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Component Analysis of a Behavioral-Supervisory System for Masters- and Doctoral-Level Research

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COMPONENT ANALYSIS OF A BEHAVIORAL-SUPERVISORY SYSTEM FOR MASTERS- AND DOCTORAL-LEVEL RESEARCH

by

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COMPONENT ANALYSIS OF A BEHAVIORAL-SUPERVISORY SYSTEM FOR MASTERS- AND DOCTORAL-LEVEL RESEARCH

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This project describes a structured approach to the supervision of M.A. theses and Ph.D. dissertations. The main components of this supervisory system are: weekly (a) specification of tasks and performance standards, (b) meetings with a supervisor (either faculty or doctoral student), (c) deadlines, (d) feedback, and (e) added incentives in the form of a point system to be included by the student's faculty advisor in any requested letters of recommendation. In seven experiments, the students' research performance was highest when all components of the supervisory system were present; it deteriorated as each major component was removed. Compared to more traditional supervisory approaches, this system produced a greater percentage of graduates in a shorter length of time, and with research-projects rated as comparable in quality. The amount of faculty supervision time was about 5 hours per week (with a total of 12 supervisees). The participants in this system highly valued their involvement.

ACKNOWLEDGEMENTS

With apologies to Fred Skinner and Tom Gilbert, my professional knowledge and skills have been most influenced by Jack Michael (in the area of behavior analysis) and Norm Peterson (in the area of performance engineering). With apologies to no one else though, I especially thank Dick Malott for his supervision in the area of "dealing with it"--that is, accomplishing important, long-range personal and organizational goals. This research reflects the contribution and value of Dick's approach to improving human performance. In addition, I thank Art Snapper, Cheryl Poche, and Art Falk for their comments on an earlier draft of this project, and Brad Huitema for suggestions on the statistical analysis.

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CHAPTER I

Introduction

Educators and administrators have been concerned with the success rates, attrition rates, and length of time in the program of graduate students (Berelson, 1960; Heiss, 1970; National Science Board, 1969; Spurr, 1970; Wilson, 1965). Generally, these authors agree that not enough matriculated students graduate, that those who do graduate take a long time, and that too many students drop from their program without a degree.

The authors also suggest a number of improvements in graduate training procedures and recommend their implementation and evaluation. A frequent and strong suggestion is that the graduate student's major advisor should provide structured supervision and guidance in the form of regular consultation meetings (Benet, 1977; Berelson, 1960, p. 235; Heiss, 1970, p. 284; Spurr, 1970, pp. 132-133; Seeman, 1973; Spriestersbach & Henry, 1978). According to Heiss (1970, p. 222), "nearly 80% of the students reported that advisors failed to schedule regular meetings for the purpose of checking the candidate's progress or needs." Seeman (1973, p. 905) recommended a research-supervisory approach in which "structure and accountability are clearly defined and (faculty advisor) involvement is high." Benet (1977, p. 384) suggested regular meetings between the student and advisor to discuss the following issues--defining a research problem, implementing and writing the research, coursework and other requirements, and

professional and personal growth and development. (It should be noted that the above reports are not experimental studies; the authors' recommendations are based on descriptive statistics of student attrition and success rates, and the authors' subjective impressions.)

Previous research in the area of improving graduate training has emphasized the validation of selection-factors, rather than the evaluation of actual training procedures. These few studies have been limited to: 1) further documentation of the attrition problem in doctoral programs (Ph.D. students in Psychology, Economics and Business programs have shown attrition rates of 35-60%); and 2) statistical treatments in which students and program characteristics were correlated with eventual student success in attaining the Ph.D. degree. (No characteristics have been consistently associated with attaining that degree.) (Decker, 1973; Knox, 1970; Lunneborg & Lunneborg, 1973; Pogrow, 1978; Wright, 1964)

To the best of the experimenter's knowledge, there apparently has been no experimental evaluation of the graduate training procedures recommended in the above reports. The present research attempted to address this issue through a series of studies. The major recommendations on training seemed to be these--involvement of the faculty advisor, regular consultation meetings, and structured research-supervision. Therefore, the experimenter designed a supervisory system with these five components: weekly (a) specification of research-tasks and performance standards, (b) meetings with a supervisor (either faculty or doctoral-student), (c) deadlines, (d) feedback, and (e) incentives.

