4-1979

A Behavioral System for Supervising Undergraduate Research

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A BEHAVIORAL SYSTEM FOR SUPERVISING UNDERGRADUATE RESEARCH

by

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A Thesis
Submitted to the
Faculty of The Graduate College
in partial fulfillment
of the
Degree of Master of Arts

Western Michigan University
Kalamazoo, Michigan
April 1979

ACKNOWLEDGEMENTS

Dr. Richard Malott is the most thoroughgoing radical behaviorist and behavioral systems analyst I have known. The quality and breadth of this thesis is primarily a result of his innovative, consistent style of teaching. I am grateful to Mike Dillon, my graduate supervisor and an excellent systems manager. His thesis-advising system defined and maintained my research activities, and his personal, thoughtful supervision guided me throughout all aspects of completing the thesis. I thank Dr. Joel Bowman for teaching me the mechanics and the subtleties of writing and for his frequent, careful editing of many drafts of this manuscript. I appreciate Earlene Gant's patience and sacrifice--and the frequent telephone calls from her work place which encouraged me during a spring and summer of writing. As always, my friend Terry McSween made excellent suggestions and fully supported the systems I designed. Dr. Paul Mountjoy and Dr. Jack Michael made useful comments on the final draft. Finally, I thank the participants --the supervisors and the researchers--whose consent and hard work made this research possible.

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Completion of research projects is difficult. Projects are long term, reinforcement for some aspects is infrequent, and other activities intrude. This study examined a way to overcome such difficulties.

Research involves at least three response classes (Dillon, 1977). First, the researcher generates a research question and design. In preparing for these activities, the researcher may review the relevant scientific literature and analyze the present state of the field. Second, the researcher implements the project. Implementation may involve data collection and manipulation of independent variables. Third, the researcher writes a report of the results, often editing and revising the report to achieve publishable quality.

As part of a training program in a scientific field, university teaching staff can teach these classes of research behaviors to undergraduate students in a laboratory course (Bacon and Malott, 1976). However, laboratory courses may not train all three classes of research behaviors. For example, laboratory setting staff may provide procedures for students to follow, thus failing to teach the students how to generate a research design (Apking, Note 1).

After taking laboratory courses, advanced undergraduate students may conduct larger, more comprehensive projects for "independent research" credit. Typically, these students conduct research under the supervision of a professor or graduate student.

But, in two important ways "independent" undergraduate research may also be independent of procedures that effectively control research activities. First, after students leave the laboratory course,

the research behaviors that course instructors controlled by frequent monitoring and grading may stop unless supervision of independent research duplicates the effects of course procedures.

I conducted a pilot study in the fall semester of 1977 that illustrated the possibility of inadequate supervision. At the beginning of the semester, graduate students who supervised independent undergraduate researchers received written descriptions of research activities that encompassed all three classes of research behaviors. On a weekly basis, they reported to me the number of tasks their researchers completed and failed to complete. As a group, the undergraduate researchers completed 78% of the research tasks assigned by their graduate supervisors.

Second, weak procedures for conducting research may not compete successfully with procedures controlling studying for courses and leisure activities. Frequent monitoring and grading by instructors may control students' course work, and easy-to-gain rewards (alcohol, attention from friends, etc.) may control their leisure activities, while lax or nonexistent procedures fail to control research behaviors.

To control independent research by undergraduate students, I designed a "behavioral supervision system." Dillon (1977) has provided concise summaries of Knezevich's description of a "system" and of Malott's description of a "behavioral" system.

> A system has three characteristics: the setting of goals and objectives; specification of activities and the clustering of these activities related to the goals and objectives; empirically based measurement of outcomes;

> evaluation of the outcomes; recycling through the earlier components to modify the system.
>
> A behavioral system has these characteristics: reliance on functional relationships to explain behavior; specification of the behavior, consequences, and contingencies; observation of the behavior; consequation of the behavior. (pp. 1-2)

The supervision system for undergraduate research and the experiment reported in this thesis comprised a "systematic replication" (Sidman, 1960) of Dillon's (1977) thesis. That is, to extend the generality of Dillon's findings, I repeated some features of his study and introduced some alterations. While Dillon's subjects were M.A. students conducting masters thesis research, the subjects in the present study were undergradute students conducting independent research. Dillon experimentally manipulated two variables: (1) an announcement that letters of recommendation would include (or not include) the total percentages of positive points earned for complete research tasks and negative points earned for incomplete research tasks and (2) the delivery (or not) of weekly reports on the cumulative numbers of positive and negative points earned by the subjects. In the present study, I manipulated one of Dillon's variables, the announcement, but included the weekly performance reports in all phases of the study. While Dillon described a system to control the activities of M.A. researchers, I described a system for the undergraduate researchers and a system for the graduate supervisors.

Dillon's manipulated variables clearly controlled the completion

of M.A. research tasks. To extend this finding, I manipulated only one of the variables, attempted to control the research activities of a different group of subjects, B.A. students, and added a system designed to control supervisory activities of graduate students.

The Supervision System

This supervision system for undergraduate research has four basic features:

1. Written descriptions of all required tasks, criteria for task completion, and systems procedures. The researchers received these written descriptions at the beginning of this study.

Similarly, as part of a study with dormitory residents, Meyers, Artz, and Craighead (1976) described to their subjects the subjects' task (reduction of noise they produced in the hallways), criteria of reduced noise levels, and rewards for meeting the criteria, before starting the described procedures. In another study, Lloyd and Knutzen (1969) suggested specifying criteria for course grades at the beginning of the course to remove ambiguity.

2. Deadlines for completion of required tasks. I provided weekly deadlines for most tasks and less frequent deadlines for some tasks. And, Miller, Weaver, and Semb (1974) reported four nonexperimental studies suggesting that a lack of deadlines produced "a large amount of incomplete and postponed work by students." Malott has stated (1971, ch. 1, p 16), "Some sort of deadlines are (probably) present in situations where people are productive."

3. Rewards and aversives[1] for completing and not completing assigned tasks. In weekly supervisory meetings, the subjects in this study reported progress on completing research tasks, and the supervisors recorded these tasks as complete or not complete on a task-completion form and on a task-completion graph. Also, on a weekly basis, the subjects received performance records on the number of tasks they completed and did not complete for each particular week, and on the cumulative percentages of tasks completed and not completed. And, an announcement stated that, at the end of this study, any requested letters of recommendation would include the cumulative task-completion data for all subjects. (The letters included task-completion data only from the first and last of the three phases of this study.)

For at least two reasons, records of complete tasks may have been rewards, and records of incomplete tasks may have been aversives. First, the performance records are similar to points toward a grade. Points toward a grade (and grades themselves) may already be "learned rewards" (Malott, et al., 1978, p. 6) as a result of pairing with other rewards (money, privileges, or praise). Owing to the shared similarities with points toward a grade, favorable records of research performance may be learned rewards, and unfavorable records (or loss of points toward a grade) may be learned aversives. Second, during the meetings, supervisors may have paired praise with reports

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[1] We tend to maximize contact with rewards and minimize contact with aversives (Malott, Tillema, and Glenn, 1978, p. 6). See Malott, et al, 1978, for a thorough discussion of rewards and aversives as technical, behavioral terms.

of incompleted tasks, the pairing causing the performance records to be more powerful learned rewards and aversives.

Several other studies have used similar combinations in which frequent performance records have resulted in some performance-based reward or aversive delivered at the end of the studies. For example, Meyers, et al. (1976) posted daily performance records on the number of noise occurrences in dormitory halls. When the performance records resulted in money or grades at the end of the study, delivering the records reduced the amount of noise. (Also, the experimenters produced some noise reduction with delivery of the daily performance records, without any money or grades.) In another case, Lloyd and Knutzen (1969) provided biweekly cumulative point distributions to their students and the final cumulative point levels determined the students' grades in the course. With a between-subjects design, Seaver and Patterson (1976) showed that performance records plus a social commendation lowered fuel oil consumption by their subjects more than either performance records alone, or the absence of records and commendations. In an applied behavior analysis laboratory course, Bacon and Malott (1976) posted the number of points earned by their students each day, and based the final course grades on the percentages of total points earned. Interestingly, in a study by Panyan, Boozer and Morris (1970), frequent delivery of performance records alone controlled the number of training sessions conducted by attendents at an institution for retarded children.

4. Weekly meetings between each undergraduate researcher and a graduate supervisor. During these meetings, the supervisors observed the

complete tasks, recorded task-completion data, and reviewed requirements for the next week.

Controlling Research Activities: A Theoretical Analysis

Subjects probably came into this study with a history of control by rules; that is, control by verbal cues[1] describing an act, the occasion upon which it occurred, and its consequences (Skinner, 1969, pp. 147-148, and p. 150). For example, subjects might have been under cue control of a rule describing the relationship between studying regularly, using libraries, and earning course points or eventual grades.

But, to maintain control by rules, the act (studying) specified by the rule must have produced immediate rewards or have avoided immediate aversives, at least occasionally (Skinner, 1969, p. 148). Rewards might have included approval from oneself or others, or control over the course material; aversives, disapproval from oneself or others, or loss of control (Malott, 1973; Malott, et al., 1978).

In this study, subjects' research activities may have come under the control of rules describing the relationship between their research acts and delayed effects of those acts. An announcement made at the beginning of the study described that relationship: all subjects'

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[1] A "cue" is a stimulus paired with a behavioral procedure. (Behavioral procedures include reinforcement, punishment, avoidance, and extinction.) "Cue control" is the control of the likelihood of an act by a cue (Malott, et al., 1978, pp. 102-104).

task-completion data would appear in any letters of recommendation requested by the subjects after the end of the study. An example of a rule statement relating the subjects' research activities to this announcement could have been, "Completing all of my research tasks will produce a favorable performance record in my letter of recommendation, but failing to complete many research tasks will result in an unfavorable record."

The four basic features of the system may have supplemented this rule and made it more effective as a cue for research acts. For example, researchers could have amplified the rule statement with statements describing specific research acts and exactly when to do them, as a result of reading the descriptions of tasks and deadlines. Similarly, the researchers could have made specific statements relating their present level of performance to the likelihood of receiving a favorable letter of recommendation, as a result of the performance records and the weekly performance reviews conducted in the supervisory meetings.

Combining the rule resulting from the announcement with the specific descriptions of tasks, deadlines, and performance levels could have caused the researchers to make elaborate statements that controlled research acts more effectively than the simple rule statement alone. "If I fail to complete a review of this article (a specific task) by two o'clock today (a specific deadline), then the percentage of incomplete tasks will increase (a learned aversive), and I may receive an unfavorable letter of recommendation (the delayed effect)." That statement may have evoked reviewing of an article, while the simple rule statement, "If I go drink beer with my friends now, instead of

reviewing the article, I still might receive a favorable letter of recommendation six months from now," may have only evoked walking across the street to the Knollwood Tavern. To complete the analysis, a consequence for following the first rule could have been self-approval, while a consequence for following the second rule could have been only a small degree of guilt--a few, weak, self-depreciative statements--drowned in beer.

However, a second announcement changed the rules, after eight weeks of this 16-week study. This announcement was that task-completion data over the next few weeks would not appear in the letters of recommendation. That announcement could have become the rule, "Completing or not completing research tasks will not affect my letter of recommendation." Although the statements about the task descriptions, deadlines, and performance records may have continued (or they may not have), putting this new rule on the end of those statements would have weakened their power to evoke research acts and might have decreased performance levels. But, the effects of the performance records may have been somewhat conditional on a statement about the ultimate inclusion of those data in the letters of recommendation: this situation is analogous to announcing in a course that quiz scores would not contribute to the final grade. Would students continue studying under that rule? Probably less. Instead, they might talk about and engage in other activities, activities that produced immediate rewards or escape from immediate aversives, or activities that they could say produced delayed rewards or escape from delayed aversives.

If the second announcement caused a decrease in performances,

re-instatement of the original announcement could possibly increase performances. Four weeks after the second announcement, the subjects heard that, once again, their task-completion data would contribute to the figures reported in the letters of recommendation. This condition continued until the end of the study, three weeks later.

Rule statements relating the subjects' behaviors to recommendations may have been effective cues before this study started because of the relationship in this setting between staff activities and recommendations. At some previous time, all subjects had received assistantships (staff positions earning pay) based, in part, on recommendations by other staff; and they had approved other applicants to staff positions based, in part, on their own recommendations. Certainly, the subjects could describe the relationship between their activities as staff members, favorable recommendations from others, and assistantship positions.

After this study, the subjects may request letters of recommendation for staff positions, and they may also request recommendations for entering graduate school or applying for jobs. Psychology departments heavily weigh recommendations and experience for graduate school applicants; and employers, hiring for jobs related to the subjects' academic training, are likely to request letters of recommendation. Because the subjects' academic histories suggest that staff positions and schooling are rewards, that psychology jobs are likely to be rewards, and that past performances have resulted in favorable recommendations and staff positions, an announcement relating research activities to letters of recommendation may produce rule control of the research acts.

The Research Question

The goal of this supervision system was to ensure that undergraduate researchers steadily completed activities in all three research response classes. And more specifically, this study examined the effects of the announcements that letters of recommendation would either include or not include performance records. These effects were measured in terms of the percentages of specified research tasks completed and not completed by the researchers.

METHOD

Setting

I conducted this study in the Psychology Department of Western Michigan University. The setting within the department was the Student Centered Educational Program (SCEP), an accelerated program for 100 first and second year undergraduate students. Under SCEP, students completed four psychology courses in two semesters.

The staffing pattern was hierarchical. One faculty adviser supervised a Ph.D. student (the Program Coordinator), who supervised five other graduate students, who, in turn, supervised 29 undergraduate students; these graduate and undergraduate students taught the courses.

Subjects

To be subjects, undergraduate students signed a consent form before the start of this study. The consent form described the independent variable and the experimental design, and stated that when I presented the results of my study publicly, I would not identify the subjects' names with their data.

The subjects were eight undergraduate students--six SCEP staff members and two researchers who had no involvement in SCEP other than their research. (However, throughout this report, I refer to all the subjects as "researchers.") Owing to illness, one additional undergraduate staff member dropped out as a subject during the 4th week.

