The Use of Bonus Pay to Produce Cost Effective Behavior Change in the Direct Care Staff of a Residential Mental Health Program

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THE USE OF BONUS PAY TO PRODUCE COST EFFECTIVE BEHAVIOR CHANGE IN THE DIRECT CARE STAFF OF A RESIDENTIAL MENTAL HEALTH PROGRAM

By

William F. Uhlman

A Dissertation
Submitted to the Faculty of The Graduate College in partial fulfillment of the requirements for the Degree of Doctor of Philosophy Department of Psychology

Western Michigan University
Kalamazoo, Michigan
August, 1982
THE USE OF BONUS PAY TO PRODUCE COST EFFECTIVE BEHAVIOR CHANGE IN THE DIRECT CARE STAFF OF A RESIDENTIAL MENTAL HEALTH PROGRAM

William F. Uhlman, Ph. D.

Western Michigan University

The literature on the design of mental health service systems and techniques to generate performance in the workplace was reviewed and synthesised to create guidelines for developing cost effective behavior change in mental health systems. The present study was an examination of the cost effective application of monetary bonuses to the completion of training objectives by professional and paraprofessional staff in a residential service setting. Training objectives consisted of the teaching of specific survival skills to adult mentally retarded clients that were designed to enable clients to move to more independent settings.

Two experiments were performed. Experiment 1 examined the effect of monetary bonuses on performance in a multiple baseline design across two groups of subjects. The application of bonuses increased the rate of objective completion. The cost per objective completion decreased with the application of bonuses. Experiment 2 examined the relative effect of increasing staff hours versus the application of monetary bonuses to objective completion.
across two groups of subjects in a multiple baseline design. Increases in staff hours affected performance inconsistently, while the result of bonus application was similar to Experiment 1. If management has the choice of hiring additional personnel and providing bonuses contingent upon completion of objectives, it is clear from Experiments 1 and 2 that providing bonuses is a viable option.

The cost per behavior change under the two alternative staffing patterns were compared, allowing predictions regarding higher level goal attainment. It was determined that through the continued use of monetary bonuses contingent upon objective completion, the movement of clients to more independent settings would increase. The application of bonuses contingent upon completion cost less than $20.00 per week, while the cost of additional hours cost more than $70.00 per week. The use of bonuses was clearly effective in reducing the cost per objective completion. The increase in staffing did not have a consistent effect.
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William F. Uhlman
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INTRODUCTION

The problems faced by managers to develop and maintain performance in the workplace apply not only to business and industry, but extend to the mental health service setting as well. In the current climate of declining resources for human service activity, practitioners find it necessary to become as product oriented, and to pay as close attention to the costs incurred in developing their products, as their business counterparts.

The present study is an examination of the cost effective application of monetary bonuses to objectives completed by professional and paraprofessional staff in a mental health service setting. An important feature of the study is the utilization of a management by objective system to aid in the setting of objectives, coupled with a client-centered management information system to provide feedback to management and staff regarding progress toward completion of objectives.

The literature on the design of mental health service systems, and techniques to generate performance in the workplace were reviewed and synthesised to create guidelines for developing cost effective behavior change in the human service setting. These guidelines were then put into practice in the development of the present study.
The Design of Mental Health Systems

Funding for mental health service systems and for human services in general is declining. This decline stems from political and cultural forces outside of the mental health system as well as from the failure of many costly social programs to withstand the rigors of program evaluation research (Ciarlo and Horrigan, 1974; Kalamazoo Gazette, Note 1). Given today's funding climate, it is no longer sufficient to merely engage in service activity that is considered "humane" and then to infer from that activity a "humane" outcome. In order to successfully compete in this climate, mental health service systems must accomplish their program goals in a cost effective manner. In order to accomplish their program goals, mental health systems must develop:

1) a purpose that can be specified and agreed upon;
2) an adequate evaluation technology that is on-going, client-centered and useful to practitioners and managers on a daily basis;
3) an effective means of generating staff performance consistent with the purpose of the system.
4) a means of evaluating the costs of achieving program goals.

Arguments, solutions and data pertaining to each
of these requirements are presented below.

The Development of a Specified and Agreed Upon Purpose

Professionals in a given field, the consumers of the services they provide, funding agencies, governmental, legislative and regulatory bodies all have different notions of about the purpose of a particular program. The more specific a program goal, the more difficult it is to generate agreement regarding its validity (Alexander and Messal, 1972). This problem of agreement stems partially from competing political and social forces, and partially from the tendency of the mental health profession to adhere to theories, techniques and processes, rather than to adhere to the accomplishment of program goals. Having agreed upon program goals that can be reduced to specifiable program objectives is a critical first step in the development of an effective service delivery system. A program can be evaluated on what it claims to accomplish only if what it claims to accomplish is specifiable.

A process for the development of agreed upon program goals has been outlined by Mager (1972), who described a step by step process to reduce broad and ill defined
program goals into specific, operational performances. While the process has been used extensively in educational systems, it rarely appears in the development of mental health systems. Although the use of goal analysis results in workable, agreed upon objectives, the process may be resisted because of the enormous task of reducing the broad but useful purpose of a complex service agency into measurable objectives. For example, the goal analysis of an organizational purpose to "Assist [mentally retarded] residents to become more self sufficient" (Residential Opportunities, Inc, Note 2), when reduced to its component parts yielded over 400 specific performances which could be agreed upon. Similarly, a mental health agency with an organizational purpose such as "To improve the quality of family life in Kalamazoo County (Family and Children Services, Note 3)" may need to specify a very large number of individual performances prior to being able to agree that the organizational purpose was achieved.

Although the process of goal analysis is rather tedious and lengthy, it incorporates the use of participatory goal setting which, according to Kim and Hamner (1976), has proved to be effective in generating goal directed work behavior, and according to Skinner (1969) sets the occasion for later cooperation of those groups involved in the process. This participatory goal setting is designed to access the staff (such as program
directors, supervisors and line staff), as well as consumers of the service (advocacy agents, funding representatives, and governmental representatives). In participatory goal setting, it is necessary to include all the groups that typically are responsible for different notions regarding the purpose of a program.

The goal analysis technology described by Mager (1972), generates the specification of program goals to allow agreement between the various components of a system. Goal analysis accomplishes the agreement primarily by involvement of individuals from every segment of the system, and by focusing the attention of these individuals upon the specific outcomes of the service provided by the organization. It does not focus involvement on techniques or processes of the system (such as the use of the normalization principle, psychoanalysis, or learning theory). The application of such techniques or processes is appropriate, but only when such applications follow the specification of and agreement upon adequate program objectives.

The development of an evaluation technology.

Rather than provide outcome data of the results of its efforts, mental health systems have traditionally
produced the face validity of professionalism, advanced degree requirements, complex theoretical structures, and process evaluation instead of directly examining the results of their work. Without an adequate technology to determine outcome, however, the analysis of processes has become the only evaluation route available. Even mental health systems that have been unable to specify goals and generate agreement regarding outcomes have typically been able to generate some agreement (either correctly or incorrectly) that the processes engaged in are beneficial. This has usually been accomplished by pointing to the extent to which the process adheres to an accepted theoretical framework, rather than pointing to any data indicating that the process actually produces a beneficial product. Although the theoretical framework may have a body of data to support it, such data have typically grouped clients statistically, and have provided little information regarding the immediate effect of the process upon a particular client (Sidman, 1960). As indicated previously, process evaluation is supported by the belief (responsible for many of the "Great Society" programs of the 1960's) that humane treatment automatically results in humane outcome (Ciarlo and Horrigan, 1974).

The use of "process" program analysis is usually due to inadequate technology to actually determine the
outcomes of processes that adhere to an assumedly valid theoretical framework. For example, Wolfensberger (1972) developed a broad concept called "Normalization". The concept states that by using as normal an environment as possible with the mentally retarded client, one can generate as normal behavior as possible. The theory of normalization has a broad logical and philosophical base that, when originally formulated, had little empirical support. Rather than measure the outcome of programs based upon the normalization principle, Wolfensberger and colleagues developed the PASS Analysis (Wolfensberger and Glenn, 1973) to determine the extent to which particular program processes were "as normal as possible". The analysis assumes that normal environments generate normal behavior, and if a program is as normal as possible, then it follows that clients in the program would behave as normally as possible. There is no client outcome data to date to support the use of the normalization principle. Although unsupported, the principle of normalization has dominated the field of mental retardation since 1972. In fact, funding decisions in at least one state wide project (the ENCORE project in Nebraska) have been entirely tied to the PASS analysis. Current data regarding the validity of the principles of normalization is inconclusive, and the most ambitious effort to implement
normalization (the ENCORE project) has experienced substantial failure.