In the present view of research production, the students' research time and effort are considered inputs (or costs) to the supervisory system; receipt of a degree is considered the output (or value) of the system (Decker, 1973; Gilbert, 1978, Chapter 1). Thus, the supervisory system would produce the greatest benefit when more of the enrolled-students graduate and when they do so in less time. (Assuming, of course, that other requirements of the system and department have also been met--for instance, the quality of the student's research is acceptable, the cost of the supervision time is low, other coursework has been completed, etc.).

A preliminary evaluation of the components of the supervisory system has shown that positive and negative points toward a letter of recommendation combined with weekly feedback are effective in controlling the research behavior of M.A. students (Dillon, Kent & Malott, 1980); and a second study has shown that the points alone are effective in controlling the research behavior of B.A. students (Gant, Dillon & Malott, 1980).

The present study evaluated the separate effects of the positive points, the negative points, the feedback, and the task-descriptions and performance guidelines on research-task completion of M.A. and also Ph.D. students in Psychology. Measures of system-performance and participant support were then compared between M.A. students in this behavioral-supervisory system and M.A. students under other, more traditional supervisory systems in the department. The performance measures included latency to start research activities, quality

ratings, success and attrition rates, and length of time to graduate; the measure of participant support was their evaluation of the quantity and quality of supervision received by the student.

CHAPTER II

Method

Subjects

Across four years of research, the subjects were 34 M.A. and 5 Ph.D. students under one faculty advisor in the Psychology Department at Western Michigan University. All were enrolled in the Applied Behavior Analysis program, and all received thesis or dissertation credit for participating in the advisor's research-supervisory system. Each student then provided informed consent, by which he or she agreed to participate in this research involving manipulation of components of the system. The department's Human Subjects Committee reviewed this research prior to implementation. In addition, the experimenter examined the American Psychological Association guidelines (APA, 1973, Section 5) on assuring subjects the freedom to participate in research without coercion. Analysis of the guidelines indicated that this research did safeguard the subject-rights.

Supervisors

The five Ph.D. students also supervised the M.A. students on their thesis research, and the faculty advisor, in turn, supervised each of these Ph.D. students. All Ph.D. students received practicum credit for participating as supervisors. The research interest of the M.A. student usually determined which Ph.D. student would serve as the

supervisor. Throughout these studies, the Ph.D. students supervised 3-4 M.A. students; the advisor supervised a maximum of four Ph.D. students at any one time. As a Ph.D. student, the experimenter was one of the supervisors, but his data were not included as a supervisee.

Procedures of the Behavioral-System

Dependent Variables. The M.A. and Ph.D. students received the following task descriptions (abbreviated here for clarity):

1. Individual meeting attendance: students met weekly for one-half hour on an individual basis with their supervisor, either the Ph.D. student supervisor or faculty supervisor.

2. Review article: the students were required to read two articles per week and to write a minimum of 100 words on a literature-review form for each article. Students read articles relevant to their research topic; and they discussed the article in the meeting, though with no points contingent.

3. Data presentation: students presented new data each week, if they were implementing their research.

4. Log: this task was optional. The 125-word log listed ideas, procedures and procedure changes, and relevant statements that came from the student's research meetings and from other courses and faculty members.

5. Hours: students summed the total number of hours worked on research activities for the week. Students who were enrolled for thesis or dissertation credit worked a minimum of 12 hours per week;

students not currently enrolled for credit specified a minimum time requirement, usually between 6-12 hours.

6. Output graphs: students plotted their hours worked per week on research activities and their personal and group performance from the weekly feedback form.

7. Writing: this task involved the formal, manuscript write-up, either 1000 new words or rewritings.

8. Editing: students edited their own writing based on three requirements desiged to improve readability.

9. Research proposal: the students provided a 200-word statement of the general problem, the setting that they worked in, and specific research recommendations.

10. Non-recurring tasks: the supervisor used this catchall category to specify tasks that occurred only once (for example, the candidacy or diploma application, preparing a special graph).

11. Large-group meeting attendance: students met weekly for two hours with all other M.A. and Ph.D. students and the faculty advisor. Once a semester, each student presented his or her research proposal or results, followed by a round-robin discussion.

The supervisors checked all of the above tasks in the individual meeting, except for large-group attendance. In addition to these tasks, each M.A. student also met individually with the faculty advisor every three weeks, but with no points contingent.

Students worked on those tasks relevant to their level of progress in completing their thesis or dissertation research. Those who just

entered the program constituted the Generating Group, as they were generating research questions for possible implementation. Students with an accepted research question were in the Implementing Group, conducting their research; students with accepted results were in the Writing Group, preparing the manuscript. See Table I for the task requirements for each group.