Five of the subjects received college credit for their research projects, two subjects received one-year research grants from the University, and one subject received both the credit and the grant.

All of these subjects were psychology majors with a mean age of 21 years; three were seniors and five, juniors; six were male and two, female. Six of the eight had previously or were currently enrolled in college courses that either taught research design, laboratory skills, or writing skills. Seven of the eight had also been subjects in the pilot study I had conducted in the fall semester of 1977.

Graduate Supervisors

To be supervisors of undergraduate researchers in this study, the graduate students also signed a consent form which included a statement that, when I presented the results of this study publicly, I would not identify the students' names with their data.

The research supervisors were the six graduate student members of the SCEP staff--two Ph.D. candidates and four M.A. candidates in the Applied Behavior Analysis program in the psychology department. As supervisors, all six received college credit. Four were male, and two, female, with a mean age of 25 years. All had taken graduate courses in research design and writing. Because one supervisor had to leave town during the 12th week of this study to take comprehensive exams at a different university, another supervisor assumed responsibility for supervision of his researcher for the last four weeks of this study; leaving that supervisor with three subjects, one supervisor with two subjects, two supervisors with one subject each, and I was a supervisor for one subject.

The four M.A. candidates had been supervisees (researchers) in Dillon's study (1977), and one of the Ph.D. candidates had been a supervisor in Dillon's system. While the other Ph.D. candidate had no previous experience with Dillon's system, all six graduate students had been supervisors in my pilot study.

I was the SCEP Research Component Coordinator, and my dutues included preparation and dissemination of all materials, data collection on performances, and weekly distribution of performance records to the researchers and supervisors.

Research Activities

Tasks

In the initial written guidelines, I assigned "weekly recurring tasks"--which occurred nearly every week--and "periodic tasks"--which occurred infrequently. During the supervisory meetings, the supervisors assigned "non-recurring tasks" nearly every week. The following paragraphs list each of these three groups of tasks and relates them to the three classes of research behaviors described in the introduction and to one additional response class: public presentation.

Weekly recurring tasks. The eight weekly recurring tasks were the following:

1. Attendance at a supervisory meeting.
2. A report of the total hours worked (four hours minimum required).
3. Literature review.
4. Writing on a final report due at the end of the semester.
5. Editing the final report writing.
6. Log recording.

7. Displayed data from the researcher's project.
8. Completion of the researcher's task-completion graph.

In a weekly meeting, the supervisors directly observed attendance at the supervisory meeting and completion of the researcher's task-completion graph, and they observed response products for the other tasks.

Periodic tasks. The ten periodic tasks were the following:

1. A quiz over a written description of the research tasks and procedures.
2. Presentation of a research proposal to a research review committee.
3. A public presentation of the results of the research project.
4. A preliminary research proposal.
5. A final, full proposal.
6. An implementation schedule.
7. A writing schedule.
8. Presentation quality graphs.
9. A second preliminary proposal (for a research project the next semester.
10. A research-system evaluation.

The supervisors directly observed the first three of these tasks and observed response products for the others.

The "Researchers' Guide" in Appendix A describes recurring and periodic tasks and specifies criteria for completion.

Nonrecurring tasks. The supervisor and researcher specified nonrecurring tasks during their meetings. These tasks arose owing to specific aspects of a project. Examples included meeting with others

and preparing handouts for subjects.

Four research response classes. Table 1 categorizes required weekly recurring, periodic, and nonrecurring tasks under headings for the four classes of research behavior; generating a design, implementing the design, writing a report of the results, and presenting the results to an audience. Although possibly not as essential as the first three classes of behavior, public presentation of research findings is often important to the researcher. A receptive audience can constructively identify errors, help establish effective speaking skills, and reward worthwhile research.

Reliability

The supervisors served as primary observers for this study. Their training consisted of reading the written descriptions of tasks and procedures for the supervisors and researchers and taking a quiz over these descriptions. I served as the secondary observer for all supervisors and researchers except myself and the researcher I supervised--for whom my thesis adviser (a Ph.D. candidate) was the secondary observer. To conduct reliability checks on the researchers' and the supervisors' tasks, I attended meetings between supervisors and researchers on an unannounced schedule.

The over-all reliability figure consisted of agreements and disagreements for each task, and for the total number of tasks completed, not completed, and required. When computing the reliability figures, an "agreement" occurred if both the primary and secondary observers scored a task in the same manner--completed, not completed, or not

Table 1

Research Tasks Categorized Under

Four Classes of Research Behavior

Generate Design	Implement Project	Write Report	Present Results
-preliminary proposal -full proposal -review by committee -literature review -nonrecurring tasks: alternate designs, meetings, discussions	-implementation schedule -data reporting -log reporting -nonrecurring tasks: consent forms, writing quizzes, questionnaires, phase changes, reliability	-writing schedule -literature reviews -report writing -editing -presentation-quality graphs -nonrecurring tasks: flow-charts, rough drafts, statistical tests	-committee review -presentation quality graphs -public presentation -nonrecurring tasks: posters, transparencies, speech outlines

applicable--and if both observers scored the same number for the total number of tasks completed, not completed, or required. I used the following formula to compute reliability percentages:

$$\frac{\text{\# of agreements}}{\text{\# of agreements + \# of disagreements}} \text{ X } 100.$$

Letters of Recommendation: Announcements And The Performance Scale

This study examined the effects on task-completion data of announcements that the Program Coordinator for SCEP would include or not include the researchers' task-completion data in any letters of recommendation requested by the subjects after the end of the study. As a way to display the task-completion data in the letters, a performance scale depicted all researchers' task-completion data and a list of the recurring and periodic tasks. A reader of the performance scale could compare a particular researcher's task-completion data with an absolute percentage scale and to the relative performance levels of every other researcher.

At the end of this study, the Program Coordinator received a performance scale for each researcher's personal file (see Appendix B). The performance scale ranges from 0 to 115% in 5% blocks. Each letter (A-H) in the blocks corresponds to a researcher, and two identical letters, each at the proper percentage block in the upper and lower portions of the scale, represent, respectively, each researcher's percentages of complete tasks and incomplete tasks. The letters in the performance scale represent the cumulative data from the first and last

phases of the study only. For each researcher's personal file, I circled the two letters on the performance scale representing him or her.

Experimental Design

The first phase of this study, a "letter of recommendation" phase, was intervention, during which all task-completion data contributed to the performance scale for the letters of recommendation. The second phase, a "no letter of recommendation" phase, was baseline, during which the task-completion data did not contribute to the performance scale. The third phase, a "letter of recommendation" phase, was a continuation of the first phase.

For several reasons, this intervention-baseline-intervention design was best. Starting with the condition considered most powerful--intervention--helped insure that research project activities began early in the semester. Lloyd and Knutzen's (1969) subjects who started more than two weeks late earned "C's," at best, because they did not complete enough of the course requirements before the end of the semester. For this reason, the present study did not begin in baseline.

Ending with the intervention condition helped insure that researchers finished their projects. Because the response requirements for other courses usually increase toward the end of a semester, these competing conditions provided a strong test of the effects of the third announcement on the final research project activities.

With this design, the two intervention phases encompassed most

of the semester. If the announcements worked effectively, this weighting in favor of the intervention condition seemed more profitable for the individual researchers and for SCEP. Together, the above considerations ruled out a baseline-intervention-baseline design. Similarly, a baseline-only condition might have hindered the completion of projects for researchers in a control group of a between-subjects design.

This reversal design assumes that the effects of the intervention are transient--that performance will deteriorate in baseline (Kazdin, 1973). Dillon (1977) used this design and found a deterioration in baseline and a return to a higher level of performance in the second intervention phase.

A multiple-baseline, across-subjects design was unacceptable, in part, because the subjects had frequent verbal contact with each other (Kazdin, 1973). Also, a multiple-baseline across subjects or behaviors suffered from the same problems as the baseline-intervention-baseline design--probable failure of some researchers to complete their projects because of extended baselines.

General Procedures

In keeping with behavior systems analysis (Malott, 1974), I arranged behavioral procedures to control the acts of all participants in the research-supervising system. The following sections describe a system for the researchers, for the supervisors, and for the research review committee. My behavior came under control of a thesis supervising system (Dillon, 1977), and I have arranged similar procedures for my successor.

Researchers' System

Materials. A central file in the SCEP offices contained a three-ring binder for each researcher. Each binder contained the researchers' guidelines, task-monitoring forms, and task-completion graphs.

(a) Researchers' guidelines: A written document described weekly recurring tasks, periodic tasks, observable criteria for the completion of each task, and general procedures relevant to the researchers' system (see Appendix A).

(b) Task-monitoring form: This form cued the supervisors to observe and score the required researchers' tasks (see Appendix C). The form listed each task horizontally across the top of a grid of cells and listed the weekly monitoring dates vertically down the left side of the grid. At the weekly meetings with the researchers, the supervisors observed each required task and scored it by placing the correct "action code" symbol in the appropriate cell of the form. The action codes are the following:

- "completed" (C): The researcher met all the requirements specified in the guidelines or by the supervisor.
- "not completed" (X): The researcher did not meet all of the criteria.
- "recycled" (R): The researcher did not complete a task owing to unusual, uncontrolled circumstances. The supervisor usually reassigned the task.
- "extra task" (C*): The guidelines specified that the researchers could earn a C* by having an additional meeting with a supervisor, writing another literature review, writing another

unit of 200 words on the final report, and editing these extra words. Also, a supervisor could award a C* to a researcher for reporting extra unassigned research activities that the supervisor thought was deserving (such as making additional graphs or writing quizzes).

-"not applicable" (-): The task did not apply that week.

(c) Task-completion graphs: At the weekly meetings, after scoring all tasks, the supervisors marked the two graphs. These graphs showed the weekly number of tasks completed and not completed, and the cumulative percentages of complete tasks (see Appendix D).

(d) Performance record: The Research Component Coordinator for SCEP distributed this form to the researchers each week about two or three days after the supervisory meetings (see Appendix E). The form showed the number of tasks the researcher completed and did not complete for that week, the cumulative percentage of tasks the researcher completed and did not complete, and the median value of the range of all researchers' cumulative percentages of tasks completed and not completed. With these data available, researchers could compare their individual performances with their past performances and with the median performances of the other researchers.

Pre-experimental Phase. (Table 2 summarizes all events described in the next four sections.) In a meeting with all participants the day before the start of this study, I explained the goals and requirements of this study. After the researchers and supervisors agreed to participate and signed consent forms, I made the first of the three phase change announcements--that letters of recommendation would

Table 2

Time Table of Important Events

Design Phases	Week # of This Study	Specific Occurrences
Pre-experiment	0	A group discussion with all of the participants, distribution of consent forms, and announcement of the start of the intervention condition occurred.
Intervention (letter of recommendation)	1	Researchers received three-ring binders with researchers' guidelines, task-monitoring forms, and task-completion graphs. The research review committee began meeting.
	2	I added the supervisors' guidelines to the binders.
	3	I added the supervisors' task-monitoring forms and task-completion graphs to the binders. All participants met and discussed all procedures.
	4	The researchers and supervisors received a quiz over the guidelines.
	5	The University closed due to a blizzard. The researchers and supervisors received performance records for the first five weeks.

Table 2 (continued)

Intervention (letter of recommendation)	6	All aspects of the intervention phase
	7	continued.
	8	Announcement of the start of the baseline condition occurred.
Baseline (no-letter)	9	The researchers began using graphs and receiving performance records designed for baseline conditions.
	10	The University closed for "Spring Break".
	11	All aspects of the baseline phase continued.
	12	
	13	Announcement of the return to the intervention conditions occurred.
Intervention (letter of recommendation)	14	Reintroduction of the intervention phase graphs and performance records occurred.
	15	All aspects of the intervention phase continued.
	16	Distribution of the system evaluations occurred.

include the researchers' task-completion data. I stated that I would distribute the researchers' materials the next day, and I requested that the researchers avoid "hoarding." Hoarding was completing a task during one week, then turning it in for task-completion credit during some succeeding week. The written guidelines repeated the request to avoid hoarding.

Letter of recommendation phase. At the beginning of the 1st week of this phase, the supervisors and researchers started a weekly routine that continued throughout the study: Meeting once a week for a minimum of 30 minutes, the supervisors observed for completion of required research tasks, scored the task-monitoring form, marked the task-completion graphs, discussed the projects with the researchers, and determined the required tasks for the next week.

Since, by the end of the 3rd week, everyone had experienced the system for the researchers (and for the supervisors), I held another group discussion and announced a quiz over the guidelines. (In part, the three-week delay was a result of one researcher not entering the system until the 2nd week.)

The participants completed the quiz over the guidelines during the 4th week. The mean score for the eight researchers was 68%, with a range of 47% to 89%; and for the four supervisors who took the quiz, 71%, with a range of 63% to 84%.

During the 5th week, the University closed because of a blizzard. Although I required supervisory meetings (the only required task) during that week, I discarded the data. The researchers completed many of their normally required tasks, but these tasks counted as extra

tasks (C*)--resulting in a misleading inflated percentage of complete tasks. (The mean percentage of complete tasks was 700% and incomplete tasks was 0.)

Also during the 5th week, I distributed performance records--one for each of the previous five weeks. Subsequently, the researchers and supervisors received performance records weekly. (Distribution did not begin until the 5th week because of difficulties in preparing the materials.) Once these forms were in use, all systems were fully operative.

At the end of the 8th week, in a group meeting, I made the second of the three announcements--that task-completion data over the next few weeks would not appear in the letters of recommendation.

No letter of recommendation phase. During the 9th week, several changes cued the condition of this phase. I replaced the task-completion graphs in the binders from the first phase with graphs designed for the conditions of the second phase. Three features of the new graphs differed from the original graphs: first, they were goldenrod, instead of white; second, "You are in baseline" appeared at the bottom of the page; and third, data from the first phase were absent from the new graphs. Another cue was the performance record designed for the second phase. This form was goldenrod, too, and a paragraph at the bottom of the form explained the "no letter" condition. Only data from the second phase appeared on this form.

During the 10th week, the University closed for "Spring Break," and supervisors did not require research tasks during that holiday.