Most mental health programs developed to solve a particular social problem, including the ENCORE project, have substantial face validity. The activities of the program suggest they are likely to produce the desired result. In fact, it has been argued (Weiss and Rein, 1969) that process evaluation is more appropriate than product evaluation on the basis that the hoped for achievement of a mental health program is too complicated to measure by simple, direct, and operationally definable criteria. The problem with this argument when no outcome variables are stated, is that the program cannot be assessed by failure or success (Levy, 1974), and therefore would be unable to survive in today's competitive climate. This inability to specify outcomes has resulted in the evaluation of processes that adhere to a particular theory, and appear "humane," but which may or may not produce any beneficial result.

The problems of developing an agreed upon purpose and the development of an adequate evaluation technology are interrelated. And although they are interrelated, it may be possible to have adequately specified outcomes without agreement regarding the appropriateness of the outcome. In fact, because an adequate technology of objective specification provides more opportunity for
disagreement than poorly defined program goals, the problem of obtaining an agreed upon purpose must be overcome.

The development of an adequate evaluation system may be accomplished by the use of two concepts, that of goal analysis, described above, and the use of a "total performance system" (Brethower, 1977). Before it is possible to adequately evaluate a program, it is necessary to specify and arrive at some agreement regarding the desired outcomes of the program. Once specific outcomes are determined, the total performance system may be used as a model to insure that necessary components of a system are in place.

A total performance system is an adaptive management system model comprised of components which, when operational, are sufficient to improve or maintain the performance of the system. An adaptive performance system is one that is guided by its performance, and by how closely its performance approximates the goals of the system. An adaptive system is designed so that it can be altered based upon performance measures of how well it is achieving its goals. The system also allows change of its goals if they are not meeting the needs of the system. Thus, the total performance system is a goal directed model which can improve or maintain performance.
depending upon how well the system is meeting its goals. The Total Performance System is limited only to the extent that performance measures are inadequately specified. Therefore, when coupled with a powerful technology for developing performance measures from broad goals, such as goal analysis, the total performance system is an effective tool for developing a mental health system that meets the needs it was designed to meet.

The total performance system consists of the specification of six basic components of a system, defined as follows:

1. Inputs. Inputs are the raw materials needed to produce the product. In the case of a mental health service system, such inputs include clients in need of service and well trained staff to provide that service.

2. A Processing System. The processing system consists of activities or work needed to produce the product. In the case of a mental health service system, the processing system includes the activities of the therapy or training, and the activities of planners, policy makers, and clerical staff.

3. Outputs. Outputs are the processing system's finished product. In a mental health system
designed to enable mentally retarded clients to become self-sufficient, products include the completion of training objectives and the movement of clients to settings of independence.

4. **Processing system feedback.** Processing system feedback consists of the quality and quantity of the finished product determined by members of the processing system before the product is presented to the public or to the receiving system. This is an important part of the total performance system for mental health.

5. **Receiving system.** The receiving system consists of those who consume the products of the processing system. Which includes clients, family members of clients, taxpayers, and legislators.

6. **Receiving system feedback.** After the finished product is consumed by the receiving system, receiving system feedback consists of information obtained from the receiving system regarding the quality and quantity of the output of the processing system. Such feedback includes public support for a program, government sponsored program audits, and feedback through public hearings, boards of directors, advocacy and
advisory groups.

As noted in item four, above, a crucial component of the total performance system that is required to develop a continuous evaluation system is the internal processing system feedback loop. Mental health systems designers typically concentrate upon development of the receiving system feedback loop since the receiving system is vital to the maintenance of funding and public support. Evaluation of performance vis a vis this feedback loop often takes the form of expensive, longitudinal program evaluations that rely upon inferential statistics. While such evaluations are very important to funders, legislative bodies, and the community, they are of little value to the daily operation and subtle adjustments of a system to enable the accomplishment of program goals. The effective use of the internal or processing system feedback loop, however, results in performance that allows the program to successfully survive statistical evaluation from the receiving system.

The questions asked and the results obtained by an accountability system based entirely upon receiving system feedback, often has little to do with the day to day activity of the mental health practitioner who is engaged in processes that are intended to result in products that meet the criteria of the program objectives. If adequate
agreement has been obtained, these products meet the criteria of the receiving system. As long as the data produced by the accountability system are of no use to the mental health practitioner providing the inputs to the accountability system, the outputs of such an accountability system are likely to be of little use to anyone at all. This results in a system whereby highly tenuous and suspect inputs provided by the mental health practitioner may be subjected to sophisticated statistical analysis (Krapfl, 1972).

The total performance system is a model of the essential components of an agency. As an model, it enables one to examine in a more simple manner the contingencies existent in a service system, and then to respond to this model in ways to improve the system. Through the adequate specification of goals, through goal analysis, the development of useful processes, and the adequate provision of processing system feedback and receiving system feedback, it becomes possible to adjust a system to most effectively meet its goals.

The Development of an Effective Means of Generating Staff Performance

Managers have engaged in a variety of techniques to increase performance in the work setting. These
techniques range from the inexpensive use of feedback systems to the use of incentive systems and behavioral contracting. One of the problems noted above, in the development of mental health evaluation systems was that management does not always provide useful data to the workers responsible for the accomplishment of program objectives. The use of the techniques of contracting and the providing of incentives for performance, described below, requires that processing system feedback be provided to workers in a manner that maximizes the social, monetary and professional rewards available to them.

**Feedback Systems.** The use of feedback techniques to increase performance in work settings has been employed frequently because of its inexpensive nature and the ease with which it can be manipulated as an independent variable (Kreither, Reif and Morris, 1977; Panyan, Boozer and Morris, 1970; Storenger, Johnston, Pisor and Monroe, 1978). In general, these researchers have increased the information available to the worker (discriminative stimuli) regarding production, while seeming to leave constant, or at least uncontrolled, the reinforcement contingencies for such behavior. The kinds of information supplied and behavior changed includes the reduction of recording errors by psychiatric aides (Andrasiak and McNamara, 1977), the maintenance of daily use of operant training methods (Panyan, Boozer and Morris, 1970; Prue,
Krapfl, Noah, Cannon and Maley, 1980), and the reduction of industrial safety hazards (Sultzer-Azarof and DeSantamaria, 1980).

At the very least, feedback systems let the worker know that the manager has outcome information, with the implied social and monetary reinforcers and punishers associated with management review. Optimally, however, the use of a feedback system enables workers to maximize monetary, professional and social reinforcers by providing discriminative stimuli regarding progress toward obtaining such reinforcers. To the extent that these discriminative stimuli and reinforcement procedures are tied to the organizational goals of the program, the feedback systems described are a form of processing system feedback.

The implementation of feedback systems alone have been generally effective, but not as effective as other types of reward systems. Since feedback systems are relatively inexpensive to implement, however, they may be quite cost effective.

It is important to note that changes in performance with some feedback studies seem to diminish over time (Pommer and Streedbeck, 1974). Studies that did not note such transitory effects were often not maintained for extended periods beyond the initial manipulation (Andrasiak and McNamara, 1977). A notable exception to this is a
study by Prue, Krapfl, Noah, Cannon and Maley (1980), where feedback in various forms maintained performance of state hospital staff for a period of 57 weeks. In another long term study, Eldridge, Lemasters and Seyport (1978) reduced industrial waste for 12 months when feedback was paired with contingent supervisor praise.

The inconsistency in the effectiveness of the implementation of feedback systems seems to stem from the fact that the feedback provided by such systems is only one portion of the three term behavioral contingency (Skinner, 1969). Any account of the interchange between an organism and the environment must include the relevant discriminative stimuli, the response of the organism, and the action of the environment after the response has been made. The use of a feedback system provides discriminative stimuli (the first term of the contingency) regarding staff performance (which is the second term), which may or may not be followed by consequences (the third term). The effectiveness of feedback as a discriminative stimulus depends upon a complete three term contingency, including some method of providing consequences for performance. For example, the long term effectiveness of the Eldridge, Lemasters and Seyport study (1978), when compared with other feedback studies, may be due to the pairing of feedback with contingent
supervisor praise (the third term of the contingency).

