Simulation Games and Experiential Learning in Action, Volume 2, 1975

MANAGEMENT IN A TEST TUBE: A SMALL GROUP LABORATORY SIMULATION

H. S. Napier University of Arkansas

Many of the advances of science have resulted from concepts initially developed under the controlled conditions of the laboratory then later proved in the field. The small group laboratory appears to provide one possibility for such a study of management concepts if we recognize, as Guetzkow & Bowes (1) have pointed out, that any laboratory simulation of real organizations is "purposively partial." The purpose of this paper is to draw attention to the use of the small group learning laboratory, as a means of developing ideas for management theory and research.

BACKGROUND

Management, may be viewed as an integration of resources to accomplish group goals. A simplified management model (2) based on concepts from the stimulus-response psychology of the Learning Theorist and aspects of General Systems Theory forms the basis for the present study. An adaptation of this model is show in Figure 1.

Figure 1

The GINO model assumes that Information (I) received by the Manager (N or M') is translated into Goals (G) and that actions by the manager include directives communicated to an Operator (0). Feedback from the actions of the Operator is the basis for corrective action as necessary. The group (organization) is assumed to have established a goal-reference system, shown here in the form of a scale by which operator output is compared to the desired or goal response. Changes in output are thus measured internally while at the same time amenable to some out side observation.

SITUATION I - PLANNING

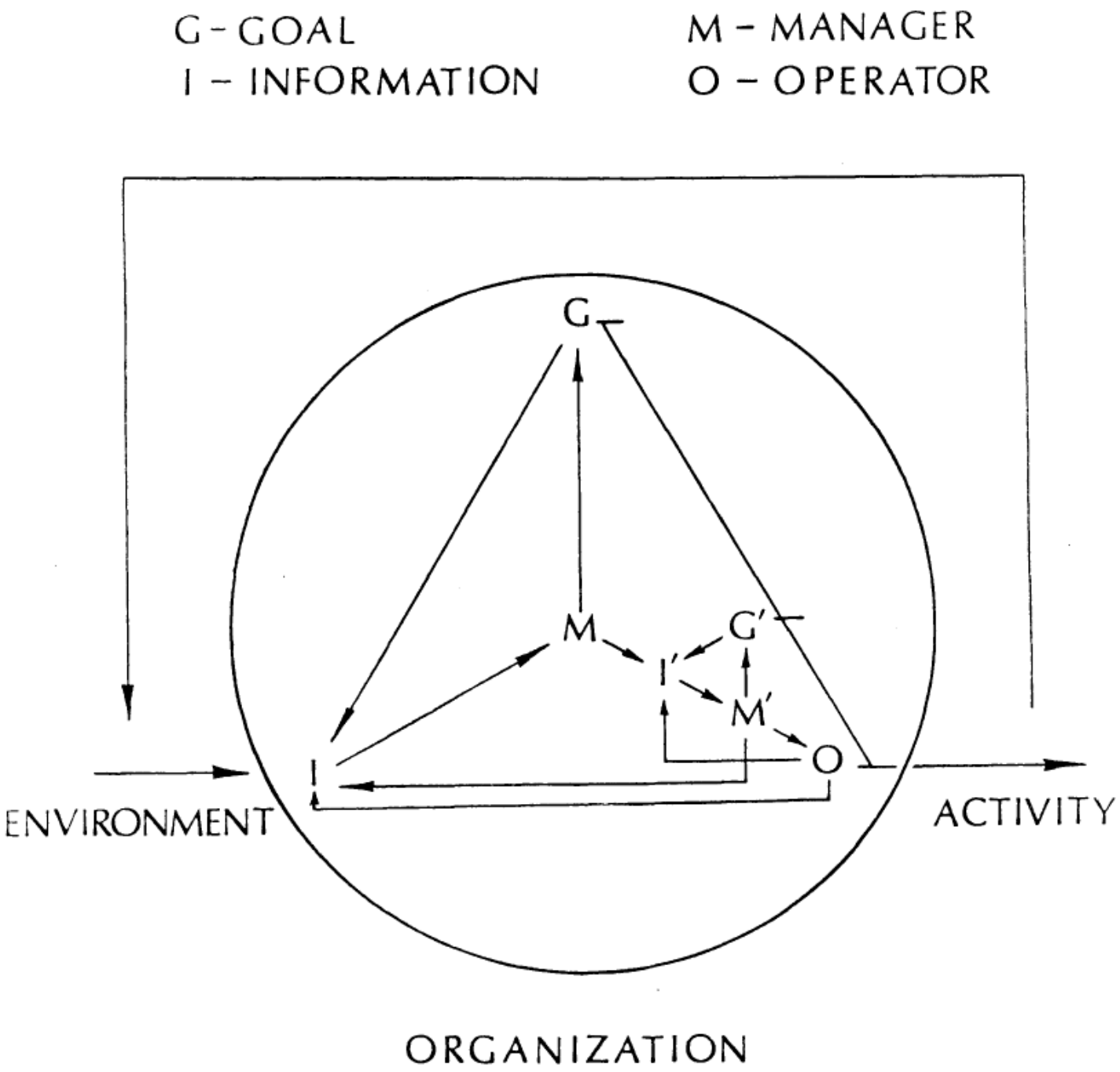
Figure 1 draws attention to the importance of the manager as a goal-setter-planner in considering future actions. If fore casting or estimating future capability are a necessary part of this function then observations on the manager as he estimates group output may provide some insight into possible areas of investigation.