Point and Feedback Systems. Where the experimental conditions allowed, the supervisors assigned two kinds of points to the student's performance: positive and negative. The student earned one positive point (+3 for the writing and editing tasks) if he or she met the criterion on the required research task, and the student earned one negative point (-3 for writing and editing) if he or she did not meet the criterion. The point requirement for completion of the writing and editing tasks was higher so that it more nearly reflected the relative amount of behavior involved in completing these tasks.

The faculty advisor used the percentage of positive and negative points earned by the student in any requested letters of recommendation. The experimenter calculated the percentage of points completed for each student by dividing the number of positive points earned in a week by the total number of required points for that week (x 100). It was possible for the student to do extra tasks each week, thus earning extra positive points and increasing his or her percentage completed. The percentage not completed was figured by dividing the number of negative points by the number of required points (x 100). However, if the student missed a deadline and earned a negative point,

Table I. Required weekly research tasks.

Table I

Required Weekly Research Tasks

Tasks	Group		
	Generating	Implementing	Writing
Individual meeting attendance[a]	X	X	X
Review article[a]	X	X	
Data presentation Log[b]		X	
Hours	X	X	X
Output graphs	X	X	X
Writing[a]			X
Editing[a]			X
Research proposal[c]	X		
Non-recurring[a]	X	X	X
Large-group attendance	X	X	X

[a]Tasks for which extra positive points were possible.

[b]Optional task.

[c]Required once, unless topic changed.

then his or her percentage not completed always showed a negative point, regardless of the number of extra points earned.

A computer program (Dillon & van Haaren, in press) managed the weekly feedback procedures, providing the student with his or her point percentages for the week and cumulative totals on the student and his or her group (either M.A. or Ph.D.).

Students could postpone deadlines if they had the consent of their supervisor 24 hours in advance of the deadline, " if unavoidable circumstances occurred".

Experimental Procedures

Comparisons within the Behavioral-System. At a large-group meeting before the start of each experiment, new and old students received written handouts describing the dependent variables, general procedures, experimental procedures (the type of design or length of phases were not described--only descriptions of the experimental conditions), and meeting schedules. The experimenter then gave a pretest to the students over the requirements of the supervisory system. The experiments started after the participants viewed their scores and the correct answers for the questions (range of means 81-89% correct).

Also at the start of each study, the experimenter told the students that the faculty advisor considered acceptable performance to be the completion of 90% (or higher) of their required points. Table II shows the experimental conditions manipulated during the research and the supervisory system components in effect.

Table III summarizes four years of research, showing seven

Table II. Behavioral supervisory system components in each of four experimental conditions.

Table II

Behavioral Supervisory System Components

in Each of Four Experimental Conditions

Components	Experimental Conditions			
	Pos & Neg Points	Positive Points	Feedback	Instructions-Only
Specification	X	X	X	X
Meetings	X	X	X	X
[illegible]lines	X	X	X	X
Feedback	X	X	X	
Consequences				
Positive Points	X	X		
Negative Points	X			

Table III. Experimental manipulation of features of the behavioral supervisory system.

Table III

Experimental Manipulation of Features

of the Behavioral Supervisory System

Experiment	Design[a]	Phase Length in Weeks	N	Group[b]	Experimental History	Median % Completed for Phase
1	BAB	4-4-4	15	Total	Naive	90-68-86
2[c]	BAB	5-3-5	15	Total	14 from #1; 1 naive	91-65-81
3	BA'B	6-3-5	8	Total	Naive	90-76-85
4	BB'	10-14	7	G	Naive	100-98
5	B'B	8-6	10	W, I	4 from #3; 6 from #4	96-97
6	BB'	5-9	7	W, I	3 from #3; 4 from #4	94-89
7	AB'	19-9	8	G	Naive	64-90

[a]In which B--Positive and Negative Points
B'--Positive Points
A'--Feedback
A--Instructions-Only

[b]In which Total--Groups G, W and I.

[c]Experiment #2 also appears in Dillon, Kent & Malott, 1980.

experiments involving the four experimental conditions and the 39 subjects. For instance, Experiment 1 used a reversal design with three phases (Positive and Negative Points--Instructions Only--Positive and Negative Points); each phase lasted four weeks.

Subjects were 15 students with no experience in this supervisory system, and they represented the three levels of research progress and all students. Experiments 1-4 are listed as they occurred chronologically; Experiment 7 ran concurrently with Experiments 5 and 6. (The last column showing median performance in each phase is described in the Results section.)