At the end of the 13th week, I made the third announcement--

that task-completion data for the remaining weeks of the study would, again, contribute to the performance records reported in the letters of recommendation--and distribution of a written notice described this change.

Letter of recommendation phase. Before the first supervisory meeting of this phase, I reinstated the task-completion graphs and performance records from the first phase, and "You are in intervention" appeared at the bottom of the graphs.

The third phase was a continuation of the first phase--not exactly a direct replication of the first phase: the accumulation of task-completion data continued from the end of the first phase into the third phase. In this way, the weekly cumulative performance records accurately reflected the stated conditions of the accouncements: an accumulation interrupted by a "no letter" condition.

During the 16th week, all participants received written evaluations for anonymous ratings of the supervision system and this experiment.

Supervisors' System

The same basic system features applied to the supervisors, too: I specified their tasks in writing, set deadlines for completing tasks, distributed performance records, and monitored their performance by reviewing their task-completion forms. Also on a weekly basis, while reviewing all task-completion data, I wrote notes to the supervisors praising them for following procedures and questioning procedural inconsistencies.

A detailed description of the supervisors' system and data appears in the next sections.

Materials. The supervisors' guidelines described the supervisors' weekly recurring and periodic tasks, observable criteria for the completion of each task, and general procedures relevant to the supervisors' system (see Appendix F). The supervisors' task-monitoring form, task-completion graphs, and performance records were identical to the researchers' forms and graphs.

Before this study began, I explained to the supervisors how to use the researchers' materials, and during the 2nd and 3rd weeks, I added the supervisors' materials to the three-ring binders. (Again, delays past the 1st week in distributing materials occurred because of difficulties perparing the materials.)

Tasks. The supervisors monitored their own tasks and marked the task-monitoring forms and the task-completion graphs during the supervisory meetings with the researchers.

The supervisors' six weekly tasks were the following:

1. Meeting with the researchers.
2. Report of supervisory hours (no minimum requirements).
3. Monitoring the researchers' recurring, periodic & nonrecurring tasks.
4. Editing the researchers' writing.
5. Monitoring the supervisors' own nonrecurring tasks.
6. Marking the researchers' and supervisors' task-completion graphs.

The supervisors' twelve periodic tasks were the following:

1. Schedule a weekly meeting time with the researchers.
2. Take a quiz over the guidelines.

3. Meet with the Research Component Coordinator of SCEP.
4. Complete a systems evaluation.
5. Hand in the researchers' final reports.
6. Assign grades (for those earning credit) to the researchers' projects.
7. Complete a report to the Research Component Coordinator of SCEP.

Also, the supervisors shared with the researchers the responsibility for certain periodic tasks of the researchers:

8. Preliminary and full proposals.
9. Implementation and writing schedules.
10. Presentations to the research review committee.
11. Public presentations.
12. The second preliminary proposals.

Examples of nonrecurring tasks for supervisors included extra meetings, editing, talking with the Research Component Coordinator, and procuring materials (books, articles, forms, and statistical tests).

Letters of recommendation. The faculty adviser received each supervisor's cumulative percentages of complete and incomplete tasks for the entire study for use in requested letters of recommendation. This feature and all other features of the supervisors' system were in effect during the 16 weeks of this study.

Data. For the 16 weeks of this study, the mean of complete supervisory tasks was 96%, with a range of 84% to 102%, and the mean of incomplete supervisory tasks was 5%, with a range of 0 to 16%.

Reliability checks on the supervisors' tasks in ten (9%) of the 108 required meetings with the researchers produced an over-all figure

of 94%, with a range of 60% to 100%. Four reliability checks occurred for one supervisor, three checks for another supervisor, one each for three supervisors, and none for the supervisor who left in the 12th week: all of these checks occurred during the last three weeks of this study.

Research Review Committee's System

Purpose. The six graduate supervisors and one undergraduate researcher composed the research review committee, which reviewed, critiqued, and approved written project proposals submitted by the researchers, before they began their projects. These reviews ensured that the projects did not unduly disrupt the normal routines of running SCEP, and the critiques presumably improved the quality of the project designs.

Routine. The committee operated with a specific routine. On a Wednesday, the committee moderator distributed to each member copies of the research proposals submitted that week. The members read the proposals and wrote comments and questions on review forms (see the review form in Appendix G). On the following Saturday, the committee orally reviewed each proposal with the submitting researcher and supervisor in attendance. During the review, one committee member recorded the committee's decisions for changes under the proper headings of the review form (for example, independent variable, reliability, etc.). Then, after completing the review, the committee either accepted, accepted pending revisions, or rejected each proposal, and gave each researcher a copy of the committee's review form. Finally, each

committee member and the researcher and supervisor completed written evaluations of the review session.

The committee reviewed and accepted five researchers' proposals between the 1st and 11th weeks of this study. As the Research Component Coordinator of SCEP, I had accepted the other three researchers' proposals before the start of this study.

Data collection. In a committee meeting during the 3rd week, the moderator defined the following required tasks for each committee member: (a) meeting attendance, (b) a vocal report that she or he had read the proposals in advance of the meeting, (c) at least two written comments on each proposal review form, (d) a vocal report on preparation time for the meetings, and (e) completion of the evaluation forms.

During each meeting, the moderator collected task-completion data and data from the review evaluations, and I counted the number of proposal changes recorded on the committee's review forms and served as the secondary observer for collecting the task-completion data.

Controlling task completion. In an attempt to control completion of the committee's tasks, the moderator reported the mean percentages of complete tasks for the entire committee in the weekly meeting minutes and distributed a copy of the minutes to each member and to the faculty advisor for SCEP. At the meeting during the 3rd week and at several subsequent meetings, upon the moderator's questioning, the members reaffirmed their agreements to complete the tasks. And often, members praised or mildly criticized one another for completing or not completing tasks.

The moderator ran the research review committee as his research

project. He was a subject in this study, completing his tasks under the contingencies for subjects, and I was his supervisor.

Data. The mean of all complete tasks by the research review committee was 89%, with a range of 82% to 94%. The reliability check produced a figure of 100%. Across all five reviews, the mean number of proposal changes was 7, with a range of 4 to 11. And, the members averaged 35 minutes preparing for each proposal review.

The answers for three (of six) questions from the review evaluations show the positive reactions of all participants to the committee's activities. Across all five reviews, the 35 (100%) responses to the question, "Would you like to see the committee continue?" were yes. On a one to five scale ("clear, sufficient" to "inadequate, confusing," respectively), 28 (80%) of 35 responses rated the committees's technical performances as a "1" or "2". All 33 (100%) responses to the question, "Were the changes (made by the committee) beneficial?" were yes.

RESULTS

The Effects of the Letter of Recommendation Announcements

The announcements that letters of recommendation either included or did not include task-completion data controlled the levels of completion of most required tasks by most researchers.

The total group data show the effects of these announcements (see Figure 1). That is, for the percentage of complete tasks, the mean for the second phase is lower then those of the first and third phases; and for the percentage of incomplete tasks, the mean of the second phase is higher than those of the other two phases. (Figure 1 is the combination of Figures 3, 4, and 5.)

The announcements controlled the research behaviors of subjects 1, 2, 3, 4, and 5 (63% of the subjects) and not of subjects 6, 7, and 8 (38% of the subjects). See Figure 2.

The announcements controlled the frequency of occurrences of the following weekly recurring tasks: writing on the final report, editing of the report writing, literature reviews, data presentations, reports of required hours, and task-completion graph (marking) (75% of the recurring tasks). The announcements did not control meeting attendance and log recording (25% of the recurring tasks). See Figure 3.

Figure 1. Total group data. (Each data point is a mean of all of the individual researcher's weekly percentages of complete or incomplete tasks. For any particular week, the percentages of complete and incomplete tasks may sum to more than 100, because the researchers could complete extra tasks. For this figure and for Figures 3, 4, and 5, the horizontal dashed lines for each phase are means of the data points. For this and all subsequent figures, the solid dots represent the percentages of complete tasks and the open circles represent the percentages of incomplete tasks. Also for all graphs, no data points appear on the 5th week, owing to a blizzard, and on the 10th week, owing to the University's Spring Break.)

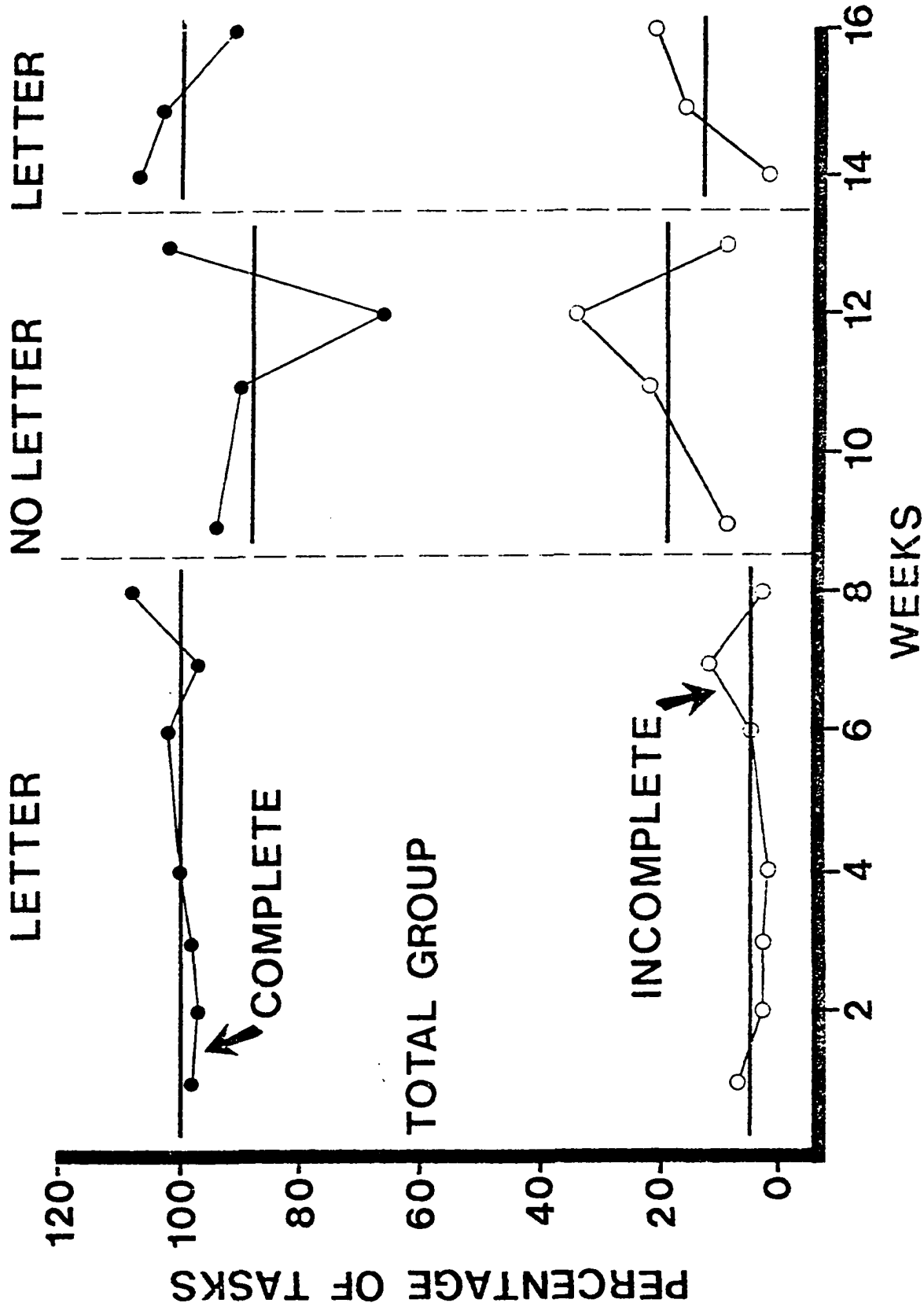
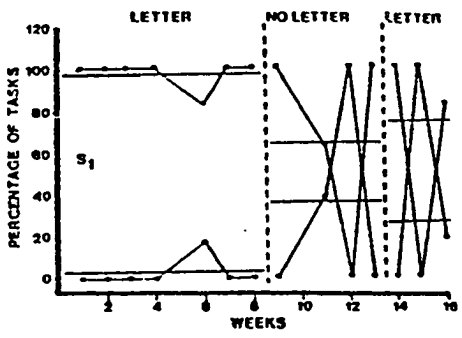
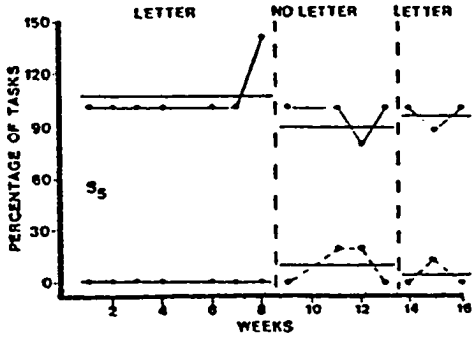
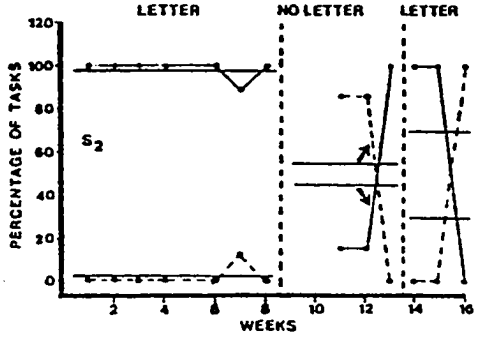
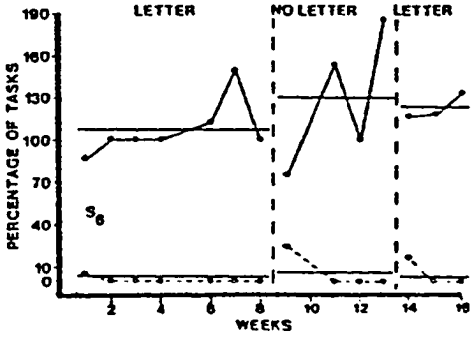


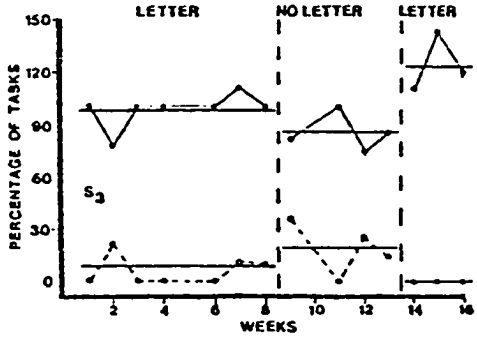
Figure 2. Weekly percentages and phase means of all complete and incomplete tasks for each researcher. (A phase mean is the sum of all complete, or incomplete, tasks in that phase divided by the total number of tasks required in that phase, and each quotient is multiplied by 100.)