Method

A small group task was used consisting of a picture puzzle composed of 12-1 1/4" x 1 l/4Tt cubes with a part of a picture on each side such that six different pictures could be assembled by correctly arranging the parts.

Subjects were 30 volunteer male students organized into 3

Figure 1. GIMO Management Model



person groups. Subjects were randomly assigned to positions around a work table and to job ("manager" or "operator"). These assignments were maintained throughout the experiment.

After an initial orientation, group members were shown a card upon which some part of the complete picture was displayed. The cards were shown for 10 seconds then removed, the cubes were exposed, and the group was allowed 60 seconds to assemble the picture. Group members were encouraged to work together on the task.

At the end of the assembly period subjects were directed to an alternate (alphabet printing) task for 50 seconds, while scores were recorded and the cubes mixed for the next trial.

Each group was exposed to 8 trials at the puzzle. Score was determined as the number of squares correctly placed during each trial. The maximum possible score for any given trial was 12.

The group member designated as "manager" (N) was required (before each trial) to estimate the number of cubes that would be correctly placed during that trial. This was intended to simulate a prediction of future output, comparable to a forecast (e.g., Sales) made as one of the early steps in planning.

Results

Results are summarized in Figure 2. Estimated scored were significantly higher ($p \sim .05$, Binomial) than actual scores. Group output improved over trials.

Figure 2

SITUATION II - ORGANIZING

If organizing is considered to involve division of tasks, a modest simulation of this condition may be achieved in the small group by the assignment of mental or physical capabilities to group members. Specifically the "manager" may be provided with enough information to analyze a problem and make a decision as to what may be done but remain incapable of physically accomplishing the required action. Figure 1 suggests this condition where the manager (M) receives information and communicates with the Operator (0) but only the operator has the capability of producing some external output.

Method

The method used in this situation was similar to Situation I. The group member designated as "manager" was provided with a picture showing three fourths of the picture puzzle (see Figure 3) while the two operator members were shown only one fourth of the puzzle. Only the "operators" were allowed to manipulate the puzzle pieces.