Ford (1980) developed a functional classification system for feedback studies that consists of five different dimensions. These dimensions are described below:

1) Individual versus group feedback (with intermediate points along the continuum dependent upon the unit of performance measured). For example, in a study by Gimmert (1978), little difference was noted in the effectiveness of individual feedback versus group feedback in a study designed to alter the efficiency of textile workers, except where consistent foreman praise was associated with the individual feedback.

2) Private feedback versus public feedback, as determined by the availability of performance data to others.

3) Personal feedback versus mechanical feedback, as determined by the degree to which feedback is mediated by mechanical instruments and devices.

4) Immediate feedback versus delayed feedback, which is defined by the contiguity of feedback delivery with performance.

5) The schedule of feedback delivery, which provides an excellent opportunity to manipulate the cost effectiveness of the data obtained.

There has been little research designed to analyze the effectiveness of these various types of feedback.
delivery. However, if the effectiveness of feedback systems is related to the effectiveness of the uncontrolled reinforcement contingencies, then a comparison of various studies along the dimensions proposed by Ford may be of little value.

**Performance Contracting.** Performance contracting is based upon the distinction between rule governed behavior and contingency shaped behavior. When an employee responds to a description of contingencies of social or monetary reinforcement or punishment, he/she is responding to a discriminative stimulus, or a rule. When a discriminative stimulus or rule is perfectly correlated with reinforcement, the behavior under its control is maximally reinforced. For example, on a fixed-interval schedule without related discriminative stimuli, an organism emits many unreinforced or "wasted" responses. By presenting a conspicuous stimulus whenever a reinforcement is available, the organism begins to respond in the presence of that stimulus only, and few responses are "wasted". In the work setting, such stimuli have been used to assist workers by specifying the responses that are required or prohibited, and the consequences for such responding.

Performance contracting has been effectively used in the classroom (Homme, 1971). An effective performance
contract must include: 1) the conditions under which behavior will be reinforced; 2) the specification of the behaviors that are to occur, and; 3) the consequences that are to occur contingent upon meeting criterion performance (Michael, 1967).

The behavior of a worker responding to a contract is often more effective than that of one whose behavior is merely contingency shaped. Contracts can be extracted from existing reinforcing contingencies, and once in existence, they can be used to corelate behavior with existing reinforcement. Contracts can also be applied prosthetically (Lindsley, 1968), by the application of new contingencies that are more effective than those currently existing in the setting.

Incentive Systems. A wide variety of incentive systems have been used to affect behavior changes in workers. Often, the use of incentive systems to control staff performance are difficult to implement due to the strength and rigidity of trade unions and bureaucratic structure. In such cases, innovative techniques have been required to affect behavior change.

Hollander and Plutchick (1972) used trading stamps contingent upon completion of research tasks with psychiatric aides. The use of trading stamps was effective, as is money, as a generalized conditioned reinforcer that could be exchanged for a wide variety
of reinforcers. The use of trading stamps also did not conflict with union regulations prohibiting the use of money or vacation days outside of contract specifications. 

Iwata, Bailey, Brown, Foshee, and Alpen (1976) used a lottery to inexpensively improve performance in a setting that was rigidly controlled by a civil service system. In such a system, the only variable left entirely to the discretionary control of the managers was the scheduling of time off. Employees who met performance criteria placed their names in a lottery and the winner was allowed to schedule time off at his/her convenience for the following week. The technique improved performance substantially, while requiring little financial investment.

The use of monetary bonuses to affect behavior change is widely used in industry, particularly with management personnel who are not subject to rules generated by unions and civil service systems, and ranges from the relatively non contingent use of the "Christmas Bonus" to bonuses for suggestions and bonuses for high production. For example, General Motors has paid out $237 million for 3.8 million suggestions to improve productivity, cut costs or save energy since 1942 (Kalamazoo Gazette, Note 4). While industry attends to the cost effectiveness of such procedures, the topic has been considered sparingly in the organizational behavior management literature. The
lack of cost effective analysis is particularly evident in studies within human service settings.

For example, Pommer and Streedbeck (1978) applied $1.00 bonuses to job completion in a psychiatric ward and demonstrated that money indeed reinforces the behavior that it is made contingent upon. Whether or not the behavior change was worth the $1.00 over hourly wage was not discussed, and an analysis of the cost per job completion during treatment was not available from their presentation. If the cost per unit of production was less after the $1.00 bonus even when adding the bonus to the cost of that unit of production, then Pommer and Streedbeck's data would have been more useful to the manager considering the use of a bonus system to improve behavior.

In a similar study, Kreitner and Golab (1978) increased the frequency of field sales staff telephone calls to the home office by refunding the cost of the call plus a percentage. Again, the monetary reward was small but effective in increasing behavior. There was, however, no indication of the degree to which behavior change affected sales volume or sales efficiency. Although there was a substantial behavior change, it could not be determined if the behavior change was worth the cost. Herman, Montes, Dominguez and Hopkins (1973) increased
punctuality in chronically late workers by applying a two peso bonus to "on time" behavior in a Mexican manufacturing plant. Although the bonuses were considered small, the application of two peso bonuses to individuals who earn approximately 50 pesos per day represents a 4% pay raise for punctuality. As with previous studies, there was no analysis of the cost effectiveness of the treatment. Giving a 4% raise without the justification of an increase in production would seem to be a demonstration of the power of reinforcement that most managers would be reluctant to replicate.

In a study that addressed the cost effectiveness of bonus application, Yukl, Wexley, and Seymore (1972) compared a variable ratio schedule of supplementary bonuses with a continuous bonus presentation. Not only was intermittent reinforcement more cost effective in terms of per unit cost of behavior, but production (the sorting of IBM cards) actually increased under the variable ratio bonus.

These and other studies (Orphen, 1978; Bufford, 1976) all indicate that monetary rewards contingent upon a particular class of behavior tend to increase that behavior, sometimes dramatically. With the exception of Yukl, et. al. (1972), however, little attention has been paid to the cost effectiveness of such techniques.

While monetary bonuses are an effective means of
changing behavior, the application is not without difficulties. Pomerleau, Bobrov and Smith (1973) discovered that a relatively large cash bonus ($30.00 per week) was required to affect significant behavior change in psychiatric aides working with psychotic patients. There was a staff "morale" problem with several subjects who hinted that there would be refusal to work during the return to baseline. In fact, the return to baseline resulted in performance levels below that in the original baseline.

In almost all instances where additional incentive systems have been used to increase performance, it has been done by superimposing such a system upon an existing feedback system. Apparently, the effectiveness of feedback systems depends upon the implied reinforcers and punishers inherent in the recording of an employee's performance. Imposing specific contingencies upon the behavior for which feedback is provided generates more effective performance than that which is maintained by the implied consequences of mere feedback for performance. And, as noted earlier, a bonus upon performance contingency was more effective when superimposed upon a feedback system than when not, leading to the conclusion that the feedback system provided relevant discriminative stimuli for performance to enable workers to maximize monetary benefits of the bonus contingency. This is consistent
with the research of Kim and Hamner (1976) who indicate that feedback does not increase performance unless the feedback is in a form that it can be used to set goals or to evaluate progress in relation to established goals (where employees are evaluated according to the accomplishment of such goals).

According to Kirby (1977), a feedback system is a specific method of collecting information regarding the results generated by employees and providing it to them on a regular basis. The provision of such feedback (processing system feedback), when associated with the accomplishment of specifiable program goals, and the rewarding of employees for such accomplishment is a powerful tool for the management of an effective human service system.

The Evaluation of Costs

As concern for evaluating the effects of mental health systems grows, and as resources for mental health systems continue to decrease, the need for relating output to cost increases. Traditionally the presumed inability to make judgements regarding the outcome of mental health services has enabled the funding of programs without information regarding value for dollar, these presumptions, and the need for accountability have
changed.

There are at least four methods of looking at the costs of a mental health program: Cost per behavior change; Cost analysis; Cost effectiveness analysis; and Cost benefit analysis (Krapfl, 1974). Although the distinction between these techniques may be somewhat arbitrary, each method provides different information about the accomplishments of a program.

