of Autonomy and Group Size on Group Performance and Satisfaction.

For organizational theorists, a major objective of work system design has been to maximize individual or work group autonomy in an attempt to increase work force commitment and to humanize the work place (Hackman & Oldham, 1980; Herbst, 1962; Trist, Higgin, Murray, & Pollock, 1963; Walton 1985).

Autonomy occurs in situations where individuals and groups can plan, regulate, and control their work situations. According to Susman (1976), workers are autonomous when they are permitted to decide on the activities necessary to produce the products or services for which they are held responsible and to regulate such activities so as to maintain an acceptable level of quantity and quality. Hackman and Oldham (1980) define autonomy as "the degree to which the job provides substantial freedom, independence, and discretion to the individual in scheduling the work and in determining the procedures to be used in carrying it out" (p.79). Breugh (1985) and Kiggundu (1983) view autonomy as the amount of discretion the worker is expected to exercise in carrying out assigned work activities. Thus, while some view autonomy more as worker independence (Hackman & Oldham, 1980; Sims, 1976; Susman, 1976) others view it more as worker control (Breugh, 1985; Kiggundu, 1983).

Many researchers feel that autonomy should also be considered in terms of job performance criteria. These include goals and performance standards against which they would be evaluated. Autonomy should not only be viewed in terms of work methods and work schedules, but also in terms of the capacity to choose and have a say over goal setting (Chung, 1977; DeCotiis & Koys, 1980; Nicholson, 1984). While the above definitions on autonomy vary, Hackman and Oldham's definition is most widely accepted due to its more restrictive and precise nature.

Benefits of Autonomy

Breugh (1985) and Breugh and Becker (1987), after reviewing the literature, strongly established the importance of autonomy in various positive individual and

organizational outcomes. Autonomy has been positively linked to organizational climate (Schnake, 1983), job satisfaction (Loher, Nore, Moeller, & Fitzgerald, 1985), employee involvement in organization decision-making (Brady, 1980), job involvement (Jans, 1985) and employee commitment (Hackman & Oldham, 1980).

Studies indicate that when groups are allowed autonomy, meaningfulness, satisfaction, and learning increases significantly. Also, high performance in quantity and quality is achieved. This has been demonstrated in different settings such as coal mines, chemical refineries and in the manufacturing of aircraft equipment (Davis & Taylor, 1979). Autonomy also influences the ability of groups to make timely decisions and to increase member commitment to those decisions (Pearce & Ravlin, 1987). Autonomy not only increases an employee's personal responsibility for work outcomes, but also increases their personal accountability for the outcomes of their work (Hackman & Oldham, 1980).

The Job Characteristics Model

In recent years, worker satisfaction and productivity have become a major concern in organizations. A possible solution is to redesign jobs in order to increase autonomy, satisfaction and motivation of employees. The job characteristics model (Hackman & Oldham, 1980) provides a systematic framework for understanding and predicting the effects of work design on motivation, performance, and satisfaction of individuals.

According to Hackman and Oldham, (1980) five "core" job characteristics - autonomy, feedback, skill variety, task identity and task significance - influence three critical psychological states: Experienced meaningfulness of the work, experienced responsibility for the outcomes of the work, and knowledge of results. These psychological states, in turn, have an effect on a variety of personal and work outcomes including high quality performance, satisfaction, and internal work motivation. Thus, the underlying assumption is that redesigning jobs in this way will lead to higher motivation, and enhance employee satisfaction. This will in turn improve group performance and reduce turnover.

Among the core job characteristics, research has shown that autonomy may be the most important one. In their meta-analysis of the relationship between job characteristics and job satisfaction, Loher et al. (1985) found autonomy to be more positively related to job satisfaction than the other job characteristics. Also Mortimer (1985) concluded that the most important determinant of job satisfaction is work autonomy.

Autonomy and Autonomous Work Groups

While the job characteristics model deals with various issues of work groups, it is frequently applied in the design of autonomous work groups (Farh & Scott, 1983). The formation of autonomous work groups usually involves reducing the degree of external supervision, training employees to acquire new skills as well as allowing them to choose their co-workers, set their work schedules, and control their work pace (Wall, Kemp, Jackson, & Clegg, 1986). According to Hackman, autonomous work groups usually include 1) a relatively whole task; 2) members who each possess a variety of skills relevant to the group task; 3) task schedules; 4) assignment of members to different tasks; and 5) feedback from the group as a whole. Being autonomous implies that individuals need to have multiple skills within a group to share an array of tasks, and self-regulation and self-organization skills not found in traditional organizations.

Many organizational internal factors can influence or place constraints when implementing autonomous work groups. The most important constraint involves the dynamics of work groups within which "self-managed" employees find themselves (Manz & Angle, 1986). These dynamics may cause individuals to lose their personal control and autonomy in a group environment. As autonomous work groups generally develop strong group cohesion, solidarity and cooperation, as well as an effective utilization of labor and resources, they tend to isolate themselves and resist the introduction of new members and the removal of existing members (Larsen, 1979). This makes them inflexible.