Figure 2. "Manager" Forecasts of Group Output

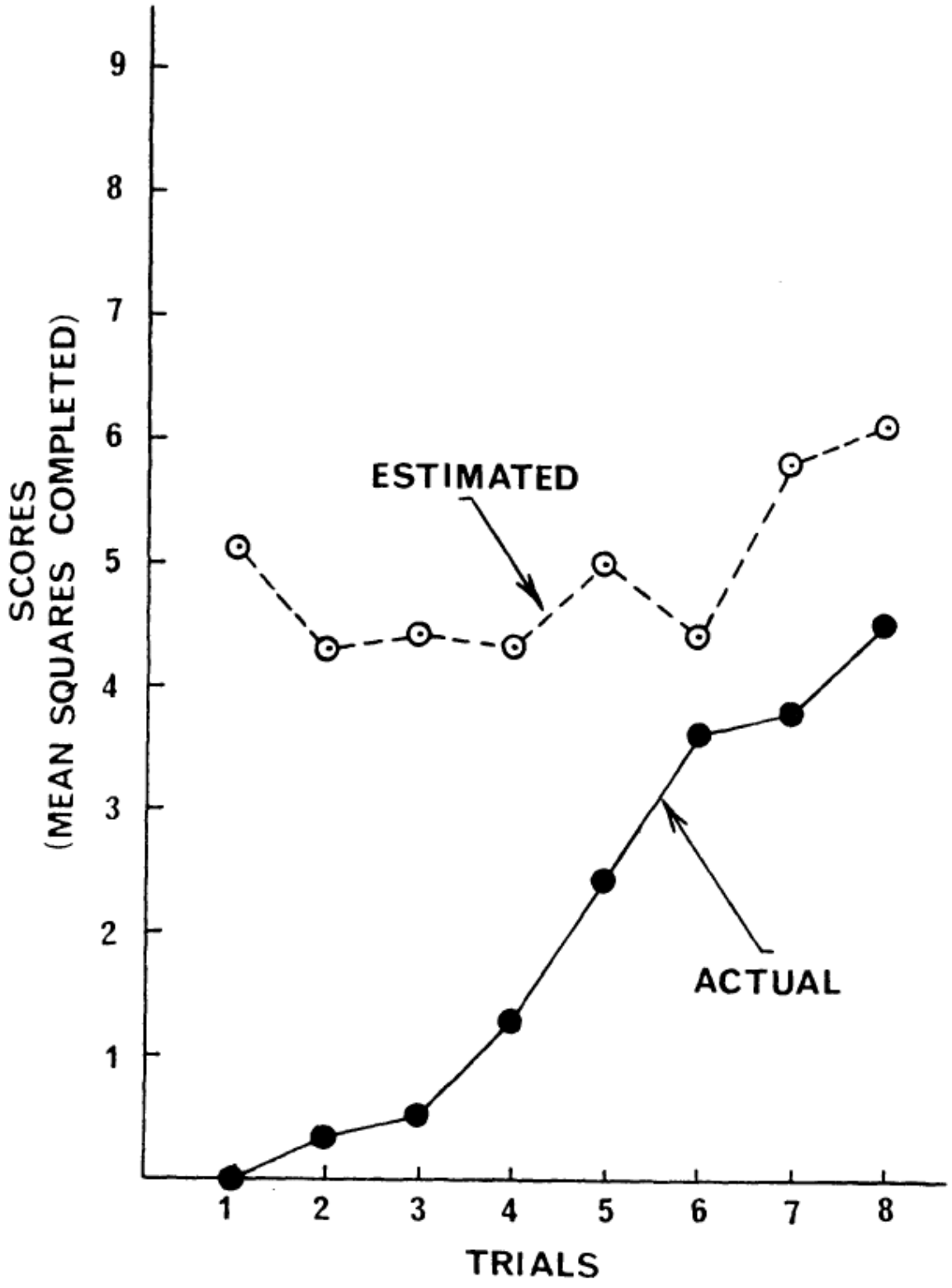


Figure 3

Results

No direct results were obtained on this situation. A demonstration only was intended.

SITUATION III - CONTROLLING

The model (Figure 1) presented here emphasizes the important communication link between the manager (M or Nt') and the operator (0) in one direction but also draws attention to the necessary function of measurement (as depicted by the scale) and of other feedback necessary to accomplish the control function. The type and effectiveness of feedback could be expected to directly affect the overall group output.

Method

The method used in this situation was comparable to that described in Situations I and II except that different subjects were used, and attention was focused on the operator (0) feed back as a basis for corrective action. Subjects were 36 volunteer male students. A record was kept of the number of questions ask ed on each trial by operator members.

Results

Results are summarized in Figure 2. Correlation between the total number of questions asked by operator members and total group output was significant (r = .61) at the .05 level. Group output improved over trials.

Figure 4

SUMMARY AND CONCLUSIONS

The study was intended to provide a laboratory simulation of a manager and his operators as they perform a simple mental-manual task. One member of the group was designated as a "manager" by being told he was "in charge", and by providing him with more information than the other members. At the same time he was denied the physical capability of accomplishing the group task. The other member "operators" were restricted in the amount of task information available to them but were allowed freedom to physically manipulate task tools. Three situations were developed as a means of studying the management functions of planning, organizing and controlling.