**Cost per Behavior Change.** Once desired client behaviors have been specified, a description of the costs required to achieve them is called a cost per behavior change analysis. In the example of a residential program for mentally retarded adults designed to enable clients to become more self-sufficient, cost per behavior change analysis would determine the costs associated with specific self-sufficiency skills such as brushing teeth, tying shoes, and dressing for work. The level of this analysis is descriptive, and is fundamental for a mental health program, as changes in behavior are the basic effects of all treatment programs. Although this analysis is often neglected, it is a vital part of processing system feedback.

**Cost Analysis.** Cost analysis is concerned with the measurement of qualitative and quantitative features of the system's output. Of interest from the above example, would be the number of clients of the residential
program who, having learned self sufficiency skills, graduate to a more independent living situation. Cost analysis utilizes objectives which are comprised of the behavioral objectives utilized in the cost per behavior change analysis. Cost analysis notes the specific behaviors to be changed, and the resulting system objectives to be obtained by accomplishing the behavioral objectives. Describing the costs associated with each of these analyses is difficult, particularly for programs with multiple purposes. This analysis is also at the descriptive level.

**Cost Effective Analysis.** Cost effective analysis includes all the costs in the previous descriptive analyses, and is used to predict the cost of achieving objectives, by defining the resources required to reach those objectives. Cost effective analysis should not be performed unless descriptive analyses are available as input to the analysis. Cost effective analysis may be used comparatively to predict the costs associated with alternative methods of reaching stated objectives.

**Cost Benefit Analysis.** Cost benefit analysis is considerably more complex than the other three forms of analysis. Cost benefit analysis attempts to compare the dollar value of the inputs with the dollar value of the outputs of the system, to determine the cost benefit of
the system. If it costs more to produce a product than
the product is worth, then the system is not cost
beneficial. If it costs less to produce the product
than the product is worth, then the process is cost
beneficial. It is difficult to convert all inputs and
outputs to dollar amounts to enable a true cost benefit
analysis. An example of a cost benefit analysis might
be to determine the total cost of a program designed to
move mentally retarded clients from dependency to self
sufficiency, including the supportive services required
to maintain the client in the community, versus the value
of that client to society once self sufficient. Again,
without the descriptive cost analyses, the data to attempt
a cost benefit analysis are not available.

The above four cost analyses fit into the total
performance system model as a part of processing and
receiving system feedback, enabling the system to adjust
to produce products as efficiently as possible.

Purpose

The present experiments were designed to examine
the cost effective application of monetary bonuses to
objectives completed by professional and paraprofessional
staff in a mental health setting. The mental health
setting had been designed according to the four guidelines
for a competitive mental health program established at
the beginning of this paper.
EXPERIMENT 1

Method

Setting

The present study was conducted in a community residential agency serving 67 mentally retarded adults. The program was structured around the previously stated guidelines for the development of a competitive mental health program, utilizing goal analysis (Mager, 1972) and the total performance concept (Brethower, 1972) as a program model.

Program Purpose. The purpose of the residential agency was:

To provide residential living accommodations for adult retarded citizens as a part of a continuum of lifetime services within the community;

To assist such residents toward self-sufficiency;

To assist such residents to participate in existing community services in the same manner as the general population and the retarded population living within the community (Residential Opportunities, Inc., Note 2).

Program Structure. Utilizing the process of goal analysis to develop specific outcomes that could be measured and agreed upon, over 400 individual training
objectives were derived. The development of the training program occurred prior to the present study. The training objectives were subdivided into progressive skill levels designed to enable clients to learn to be self-sufficient one step at a time. Each client had been assessed to establish a basic skill level, and then taught the skills enabling movement to the next level. Each group home had been assigned a position along the sequence of increasingly complex skill levels so that clients could graduate to other more self-sufficient environments and eventually into more independent living based upon the skills they had learned. The completion of training objectives, then, not only meant that clients were more self-sufficient, but enabled them to move to more independent residential facilities within the community. Thus, the basic measurable outputs (training objectives completed) were tied directly to agency goals.

The following are examples of training objectives ranging from the most basic to the most complex:

The resident will be able to wash and dry hands, independently.

The resident will apply deodorant, daily.

The resident will keep laundry in a laundry basket or other designated place.

The resident will be able to set the table.
The resident will write checks for household items (Residential Opportunities, Inc, Note 5).

Each training objective had an assessment package associated with it that specified the conditions under which the behavior was to occur, the criteria for meeting the objective, and the terminal behavior specified in observable terms. A sample of these criteria are presented in Appendix A.

**Program Monitoring.** Processing system feedback regarding the progress of clients and the completion of objectives was provided through the use of a computer assisted management information system. The management information system was designed to: 1) provide ongoing feedback to service delivery staff regarding client progress; 2) provide a prescriptive tool to enable the development of individual plans of service; 3) provide ongoing feedback to program management regarding program development and planning; 4) provide ongoing feedback to administrative staff regarding resource allocation and its effectiveness; 5) provide a permanent record of achievement for each client's file; 6) provide an accountability system to generate and maintain external funding.
Program monitoring was accomplished by the specification of all the training objectives deemed necessary for self-sufficient living, sequencing the objectives into skill levels, and then developing a tracking system utilizing a "milestone" concept (Burian, Note 6) to follow the progress of clients toward the achievement of self-sufficient living skills and subsequent movement to more independent settings. The tracking system was developed through the use of an activity coding system designed to document and categorize all work with clients. "Milestones" represented the coding of discrete events in the life of each client that reflected progress toward service goals. These "milestones" were entered on the time sheets designed to document and categorize all work done with clients. Time sheets were submitted for payroll and computer input on a bi-weekly basis.

The tracking system was developed in a hierarchy, so that all progress toward objective completion (indicated by milestones) reflected the extent to which overall agency goals had been met. A schematic diagram of this hierarchy is presented in Figure 1. For example, there were up to eight milestones used to indicate progress toward objective completion, such as "Objective assigned to
AGENCY GOAL: TO ASSIST MENTALLY RETARDED RESIDENTS TOWARD SELF SUFFICIENCY, AND TO ASSIST THEM TO PARTICIPATE IN THE COMMUNITY.

Training program is interfaced with an apartment living program in the community.
Example: Upon completion of the training sequence in the last of the five group homes, the client is eligible to move to a training apartment.

Five homes are placed in sequence from the most dependent to the most independent.
Example: Upon completion of 90% of the objectives from levels 11 to 14, the client is eligible to move from Home A to Home B.

Five to ten Skill levels are assigned to each group home.
Example: The client works on objectives from levels 11 to 14 while residing in Home A. The accomplishment of these objectives are tracked though the use of milestones.

15 to 25 objectives exist in each of 20 skill levels.
Example: Milestones indicate when the client has accomplished 90% of level 5 objectives to enable movement to level 6.

8 to 10 milestones indicate progress toward objective completion.
Sample Objective: The client will apply deodorant daily.
Sample Milestones: Program written; baseline complete; objective complete; objective verified.

Figure 1: A diagram of the extent to which progress toward objective completion reflects progress toward agency goals.
staff", "Baseline complete", "Training started", and Objective complete". There were 15 to 25 training objectives in each of 20 skill levels. There were five to ten skill levels assigned to each group home, with five homes in sequence from the most dependent setting offered by the agency to the most independent setting offered by the agency. The system was hierarchical, then, in that progress toward any objective (documented by the use of milestones and activities on the staff time sheet) indicated progress toward self-sufficiency. Milestones were also used to document client intake, referral, and movement through the system.

In addition to providing an accountability system that indicated progress toward agency goals, the management information system enabled staff to plan an individualized training program for each client. Through the use of data from the management information system, summaries of client progress toward objective completion, reports of client position in the skill level system, an analysis of what skills were needed in order to progress, and a chronological report of all of a given client's accomplishments, were provided. A permanent record of objective completion was provided for each client's file, as well as a master list indicating which staff were
responsible for completion of each objective. The management information system also provided a broad data base to enable the continuous evaluation of any measures taken to develop a cost effective program.

Subjects

Subjects were professional and paraprofessional direct care staff in two of the seven group homes operated by the agency. These two homes were chosen for Experiment One because their size, staffing pattern, and the required qualifications of staff were similar. The group homes each housed 16 developmentally disabled residents. Each home was staffed in the following manner:

1 Full time Home Supervisor paid $11,500 annually.
   Qualifications: B. A. in a human service profession and one year experience with the mentally retarded.

1 Part time (32 hours per week) Assistant Supervisor paid $4.50 per hour.
   Qualifications: Working on B. A. in a human service profession, having achieved at least the third year of study, plus at least 6 months experience with the mentally retarded.

