A MODEL OF BUREAUCRATIC GROWTH USING GPSS

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INTRODUCTION

Few will debate the apparent validity of the effect discovered and reported by C. Northcote Parkinson in his "Law of the Rising Pyramid."[1] Parkinson determined his "Law" from the study of government bureaus (specifically, the British Navy) and the manner in which they grew. In these days of big government, labor, business, and population, the growth of our bureaucratic institutions continues unstemmed. The term "Parkinson's Law" has become a crutch upon which we fall back, unable to cope with the problem of bureaucratic expansion.

If the basic causes of bureaucratic growth can be determined, as opposed to measuring their effect; if they can be identified and quantified, a new means may be devised that will enable something concrete to be done to effect and stem the rate of growth of bureaucracies. The understanding of causal relations in the area of socio-economic group interaction can provide specific means whereby one can at last begin to find better ways of organizing to do jobs more effectively.

Some of the causes of bureaucratic growth may be psychological; such as competition among people and ambition of individuals, as well as size of an organization as a rewarded goal. These are well documented by Parkinson.[2] While these factors may not be eliminated, they may be minimized. Organizational growth continues even under the best of conditions, indicating existance of a more basic, underlying cause.

This cause is conjectured to be the ineffectiveness of communication among people as a result of overladen, noisy, saturated communication channels within an organization. The validity of this hypothesis, while not actually proven, provides a vehicle for obtaining useful information.

The basic hypothesis may be formally stated as follows: "Ineffective Communication Among People is the Major Cause of Bureaucratic Growth."

A model of bureaucratic growth, based completely upon the communication among people in an organizational structure, has been formulated and is described here. The model has been simulated using GPSS/360. The model uses less than 250 blocks and takes advantage of the interpretative language capability of GPSS. Results of the simulation show growth values similar to that of Parkinson and yield a great deal of information about organizations and communication within them.

The model yields general results, since it is formulated in general terms. It can be used to simulate both abstractions of variety of organizations and various configurations of specific organizations when real data is available. The program requires parameter values and algorithms that describe action as input. While the model is indeterministic until these are supplied, the general nature of the solution is invariant as these change. This implies that the basic nature of the process has been modelled, not a particular situation.

THE UNIT/GROUP INTERACTIVE MODEL CONCEPT

Models generally characterize only those features and characteristics of the actual system which are either of interest or relevant to those of interest. The modelling of large socio-economic systems is made difficult through the indefinitely large number of parameters and interactions that can occur along with the difficulty and expense of obtaining useful data about the system. Such "models" defy quantitative approaches.

To avoid this difficulty, two modelling techniques have been used. The first is the general approach of constructing a model that is a close approximation to reality. This technique is patterned in a manner similar to Ackoff's and Sasieni's "artificial reality model."[3] The model is not one of reality, but is used as a reality to be modelled. It is a tool to gain information on complex experimental situations.

[1] Parkinson's Law and Other Studies in Administration, Professor C. N. Parkinson, Houghton Mifflin Company, Boston, 1957, Library of Congress Catalogue Card 57-9981.

[2] Ibid.

[3] Ackoff, R. L. and M. W. Sasieni, Fundamentals of Operation Research, John Wiley and Sons, New York, 1968, Library of Congress Catalogue Card 67-27271, pp. 72-74.

The second technique is unique to this simulation as it attempts to treat both individual behavior and group behavior simultaneously. It assumes that each identifiable part of the whole can be presented by the behavior of a single part, similar to all other parts; so that, statistically, the behavior of the individual part represents similar action throughout the system. The representative individual is modeled in detail, using statistical distributions to account for variations among individuals, and interacts with a second model structure which represents the group (whole) action inherent in the system as opposed to individual action.

Thus the model is representative of a "single-subscriber" (the individual) interfacing through communication channels to a communication network with group characteristics. Instead of showing all subscribers and their interaction, the single subscriber is examined in detail and interaction with other subscribers is statistically considered in the communication or "organization" network.