As to specific findings, in Situation I (planning) the "manager" attempted to predict the group output. This was in tended as a simulation of forecasting in the planning function. The "manager" consistently over estimated the group ability to

Figure 3. Sectioned Information Diagram of Picture Puzzle

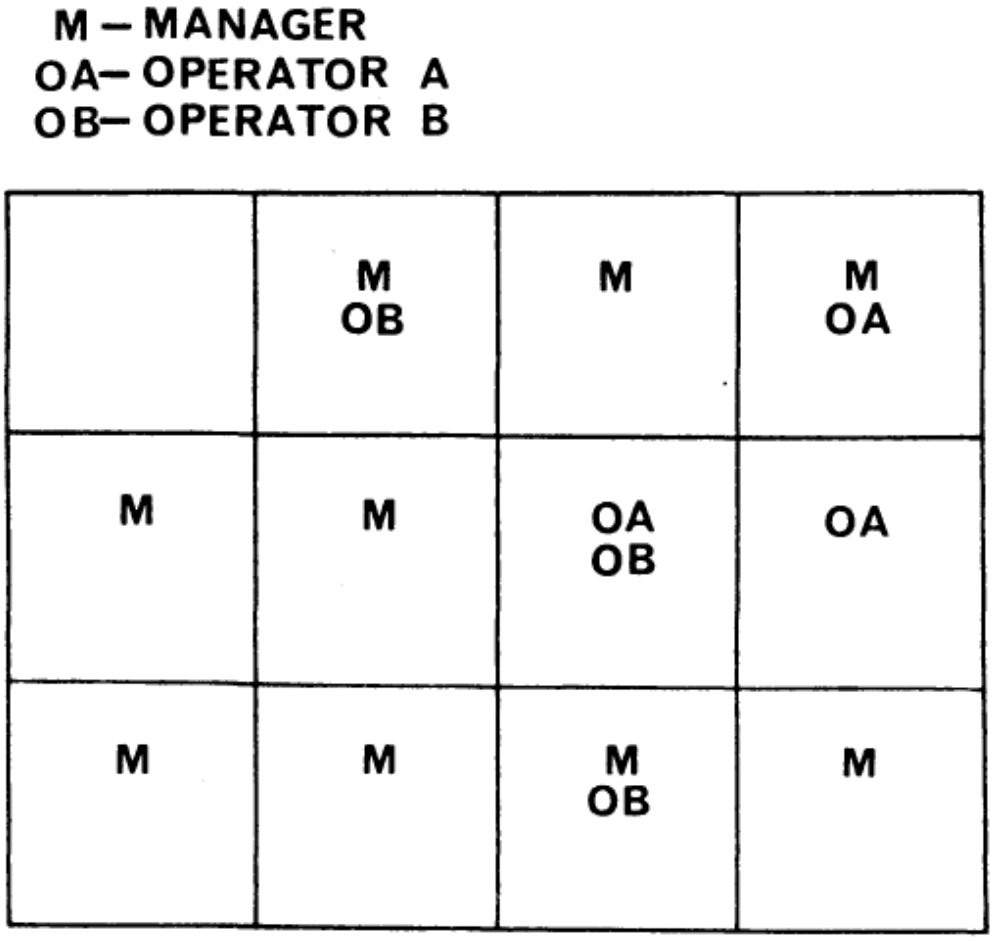
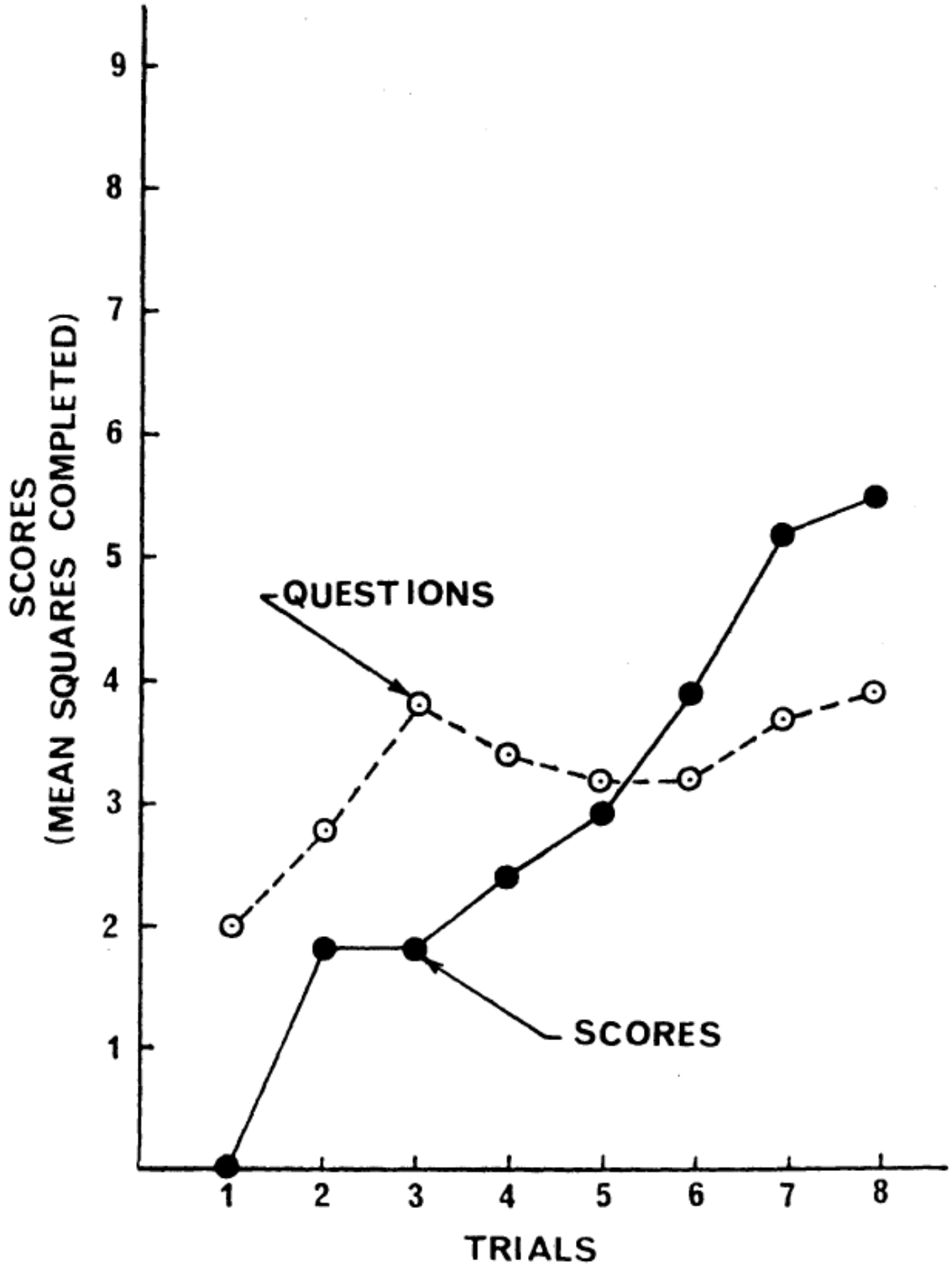