2 Half time (20 hours per week) Residential Trainers paid
$3.50 to $4.00 per hour.

Qualifications: Working on B. A. in a human service profession, having achieved at least the third year of study.

1 Full time Night Shift worker paid $3.35 per hour.

Qualifications: High school diploma.

In addition to these individuals who comprised the subjects of the study, each group home utilized weekend relief staff, a cook, and domestic help, who were not a part of the experiment. The program coordinator who supervised the implementation of client training programs was not a subject of the study.

During the course of the study, occasional staff turnover occurred. However, with the exception of brief vacations, illness or holidays, a minimum of 10 subjects participated in the experiment during any single unit of measure. Overall, 12 subjects participated in the experiment, four male and eight female, ranging in ages from 24 to 33. Ten subjects had completed B. A.'s in human service professions, and two were undergraduate students. Two subjects possessed degrees in behavioral psychology, and two subjects were working on such degrees.
**Procedure**

**Experimental Conditions**

**Baseline.** The Home Supervisor, the client, the Program Coordinator from the agency, and a case manager from the local community mental health board assessed the needs of each client, identified service goals and assigned specific training objectives that were consistent with the service goals and the structured training program of the agency. This "service team" met in bi-weekly planning sessions and discussed the training program of each client at least quarterly. Target dates for completion of each objective were established by the group, and one of the subjects (including the home supervisor involved in the planning) was then assigned to complete the objective with the client. The daily training schedule was negotiated between the subject and the client.

The subject was then required to develop and have approved an intervention plan for each objective assigned. The subject was to work on that objective, recording data regarding the time spent on the objective and major milestones indicating completion of the objective. Upon completion of each training objective, the subject entered the milestone for "objective complete" on the time sheet,
and reported the completion to the supervisor. The supervisor (who in many cases was also a subject) performed a reliability check to determine agreement between the report and the client's behavior. All objectives were considered complete when the subject's supervisor entered the milestone "objective verified" on the time sheet.

Each subject received through the home supervisor a bi-weekly "time allocation report" based upon the time sheet entries for that bi-weekly period (Appendix B). The time allocation report indicated the amount of time spent in a variety of activities with each client; as well as the number of all objectives assessed, verified, or completed. In addition, subjects had continuous access to client files that contained a variety of reports regarding progress toward and evidence of objective completion. The subject's name appeared in all client records for which the subject was responsible. A graph of all objectives completed in each group home was posted in a meeting room at the administrative office of the agency. The graph was visible to all staff, administrators, clients, client's family members, and the agency Board of Directors.

**Bonus Contingent upon Completion.** Bonus contingencies were imposed upon the baseline condition through the use of a memo to the staff of a given home.
The memo stated that there were unexpended funds in the staffing budget, and that the funds would be distributed according to objective completion. Staff were instructed that they would receive $5.00 contingent upon the completion of each objective indicated on the time sheet by the milestone for "objective completion". The bonuses were accumulated through the bi-weekly pay period, and appeared on pay checks in a box marked "other gross". Timesheets were submitted every other Monday, and paychecks were issued the following Wednesday. Subjects received their bonuses, then, from three to seventeen days after objective completion, depending upon the time within the pay period the objective had been completed. To insure prompt payment, bonuses for completed objectives were paid prior to assurance that the supervisor reliability check had occurred.

**Dependent Measures**

Data were obtained from management information system entries, and were computed and summarized on a bi-weekly computer print out for each subject and for each group home. The following dependent measures were obtained for individuals and for the group:

1) total staff hours per week;
3) total training hours per week;
4) total training cost per week;
5) number of timesheet entries per week overall and in training;
6) objectives completed per week;
7) objectives verified per week.

To insure that all objectives were verified by an independent observer, a continuity check for each objective was also printed out to track the verification of all completed objectives. If an objective was not verified within the pay period completed, a reminder to the supervisor was printed.

Experimental Design

Subjects were exposed to the baseline and bonus contingency in a multiple baseline across subjects. The subjects in each home were exposed to each experimental condition as a group. There were five subjects in each group, made up of the staff from each home.
Results

Staff Hours and Costs

The aggregate number of hours worked by subjects (Staff Hours) in each of the group homes is presented in Figure 2. Staff Hours remained stable across conditions throughout the experiment, and showed a slight increase, but no apparent trend. Home A averaged 108 staff hours per week during six weeks of baseline, and averaged 110.7 staff hours per week during twenty weeks of the bonus condition. Home B averaged 111.5 staff hours per week during fourteen weeks of baseline, and averaged 124.9 hours per week during twelve weeks of the bonus condition. The high and low ranges of hours worked also showed no trend. A similar function was obtained for the number of hours per week actually spent in individualized client training, where staff from Home A spent 35.6 hours and 31.0 hours in baseline and the bonus condition, respectively. The staff from Home B spent 23.0 hours and 32.3 hours in client training during baseline and the bonus condition, respectively. Although the mean training hours for Home B increased slightly, examination of the ranges indicates no particular trend.

The costs associated with hours worked are presented
FIGURE 2: Staff hours worked for Home A and Home B as a function of weeks in Baseline and Bonus Conditions. Solid lines represent total hours and dashed lines represent training hours.
in Table 1, and also rose slightly, since pay rates did not change during the experiment. The mean staff costs for Home A averaged $429.98 per week during baseline, and $461.83 per week during the bonus contingency, excluding the cost of bonuses. The mean staff costs for Home B were $473.95 per week during baseline, and $536.93 per week during the bonus contingency, again excluding the cost of bonuses.

The mean cost of individualized client training for Home A was $131.31 per week during baseline and $79.89 per week during the bonus condition. For Home B, the mean cost was $89.67 per week during baseline, and $93.57 per week during the bonus condition. The training cost does not include the cost of bonuses.

**Objective completions and related costs**

Changes in objective completion are shown in Figure 3. While staff hours and costs remained relatively stable across conditions, the rate of objective completion increased for both homes during the bonus condition. The mean rate of objective completion for Home A nearly tripled from 1.17 completions per week during baseline to 3.35 completions per week during the bonus condition. In Home B, the mean rate increased from 1.43 completions
FIGURE 3: Cumulative objective completions for Home A and Home B as a function of weeks in Baseline and Bonus Conditions.
per week during baseline to 3.83 per week during the bonus contingency. The mean rate of objective completion for Home B was stable throughout relative to the bonus condition, while the mean rate of completion in Home A was greater for the first four weeks of the bonus condition than for the following sixteen weeks, as the curve is negatively accelerated. The mean completion rate of 2.21 for the last sixteen weeks of the bonus condition was, however, almost double the baseline rate of completion of 1.17 completions per week.

These increases in objective completion were accompanied by an increased cost due to mean earned bonuses of $16.75 per week in Home A and $19.15 per week in Home B. However, the substantial increase in objectives completed for both homes resulted in a unit cost per objective completion that was substantially lower than baseline in both homes as shown in Table 1. The unit cost in Home A was reduced from $367.50 per objective completion during baseline to $142.86 per completion during the bonus condition, resulting in a savings of $224.64 per objective completion. In Home B, the savings was slightly less, with a unit cost during baseline of $331.43 and a unit cost during the bonus condition of $145.19, resulting in $186.24 savings per objective completed.

Similar relationships were obtained when considering
TABLE 1

Mean cost, training cost, cost of bonuses and cost per week per objective completion associated with baseline and bonus conditions.