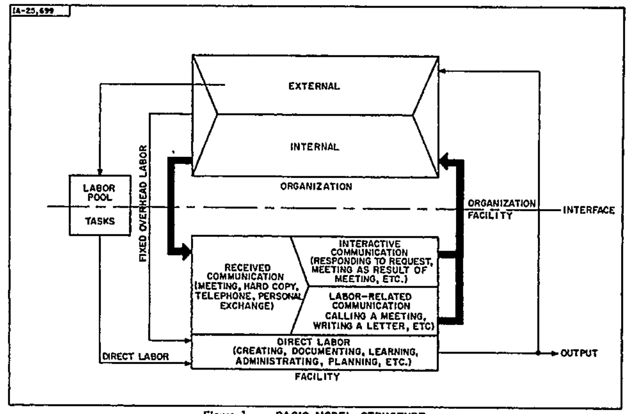

Figure 1 BASIC MODEL STRUCTURE

THE GPSS MODEL

The generalized model is shown in Figure 1 and a simplified version of the simulated model is shown in Figure 2. The model consists of a single facility which represents a single worker. His available time is competitively sought after by varying types of labor and communication tasks. The labor and communication tasks queue (in separate queues) on a priority basis. The facility receives communication from his organization and in turn generates communication to the organization where it spreads based upon protocol.

As the queues build, it becomes necessary to add more workers (accomplished by shortening the time to process a transaction). As more are added, new communication channels are required. At a threshold determined by the simulation, the opening of new communication channels causes more communication to be accommodated than addition of people can handle and irreversible exponential growth begins.

RESULTS

The model exhibits irreversible exponential growth similar to that expressed by Parkinson as shown in Figure 3. The exponential nature of the model is a basic result of the feedback model, it is invariant to changes of parameters or algorithms although the rates of growth change accordingly.

The simulation shows distinct sensitivity to variation in organizational structure, communication loads and protocol. It also demonstrates (without premeditation of the designer) that meetings are the most time-consuming phase of communication.