Figure 4. "Operator" Feedback vs. Group Output



perform. No effort has been made to determine if this is a frequent pattern in real life.

In Situation II (organizing) a case was made for the logic of simulating the organizing functions of the assignment of tasks to differentiate between the manager and the operator. The "manager" was given information but no physical capacity to act on it. The "operator" had the physical capability to perform but limited in formation on which to base correct actions.

In Situation III (controlling) an attempt was made to focus on communication and control. The results of this simulation suggest that while an important communications link may exist between manager and operator members, some reevaluation may be in order concerning the most effective means of communication for control purposes. From the present data it appears that the focus should be more on the operator rather than to depend entirely on the supervisor. This is consistent with the view held by many observers that more worker participation in management type activities enhances output. Put another way, the results here lend support to the view that instead of emphasizing the speaker talents of supervisors we should concentrate more on setting up an atmosphere which encourages better understanding by operators. The two may not be the same.

While the results obtained in Situations I and III may provide ideas for the further study of these concepts using other methods and sources of data, the major purpose of the study was to provide a demonstration of the use of the small group experiment at laboratory as one of many potential tools for future management research.

REFERENCES

1. Guetzkow, H. & Bowes, A. E., The development of Organizations in a Laboratory. Management Science, 3 380-402. (1957)

2. Napier, H. S., The Concept of Management - Another View, Arkansas Business and Economic Review, 4, 3, 2-5. (1971)

3. Glueck, W. F., Business Policy: Reality and Promise, Paper read before a meeting of the Academy of Management, Minneapolis, Minn., (August, 1972)