<table>
<thead>
<tr>
<th>HOME A</th>
<th>BASELINE</th>
<th>BONUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRAINING COST</td>
<td>$131.31</td>
<td>$79.89</td>
</tr>
<tr>
<td>BONUS COST</td>
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<td>16.75</td>
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<td>OBJECTIVES COMPLETE</td>
<td>1.17</td>
<td>3.35</td>
</tr>
<tr>
<td>OVERALL COST/COMPLETION</td>
<td>367.50</td>
<td>142.86</td>
</tr>
<tr>
<td>TRAINING COST/COMPLETION</td>
<td>112.23</td>
<td>28.85</td>
</tr>
<tr>
<td>OVERALL COST</td>
<td>429.98</td>
<td>461.83</td>
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</table>

<table>
<thead>
<tr>
<th>HOME B</th>
<th>BASELINE</th>
<th>BONUS</th>
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</thead>
<tbody>
<tr>
<td>TRAINING COST</td>
<td>$ 89.67</td>
<td>$ 93.51</td>
</tr>
<tr>
<td>BONUS COST</td>
<td>0</td>
<td>19.15</td>
</tr>
<tr>
<td>OBJECTIVES COMPLETED</td>
<td>1.43</td>
<td>3.83</td>
</tr>
<tr>
<td>OVERALL COST/COMPLETION</td>
<td>331.43</td>
<td>145.19</td>
</tr>
<tr>
<td>TRAINING COST/COMPLETION</td>
<td>62.71</td>
<td>29.42</td>
</tr>
<tr>
<td>OVERALL COST</td>
<td>473.95</td>
<td>536.93</td>
</tr>
</tbody>
</table>
only the costs of direct training. The mean training cost per objective completed in home A was reduced from $112.73 per week during baseline to $28.85 per week during the bonus contingency. In Home B, mean cost was reduced from $62.71 per completion to $29.42 per completion during the bonus condition. These reductions resulted in an $83.38 and a $33.29 savings per objective completion for Homes A and B, respectively. These savings, as with the savings in total costs, above, include adding the cost of bonuses to the staff costs during the bonus condition.

Staff Turnover

No staff turnover occurred in Home B. Staff turnover in Home A did not coincide with condition changes. One turnover occurred in week 11 of baseline, and one turnover occurred in week ten of the bonus contingency. Both turnovers were in the position of Residential Trainer.

Reliability

An independent observer verified 93% of all objective completions during baseline, and 91% of completions during the bonus contingency. Of the 7% completions not verified during baseline, all were eventually verified during the
bonus contingency. For all verifications made, there was 100% agreement that the client could perform the skill according to the pre specified criteria, including those verifications made by the Program Coordinator who was not a subject of the study.
Discussion

The purpose of Experiment 1 was to determine if cost effective behavior change could be obtained through the application of bonuses contingent upon objective completion. The data indicate that for both Homes A and B, cost effective changes occurred. The additional expenditure of less than $20.00 per week on bonuses resulted in an increase in production that "saved" between $33.00 and $83.00 per week in direct costs per objective completed (for funds spent in direct client training), and saved between $186.00 and $224.00 in total costs. These savings were accompanied by increasing the rate of completion to nearly three times that of baseline.

It is noteworthy that although Home A's overall costs increased from baseline to the bonus condition due to a slight rise in staff hours, the modest expense of contingent bonuses paired with a large increase in output, resulted in substantial cost per behavior change savings.
EXPERIMENT 2

Method

Setting

The setting for Experiment 2 was the same as that described for Experiment 1.

Subjects

Subjects were professional and paraprofessional direct care staff in two of the seven group homes operated by the agency. These two homes were selected because their size, staffing patterns, and qualifications of staff were similar. Home D housed six developmentally disabled clients, and Home E housed five such clients. Each home was staffed in the following manner:

1 Full time live-in Resident Manager paid either $9,000 annually or $10,200 annually.
   Qualifications: B. A. in human service profession and one year experience with the mentally retarded, or four years of experience with the mentally retarded.
1 Part time (10 hours per week) Residential Trainer paid $4.00 per hour (during baseline).

Qualifications: Working on B. A. in a human service profession, having achieved at least the third year of study.

1 Part time (25 hours per week) Assistant Supervisor paid $4.50 per hour (during additional staff and bonus conditions).

Qualifications: Working on B. A. in a human service profession, having achieved at least the third year of study, plus at least 6 months experience with the mentally retarded.

In addition to these individuals who comprised the subjects of the study, each group home utilized weekend relief staff who were not a part of the experiment. The program coordinator who supervised the implementation of client training programs was not a subject of the study.

During the course of the study, occasional staff turnover occurred. However, with the exception of brief vacations, illness or holidays, a minimum of four subjects participated in the experiment during any single unit of measure. Overall, six subjects participated in the experiment, one male and five female, with ages ranging from 23 to 29. Four subjects had completed B.A.'s in
human service professions, and one was an undergraduate student. Three subjects possessed degrees in behavioral psychology, and one subject was working on such a degree.

Procedure

Experimental Conditions

Baseline. The Resident Manager, the client, the Program Coordinator from the agency, and a case manager from a local community mental health board assessed the needs of each client, identified service goals and assigned specific training objectives that were consistent with the service goals and the structured training program of the agency. This "service team" met in bi-weekly planning sessions and discussed the training program of each client at least quarterly. Target dates for completion of each objective were established by the group, and one of the subjects (including the home supervisor involved in the planning) was then assigned to complete the objective with the client. The daily training schedule was negotiated between the subject and the client.

The subject was then required to develop and have approved an intervention plan for each objective assigned. The subject was to work on that objective, recording
data regarding the time spent on the objective and major milestones regarding completion of the objective. Upon completion of each training objective, the subject entered the milestone for "objective complete" on the time sheet, and reported the completion to the supervisor. The Resident Manager (who was also a subject) or the Program Coordinator performed a reliability check to determine agreement regarding objective completion. All objectives were considered complete when the subject's supervisor entered the milestone "objective verified" on the time sheet.

Each subject received a bi-weekly "time allocation report" based upon the time sheet entries for the bi-weekly period (Appendix B). The time allocation report indicated the amount of time spent in a variety of activities with each client; as well as the number of all objectives assessed, verified, or completed. In addition, subjects had continuous access to client files that contained a variety of reports regarding progress toward and evidence of objective completion. The subject's name appeared in all client records where the subject was responsible for or was assigned to objective completion. A graph of all objectives completed in each group home was posted in a meeting room at the administrative office of the agency. The graph was visible to all staff, administrators, clients, their family members, and the agency Board of Directors.
Increased Staff Hours. During baseline, additional funding for the two group homes of Experiment 2 was obtained from the State Department of Mental Health, requiring the immediate increase in staff hours. The position of Residential Trainer (paying $4.00 per hour) was immediately upgraded to that of Assistant Supervisor (paying $4.50 per hour) and hours were increased from ten per week to twenty five per week.

Bonus Contingent upon Completion. Bonus contingencies were implemented upon the additional staff condition in the same manner as described in Experiment 1.

Dependent Measures

Dependent measures were obtained in the same manner as in Experiment 1.

Experimental Design

Subjects were exposed to the baseline and bonus contingency in a multiple baseline across subjects. The subjects in each home were exposed to each experimental condition as a group. The two groups were composed of the two subjects from each of the homes. The additional
staff hours condition was imposed upon both homes simultaneously due to constraints imposed by the funding source.
Results

Staff Hours and Costs

The number of hours worked by subjects in both group homes are presented in Figure 4. These data show a slight increase in mean staff hours per week from baseline through intervention. The mean for Home D was 57.9 staff hours per week during nineteen weeks of baseline, and 58.95 staff hours per week for Home E during the same period. Staff hours in Home D increased to a mean of 69.5 hours per week when increased staff hours were available, and Home E increased to a mean of 89.8 hours per week during the same condition. When the bonus contingency was applied to home D, mean staff hours increased further to 79.9 per week. Home D was exposed to the increased staff hours condition for eight weeks and the bonus plus increased staff hours condition for six weeks. Home E was exposed to the additional staff hours condition for a total of fourteen weeks, and was not exposed to the bonus condition.

A similar function was obtained for the mean number of hours per week actually spent in individualized client training, where Home D staff spent 11.0 hours, 18.4 hours, and 27.16 hours in baseline, increased staff hours, and
FIGURE 4: Staff hours worked for Home D as a function of weeks for Baseline, Increased Staff, and Bonus Plus Additional Staffing. Staff hours worked for Home E as a function of Baseline and increased Staff Conditions. Solid lines represent total hours and dashed lines represent training hours.
the bonus plus increased staff hours condition, respectively. The staff from Home E spent a mean of 9.8 hours per week in client training during baseline and 16.0 hours in the increased staff hours condition.

The cost associated with each condition followed a pattern similar to staff hours, and is shown in Table 2. Mean staff cost for Home D was $262.89 per week during baseline, $321.17 during increased staff hours, and $370.78 per week during the bonus and additional staff hours condition, excluding the cost of bonuses. The mean staff cost for Home E was $253.43 per week during baseline, and $370.35 per week during increased staff hours condition. The mean cost of individualized client training for Home D was $47.16 per week during baseline, $84.94 during additional staffing, and $125.37 per week during the bonus plus additional staff hours condition. For Home E, the mean cost was $40.71 per week during baseline, and $68.63 per week during the additional staff hours condition.