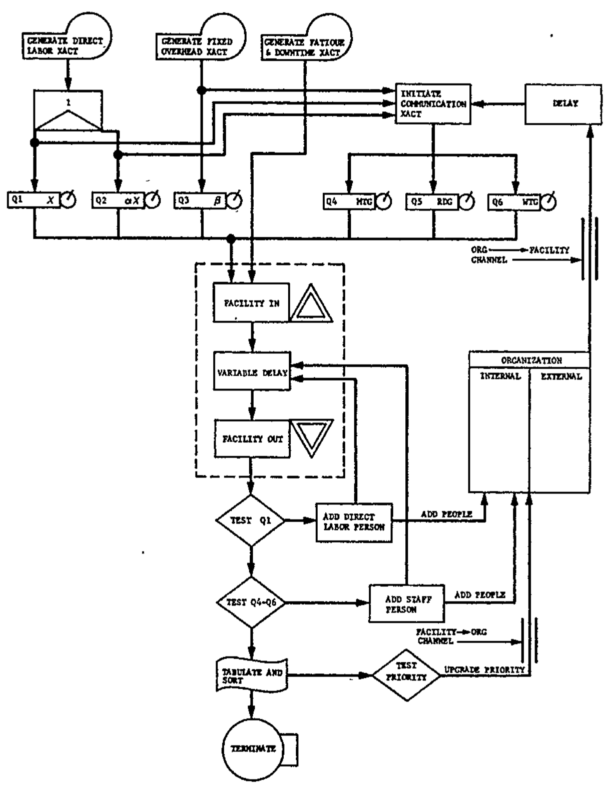

FIGURE 2
SIMPLIFIED DIAGRAM OF GPSS SIMULATION OF BASIC MODEL

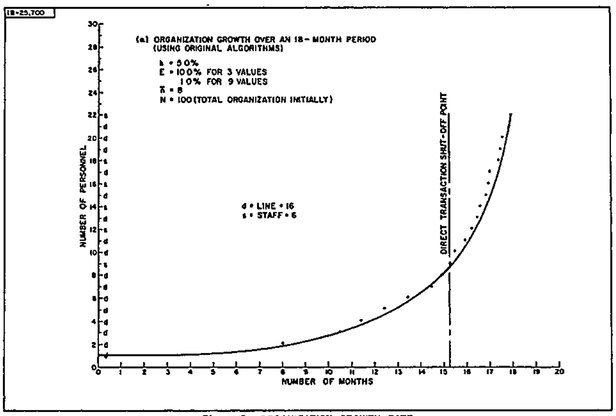

Figure 3 ORGANIZATION GROWTH RATE

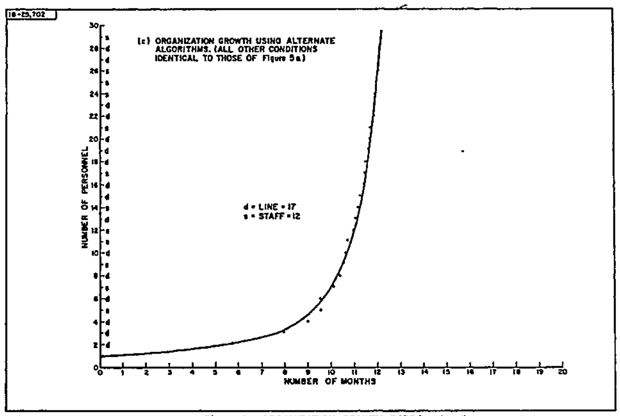

Figure 3 ORGANIZATION GROWTH RATE (continued)

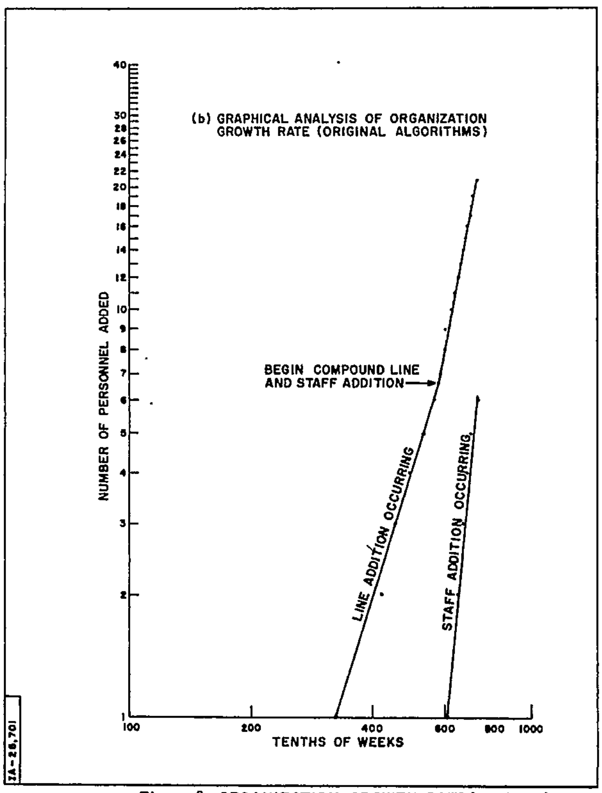

Figure 3 ORGANIZATION GROWTH RATE (continued)

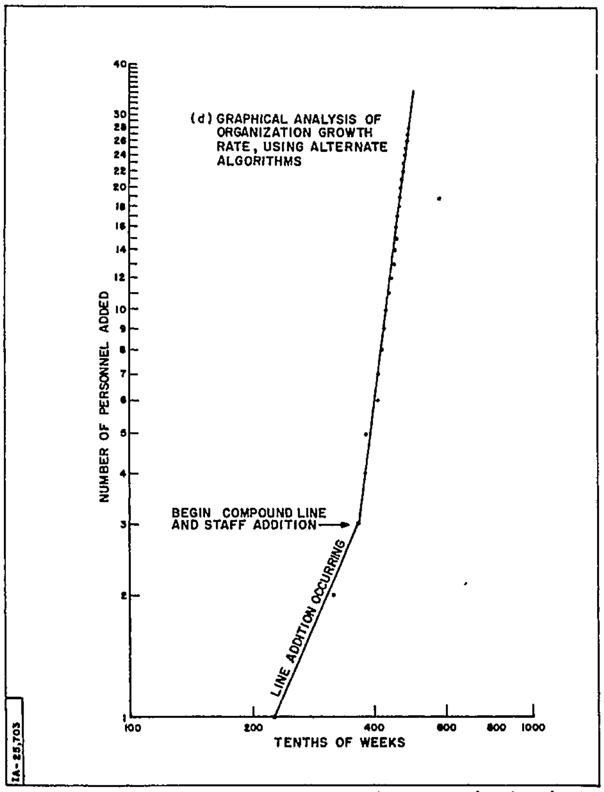

Figure 3 ORGANIZATION GROWTH RATE (continued)