The extent of autonomy possessed by work groups will influence individual and group performance and satisfaction. Too little autonomy will not allow the individual

benefits to emerge, and relatively high levels of autonomy will lead to the development of increased amount of independent behavior which could create problems of coordination and of internal opposition (Carnell, 1982). According to Turner and Lawrence (1965), jobs that measure high on autonomy tend to make workers feel that they own the outcomes of their work, while jobs that measure low on autonomy make a worker feel that successes and failures are more often due to the good work done by other workers. Cosier and Aplin (1980) found that when a group of subjects were allowed a higher level of autonomy they made poorer quality decisions than a group that was allowed less autonomy. Thus, this research suggests that there has to be a feasible range of autonomy for any organization determined by the dynamics of the group.

The above mentioned review establishes the importance of autonomy in various individual and organizational outcomes. Autonomy increases not only group performance but also job satisfaction. However, there has also been the disagreement regarding what level of autonomy would bring about maximum group performance and satisfaction.

Group Size

In most organizations, work groups are designed in such a way that: (1) members possess all the requisite skills required for effective performance and (2) individuals are personally compatible and are likely to build into a cohesive and productive group. One of the major factors that affect these requirements is the size of the group. In a discussion of work design in a dog food plant in Topeka, Walton (1977) while studying groups ranging in sizes from 7 to 14, claimed the goal is to create teams that are large enough so that employees will take responsibility for the whole task requiring different skills, but at the same time small enough to allow for proper coordination and decision making.

Effects of Group Size

According to Steiner (1972) if groups take complete advantage of the efforts and abilities of group members, the larger the group the greater its productivity. However, he observed that when groups got larger they did not perform up to their potential

productivity. This is because of what he calls "process losses" that include problems of motivation, coordination and inefficiencies and errors that arise when people attempt to work together.

O'Dell (1968) found that as group size increased, there was greater level of disagreement and antagonism toward each other. According to Shaw (1981), as groups get larger, subgroups are more likely to form, creating potential for conflict. Latane and Darley (1969) found that individual motivation also decreases as group size increases. Although it is difficult to say what size would be most effective, Bavelson and Steiner (1964) claim that problems are likely to arise as the group gets larger than five. Stoneman and Dickinson (1989) found that overall group productivity did not differ as a function of group size; however, individual performance variability in groups was dependent on group size, with the greatest variability occurring in groups of two and the least variability occurring in groups of nine.

According to Hackman (1980) the group should be large enough to do the work - but not much larger. If a job requires three people to complete it then there should be only three people; over staffing a work group by adding additional members may decrease the productivity of the group. Stasser (1992), while studying problem solving groups of sizes four and eight found that the larger group performed more poorly in advocacy and non-advocacy discussions than the smaller groups. This was because the smaller group members adopted an impartial fact-finding approach (non-advocacy) to discussion while the larger group members often failed to pool unshared information which resulted in lesser options and bad decisions. A meta analysis of eight U.S. studies revealed that as work groups got larger, members were more likely to be dissatisfied (Mullen, Symons, Hu, & Salas, 1989). Group size also has been found to affect the retention of training material. In a study by Athey and McIntyre (1987) groups of 12, retained less pretraining material than groups of six. However, size did not effect the retention of training material.

In summary, group size has an effect on job satisfaction, group dynamics, performance and personal motivation. Most work groups generally range from three to ten in size. The above arguments tend to claim that an increase in group size is related to decreases in individual motivation, performance, and satisfaction.

Purpose of Study

The overall purpose of this study is to explore the effect of autonomy and group size on group performance and satisfaction. The literature review on autonomy and group size has demonstrated the influence that autonomy and group size have on group performance and satisfaction. Hackman and Oldham (1980) suggest that autonomy has a direct effect on behavior such that if workers are not delegated discretion commensurate with their responsibilities, they will not perceive themselves as the cause of the organization's valued outcomes. Individuals who are satisfied with their work context, coworkers, and supervisors have a higher level of motivation and will respond positively to their jobs (Hackman & Oldham, 1980).

Organizations today are shifting towards autonomous work groups for greater productivity (Pearce & Ravlin, 1987). Autonomy increases not only group performance, but also different aspects of job satisfaction. However, there has also been the controversy of what level of autonomy would bring about maximum group performance and satisfaction with the work context. Another important factor that effects group performance and satisfaction is group size. Studies have shown that smaller groups perform better than larger groups. However, so far no research has been done on the possible interactive effect of autonomy and group size on group performance and satisfaction.

Specifically, the purpose of this research is threefold. The first purpose is to determine if there are significant differences between various levels of autonomy on group performance and satisfaction. The second purpose is to determine if there are significant differences between small and large groups on group performance and satisfaction. The

third purpose is to determine any interactive influences between autonomy and group size on group performance and satisfaction.

This study has three research hypotheses:

1. Semi-autonomous groups will produce the greatest group performance and satisfaction as compared to non-autonomous and autonomous groups. Too little autonomy will not cause individual benefits to emerge and too much autonomy will lead to problems of coordination within the group. Thus semi-autonomous groups would be most likely to produce highest levels of group performance and satisfaction.
2. Smaller groups will produce higher levels of group performance and satisfaction than larger groups. As groups get larger, problems of motivation, coordination and difficulty in interpersonal relationships arise which reduces satisfaction and productivity of the group.
3. In terms of the interaction between level of autonomy and group size, smaller size groups in the semi-autonomous condition will produce the highest levels of performance and satisfaction and larger group sizes in the autonomous condition will produce lowest level of performance and satisfaction.