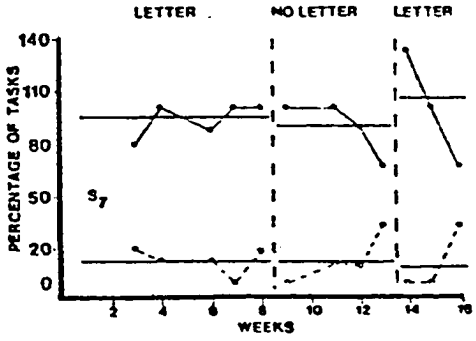


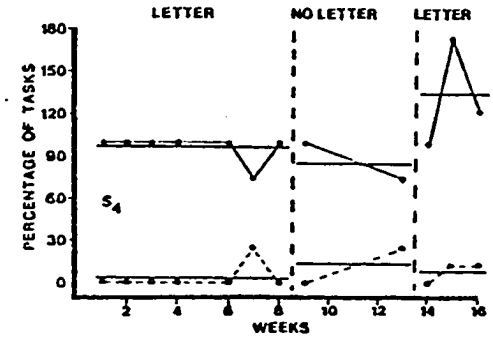












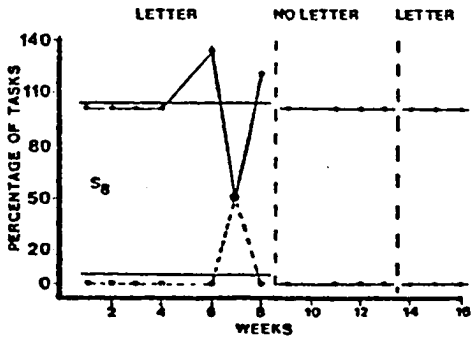
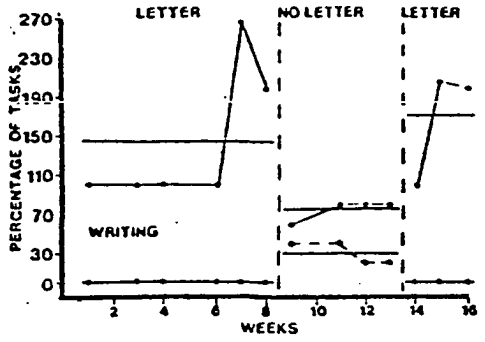
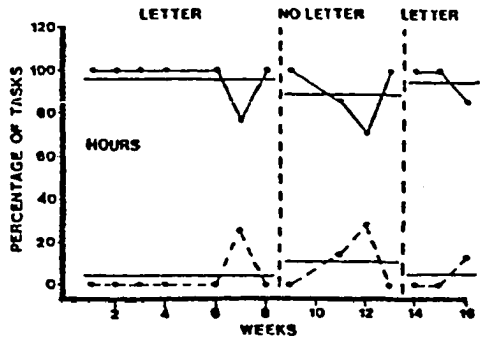
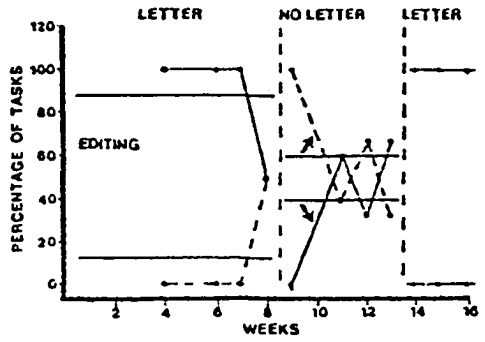
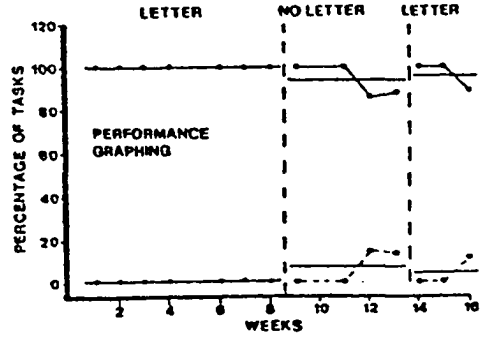


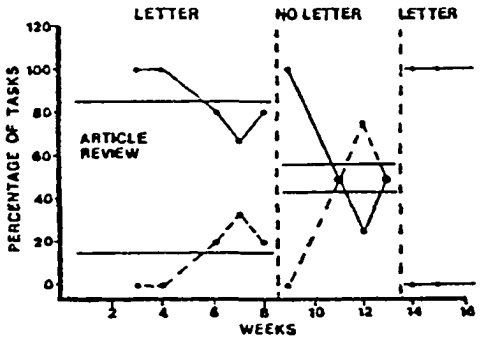
Figure 3. Weekly mean percentages, complete and incomplete, for each recurring task, averaged across the subjects. (The supervisors did not assign tasks for the weeks with no data points.)

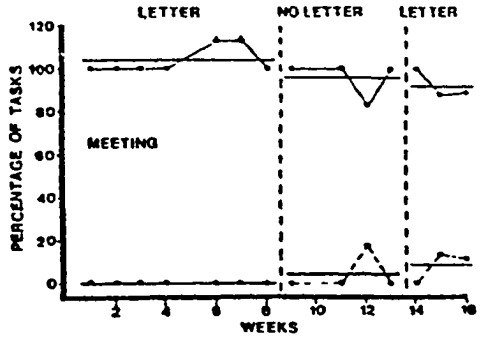


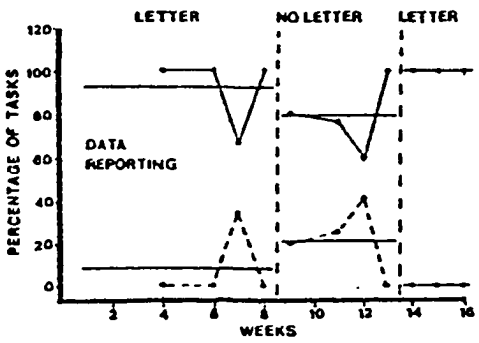


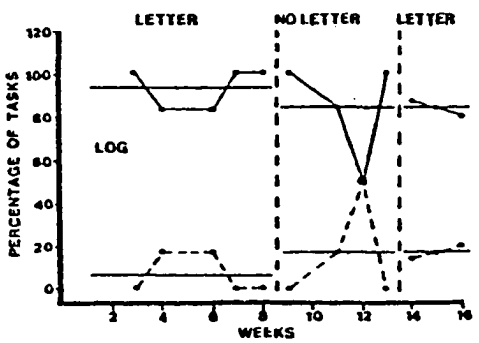












The announcements did not show control for the periodic tasks (see Figure 4), but showed some control for the nonrecurring tasks (see Figure 5). Apparently, the announcements controlled the weekly recurring tasks more than the variety of tasks that occurred rarely or only once.

In summary, the announcements exerted experimental control for 63% of the subjects, 75% of the weekly recurring tasks, and the nonrecurring tasks. The periodic tasks, 38% of the subjects, and 25% of the weekly recurring tasks show no experimental control.

System Evaluations

Five of the supervisors and seven of the researchers completed an anonymous evaluation of the systems during the last week of this study, giving good ratings to most features. Table 3 lists 13 questions and answers (selected from the 112 questions) reflecting opinions about aspects of the study. "Valuable to worthless," one of the rating scales in the evaluation, was designed to discover whether that feature was useful or not useful to the researchers. "Rewarding to aversive," another rating scale, was designed to discover whether the researchers liked or disliked a particular feature.

Figure 4. Weekly percentages and phase means of all complete and incomplete periodic tasks (computed in the same manner as for the total group data). The guidelines did not require periodic tasks during the weeks with no data points.

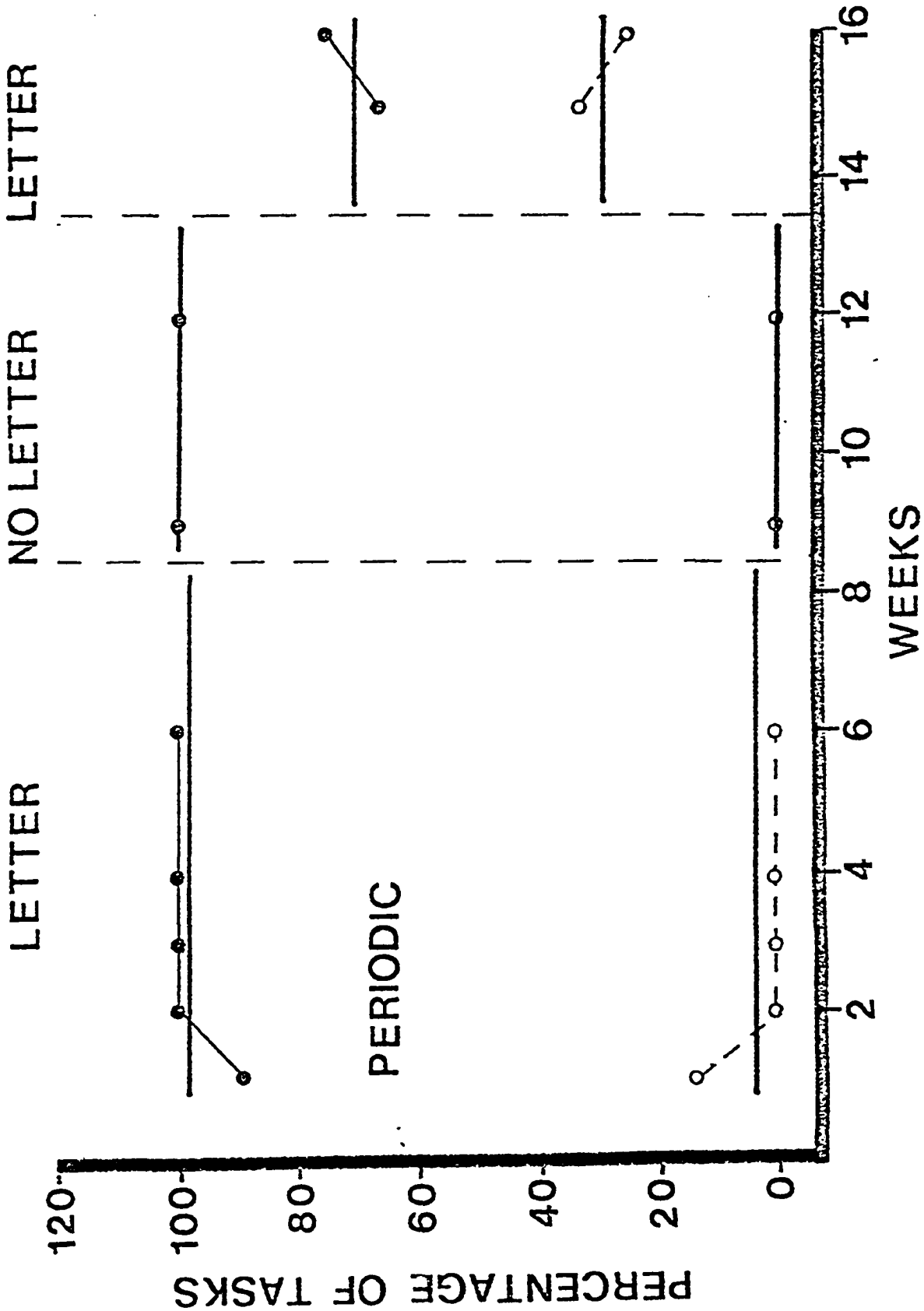


Figure 5. Weekly percentages and phase means of all complete and incomplete nonrecurring tasks (computed in the same manner as for the total group data).