**Objective completions and related costs**

The changes in objective completions are presented in Figure 5. While staff hours and costs increased across each condition, changes in the rate of objective completion
FIGURE 5: Cumulative objective completions for Home D as a function of weeks for Baseline, Increased Staff and Bonus Plus Increased Staff. Cumulative objective completions for Home E as a function of Baseline and Increased Staff Conditions.
TABLE 2

Mean cost, training cost, cost of bonuses and cost per week per objective completion associated with baseline, increased staff hours, and bonus conditions.

<table>
<thead>
<tr>
<th></th>
<th>BASELINE</th>
<th>ADDITIONAL</th>
<th>BONUS</th>
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<td>HOME D</td>
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<td>TRAINING COST</td>
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<td>BONUS COST</td>
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<td>OBJECTIVES COMPLETE</td>
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<td>OVERALL COST</td>
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</tr>
<tr>
<td>TRAINING COST</td>
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<td>$68.63</td>
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<tr>
<td>BONUS COST</td>
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<td>0</td>
<td></td>
</tr>
<tr>
<td>OBJECTIVES COMPLETE</td>
<td>0.37</td>
<td>3.79</td>
<td></td>
</tr>
<tr>
<td>OVERALL COST/COMPLETION</td>
<td>684.95</td>
<td>97.72</td>
<td></td>
</tr>
<tr>
<td>TRAINING COST/COMPLETION</td>
<td>110.03</td>
<td>18.11</td>
<td></td>
</tr>
<tr>
<td>OVERALL COST</td>
<td>253.43</td>
<td>370.35</td>
<td></td>
</tr>
</tbody>
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were not consistent between the two homes. Objective completions for Home D decreased from a baseline mean of 1.26 per week to a mean of 0.25 during the eight weeks of increased staff hours. When the bonus contingency was superimposed on the increased staff hours, mean completions increased to 4.17 objectives per week. In Home E, mean completions during baseline were nearly zero (0.37), and increased substantially to 3.79 objectives per week when staff hours were increased. The instability of the data for Home E precluded the timely application of a bonus contingency after the increased hours condition. Although mean completions for Home E were relatively high during the increased staff hours condition, there were no completions in the last five weeks of the fourteen week condition.

The increase of staff hours in Home D resulted in a mean additional cost over baseline of $58.28 per week, while the mean of objective completions decreased. When the bonus contingency was added to the increased staff hours condition, the completion rate increased while staff hours and costs increased a mean of $49.61 over the additional staff condition. The unit cost per completion during the bonus and increased staff hours condition was $93.92, a savings of $114.72 compared to baseline conditions. The cost of direct client training, described in Table 1, increased in greater proportion than did total
costs across each condition for Home D, suggesting that many of the additional hours were spent in client training. The increase in objective completion noted for the bonus condition only partially offset this increase, resulting in a $2.37 savings per unit completion from baseline to the bonus contingency.

The addition of staff hours in Home E had the opposite result from that in Home D. When staff hours were added in Home E, costs increased by $116.92 per week, but the completion rate increased also, resulting in a unit cost per completion of $97.72, substantially lower than the unit cost of $684.95 during baseline.

Similar results obtained for Home E when considering only the cost of direct client training. The cost of training increased from a mean of $27.92 per week from baseline to the additional staff hours condition, but the increase in production resulted in a unit cost savings of $91.92 per objective completion.

Staff Turnover

Upon upgrading and adding additional hours to the Residential Trainer position (the increased staff hours condition), a new staff person was hired in each of the two homes. In addition, during week three of baseline,
the Resident Manager in Home D was replaced.

Reliability

An independent observer verified 89% of all objective completions during baseline, 97% during the increased staff hours condition, and 82% for Home D during the bonus condition. All but two objective completions in Home E were verified by the end of the study, and all completed objectives with the exception of three from the final week of the bonus contingency were verified for Home D. There was 100% agreement that the skill had been learned according to the pre-specified criteria for all objectives verified, including those verified by the Program Coordinator.
Discussion

Experiment 2 resulted from the sudden availability of additional funds that were required to be expended in increased staffing in Homes D and E. The purpose of the study was to compare the effect of this increase in staff hours to the effects of bonuses contingent upon completion with respect to the baseline condition. The results of the increased staffing condition were inconclusive. The increase in staff hours had no positive effect in home D, but had a facilitative effect in home E. When bonuses were applied to home D, in addition to the ineffective additional staff hours, the bonuses substantially reduced the cost per behavior change compared to baseline costs even with the increased overall costs associated with additional staffing. Although the effect of the bonus contingency in Home D supports the results of Experiment 1, there is little conclusion that can be drawn regarding the relative effects of additional staff hours on performance or cost per behavior change.

The effects of hiring new staff and increasing the available hours were confounded in the present study by the increase in pay and qualifications required for the position. The position of residential trainer paying $4.00 per hour during baseline was upgraded to that of
Assistant Supervisor at $4.50 per hour for the remainder of the experiment. The qualifications were also changed from requiring little or no experience to requiring at least six months experience. In fact, when the new position was posted, the undergraduate students in both positions were replaced by people with bachelors degrees and, in one case, considerable experience in the field. Home E received the staff member with considerable experience, possibly resulting in the immediate increase in objective completions.
GENERAL DISCUSSION

If management has the choice of hiring additional personnel and providing bonuses contingent upon completion of objectives, it is clear from Experiments 1 and 2 that providing bonuses is a viable option. The effects of hiring additional staff are, however, not as clear. The costs associated with each choice are very clear. The application of bonuses contingent upon completion cost less than $20.00 per week, while the cost of additional hours and the upgrading of the position cost more than $72.00 per week. In Home E, the results of this investment compared favorably with that of bonus application, raising the production rate from 0.37 completions per week to 3.79 completions per week. However, since in Home D no such result was obtained, it is difficult to recommend increased staffing as a function of Experiment 2. Since the bonus contingency was relatively inexpensive, and the results were more clear cut than the results of increasing staff, the application of bonuses is the best option at this time.

The following sections are a series of topics that warrant discussion, but that do not flow easily from one to another. They are presented in order of importance.
Cost Effectiveness

Experiment 1 and 2 reflect the definition of Krapfl (1974) for the analysis of cost effectiveness, in that cost per behavior change under various alternative staffing strategies were compared, and predictions regarding higher level goal attainment can be made. Experiment 1 evaluated the effect of bonuses versus no bonuses, and Experiment 2 attempted to evaluate the relative value of two staffing levels and the presence or absence of a bonus contingency. As Krapfl (1974) warns, the comparison of the alternative strategies would not have been possible without first setting measurable objectives and then developing a means to obtain cost per behavior change data. Krapfl (1974) also warns that obtaining this level of analysis is extremely difficult. The amount of time and effort devoted to the development of the management information system prior to implementation of the present study bears this out.

Although the present study was not of sufficient duration to do so, the next logical step in the development of cost effectiveness measures would be to empirically analyze the effect of the cost per behavior change differences for bonus and non bonus conditions on the system level objectives of client movement to more independent settings. Such an empirical analysis may
not be necessary, however, given the predictive value of cost effectiveness evaluation when based upon sufficient cost per behavior change data. The structure of the program is such that an increase in client movement to more independent settings can be inferred or predicted from the present study based upon the continued application of the bonus contingency, if the continued application maintains the relatively higher rate of objective completion. The program is structured so that once clients achieve a particular skill level (typically every fifth level) they are eligible for graduation to the next, more independent, group home, and eventually, after progressing through 20 levels, are eligible to move to sheltered apartments sponsored by another agency. Current data regarding client movement to more independent settings averages 10 such moves per year. The continued use of bonuses contingent upon behavior change could produce 25 such moves per year. This projection rests upon an assumption, however, that objective completion and skill level change are the only determinants of client movement. In fact, the vacancy rate of other homes, episodic behavior problems, client preference, family resistance, and barriers to the physically handicapped also influence rate of client movement to more independent settings. Although these factors definitely influence the rate of client movement, the one absolutely necessary criterion
for movement is the skill level of the client. As such, continuation of the bonus condition, with all other conditions being optimal should result in a substantial increase in client movement to more independent settings.