Because of the controversies on how much autonomy is right for the group, this study should prove useful when forming work groups in order to effect changes in performance and satisfaction. Organizations hope that these autonomous groups will help employees participate in problem solving. However, if participation is important then a sense of personal involvement will be required, especially if the group size increases. Larger groups may reduce personal involvement which is critical in gaining commitment.

Hence, this study should reveal the size of groups and level of autonomy required to maximize group performance and different aspects of satisfaction.

Method

Subjects

Subjects were 45 male and 51 female undergraduate psychology students for whom participation in the experiment fulfilled a course requirement. The subjects also received credit for participation. The average age was 21 years, ranging from 18 to 49. The subjects represented a wide diversity of ethnic backgrounds. Asians constituted 37% while 33% were white. Majority of the subjects (66.7%) were either part time or full time employees. Most of those employed (58.3%) experienced working in groups.

Experimental Design

This experiment used a 3 (autonomy: autonomous, semi-autonomous and non-autonomous) \times 2 (group size: four and eight) randomized group factorial design.

Experimental Tasks

The job designed for this experiment involved the production of moon tents (Kolb, Rubin, & Osland, 1991). This exercise was designed to research on work groups as in manufacturing organizations. By using a questionnaire is used to keep track of the productivity rate as well as satisfaction indices, the exercise help study the effect of autonomy and group size on group performance and satisfaction.

There were 8 steps involved in the production of a single moon tent. Subjects were asked to produce 20 moon tents within 10 minutes. They were first trained with the help of a video tape on how to produce the moon tents. The video tape was used to provide standardized instructions to all subjects.

Subjects were randomly assigned to one of the three levels of autonomy and one of two levels of group size. In the non-autonomous conditions, subjects were preassigned the sequence of steps required in the production of the tents and were asked to produce 20

tents. Subjects in groups of four performed two steps each while those in groups of eight performed one step each. Subjects were given two minutes to review the steps given to them.

In the semi-autonomous condition, subjects in groups of four and eight were allowed to decide on how to produce the tents, and were asked to produce 20 tents in the given time limit. The subjects were given an additional two minutes initially to decide on the procedure. The autonomous condition was similar to the semi-autonomous condition except that participants were able to determine their own productivity rate. Hints on dividing the tasks among the groups members was mentioned in the written instructions. This was done to prevent individuals from completing the whole task and to enhance interaction within the group.

Procedure

Subjects were first trained in the production of moon tents before being randomly assigned to one of the groups. Subjects were given both written and verbal instructions. Part A of the instructions was common for all the groups. After part A instructions, subjects in different autonomy conditions received different part B instructions.

Part A Instructions:

You are part of an organization that produces moon tents. For every moon tent produced the organization makes a profit of \$1000. The bonus for employees depends on the profit made by the organization. The more you produce the more bonus you earn. Your group is entirely responsible for the production of the moon tents.

All moon tents have to first go through quality control before they are sold.

The three main quality control points for the moon tents are:

1. The top of the tent must come to a point.
2. The printing must be on the outside of the tent.

3. The turned up points at the base of the tent must lie flat against the tent sides.

Part B instructions:

For Non-Autonomous groups (Small groups)

You have the responsibility of making 20 moon tents (including the unfinished moon tents left by the previous group). You have 10 minutes to complete the whole task. There are 8 steps involved in the production of the moon tent. Each employee is responsible for two steps of the production process, but the entire group is responsible for the completed moon tent. Each employee will be assigned responsibility for completion of two steps. You will be given two minutes to review the steps assigned to you. Once you have completed your particular step, pass the unfinished task to the next employee. There are also some unfinished tents left by the previous group of employees. Your task is to first complete the unfinished tents and then proceed with new tents. At the end of 10 minutes you will be asked to stop the production.

For Non-Autonomous groups (Large groups)

You have the responsibility of making 20 moon tents (including the unfinished moon tents left by the previous group). You have 10 minutes to complete the whole task. There are 8 steps involved in the production of the moon tent. Each employee is responsible for one step of the production process, but the entire group is responsible for the completed moon tent. Each employee will be assigned responsibility for completion of one step. You will be given two minutes to review the steps assigned to you. Once you have completed your particular step, pass the unfinished task to the next employee. There are also some unfinished tents left by the previous group of employees. Your task is to first complete the unfinished tents and

then proceed with new tents. At the end of 10 minutes you will be asked to stop the production.

For Semi-Autonomous groups

You have the responsibility of making 20 moon tents (including the unfinished moon tents left by the previous group). You have 10 minutes to complete the whole task. The whole group has to decide on how to make the moon tents. You will be given two minutes to make the decision. There are also some unfinished tents left by the previous group of employees. Your task is to first complete the unfinished tents and then proceed with the new tents. The whole group will be responsible for each and every moon tent produced. At the end of 10 minutes you will be asked to stop the production.

HINT: Try to divide the tasks among all the members of the group.

For Autonomous groups

You have the responsibility of making as many completed moon tents as you can (including the unfinished moon tents left by the previous group). You have 10 minutes to complete the whole task. The whole group has to decide on how to make the moon tents. You will be given two minutes to make the decision. There are also some unfinished tents left by the previous group of employees. Your task is to first complete the unfinished tents and then proceed with the new tents. The whole group will be responsible for each and every moon tent produced. At the end of 10 minutes you will be asked to stop the production.

HINT: Try to divide the tasks among all the members of the group.

Each group was handed a large stack of materials for the task, so that they would not stop the production once they completed the required 20 tents. This was done to ensure that all groups worked for the same amount of time. Groups would then work on the job for the next 10 minutes.