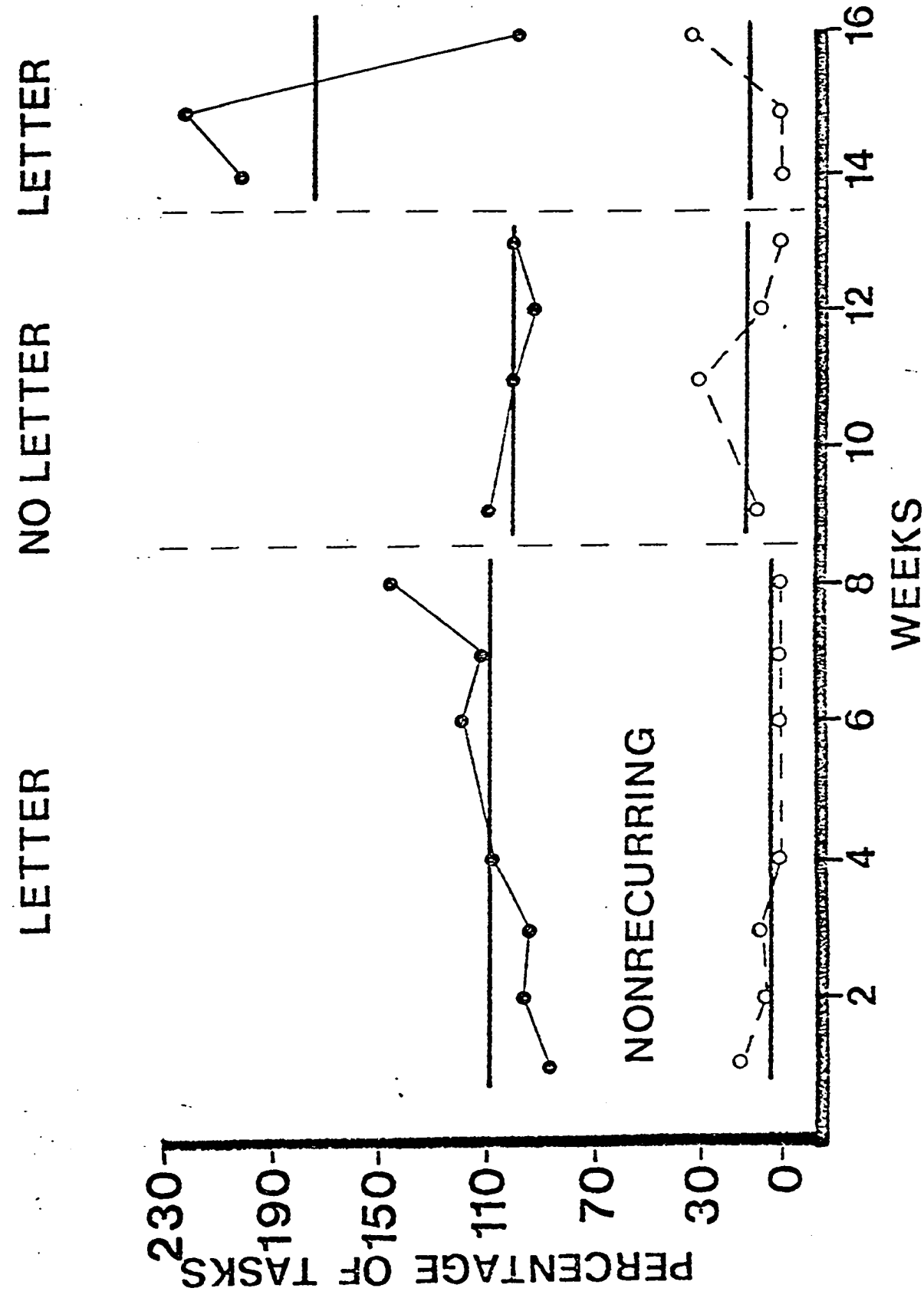


Table 3

Evaluations of the System

Questions	Type of Scale	Percentage Ratings[a] 1	2	3	4	5
Basic Features of the Researcher's System						
written guidelines	"clear to vague"	0	30	50	20	0
strained, at the required pace of the deadlines	yes ("1") or no ("2")	30	70	-	-	-
records of percentages of incomplete tasks	"valuable to worthless"	20	30	40	0	10[b]
records of percentages of incomplete tasks	"rewarding to aversive"	0	11[b]	11[b]	33	44
weekly supervisory meetings	"valuable to worthless"	60	20	20	0	0
Announcements						
letters of rec. include data	"rewarding to aversive"	10[b]	0	40	20	30
Research Tasks						
research proposal	"valuable to worthless"	30	50	20	0	0
weekly presentation of project data	"valuable to worthless"	18	55	27	0	0
final report writing	"valuable to worthless"	56	33	11[b]	0	0

Questions	Type of Scale	Percentage of Ratings 1	2	3	4	5
Experimental Design and Other Problems						
understanding phase conditions and changes	yes or no	91	9	-	-	-
using procedures outside of this system	yes or no	33[c]	67	-	-	-
hoarding	yes or no	10	90	-	-	-
Over-all						
this system vs. no system	yes (this) or no (no)	78	22	-	-	-

[a] All numbers in the table are percentages based on the number of respondents who answered the questions.

[b] This percentage (10% or 11%) represents only one person.

[c] Two researchers set a 90% criterion for complete tasks for an "A" for college credit, and one researcher said that she or he "occasionally used a behavioral contract" for writing on a final report.

Reliability

The mean over-all reliability between the primary and the secondary observers' checks of the researchers' tasks was 88%, with a range of 50% to 100% for the 18 individual meetings in which the checks occurred. Separate reliability figures on the recurring tasks were meeting attendance, 95%; report on required hours, 100%; literature review, 50%; writing, 91%; editing, 89%; log recording, 86%; data presentation, 100%; and task-completion graphing, 94%. The reliability figure for periodic and nonrecurring tasks was 100%.

Reliability checks included 18% of the total occurrences of the researchers' required tasks (that is, 136 of 739 tasks). Seven reliability checks occurred in the first phase, none in the second, and 11 in the third, including three checks for each of two researchers and two checks for each of the other six researchers.

The method of computing the over-all reliability percentage (including all possible agreements and disagreements) contributed to the lowering of the over-all figure. Because I recorded agreements and disagreements on the total number of complete tasks and the total number of incomplete tasks, a single disagreement on a specific task could result in three disagreements: one for that task, one for the number of complete tasks, and one for the number of incomplete tasks. By excluding the agreements and disagreements for the number of complete and incomplete tasks from the computation, the over-all reliability rose to 92%.

Another factor contributed to the lowering of the over-all reliability percentage. During the 7th week of the study, the first occurrence of any reliability checks, five (of 13) disagreements concerned technical requirements: requirements that eased observation, but were not essential to the tasks. For the three recurring tasks--writing on the final report, log recording, and literature reviews--the guidelines specified technical requirements: count the number of written words, write that number at the top of the first page, and circle it. A researcher could have written a section of the final report, a log, or a literature review, but failed to encircle the number of words at the top of the page. When these technical failures occurred, during the reliability checks in the 7th week, two supervisors counted the tasks as complete, but the secondary observer counted them as not complete, resulting in a reliability figure for the four checks in the 7th week of 66%. Late in the 7th week, after the reliability checks, I explained to the supervisors, on an individual basis, that they must meet all criteria defined in the guidelines. Following this, the reliability figure for the three checks taken in the 8th week was 90%, and reliability for all weeks after the 7th week was 94%. In fact, 12 of the 18 total checks were 100%. I did not record that any disagreements occurred on technical requirements after the 7th week of the study.

DISCUSSION

The supervision system did ensure that undergraduate researchers steadily completed activities in the four classes of research behaviors. The researchers designed projects, implemented them, wrote reports about them, and presented them to professional audiences.

The Experiment

This study assessed the effects of an announcement, that letters of recommendation would include task-completion data, on the percentage of research tasks completed and not completed by undergraduate researchers. The experimental design of this study included three phases, with the letter of recommendation announcement in effect during the first and last phase.

Experimental Control of Research Tasks

This study showed experimental control for five of eight subjects, for six of eight recurring tasks, and, to some degree, for the non-recurring tasks. Averaged across individuals, the researchers failed to complete 20.5% (0 to 55%) of the tasks in baseline and failed to complete only 6.6% (2% to 13%) of the tasks in the intervention phases.

By contrast, during the pilot study I conducted in the fall of 1977, the researchers failed to complete 22% (0 to 62%) of their research tasks. But, researchers in the pilot study did not have task-completion graphs, performance records, and the letter-of-recommendation condition of the present study, and supervisors in the pilot

study did not require all of the tasks described in the present study and did not consistently collect or report task-completion data. Also, the pilot study did not include a research review committee. As a result, during the pilot study researchers probably could not clearly state what they were to do, when they were to do it, or how well they were doing.

In another contrast, the performance level of Dillon's (1977) subjects decreased in baseline more than the performance level of the subjects in this study--a 24% loss compared to a 12% loss. For Dillon, the larger decrease may have been because, relative to this study, he required more tasks (for example, attending more meetings and writing more words). Dillon's larger task requirements are reflected by the greater average number of hours engaging in research activities reported by his subjects--13 hours a week compared to 8 hours a week reported by subjects in this study (Note 2). Dillon probably produced a larger decrease in baseline because the intervention procedures were maintaining more behavior, relative to the present study.

Recent data have indicated that another difference between the two studies did not account for the relatively larger decrease in Dillon's baseline. While in baseline both Dillon (1977) and I withdrew the announcements about including task-completion data in letters of recommendation, Dillon also withdrew the performance records. But Dillon has repeated the study, withdrawing only the announcement condition, and still has produced a 20% loss of performance in baseline (Note 2). Apparently, the difference between the studies in baseline procedures did not account for Dillon's greater loss of performance

in baseline.

Failures to Show Experimental Control

Although the data for three researchers failed to show experimental control, all performed well, presumably owing to effects of the system. Subject 6 failed to complete only 6% of the tasks during baseline and 3% during the intervention phases; subject 7, 12% in baseline and 11% in intervention; subject 8, 0 in baseline and 4% in intervention. In respect to the goals of the system, these subjects were successes.

Although the data for two recurring tasks did not show clear experimental control, again performance levels were high. At the worst, failures to make the meeting attendance requirements were only 8% in the third phase. Failures to complete a log were 17% in the third phase. In both cases, the problem was a failure to regain performance levels lost in baseline. In part, reductions in performance during the last week or two of the study may have been due to strongly competing activities at the end of the semester. In addition, the log was probably most useful for recording aspects of implementation, and most researchers had finished implementing their projects before the last two weeks of the study.

Researchers completed almost all periodic tasks until the last phase, then they failed to complete 29% of the required tasks. This effect may have been a result of strong competing activities and an unusually large number of periodic tasks required for the last week (14 vs. a weekly average of 3.6 for all researchers). While competing

activities probably interfered with research activities more strongly during the last few weeks of this study, I cannot guess why only these particular tasks (periodic, log, and meeting) were affected.

Two problems relevant to showing experimental control emerged from the anonymous evaluations of the systems. First, three researchers said that they arranged procedures apart from the researchers' system to control their research acts. These additional procedures may have helped maintain high performance levels across all phases. Second, two researchers stated that they did not realize at first what experimental condition was operating. One person was unsure at the beginning of the study. Possibly, this person was the researcher who, owing to lack of early contact with his supervisor, did not enter the system until the second week. The other person indicated uncertainty about a phase change (he or she did not state which change), but wrote that the uncertainty "did not last long"--probably because the researchers received task-completion graphs and performance records within the first week of a new phase that changed colors from the previous week (phase). Therefore, the conditions of the new phase may not have affected his or her performance for the first week of that new phase.

A third variable relevant to experimental control was the acceptance of all eight subjects' research projects for presentations at the Midwestern Association for Behavior Analysis (MABA) convention --held three weeks following the end of this study. The researchers received acceptance notices about the same time as the start of the second phase, and as a result, may have made statements about the

relationship between their research activities, task-completion data, and favorable or unfavorable presentations at MABA. They talked among themselves and with the supervisors about developing a good design, establishing strong reliability, and, in general, making no mistakes in implementation. As cues and consequences, these statements may have contributed to starting and completing research tasks regardless of experimental conditions.

The Announcements: Advantages

The announcements were useful in three ways. First, they effectively controlled the completion of most research tasks. Second, they were administratively inexpensive: the experimenter merely talked to the subjects. Third, the outcome of the announcements--that is, inclusion of task-completion data in letters of recommendation--sets an example for systems managers to base letters of recommendation on objective records of performance.

Behavior Analysis of Experimental Control

In the first and third phases, the combination of the announcement and the other systems features may have produced rule control of research activities, whereas the announcement in the second phase appeared to have weakened rule control of research activities. And, in fact, most researchers completed (and probably started) a smaller proportion of their tasks during the second phase than during either the first or third phases.

However, two aspects of the researchers' system probably continued

to maintain some research activities during the second phase. First, distribution of performance records continued. Owing to a history of points toward grades as rewards and possible pairing of supervisors' praise with the researchers' reports of completed tasks, performance records may have maintained some research activities. However, as described in the introduction, the effects of the performance records may have been conditional on whether the letters of recommendation would include the task-completion data. Second, the research projects continued. Control of the projects remained as a possible reward for completing research tasks. And, any deteriorations in the project procedures may have produced aversives from the researchers' subjects and other staff members of SCEP.

Another aspect of the study, statements concerning the upcoming MABA convention, may have added to the control of research acts.

The System

Control of Behavior

The total system seemed to control the research activities of the subjects: the worst performance during the first and third phases was by the researcher who failed to complete 13% of the required tasks. By comparison, the worst performance in the pilot study was by the researcher who failed to complete 62% of the required tasks. For another comparison, even in the second phase, the total group of researchers in this study faily to complete only 20.5% of their tasks--1.5% better than the average of the total group in the pilot study.

And the mean of the first and third phases of this study for incomplete tasks was 15.4% better than the mean of the pilot study. (The pilot study included only one phase.)

Evaluative Cost Analysis

Krapfl (1974, p. 245) stated that we can "define successes in terms of desired behavioral or performance outcomes and the inputs (costs) which are available for achieving these outcomes." Although the data from this study are not sufficient to derive an evaluative cost figure, a discussion about the measurement of "success" is possible.

Kowalski and Gant (1977, Note 3) identified the purpose, goals, and measurable outcomes for this supervision system. The purpose of the system was to foster educational technology research, and three of the goals were (1) to teach the four classes of research behavior, (2) to teach supervision skills, and (3) to improve SCEP as an educational setting by applying conclusions based on the research results. Relative to previous pilot studies (fall and winter semesters, 1977), this study moved SCEP closer to meeting objectives under all three goals (especially the first goal): researchers engaged in all four classes of research behavior, the guidelines further clarified the role of the supervisors, and the research review committee's involvement improved the chances of research results affecting SCEP procedures.

The only cost data available on meeting the goals of the system are reports of hours worked. To produce research skills, each

supervisor worked about one hour and the Research Component Coordinator of SCEP worked about three or four hours each week of this study. To manage the supervisors, the Research Component Coordinator worked another one to two hours a week. And, to design research questions useful to SCEP, each research review committee member worked a total of about one hour a week.

In the future, SCEP will probably pay assistantship money to the Research Component Coordinator, but not at much additional cost. In the past, SCEP has paid a graduate student for 10 hours a week to teach an applied laboratory course to 8 to 12 undergraduate students in SCEP. As a result of better programming of this laboratory course and the supervision system, a graduate student could teach the laboratory course and coordinate the supervision system with an increase in time of only about two hours a week. With as many as 20 undergraduate researchers, ranging from sophomores to seniors, under the coordination of one graduate student, SCEP could develop a more comprehensive series of projects than previously possible.

In summary, the system was successful. The main increase in cost--the Research Component Coordinator's time--beyond the cost of the pilot studies was offset by improvements in quantity and quality of research conducted in SCEP.