Unit of Measure

Both the direct training cost per behavior change and the total cost per behavior change were valid measures in examining the cost effectiveness of the alternative staffing patterns. Since the primary purposes of the organization are to enable clients to become more self sufficient and to enable clients to become a part of the community, all staff activities other than training are a part of the supportive costs of that training that results in client skill increase and movement.

Role of Instructions

The use of instructions to staff in the form of a memo served the purpose of establishing rule governed behavior. The memo to staff (Appendix B) served as a contract, stating that until further notice, if staff completed objectives, they would receive bonuses. The instructions were also designed to remove some of the
problems associated with bonus delivery that were noted by Pomerleau, Bobrov and Smith (1973). The instructions stated that the funds for the bonuses were limited, and that the contingency would terminate when the funds ran out. This was done to reduce the staff morale problems that could have resulted from different homes (and staff) being treated differently, and from the punishing effects of withdrawal of extra money. However, since the bonuses were never withdrawn, this problem was never encountered.

Quality of Staff

The quality of the staff, in terms of their training and dedication to a human service profession, was quite different than the quality of staff in the Pomerleau, et. al. study. Pomerleau, et. al. worked with psychiatric aides "off the streets" as opposed to the present study, where subjects were persons at the entry level of various human service professions. Although the contingencies maintaining "professional" activities are complex, those contingencies, in contrast to the Pomerleau, et. al. study, appeared to have worked in favor of the present study.
Conclusion

The present study was designed around the criteria established to enable successful competition in the funding climate of today: Goal analysis was utilized to produce specific objectives that could be agreed upon; A management information system was designed around the model of a Total Performance System to develop an effective evaluation system for program staff; The management information system was designed to produce ongoing data regarding costs; And the two experiments performed examined methods to generate staff performance consistent with the agreed upon program goals of the agency. The development of such a system enables the ongoing refinement and analysis of products, processes, and goals to continue to meet the needs of the client and the community.
REFERENCE NOTES


2. Residential Opportunities, Inc. Bylaws, 1977. (Available from Residential Opportunities, Inc., 438 W. South St., Kalamazoo, MI 49007)


5. Residential Opportunities, Inc. A Curriculum for the Achievement of Self-Sufficient Living Skills, 1980. (Available from Residential Opportunities, Inc., 438 W. South St., Kalamazoo, MI 49007)

APPENDIX A: Sample Assessment Criteria

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<table>
<thead>
<tr>
<th>Objective</th>
<th>Assess</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personal Care</strong></td>
<td><strong>121 Will bathe/ shower as often as necessary with no reminders.</strong></td>
<td>Clean appearance and absence of body odor must occur for each of the seven days of observation. No prompting of bathing accepted. If resident smells 2 days into the observation, consider criteria not met and tell him/her to go bathe/shower!!</td>
</tr>
<tr>
<td><strong>123 Will wash hair with shampoo 3 times a week or as often as necessary.</strong></td>
<td>Observe resident for 7 consecutive days. (Weekend included).</td>
<td>Hair shiny and clean appearing with no oily clumps, dandruff not visible etc. For each of the 7 days observed. If resident's hair is atrocious 3 days into the observation, consider the objective not met and tell him/her to go wash it!!!!!!</td>
</tr>
<tr>
<td><strong>115 Will brush teeth after breakfast, dinner, before bed.</strong></td>
<td>Observe resident after breakfast, dinner, before bed for 2 days.</td>
<td>Resident brushes teeth at 3 times listed, $2/2$ times observed.</td>
</tr>
<tr>
<td><strong>113 Will wash face with soap and dry daily.</strong></td>
<td>Observe resident at time of day when he/she washes face (before bed or in the morning), for 2 days.</td>
<td>Resident washes entire face (except eyes and eye area) with soap and dries face at least 1 time per day, $2/2$ times observed.</td>
</tr>
</tbody>
</table>
TO: Program Staff of Douglas House
FROM: Bill
DATE: May 3, 1982
RE: Objective Completion

From previous hiring lags, we are running slightly under budget in the program staff line item at Douglas House. Therefore, starting with last pay period (ending May 2, 1982) and until further notice, staff at Douglas House will receive a $5.00 bonus for every training objective completed. This will be done on an individual basis, so the more you complete, the more you earn.

The bonus will appear on your paycheck in the box titled "Other Gross".
APPENDIX B: Time Allocation Report
## STAFF TIME ALLOCATION REPORT

**Dated:** 1 25 81

### RESIDENTIAL PROGRAMMING

<table>
<thead>
<tr>
<th>Client</th>
<th>Entries</th>
<th>DST</th>
<th>AST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evelyn</td>
<td>1</td>
<td>0:0</td>
<td>0:0</td>
</tr>
<tr>
<td>Gaye</td>
<td>14</td>
<td>3:15</td>
<td>0:0</td>
</tr>
<tr>
<td>Helen</td>
<td>3</td>
<td>0:35</td>
<td>0:0</td>
</tr>
<tr>
<td>Marilyn</td>
<td>10</td>
<td>1:30</td>
<td>0:0</td>
</tr>
<tr>
<td>Margaret</td>
<td>1</td>
<td>0:0</td>
<td>0:0</td>
</tr>
<tr>
<td>Lynn</td>
<td>1</td>
<td>0:45</td>
<td>0:0</td>
</tr>
<tr>
<td>Deb</td>
<td>5</td>
<td>1:15</td>
<td>0:0</td>
</tr>
<tr>
<td>Gerald</td>
<td>5</td>
<td>1:15</td>
<td>0:0</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>0:0</td>
<td>0:0</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>1:30</td>
<td>0:0</td>
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<tr>
<td><strong>Totals:</strong></td>
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### GENERAL ACTIVITY

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<tr>
<th>Activity</th>
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<th>AST</th>
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<tr>
<td>General Staffings</td>
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<td></td>
</tr>
<tr>
<td>In House Staffings</td>
<td>2</td>
<td>2:15</td>
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</tr>
<tr>
<td>Service Team MTGs</td>
<td>1</td>
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<td></td>
</tr>
<tr>
<td>Home Maint</td>
<td>4</td>
<td>2:30</td>
<td></td>
</tr>
<tr>
<td>Group Recreation</td>
<td>6</td>
<td>7:0</td>
<td></td>
</tr>
<tr>
<td>Admin Paperwork</td>
<td>8</td>
<td>4:15</td>
<td></td>
</tr>
<tr>
<td>Staff Supervision</td>
<td>2</td>
<td>1:30</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>17</td>
<td>12:25</td>
<td></td>
</tr>
<tr>
<td>Sick Time</td>
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<tr>
<td>Group Supervision</td>
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### CLIENT RELATED ACTIVITY

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<td>Counseling/Prob Solv</td>
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<tr>
<td>Family Phone Contact</td>
<td>James</td>
<td>1</td>
<td>6:15</td>
<td>6:0</td>
</tr>
<tr>
<td></td>
<td>Tom</td>
<td>1</td>
<td>6:15</td>
<td>6:0</td>
</tr>
<tr>
<td></td>
<td>Evelyn</td>
<td>1</td>
<td>6:15</td>
<td>6:0</td>
</tr>
<tr>
<td></td>
<td>Gerald</td>
<td>1</td>
<td>0:15</td>
<td>0:0</td>
</tr>
<tr>
<td></td>
<td>Ken</td>
<td>1</td>
<td>0:15</td>
<td>0:0</td>
</tr>
<tr>
<td><strong>Totals:</strong></td>
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<td>5</td>
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<td>6:0</td>
</tr>
<tr>
<td>Family Direct Contact</td>
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<td>6:15</td>
<td>6:0</td>
</tr>
<tr>
<td></td>
<td>Evelyn</td>
<td>1</td>
<td>6:15</td>
<td>6:0</td>
</tr>
<tr>
<td></td>
<td>Helen</td>
<td>1</td>
<td>0:15</td>
<td>0:0</td>
</tr>
<tr>
<td></td>
<td>Don</td>
<td>2</td>
<td>1:15</td>
<td>0:0</td>
</tr>
<tr>
<td></td>
<td>Ken</td>
<td>1</td>
<td>0:15</td>
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<tr>
<td><strong>Totals:</strong></td>
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<td>6</td>
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### CLIENT ACTIVITY TOTALS

- Completed: 3
- Verified: 0
- Evaluated: 0

### GRAND TOTALS

- Total Entries: 122
- Total DST: 14:35
- Total AST: 57:15

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Stoerzinger, A., Johnston, J., Pisor, K., and Monroe,