Having completed the task, subjects were then asked to complete a questionnaire that measured performance and satisfaction. Work group performance measures were comprised of quantity and quality indices. The quantity index was measured by the total number of tents produced by the group. The quality index was measured by the total number of tents approved by a rater, who rated the tents on the bases of the three quality control check points. To measure individual performance, the mean number of tents produced per individual was calculated for the quantity and quality indices.

Subjects also completed a series of self report measures of satisfaction from the Job Diagnostic Survey (Hackman & Oldham, 1980). The scale had been slightly modified to suit the requirements of the experiment to be conducted. Different aspects of satisfaction were measured through the satisfaction questionnaire. Subjects were asked to rate on a satisfaction scale of 1 to 7 on their General Satisfaction with the Groups, Satisfaction with Coworkers, Satisfaction with Group Size, and Satisfaction with the Production of Tents.

In order to estimate reliability of the satisfaction measure, a Cronbach's alpha was computed to test for internal consistency. For the 30 separate items, an alpha coefficient of .90 was obtained. Separate Cronbach's alphas were also computed for the different aspects of Satisfaction. The alphas for General satisfaction with the group, Satisfaction with coworkers, Satisfaction with group size, and Satisfaction with the production of tents were .83, .78, .65 and .78, respectively. Thus indicating the questionnaire was sufficiently reliable. Demographic data were also obtained from each subject. These data included the subject's gender, age, ethnic background, and work experience.

Results

Individual Performance

To test the hypothesis of the effect of the level of autonomy and group size on the quantity and quality of individual performance a 3×2 (Level of Autonomy \times Group Size),

analysis of variance (ANOVA) was conducted. The means and standard deviations for the quantity and quality individual performance measures as a function of group size and level of autonomy are displayed in Tables 1 and 2. The results of the ANOVA for the individual quantity performance revealed a significant main effect of group size [$F(1,12) = 9.67, p < .001$]. As shown in Table 1, individuals in the smaller groups produced more on the average than did individuals in the larger groups. This result supports the hypothesis that regardless of degree of autonomy, individuals in smaller groups perform better than individuals in larger groups. Furthermore, although subjects in the semi-autonomous groups produced more tents than the non-autonomous and autonomous groups, there was no significant main effect of Autonomy [$F(2,12) = 1.03, ns$]. Also, even though the smaller groups in the semi-autonomous condition produced the greatest number of tents and the larger group in the autonomous condition produced the least the Autonomy \times Group Size interaction was not significant [$F(2,12) = 0.51, ns$].

The results of the ANOVA on the quality of individual's performance revealed a pattern of results that was similar to the results for the quantity measure. There was a significant main effect of Group Size [$F(1,12) = 4.61, p < .05$]. The quality of an individual's performance was better in smaller groups than larger groups (see Table 2). However, there was no significant main effect for Autonomy [$F(2,12) = 1.11, ns$], and no significant Autonomy \times Group Size interaction [$F(2,12) = 0.01, ns$].

Group Performance

The 3×2 (level of Autonomy \times Group Size) ANOVA of the quantity group performance measures revealed a significant main effect of group size [$F(1,12) = 14.41, p < .001$]. As expected, the total number of tents produced was greater in the larger groups ($M = 34.50$) than smaller groups ($M = 22.80$). However, the level of Autonomy main

Table 1

Means and Standard Deviations for Individual Quantity Performance by Level of Autonomy and Group Size

| Group Size | Level of Autonomy | | | |
|------------|----------------------|-----------------------|------------------|------------------|
| | Non Autonomous (n=6) | Semi Autonomous (n=6) | Autonomous (n=6) | |
| 4 (n=12) | 5.25 (1.26) | 6.25 (0.50) | 5.50 (1.73) | 5.67 * (1.23) |
| 8 (n=6) | 4.00 (0.00) | 5.00 (1.41) | 4.00 (1.41) | 4.33 * (1.03) |
| | 4.83 (1.17) | 5.83 (0.98) | 5.00 (1.67) | |

* p<.001

Table 2

Means and Standard Deviations for Individual Qualitative Performance by Level of Autonomy and Group Size

| Group Size | Level of Autonomy | | | |
|------------|----------------------|-----------------------|------------------|------------------|
| | Non Autonomous (n=6) | Semi Autonomous (n=6) | Autonomous (n=6) | |
| 4 (n=12) | 3.25 (0.50) | 3.75 (0.50) | 3.25 (1.26) | 3.42 * (0.79) |
| 8 (n=6) | 2.50 (0.71) | 2.50 (0.71) | 1.50 (0.71) | 2.17 * (0.75) |
| | 3.00 (0.63) | 3.33 (0.82) | 2.67 (1.37) | |

*p<.05

effect [$F(2,12) = 1.24$, ns], was not significant nor was there a significant Autonomy \times Group Size interaction, [$F(2,12) = 0.26$, ns].

The ANOVA performed on the quality performance measures also showed a significant main effect of Group Size [$F(1,12) = 5.64$, $p < .05$]. The total number of acceptable tents was greater in the larger groups ($M = 16.83$) than smaller groups ($M = 13.42$). There was no significant main effect for Autonomy [$F(2,12) = 1.63$, ns] and no significant results for the Autonomy \times Group Size interaction [$F(2,12) = 0.56$, ns].