Social Validation

Participants in a system and the recipients of the participants' outputs should evaluate the system's goals, procedures, and effects (Wolf, 1978; Kazdin, 1977; Malott, 1974). The systems-evaluation

form distributed during the last week of this study produced participants' evaluations of the goals, procedures, and effects of the research-supervising system, and the MABA convention served as an evaluation by recipients of the researchers' outputs (the effects of the system).

Evaluations by Participants

The participants rated highly the over-all system and most of the basic features. They said that they worked harder and more steadily because of the system, and the researchers particularly appreciated receiving guidance when designing their projects.

However, some of the researchers gave low ratings to being compared with the other researchers in the letters of recommendation, and they thought that the aversiveness of data reported on incomplete tasks outweighed any reward value of data on complete tasks.

Evaluation by the Professional Community

As previously stated, the review committee of MABA accepted proposals to present at the convention by all eight of the researchers. During the presentations at the convention, many researchers received requests for copies of their project reports. The acceptance to participate and the recognition received at this convention indicated that the convention staff and participants thought that these researchers conducted valuable research.

As further validation of the supervision system, the MABA review staff accepted this study for presentation at the convention. During

the presentation, I received ten requests for materials from this system. This recognition indicated that the system itself is a contribution to the field of behavioral systems analysis.

Recommendations

Consistent Application

Three factors suggest that more consistent application of the system is possible. First, because participants did not score well on a quiz over the guidelines, they may not have used all the guidelines consistently.

Second, because no reliability checks were taken in the second phase, undetected changes in supervisors' observations of task completions correlated with that phase could have occurred. No reliability checks in that phase and the low total numbers of checks were partly a result of difficulties in scheduling. Often, the six researchers who were SCEP staff members met with their supervisors "some time" during the researchers' two-hour work shifts, and owing to my meetings and classes, I had difficulty covering all of these times to conduct reliability checks.

Third, all features of the system did not begin at the start of the study because I had not prepared all materials. This delay was not intentional and may have produced inconsistent applications of the system during the first few weeks.

Therefore, I recommend occasional quizzes on the guidelines, frequent reliability checks, and implementation of all features at the start

of the study.

Points for Tasks

I recommend assigning point values to the tasks: assign positive points for complete tasks and negative points for incomplete tasks. In this way, aversive or hard-to-control tasks can be worth more points. Dillon (1977) noted that he could not control writing and editing until he raised the point values for writing and editing (thereby arranging for greater point losses for not completing the writing and editing requirements). In this study, because the data on meeting attendance and log recording did not recover from a low baseline, and the evaluations indicated that writing on the final report was particularly aversive, these tasks may require more points than other tasks.

Forms

Malott (Note 4) said, "Thirty percent of the world's problems are solvable by using the correct forms." While the figure may be in jest, the point is that well-designed forms can control some previously uncontrolled behaviors.

Two forms for the log might improve its functions: organizing statements on proposals, aspects of implementation, or writing--depending on the stage of the project. The first form could contain sections normally found in a proposal or final report (such as, subjects, independent variable, and experimental design) and could apply to all three stages of the project. The researchers would record entries

under the appropriate categories. The second form is a calendar on which the researchers could record the exact dates of aspects of implementation (such as, phase changes, when subjects withdrew from the experiment and anomalies).

The task-completion graphs can also be improved. The graphs from this study included a frequency graph of complete and incomplete tasks and a cumulative percentage graph which, however, did not include the percentage of incomplete tasks. I suggest using only a graph of the cumulative percentages of complete and incomplete tasks because this type of graph may depict progress through the semester in a clearer way than the frequency graph.

Delayed Rewards and Aversives

Considering the subjects' histories and the proposed control by rules about the relationship between performance records and favorable letters of recommendation, a similar rule about performance and grades would probably control behavior. Whether a performance-based letter is part of the system or not, performance-based grades could be useful.

Improved Quality

I recommend three steps for insuring higher quality research outputs:

1. An experimenter or system manager should insure that the researchers make the changes and additions to the research proposal requested by the research review committee. The present system

provided no mechanism for this.

2. The manager should provide the supervisors with a checklist to monitor aspects of implementation of the researchers' projects, such as signatures on the consent forms, data collection, reliability, announcements of phase changes, and implementation of new phases. Monitoring implementations may have been a weak aspect of the supervisors' system.

3. The manager should expand editing requirements beyond the present task of monitoring paragraphs for topic sentences and supporting sentences. I suggest an increased use of active voice because APA's publication manual (APA, 1974) recommends greater use of active voice, and an increased use of "free modifiers" and "cumulative sentences" because Tillema (1977) cited Christensen as saying that professional writers cast about 32% of their words as free modifiers and that over half of their sentences are cumulative. (Free modifiers are words set off by commas, dashes, or parentheses from the main clause of the sentence, and sentences with free modifiers at the end of the sentences are cumulative. Because these definitions are oversimplified, the reader should see Tillema, 1977, and Note 5, for amplification.)

Conclusions

All four basic features of the present study may be essential to a supervision system for research: written descriptions of tasks, deadlines, and procedures; specified deadlines; added rewards and aversives for completing and not completing research tasks; weekly supervisory meetings. A research system could also benefit from a

review committee, which could improve the research design of the projects and could help integrate projects into the applied setting.

While the written descriptions may clarify what constitutes research and supervision, and the deadlines and the frequent delivery of rewards and aversives (performance records) may help maintain performance, the supervisors' actions are probably the keystone of the system. As managers, they are responsible for observing evidence of complete tasks and delivering the rewards and aversives. As guides to conducting quality research, their effectiveness may depend, in part, upon giving good "advice" to their researchers: by following the supervisors' suggestions, the researchers produce rewards or avoid aversives other than those added by the supervisors or by the supervision system (Skinner, 1969, p. 148). That is, the researchers' advice-following acts control the project (for example, produce experimental control or a high level of reliability or avoid an unreadable writing style), in addition to earning praise from the supervisor or points toward a grade or a letter of recommendation.

Additionally, the four basic features of this system are probably applicable to any management situation in which supervisees engage in frequent recurring tasks and supervisors can provide weekly monitoring of task completions.

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APPENDICES

Appendix A

RESEARCHERS' GUIDELINES

Introduction

The purpose of the Research Component of SCEP is to provide a system that fosters educational technology research. Some of the goals follow:

1. train research skills
2. train supervision skills
3. produce research results utilized by SCEP.

To help achieve this first goal, we defined many researcher tasks and procedures to control task completion. Hopefully, achievement of these tasks does lead to improved research skills. Similarly, we defined supervisor tasks and related procedures. We increase the likelihood that SCEP utilizes the research results by establishing a Research Review Committee composed of several SCEP assistants. These people help determine topics, approve proposals and review recommendations from researchers. They are in a position to utilize the reported results.

The Researchers' Guidelines describe researcher tasks and the research component procedures. The numbering in the task description corresponds with the numbering on the recurring task form. Read these descriptions carefully. They compose the criteria for determining that you "complete" the tasks. Failure to meet all the criteria will

Appendix A (continued)

earn you an "incomplete" for those tasks.

There are several abbreviated terms used throughout the guides. Here is a list of those abbreviations and the relevant expansions:

1. 'searcher: researcher
2. super: a researcher's supervisor
3. research team or team: the researcher and supervisor together.
4. r/nonr, periodic: recurring, nonrecurring, and periodic researcher tasks. Typically, recurring tasks are weekly, nonrecurring one-time events, and periodic tasks are similar to the recurring tasks but occur less frequently.
5. RCC: Research Component Coordinator (A GA)
6. RRComm: Research Review Committee (who review and approve research proposals).

RESEARCHERS' TASKS

Recurring Tasks

1. Meeting with supervisor:
   a. In Wood Hall on a Monday or Tuesday (A "week" ends with the team meeting) at a specified start time.
   b. On time is no more than 2 minutes late on a WH clock. (If the supervisor arrives later, then simply arriving before the supervisor is satisfactory.)
   c. Stay until at least 30 minutes after the start time (by the same clock).

d. This requirement starts with week one. So, you must meet with your supervisor the first week.

2. Hours:

a. Fill in all blanks on the "hours form". (The bottom row of boxes are for sums of the columns and the GT is the total of the bottom row of hours-time.)

b. The Grand Total must equal at least 4 hours per week.

c. Your first report of hours is required at your second week meeting.

3. Literature review:

a. One review is required per week (at least until you generate 3 that your supervisor approves to go into the introduction).

b. Fill out the top part of the form.

c. Write something under each category (even if it's just N/A).

d. Write a minimum of 100 words. Sum the words, write the total at the top, and circle the number.

e. The first review is required at the second week meeting.

4. Final report writing assignment:

a. Only writing on your final report falls under this category. It must be the writing assignment due that week according to the writing schedule. If you get behind, do double-time.

b. Double-space.

c. Write a minimum of 200 words per week. Sum words, write the total at the top of the first page, and circle the number.

d. Your first writing assignment is due at the first meeting after approval of your project by the RRComm.

5. Edit final report writing:

   a. While the sentence is the basic unit in writing English, it is the paragraph (composed of sentences) that usually expresses the author's point. The paragraph serves a dual purpose: an organizing frame for the writer when preparing her or his ideas and a compact and coherent framework for the reader while reading the material. There really is no further grammatical requirement-- it is a stylistic technique for producing readability.

      The topic sentence is usually the first sentence of the paragraph and introduces the issue or main point. The subsequent sentences in the paragraph elaborate, exemplify, or bring up counter issues, but these are related to the topic of the paragraph. In good writing, each paragraph expresses a complete thought and organizes the written material in an effective way for the reader. The logical flow is further developed for the writer when one writes in this manner.

   b. For editing, use a color different from the original writing. Underline the topic sentence of each paragraph. Place a checkmark at the end of each of the other sentences that agree with the "theme" of the topic sentence. Place an 'X' after sentences that disagree. (The topic sentences should be the first sentence of the paragraph and all other sentences in the paragraph should agree.)

   c. Other self-editing requirements (active voice, first person, and cumulative sentences) may be added later.

d. This requirement begins with the final report writing assignment (#4).

6. Log (and implementation report):

a. The log should list ideas, concepts, notions, procedures, and procedure changes. Statements from your team meetings, from RRComm review, and from other meetings should be included. Ideas from other courses, things that you have read, and self-memos can be entered. Things in your environment that are influencing your study should be listed. Include reasons why any subjects drop out and report this to the RCC.

b. Each weekly log must contain a minimum of 75 words. Sum the words, write the total at the top and circle the number.

c. Put a star by each item relevant to your final report.

d. The first log is required at your first team meeting after implementation.

7. Graph research project data:

a. Once you start collecting and presenting data, you must continue this weekly task--any break must be agreed on the week before. Data must be presented on presentation quality graphs --or tables when appropriate. (Refer to #7 periodic task.)

b. This requirement begins the first week after data collection begins.

8. Complete nonrecurring tasks:

a. Typically, nonrecurring tasks assignments are made at a team meeting and are due (at least a report) at the next meeting.

b. "Completion" is judged by your super. Verbal reports are o.k.

when permanent products are not generated. (For example, an assignment is to ask a professor a question.)

9. Mark 'searcher tasks-completion graph:

   a. Mark the graph of the number of tasks complete and the number of tasks incomplete for that week. In the cells provided, sum to the previous week, the cumulative number of tasks complete and the cumulative number of tasks incomplete. Compute the percentage and mark the graph of the cumulative percentage complete.

   b. This requirement begins at week zero. (If there are zero tasks complete and zero tasks incomplete, make no marks on the graphs other than dashes in the cumulative tasks cells.)

Researchers' Periodic Tasks

Deadlines are marked on the recurring form. The cell for the deadline week is circled. If the researcher completes a task in advance, check that in the cell for that week and put a dash through the circled cell.

1. Quiz over guides:

   Complete researcher quiz in the presence of the super. It's a closed book quiz. Leave the completed quiz in the folder.

2. Preliminary proposal:

   a. Use the preliminary proposal form. Something must be written under all categories (even if it's just N/A).

   b. There must be a minimum of 70 typed words. Sum the words,

Appendix A (continued)

write the total at the top of the page and circle it.

c. You may find two circled deadline weeks. Between the first and the second your super will edit and return it, and you rewrite it (if necessary) for the second deadline.

3. Full proposal:

a. Use the full proposal form. Something must be written under all categories (even if it's just N/A).

b. There must be a minimum of 150 typed words. Sum the words, write the total at the top of the page, and circle it.

c. You may find two circled deadline weeks. Between the first and second, your super will edit and return it, and you re-write it (if necessary) for the second deadline.

4. Implementation schedule:

a. It must be typed. (This is part of the full proposal and is handed to the RRComm along with the proposal.)

b. There must be a deadline for each event.

c. Implementation breakdown (you may add others--depending on your particular project):

1. develop forms and procedures.

2. get informed consent.

3. begin measurement (and get it running smoothly and reliably).

4. begin baseline (or pre-test, etc.).

5. reliability checks.

6. begin intervention.

Appendix A (continued)

7. reliability checks (on IV and DV).
8. follow-up (questionnaire, evaluation, extended post-intervention data, etc.).
9. data analysis.

5. Final report writing schedule:

a. It must be typed. (This is part of the full proposal and is handed in to the RRComm with the proposal.)

b. There must be deadline dates for each event.

c. Writing breakdown (you will want to change the order and may want to break it down further):

APA:

1. introduction and references.
2. method.
3. results and figures.
4. discussion, appendices, and abstract.
5. final report.
6. specify a deadline for at least one re-write for each of the above five.

BSA:

1. analysis and references.
2. objectives.
3. design and implementation.
4. evaluation and figures.
5. recycle, appendices, and abstract.

Appendix A (continued)

6. final report.
7. specify a deadline for at least one re-write for each of the above six.

6. Present to the RRComm:
   a. Hand in 7 copies of the full proposal (and implementation and writing schedules) to Gary or Bob by 9 a.m. Wednesday of the week you present.
   b. Appear before the RRComm the scheduled Saturday at 12:15 p.m. in room 302 (quizzing room) and remain until 1 p.m. or the end of the review--whichever comes first.
   c. On the Saturday that the RRComm reviews the proposal, complete the Research Committee Evaluation Form. Hand in the completed form to Bob or Gary before you leave. This criterion applies to the researchers and supervisors.