Thus, the effect of level of autonomy and group size on performance revealed only a main effect of Group Size. Though larger groups produced more than smaller groups, the average number of tents produced per individual revealed that individuals perform better in both quantity and quality in smaller groups than larger groups. This supports what previous research claim that individual performance is better in smaller groups than larger groups.

Satisfaction measures

To test the effect of the level of autonomy and group size on satisfaction, a 3×2 (Level of Autonomy \times Group Size) ANOVA was conducted on each of the four aspects of satisfaction: General Satisfaction with the Group, Satisfaction with Coworkers, Satisfaction with Group Size and Satisfaction with the Production of Tents. The means and standard deviations for the different aspects of satisfaction as a function of level of autonomy and group size are shown in tables 3,4,5 and 6, respectively.

General Satisfaction with the Groups

The ANOVA performed on subject's general satisfaction with the groups revealed that there was a significant main effect of Autonomy [$F(2,90) = 3.35$, $p < .05$]. There was no significant main effect of Group Size [$F(1,90) = 0.42$, ns]. However, the Autonomy \times Group Size interaction had a marginally significant effect [$F(2,90) = 2.38$, $p < .10$]. A Tukey multiple comparison test was conducted on the means for the three autonomy

Table 3

Means and Standard Deviations for General Satisfaction with the Group by Level of Autonomy and Group Size

| Group Size | Level of Autonomy | | | |
|------------|-----------------------|------------------------|-------------------|----------------|
| | Non Autonomous (n=32) | Semi Autonomous (n=32) | Autonomous (n=32) | |
| 4 (n=48) | 5.63 (0.81) | 6.18 (0.82) | 5.34 (0.99) | 5.71 (0.95) |
| 8 (n=48) | 5.91 (0.55) | 5.82 (0.57) | 5.71 (0.77) | 5.81 (0.64) |
| | 5.77 (0.71) | 6.00 * (0.71) | 5.52 * (0.89) | |

* p<.05

Table 4

Means and Standard Deviations for Satisfaction with Coworkers by Level of Autonomy and Group Size

| Group Size | Level of Autonomy | | | |
|------------|-----------------------|------------------------|-------------------|-------------|
| | Non Autonomous (n=32) | Semi Autonomous (n=32) | Autonomous (n=32) | |
| 4 (n=48) | 4.79 (0.82) | 5.43 (0.84) | 5.12 (0.87) | 5.12 (0.87) |
| 8 (n=48) | 5.11 (0.90) | 5.52 (0.59) | 5.05 (0.76) | 5.23 (0.78) |
| | 4.95 * (0.87) | 5.48 * (0.71) | 5.09 (0.80) | |

* p<.05

conditions. Only the Semi-Autonomous and Autonomous groups were found to have significantly different means. Subjects in the Semi-autonomous groups were more satisfied ($M = 6.00$) with their groups than those in Autonomous groups ($M = 5.52$). Table 3 shows the means for the Autonomy \times Group Size interaction. Comparison of these means suggests that subjects in smaller groups were more satisfied in the semi-autonomous condition than in the autonomous or non-autonomous conditions. In large groups, however satisfaction did not differ as a function of degree of autonomy.

Satisfaction with coworkers

The ANOVA on satisfaction with coworkers measure revealed a significant main effect of Autonomy [$F(2,90) = 3.69, p < .05$]. The Tukey multiple comparison test (see Table 4) showed that subjects in the Semi-Autonomous groups ($M = 5.48$) were more satisfied with their coworkers than subjects in the Non-Autonomous groups ($M = 4.95$). There was no significant main effect of Group Size [$F(1,90) = 0.46, ns$], and Autonomy \times Group Size interaction [$F(2,90) = 0.12, ns$].

Satisfaction with Group Size

The ANOVA on the satisfaction with group size measure showed only a main effect of Autonomy [$F(2,90) = 6.33, p < .01$]. There was no significant main effect of Group Size [$F(1,90) = 0.01, ns$], nor was there an Autonomy \times Group Size interaction [$F(2,90) = 0.95, ns$]. The Tukey multiple comparison test showed that subjects in the Non-autonomous and Semi-autonomous groups were more satisfied with their group size than those in the Autonomous groups (see Table 5).

Satisfaction with the production of tents

The results of the ANOVA on the degree of satisfaction with the number of tents produced were similar to the previous satisfaction results. Again, there was a significant

Table 5

Means and Standard Deviations for Satisfaction with Group Size by Level of Autonomy and Group Size

| Group Size | Level of Autonomy | | | |
|------------|-----------------------|------------------------|--------------------|----------------|
| | Non Autonomous (n=32) | Semi Autonomous (n=32) | Autonomous (n=32) | |
| 4 (n=48) | 6.08 (0.65) | 6.35 (0.70) | 5.31 (1.33) | 5.92 (1.03) |
| 8 (n=48) | 6.31 (0.66) | 5.98 (0.90) | 5.52 (1.41) | 5.94 (1.07) |
| | 6.20 ° (0.66) | 6.17 * (0.82) | 5.42 * ° (1.35) | |

* p<.01

° p<.01

Table 6

Means and Standard Deviations for Satisfaction with Tents Produced by Level of Autonomy and Group Size

| Group Size | Level of Autonomy | | | |
|------------|-----------------------|------------------------|-------------------|----------------|
| | Non Autonomous (n=32) | Semi Autonomous (n=32) | Autonomous (n=32) | |
| 4 (n=48) | 5.46 (1.35) | 6.27 (0.91) | 5.31 (1.11) | 5.68 (1.19) |
| 8 (n=48) | 5.94 (0.56) | 6.08 (0.65) | 5.50 (0.81) | 5.84 (0.71) |
| | 5.70 (1.05) | 6.18 * (0.79) | 5.41 * (0.96) | |

* p<.01

main effect of Autonomy [$F(2,95) = 4.84, p < .01$]. The Tukey analysis showed that subjects in the Semi-autonomous groups were more satisfied with the production of tents in their groups than subjects in the autonomous groups (see Table 6). There was no significant difference in the level of satisfaction among the Non-autonomous and Semi-autonomous groups. No significant main effect of Group Size [$F(1,90) = 0.70, ns$] or Autonomy \times Group Size interaction effect was found [$F(2,90) = 1.02, ns$].

In summary, the effect of the level of autonomy and group size on satisfaction revealed only a main effect for Autonomy. In all aspects of Satisfaction, regardless of group size, subjects in the semi-autonomous groups had a significantly higher satisfaction level than subjects in the autonomous groups. This partly supports the claims of previous research that subjects are more satisfied when they are allowed some autonomy rather than complete autonomy. However, there was no significant difference in the satisfaction level between subjects in the semi-autonomous groups and those in the non-autonomous groups.

Discussion

This research was conducted to study the effects of level of autonomy and group size on group performance and satisfaction. Results showed that only Group Size had a significant effect on individual performance in groups. Individuals in smaller groups performed better than individuals in larger groups. The Level of Autonomy had a significant effect on satisfaction in groups. Individuals in the semi-autonomous groups were more satisfied with their groups, coworkers, group size, and the production of tents than those in the autonomous groups.

These results partially support the hypothesis that allowing groups to be semi-autonomous groups will result in maximum group performance and satisfaction. According to Lawler (1990) it is quite possible that employees will be satisfied with their jobs but not perform well. There could be various reasons for this. Most companies hope

to increase worker participation by allowing groups autonomy in managing daily activities, - in scheduling the work and determining the procedures to carry it out. Thus while workers become more self-managing, they still have to follow rigid methods and procedures, prescribed problem solving methods, which makes their system no less demanding than an assembly line (Klein, 1989).

Another important reason could be that while groups were given autonomy, they were not trained in the group skills e.g. collaboration, cooperation, which are required to perform efficiently as a group. According to Salanick (1977) if participants are committed to the change from the beginning, productivity will improve. According to Hackman and Oldham (1975) if workers do not perceive that they have work autonomy then, for all intents and purposes, they do not have autonomy. Since the participants in this research were students in a temporary group with little interest in the process or outcome of the study, it is very likely that they did not feel committed to the group as employees in an organization are. Group skills and commitment are as important to the groups performance as it is to the purpose of the group.

Another issue related to autonomy and performance is the distribution of tasks assigned to different roles within the group. While semi-autonomous and autonomous groups were allowed autonomy to determine the procedure of making the tents, they were not trained in the required decision making skills. Problems of overall task coordination may arise if the different tasks are not of equal duration and size (Klein, 1989). Thus one worker may perform a task faster or slower than another causing disruption in the flow of services. While this often occurs in assembly line type productions, it also reflects on the grouping of work roles around tasks. Thus regardless of the level of autonomy allowed, the combination of group and decision making skills, cooperation, and commitment, effect the level of effort put forth by the group perform efficiently.

In terms of satisfaction individuals in the semi-autonomous groups were more satisfied with their groups, coworkers, group size and production of tents than those in the

autonomous groups. This is in accordance with what previous literature has shown. According to Manz and Angle (1986) by allowing the group complete autonomy, members sense a threat to their personal autonomy stemming from having to cooperate with other members. They view autonomy as a continuum wherein, on one side there is complete anarchy, and the other side is completely formalized and structured. Semi-autonomous groups lie somewhere on the continuum wherein group members are likely to experience interaction and support from other members in order to make necessary decisions and perform required tasks that the group is confronted with. Group members work as a unit on a daily basis and depend on each other on the effective completion of group tasks. This has probably been more effective in semi-autonomous groups which has led to higher satisfaction level.

Another factor affecting groups and satisfaction is member participation. Semi-autonomous groups as compared to complete autonomous and non-autonomous groups provide a non-chaotic and non-structured environment to facilitate member participation (Manz & Angle, 1986). The research also supported that semi-autonomous groups were more satisfied with their coworkers than non-autonomous groups. According to Hackman and Oldham (1980) individuals that are more satisfied with their work context and coworkers respond better to challenging jobs than those who are dissatisfied.

The research partly supported the second hypothesis, that individuals in smaller groups will produce more and be more satisfied than those in larger groups. The results support that the average individual performance in a group decreases as the group size increases (Thornburg, 1991); however, the size of the group did not have an effect on the different aspects of satisfaction. Large groups are likely to break into sub teams rather than function as a single unit. Members in these groups generally have trouble interacting constructively as a group. Smaller groups are more likely to work through individual, functional, and hierarchical differences toward a common plan and to hold themselves jointly accountable for the results.