7. Presentation quality graphs (or tables):

   Type or use cut-out letters. Do not just print. Follow the six-foot rule: it must be legible from six feet away. (Suggestions: Do not use colors because they will not photocopy. Use large symbols that follow the six-foot rule. Make extra copies of blank graphs. Use a copy for your weekly data presentations to your super.)

8. System evaluation:
   a. Complete the evaluation form.
   b. Hand in at the designated team meeting.

Appendix A (continued)

9. Preliminary proposal for next term:

Same as #2.

10. Public presentation of research:

a. Make two transparencies (one for the data and one that outlines the design) and a written outline of your speech.

b. Present your research at the Systems Innovation Meeting or the SCEP Symposium.

c. Prepare your transparencies and outline far enough in advance that your supervisor can give feedback and changes can be made.

RESEARCHERS' PROCEDURES

Specification

Cues: The cues are the guidelines and the r/nonr form.

Acts: The specified actions are the recurring and periodic tasks specified in the guidelines and on the recurring form. The acts also include the nonrecurring tasks generated by the research team and placed on the nonrecurring part of the r/nonr form.

All work reported for a particular week should be completed in that week. That is, do not complete a task during one week, then turn it in for credit during some succeeding week. This undesirable activity is called "hoarding".

Consequences: On a weekly graph, the team marks the number of complete tasks and the number of incomplete tasks for each week. Also,

Appendix A (continued)

the team marks the cumulative percentage of complete tasks. This graph provides feedback on the researcher's performance.

The number of complete tasks is a quantity measure. You can complete more than the required number of tasks. For example, one assignment is to write 200 words each week. If you write 400 words, you count that as completion of two tasks. This additional work does not reduce future reponse requirements.

Researchers can earn extra task-completion credit on the following tasks: meeting with the supervisor (minimum 30 minutes), 200 words written, editing (on the additional words), and literature reviews.

The number of incomplete tasks is a measure of timing. You are credited with an incomplete task for failing to meet a deadline. Task completions can be "made up" (by doing extra tasks), but credit for an incomplete task is forever.

(One additional "consequence" is described in the following section--"contingencies".)

Contingencies: The procedures include an experimental design. You begin the semester under an intervention condition; at some point, you enter a baseline condition; then, you return once more to an intervention condition. The RCC will place notification of these changes in your folder.

Appendix A (continued)

Under the intervention conditions, the RCC submits your data to Terry McSween, the Program Coordinator. The data are presented in a scattergram showing the number of complete and incomplete tasks and how you stand in relation to other researchers for this semester. When Terry writes a letter of recommendation for you, he will include the scattergram and an explanation. (Any letter of recommendation from Dr. Malott, the faculty advisor, will depend heavily upon Terry's letter.) Probably, you already realize the importance of positive letters of recommendation.

Under the baseline conditions, your supervisor continues to monitor and graph your performance, but your performance data is never released to Terry or Dr. Malott. (Terry and Dr. Malott may see group data on all researchers, but they will never see your data with your name attached to it.) Dr. Malott, the graduate coordinators, and your supervisor do expect you to continue completing tasks during this condition, although the task completion data will not influence the letters of recommendation.

Observation and Consequation

Your supervisor monitors your tasks weekly by marking the appropriate cells on the r/nonr form during the team meeting. She or he consequates your behavior weekly by marking the Researchers Graph, and the RCC reports these data to Terry. At the end of the term, the RCC places in your personal file in Dr. Malott's secretary's office a record of your number of total complete and incomplete tasks

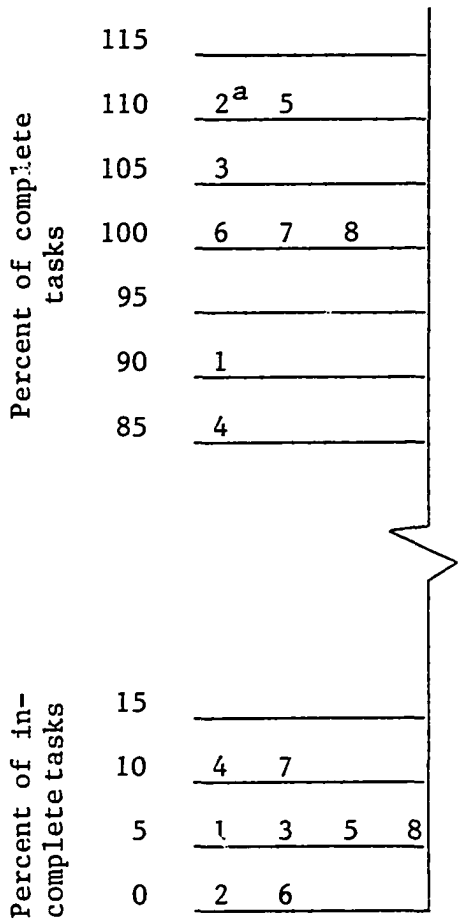
Appendix A (continued)

in a scattergram showing how you rank relative to other researchers. (You will receive a copy, also.)

A researcher may miss a deadline (without earning credit for an incomplete task) if he or she gets consent from the supervisor in advance of that deadline. Mere notification does not qualify as consent.

Appendix B

PERFORMANCE SCALE FOR UNDERGRADUATE RESEARCHERS--SCEP, WINTER, 1978



Weekly Tasks:

1. supervisory meeting
2. report of hours
3. literature review
4. writing on final report
5. editing on final report
6. log
7. data presentation
8. task completion graph

Periodic Tasks:

1. quiz ocer guidelines
2. preliminary proposal
3. full proposal
4. implementation schedule
5. writing schedule
6. presentation before research review committee
7. presentation-quality graphs
8. system evaluation
9. preliminary proposal
10. public presentation

[a] 1-8: Subjects

Appendix C

RESEARCHER'S TASK MONITORING FORM

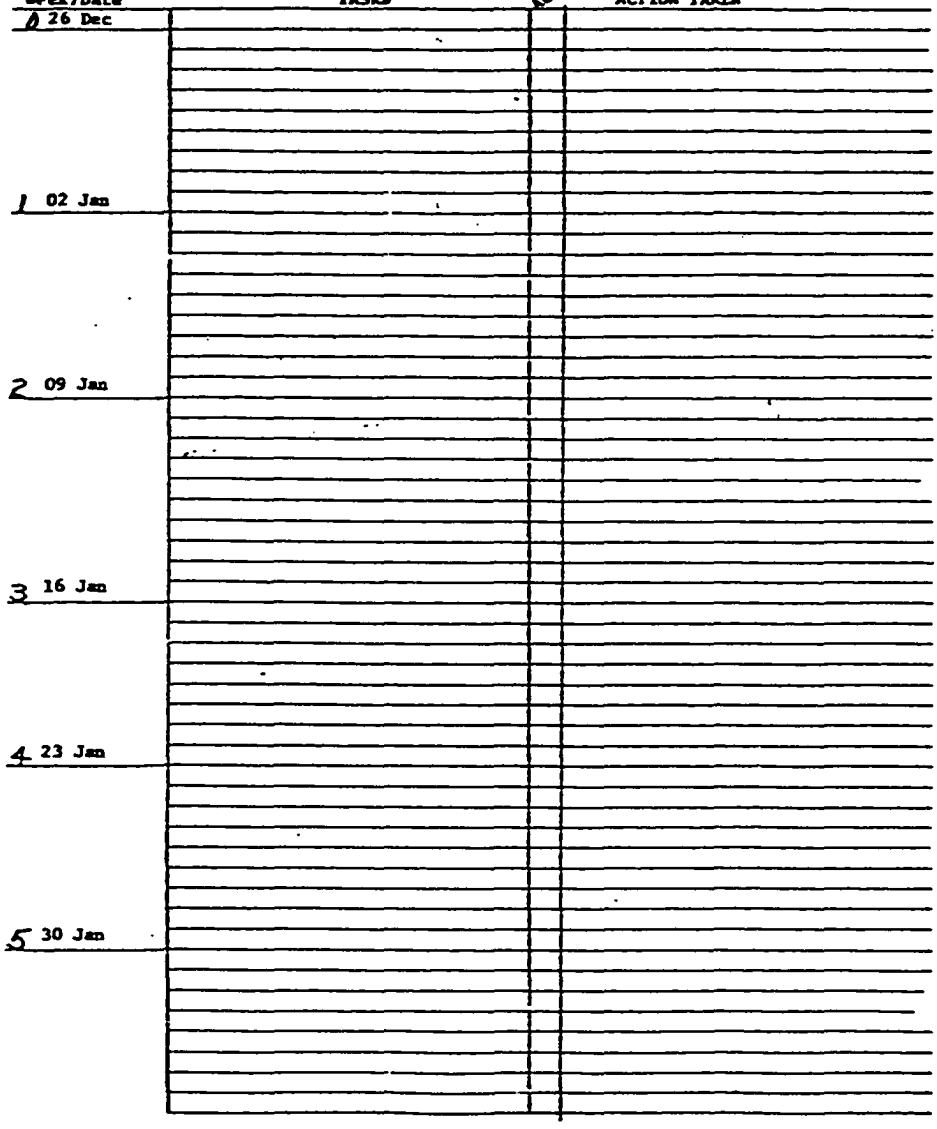
IMPLEMENTATION SCHEDULE	WRITING SCHEDULE

ACTION: CODE -- Completed, C; Not completed, X; Recycled, R;
Extra tasks, C*; Not applicable, -.

		Weekly recurring tasks									Periodic tasks										
	TASK DESCRIPTION	1) meeting	2) hours	3) lit review	4) writing	5) editing	6) log	7) data	8) cont tasks	9) graph	1) quis	2) prel prop	3) full prop	4) implement sch	5) writing sched	6) RRConn	7) graphs	8) eval	9) prel prop	10) present	
	Week/Date																				
Monday Dates	0 26Dec																				
	1 02Jan																				
	2 09Jan																				
	3 16Jan																				
	4 23Jan																				
	5 30Jan																				
	6 06Feb																				
	7 13Feb																				
	8 20Feb																				
Spring Break	9 27Feb																				
	10 06Mar																				
	11 13Mar																				
	12 20Mar																				
24th-no classes	13 27Mar																				
	14 03Apr																				
	15 10Apr																				
22nd last day	16 17Apr																				
	17 24Apr																				

Appendix C
(continued)

NONRECURRING TASKS



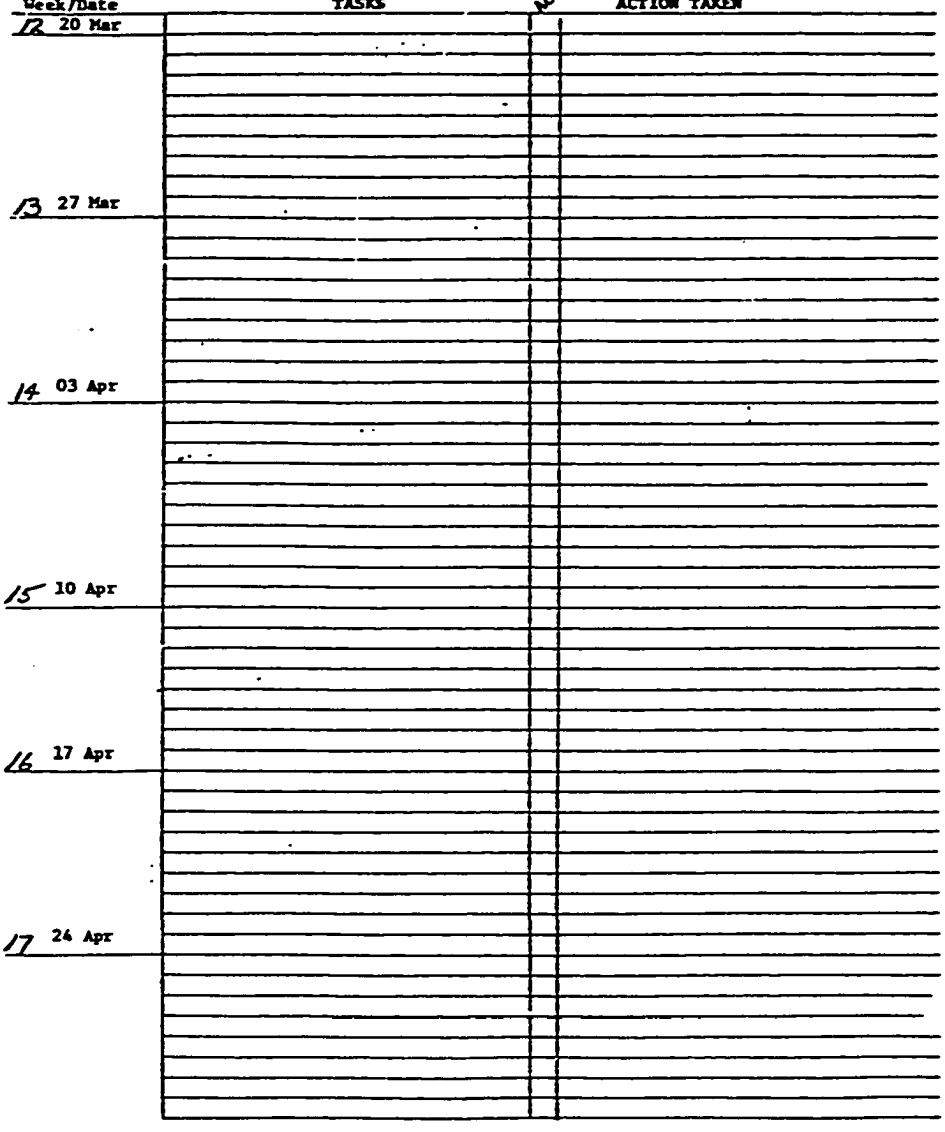
Appendix C
(continued)

NONRECURRING TASKS

Week/Date	TASKS	Action Code	ACTION TAKEN
6 06 Feb			
7 13 Feb			
8 20 Feb			
9 27 Feb			
10 06 Mar			
11 13 Mar			

Appendix C
(continued)

NONRECURRING TASKS

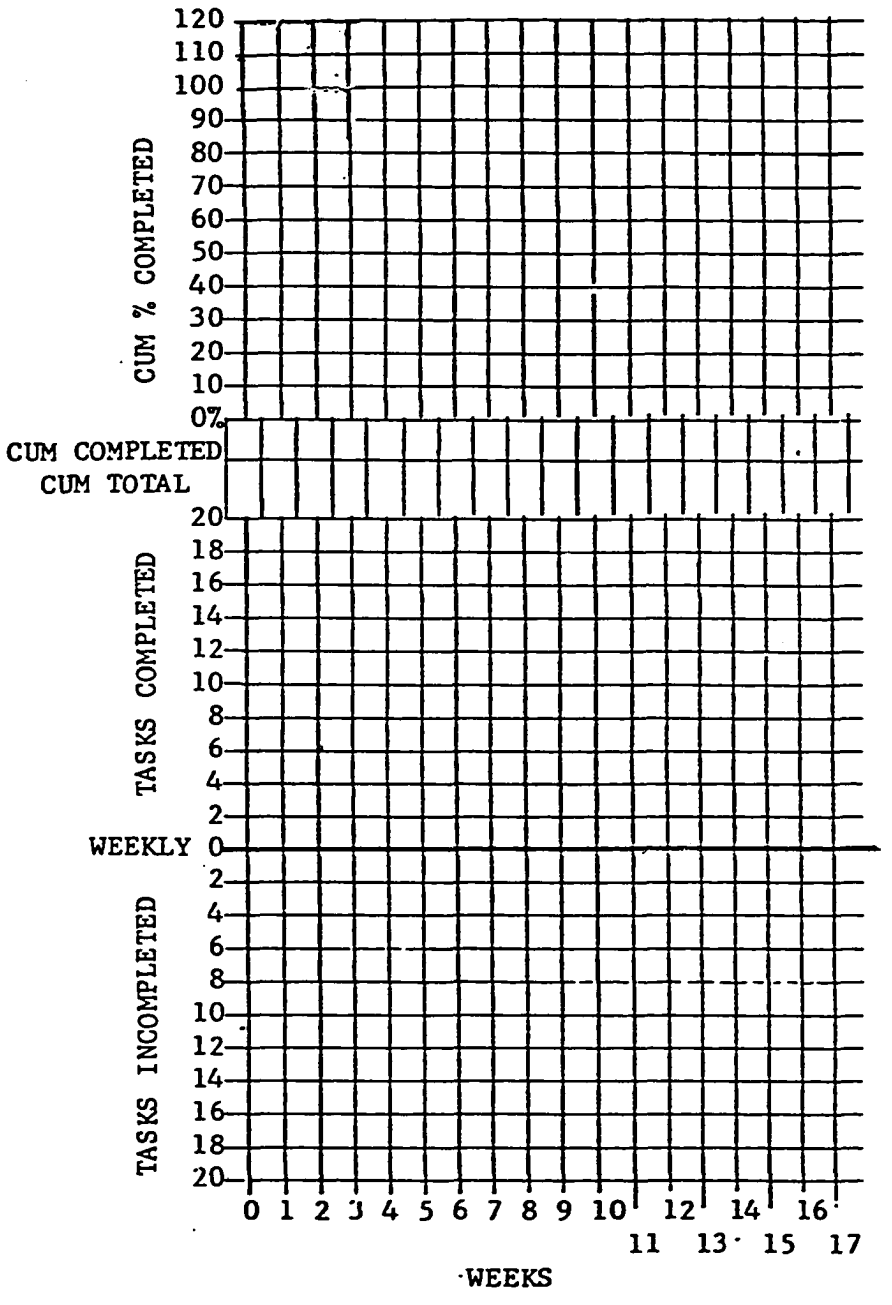


Appendix D

RESEARCHER TASK COMPLETION GRAPH

RESEARCHER _____ SUPERVISOR _____ TERM/YEAR _____

PROJECT TITLE _____



Appendix E

Individual Performance Record

January							
1	X	X	4	5	6	7	Wk 1
8	9	10	11	12	13	14	wk 2
15	16	17	18	19	20	21	wk 3
22	23	24	25	26	27	28	wk 4

February							
29	30	31	1	2	3	4	WK 5
5	6	7	8	9	10	11	WK 6
12	13	14	15	16	17	18	WK 7
19	20	21	22	23	24	25	WK 8
26	27	28	1				

March							
		1	2	3	4		Wk 9
5	X	X	X	X	X	11	WK 10
12	13	14	15	16	17	18	WK 11
19	20	21	22	23	X	25	WK 12
26	27	28	29	30	31	1	WK 13

April							
2	3	4	5	6	7	8	WK 14
9	10	11	12	13	14	15	WK 15
16	17	18	19	20	21	22	WK 16
23	24	25	26	27	28	29	WK 17

Researcher _____ Supervisor _____

This Week:	recurring	periodic	nonrecurring	TOTAL
completed				
incompleted				

Your cumulative % of tasks completed _____

Your cumulative % of tasks not comp _____

Cum. Total Group % of tasks completed _____

Cum. Total Group % of tasks not comp _____

You are in the intervention condition at this time. In this condition your supervisor monitors your task completions. You will receive weekly and cumulative records on your performance and cumulative records on the total group's performance. Only under this condition will your task-completion data contribute toward a letter of recommendation from Terry McSween.

Appendix F

SUPERVISORS' GUIDELINES

Supervisors' Tasks

Recurring Tasks

1. Meet with researcher:
    a. This requirement is the same as the #1 recurring task of the researchers, "meet with supervisor." Consult the Researchers' Guidelines.
    b. Meet with your researcher(s) the first week of the term to go over the guidelines and familiarize yourself with the descriptions.
    c. Talk with the Research Component Coordinator (RCC) if you can't arrange your meeting time for Monday or Tuesday. Basically, we want all team meetings to occur in a two-day period, and it doesn't really matter what two days.

2. Hours:
    a. Write your actual time in the hours cell. Use fractions (such as 1 1/4, 1 1/2). You will probably put in one to two hours per week.
    b. When the researchers report hours, write the time in the hours cell on their form (as you have done with your own).

3. Monitor researchers' recurring tasks:
    a. Review each task area identified on the r/nonr form and

Appendix F (continued)

determine whether the researcher has completed each.

b. Using the "action code", record your determinations on the researchers' r/nonr form.

c. How to use the action code:

-"C": Credit the researcher for a "complete task".

-"X": Credit the researcher for an "incomplete task". (This holds true whether the task is actually "incomplete" or even "not done".)

-"-": Use the "not applicable" symbol when you have consented in advance to a missed deadline, or, in the case of a periodic task, it was completed during some earlier week.

-"R": Use the "recycle" symbol for incomplete tasks beyond the control of the researcher. These tasks are usually re-assigned. For example, a nonrecurring task is to talk to someone who, it turns out, is not in town. On the other hand, if the assigned person was simply out of his or her office, and the researcher failed to check back again, that is an incomplete. Additionally, you may score an "R" along with a "C" for cases in which you give the researcher credit for completing the task, the best he or she could, and yet you re-assign the task for future work. For example, a writing assignment meets the criteria specified in the guidelines, but you edit for other changes.

Appendix F (continued)

In summary, a "C" counts as a complete task, an "X" as an incomplete task and the other symbols, "-" and "R", do not count toward the task-completion data.

4. Monitor researcher's nonrecurring tasks:

   a. When assigning a nonrecurring task, be sure to specify criteria for completion of the task and a deadline date. Your next weekly meeting would usually be the latest possible deadline.

   b. Monitor this item in the same manner as the 3rd task (monitoring recurring tasks). Place the action-code symbol in the designated box on the nonrecurring portion of the form.

   c. You may credit your researcher with a "C" for reporting research activities that are relevant, but were not assigned. You must determine whether the reported activity deserves this special credit. Write a description of the activity into the nonrecurring "tasks" box, score a "C", placing a star (*) next to the "C", in the action-code cell. Also, you can place a star next to a "C" for tasks completed before the specified deadline. So, the "*" is a new symbol used in conjunction with a "C" to indicate tasks that were not assigned or were completed in advance of the deadline.

5. Return edited final report writing:

   To score this task as completed, you must meet two criteria. First, return the edited writing within 48 hours of receipt. Second, your editing must include at least 25 written words.

Appendix F (continued)

6. Monitor completion of supervisors' nonrecurring tasks:

   a. This is a prompt to monitor your own nonrecurring tasks. Enter the appropriate symbol in the action-code cell.

   b. There is a diagonal line across the middle of the appropriate cell on the recurring side of the form. Write in the number of tasks completed over the number assigned. Score the researchers' nonrecurring tasks the same way. When counting the number of complete tasks, include all complete nonrecurring tasks. (For example, three nonrecurring tasks count as three --not one. Two incomplete tasks count as two--not one.)

7. Mark the researchers' task-completion graphs:

   a. For each week, count the number of complete and incomplete tasks. At the appropriate week on the bar graph, draw vertical columns for the number of complete and incomplete tasks and draw a horizontal slash at the end of the columns. (There is a sample graph in the folder.) It would be nice to use two colors. Make no mark if the count is zero.

   b. There are two rows of boxes just below the percentage graph: cumulative complete and cumulative total. By adding each week's numbers to the cums, you can easily figure the cumulative percentage and mark that graph with a dot (and connect the dots). If the count is zero, do not mark the graph and do not connect the prior dot to the dot for the next week, but do bring the previous cums forward.

Appendix F (continued)

8. Mark the supervisors' task-completion graphs:

Follow the instructions under task #7. A reminder: monitor all tasks (researchers' and supervisors') and mark r/nonr forms and graphs in the presence of the researcher.

Periodic Tasks

1. Set meeting time with the researchers:

a. Organization of the system is easier if all teams meet over the same two-day period. I suggest Monday and Tuesday, so try for that, but it doesn't really matter which two days. Also, I suggest avoiding very early in the morning and late at night. (I need to do reliability checks on the meetings.)

b. So, set a regular meeting time and tell the RCC what it is. Also, schedule a meeting for the first week--even though your regular time may be on a Monday or Tuesday. You and the researchers need to go over the guidelines, the forms, graphs, and deadlines. Negotiate changing deadlines with the RCC.

2. Quiz over the guidelines:

Complete the quiz on the supervisors' guidelines in the presence of a researcher. It is a closed-book quiz. Leave the completed quiz in the folder.

3. Meet with the RCC:

Schedule a time (by the end of the deadline week). We have this meeting to discuss the procedures, deadlines, etc. If the

Appendix F (continued)

researcher is earning credit, let's talk about criteria. Let's make sure we get it all together--with agreement.

4. through 8. Proposals and presentations:

We consider both team members responsible for the completion of these tasks: preliminary proposal, full proposal, implementation schedule, writing schedule, and presentation to the RRComm. Consult the Researchers' Guidelines for details.

9. Systems evaluation:

Complete the evaluation form. Place it in the folder at the team meeting designated on the r/nonr form.

10. and 11. Public presentation of the researchers' projects and next term's proposal:

We consider the team responsible for these items. Consult the Researchers' Guidelines for details.

12. Researchers' final reports:

a. Again, you are partially responsible for the report.

b. Give a copy of the report to Carole Newkirk or Barb Fulton. This must be done or the researcher will not get credit for the project. Make sure the researcher keeps a copy.

c. Give a copy of the abstract to the RCC of SCEP.

13. Researchers' grades:

a. If a researcher is enrolled for credit, give Carole the grade

Appendix F (continued)

before the deadline for grades. Talk to the RCC about criteria for grades.

b. The Rcc will deposit the researchers' task-completion data on file. You may add additional comments, if you wish.

14. Report to the RCC:

a. The team folder and all contents go to the RCC. You can simply put the following comments in the folder. Please make reports for each researcher.

b. The report consists of the researcher's topic, length of the project (in weeks), the total number of the researcher's and the supervisor's hours, costs, grade (A, etc.), title (CA, etc.), level (junior, etc.), gender, and race.

Supervisors' Procedures

Specification:

Cues: The guidelines and the r/nonr forms are the cues.

Acts: The specified actions are the recurring and periodic tasks described in the guidelines and on the recurring form. Also, acts include the nonrecurring tasks generated by the research team and placed on the nonrecurring part of the r/nonr form.

Consequences: On a weekly graph, the team marks the number of the supervisors' incomplete and complete tasks. Also, the team marks the cumulative percentage of complete tasks. This graph provides feedback on the supervisors' performance.

Appendix F (continued)

At the end of the term, the RCC will place all the supervisors' task-completion data and task non-completion data on a scattergram. This scattergram and a cover letter that explains how to read the scattergram, identifies which mark is yours, and lists of the tasks will be placed in your personal file. A letter of recommendation from Terry McSween or Dr. Malott will include the scattergram and cover letter.

Each week, the RCC will hand out a feedback form for each supervisor. The completed form displays your weekly and cumulative performance and the weekly and cumulative performance for the group of all supervisors.

Contingencies: Supervisors are not under an experimental design. All data across the term will contribute to the scattergram. The RCC will hand out feedback forms every week.

Observation:

The RCC will review all researchers' folders each week. The task-completion data for researchers and supervisors are collected. Also, the RCC will sit in on meetings between the supervisors and researchers occasionally to conduct reliability checks on the supervisors' monitoring.

Appendix G

SCEP RESEARCH REVIEW COMMITTEE DECISION FORM

Researcher_____ Supervisor_____

Research Title_____ Review #_____

Review Date(s)_____ Final Approval Date_____

Reviewer:_____

Categories of Consideration

✓ = Approve
X = Rework

(1) Research Question:____-_____

(2) Dependent Variable(s):_____-_____

(3) Independent Variable(s):_____-_____

(4) Design:_____-_____

(5) Data-Collection:_____-_____

(6) Reliability:_____-_____

(7) Subjects:_____-_____

(8) Settings:_____-_____

(9) Confounding:_____-_____

(10) Disruptions:_____-_____

(11) Consent Form(s):_____-_____

(12) Misc.:_____-_____

Activities researchers can start immediately:_____

Outcomes to include in final report:_____

Committee's formal decision (accept, accept pending minor revisions, accept pending major revisions, reject):_____