In addition to finding the right size, teams must develop the right mix of skills necessary to do the job. Large groups pose numerous problems which includes developing the group process as well as problems of work design. According to Lawler (1990), it is difficult to understand a work process in a large group and it is also difficult for individuals to learn and rotate many different tasks. Very large groups also tend to be low in group cohesiveness. For groups to be effective in decision making and productivity they must be cohesive.

In terms of the interaction between level of autonomy and group size, the results did not support the hypothesis that smaller size groups in the semi-autonomous condition would produce higher levels of performance and satisfaction and larger group sizes in the autonomous condition would produce lowest level of performance and satisfaction. However, the means did indicate that in small groups the semi-autonomous groups were most satisfied, but in the larger groups the non-autonomous groups were more satisfied. Groups in the autonomous condition were the least satisfied. The reasons for this are not very clear and more research is required to study the interaction.

There are various practical implications for organizations using semi-autonomous work groups. Even though the results showed that autonomy did not effect performance, it did have an effect on job satisfaction. Because various studies have shown that satisfaction is negatively related to absenteeism and turnover, semi-autonomous work groups should prove more cost effective and more efficient than traditional groups. However, organizations should be careful when allowing autonomy to traditional groups, especially if the group members lack the required skills to perform efficiently and are unable to cooperate or collaborate among themselves. Another important issue that organizations should also consider when forming autonomous work groups is to also focus on the task design and not only on task execution. Technology will also play an important part in deciding the different parameters of autonomy.

It may be potentially viable to treat autonomy as an "individual difference" variable in the context of making job placement decisions, e.g. initial hiring, promotions, and transfers. Organizations, when implementing autonomous work groups, have to take into consideration the objectives of the groups, the nature of the setting in which they are put in place, and the way they are implemented and maintained in order not to undermine individual discretion, autonomy and initiative.

In terms of group size, organizations should use just the required number of individuals to get the work done. However, it is also important that the employees have the right mix of skills to get the work done. Organizations may also have to train employees on working in groups.

The weakness of this study is that students were used as subjects, rather than working groups in organizations. Performance by students may not generalize performance in an organizational setting. Since the satisfaction survey relied on self-report, the research was also subject to all the biases and weaknesses that are inherent in self-report measures. Another major factor effecting the results of this research is the sample size. Due to the unavailability of subjects, only 18 groups could be tested. The sample size may have affected the significance of the results.

There are several methodological problems that could have influenced the results. On the satisfaction scale of 1 to 7, almost all groups reported a satisfaction level above 5. This could be because the task given to the groups was too easy. Group performance and goals are generally associated with satisfaction. All the groups in the experiment attained the goal of producing the number of tents specified. Thus it could be that the perception of having achieved the goal resulted in subjects being satisfied with the groups.

Future research needs to focus on replicating this study with an emphasis on comparing an individual's performance with group performance. This would help to study whether autonomy and group size effects the individual's performance within a group or merely the group's performance. Autonomy as a property or characteristics of a job,

should also be more precisely defined. According to Schein (1987), although almost all employees require some amount of autonomy, only a few are concerned about autonomy. Thus, it would be beneficial to study employee attitudes and their perception about autonomy. Some may also view autonomy as a career enhancement, hence more research on treating autonomy as an individual difference is required. Another issue which merits consideration is what different employee technical and interpersonal skills are required for the group to function efficiently. Finally, more research on the effect of group size on group satisfaction is required as organizations are becoming more conscious of increasing employee participation by decreasing the size of their work groups.

References

- Athey, T.R., & McIntyre, R.M. (1987). Effect of rater training on rater accuracy. Journal of Applied Psychology, 72, 567-572.
- Breaugh, J.A. (1985). The measurement of work autonomy. Human Relations, 38, 551-570.
- Breaugh, J.A. (1989). The work autonomy scales: Additional validity evidence. Human Relations, 42, 1033-1056.
- Breaugh, J.A., & Becker, A.S. (1987). Further examination of the work autonomy scales: Three studies. Human Relations, 40, 381-400.
- Chung, K.H. (1977). Motivational theories and practices. Columbus, Ohio: Grid Publishing.
- Cosier, R.A., & Aplin, J.C. (1980). Effects of delegated choice on performance. Personnel Psychology, 33, 581-593.
- Davis, L.E., & Taylor, J.C. (1975). Technology effects on job, work, and organizational structure: A contingency view. In L.E. Davis, A.B. Cherns, and Associates (Eds.), The Quality of Working Life (pp. 220-241). New York: The Free Press.
- DeCotiis, T.A., & Koys, D.J. (1980). The identification and measurement of the dimensions of organizational climate. Academy of Management Proceedings, pp. 171-175.
- Farh, J.L., & Scott, J. (1983). The experimental effects of "autonomy" on performance and self-reports of satisfaction. Organizational Behavior and Human Performance, 31, 203-222.
- Hackman, J.R., & Oldham, G. R. (1980). Work Redesign. Reading, Mass.: Addison-Wesley.
- Herbst, P.G. (1962). Autonomous Group Functioning. London: Tavistock.

- Jans, N.A. (1985). Organizational factors and work involvement. Organizational Behavior and Human Performance, 31, 382-396.
- Klein, J.A. (1989). The human costs of manufacturing reform. Harvard Business Review, pp. 60-66.
- Klein, J.A. (1991). A reexamination of autonomy in light of new manufacturing practices. Human Relations, 44, 21-38.
- Kiggundu, M.N. (1983). Task interdependence and job design: Test of a theory. Organizational Behavior and Human Performance, 31, 145-172.
- Lawler, E.E. (1990). High-Involvement Management. Jossey - Bass Publishers.
- Loher, B.T., Noe, R.A., Moeller, N.L., & Fitzgerald, M.P. (1985). A meta-analysis of the relation of job characteristics to job satisfaction. Journal of Applied Psychology, 70, 280-289.
- Manz, C.C., & Angle H. (1986). Can group self-management mean a loss of personal control: Triangulating a paradox. Group and Organization Studies, 11, 309-334.
- Mullen, B., Symons, C., Hu, L., & Salas, E. (1989). Group size, leadership behavior, and subordinate satisfaction. Journal of General Psychology, 116, 155-170.
- Pearce, J.A., & Ravlin, E. C. (1987). The design and activation of self-regulating work groups. Human Relations, 40, 751-782.
- Schein, E.H. (1987) Organizational behavior at various system levels. In J.W. Lorsch (Ed.), Handbook of Organizational Behavior (pp. 155-171). Englewood Cliffs, N.J.: Prentice Hall.
- Schnake, M. E. (1983). An empirical assessment of the effects of affective response in the measurement of organizational climate. Personnel Psychology, 36, 791-807.
- Stasser, G. (1992). Information salience and the discovery of hidden profiles by decision-making groups: A "Thought Experiment". Organizational Behavior and Human Decision Processes, 52, 156-181.
- Steiner, I.D. (1972). Group Process and Productivity. New York: Academic Press.

- Stoneman, K. G., & Dickinson, A.M. (1989). Individual performance as a function of group contingencies and group size. Journal of Organizational Behavior Management, 10, 131-150.
- Susman, G.I. (1976). Autonomy at Work: A Sociotechnical Analysis of Participative Management. Praeger Publishers, Inc.
- Turner, A.N., & Lawrence, P.R. (1965). Industrial jobs and the worker. Cambridge, Massachusetts: Harvard University Press.
- Wall, T.D., Kemp, N.G., Jackson, P.R., & Clegg, C.W. (1986). Outcomes of autonomous workgroups: A long-term experiment. Academy of Management Journal, 29, 280-304.
- Walton, R.E. (1977). Work innovations at Topeka: After six years. Journal of Applied Behavioral Science, 13, 422-433.

APPENDIX

The questions are designed to obtain your perceptions of the group and job that you just performed. All your answers will be kept completely confidential. Please answer each item as honestly and frankly as possible.

Write a number in the blank for each statement, based on this scale:

How much do you agree with this statement?

| | | | | | | |
|------------------------------|-----------------|------------------------------|----------------|---------------------------|--------------|---------------------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Disagree Strongly | Disagree | Disagree Slightly | Neutral | Agree Slightly | Agree | Agree Strongly |

- _____ Generally speaking, I was very satisfied with this group.
- _____ There was a feeling of worthwhile accomplishment I got from doing this job.
- _____ I was satisfied with my level of participation in the group decision.
- _____ Group members took into account the feelings and thoughts of everyone in the group.
- _____ I was satisfied with my performance on this job.
- _____ The size of my group was just right.
- _____ Most people in this group were very satisfied with the group.
- _____ It was difficult for the group to come to a decision.
- _____ I was satisfied with amount of moon tents produced by the group.
- _____ Most members participated actively in the groups decisions.
- _____ I was satisfied with the way the moon tents were produced.
- _____ Group members were able to express themselves freely and clearly.
- _____ I was satisfied with the quality of moon tents produced.
- _____ The group was honest and straight forward with me.
- _____ I was satisfied with the opinion expressed by other members.

- _____ The group was successful in accomplishing its goals.
- _____ I felt comfortable in my group.
- _____ My group lacked organization.
- _____ The group influenced me in my decisions.
- _____ My group was in uproar.
- _____ My group had too many people making decisions.
- _____ The number of people in my group was wrong for the type of goals we had set.
- _____ I was confused about exactly what direction the group was going.
- _____ Most people on this group had trouble figuring out how to produce the moon tents.
- _____ I was satisfied with the amount of independent thought and action I could exercise in my group.
- _____ I am satisfied with the people I talk to and work with in my group.
- _____ Some people tried to exert pressure on members to accept their decisions.
- _____ There was a diversity of ideas among my group members.
- _____ The individual personality of the group members did not make it difficult to come to a decision.
- _____ If I were asked to participate in another project like this one, I would like to be with the same people who were in the present group.

Please answer the following questions:

Total number of moon tents produced by the group _____

Describe in brief the method of production used by the group _____

Age: _____

Gender:

1. Male _____

2. Female _____

Ethnic Background (Check One Only)

- 1. American Indian or Alaskan Native 1. _____
- 2. Asian 2. _____
- 3. Black, non-Hispanic 3. _____
- 4. Filipino 4. _____
- 5. Mexican-American, Chicano, Mexican 5. _____
- 6. Pacific Islander 6. _____
- 7. White, non-Hispanic 7. _____
- 8. Other Hispanic 8. _____
- 9. Vietnamese 9. _____
- 10. Other (Specify) 10. _____

Current Employment Status:

- 1. Full-Time _____
- 2. Part-Time _____
- 3. Not Employed _____
- 4. Other (Specify) _____

To what extent does your job involve working in groups (Please Circle)

1 2 3 4 5
Not at all Seldom Sometimes Most of the time All of the time

Group # _____