At the end of each experiment, participants anonymously rated the tasks and procedures of the system on a five-point scale, indicating the value in helping them complete their research and also the pleasantness. (For example, Literature Review task: Valuable A B C D E Worthless; Rewarding A B C D E Aversive.) This measure of participant support is a recommended type of social validity procedure (Kazdin, 1977).

Comparisons Between the Behavioral- and Standard-System. Several comparisons were made between the M.A. students in the Behavioral-System and other Applied Behavior Analysis M.A. students under other faculty advisors in the department, grouping all of these students into a 'Standard' Supervisory System. On a questionnaire, students in required graduate classes indicated when they were admitted to the graduate program and under which faculty advisor, when (if at all) they had started the various research tasks, and their rating of the

quantity and quality of research supervision. This method of distribution did not provide a random sampling of all Applied Behavior Analysis students available from all supervisory systems present in the department, but a good cross-section of students (and therefore, supervisory systems) was collected. The Behavioral-System students also filled out the questionnaire.

To measure the quality of thesis research, orals committee members rated features of the orals document including appropriate data analysis, experimental control shown, generalizability of results, and overall quality of the write-up and orals defense. A five-point scale was used (Poor A B C D E Outstanding). The rating was done privately; neither the student nor the other committee members viewed the ratings. Although collected, the committee chair's data were not included in the comparisons. In a second measure of quality, the experimenter tallied the number of articles submitted to major, refereed journals in the field by graduates of the Behavioral- and Standard-Systems. The experimenter asked the orals committee chair (the student's major advisor) for the information on submission and editoral decision.

To measure the percentage of students graduated and their duration in the program, the experimenter compared official department admittance records with university graduation records. The experimenter monitored Standard-System students 4 to 5 years (from admittance in either 1975 or 1976 until 1980, when this research was terminated), and Behavioral-System students 2-4 years (from admittance in 1976-78 until 1980).

Observation and Reliability

The supervisors served as the primary observers. The training of the Ph.D. student observers involved reading the written handouts on the supervisory system's procedures and requirements, taking the pretest (range of means 90-93%), and viewing the answers.

The experimenter served as the secondary reliability observer. On an unannounced basis across the experiments, he attended individual and large group meetings to assess the work (or presence) of the M.A. or Ph.D. student. Interaction between the secondary observer and the participants in the individual meeting was brief (two to four minutes) and specific discussion was avoided. The other supervisors acted as the secondary observer for M.A. students whom the experimenter supervised.

The experimenter used a reliability calculation (Bijou, Peterson & Ault, 1968) in which the reliability percentage equalled the number of agreements divided by the total number of agreements and disagreements (x 100). The number of agreements and disagreements was calculated following a comparison of the secondary observer's reliability sheet with the supervisor's data sheet.

The overall reliability percentage on the dependent variables for the seven experiments was 90%, with a range from 88% to 96%. The experimenter sampled supervisors on each research task in each phase of the experiments, checking a median of the task occurrences (range across tasks of 16-31%). Reliability percentages on the students the experimenter supervised showed no difference when compared to the percentages of the other supervisors.

CHAPTER III

Results

Comparisons Within the Behavioral-System

Generally, the students' performance was highest when all components of the system were present; it deteriorated as each major component was removed. The M.A. and Ph.D. students completed over 90% of their tasks when points were in effect [though negative points (range 81-100%) added nothing to the performance measured under positive points (89-98%)]. The performance decreased to 76% during the one phase where points were removed and only feedback was present. It decreased even further to 66% when the feedback was also removed, leaving only the instructions (range 64-73%). (See Figure 1.) There was a significant difference among the point, the feedback-only, and the instructions-only conditions (the experimenter used a median test: $\chi^2 = 6.92$, df = 2, p = .05); there was also no overlap in the ranges among the three conditions.

The last column in Table III shows the median percentage of points completed per phase for each of the experiments. In Figure 2, representative data are shown of the four experimental comparisons: Positive and Negative Points with Instructions, Positive and Negative Points with Feedback, Positive and Negative Points with Positive Points, and Positive Points with Instructions. (No experimental comparisons were made of the Feedback condition with the Positive Points condition

Figure 1. Median percentage of required points completed for each experimental condition. Data were collected over four years from 34 M.A. and 5 Ph.D. students. The Positive and Negative Points condition contains 9 phase medians, Positive Points has 4, Feedback has 1, Instructions-Only has 4.

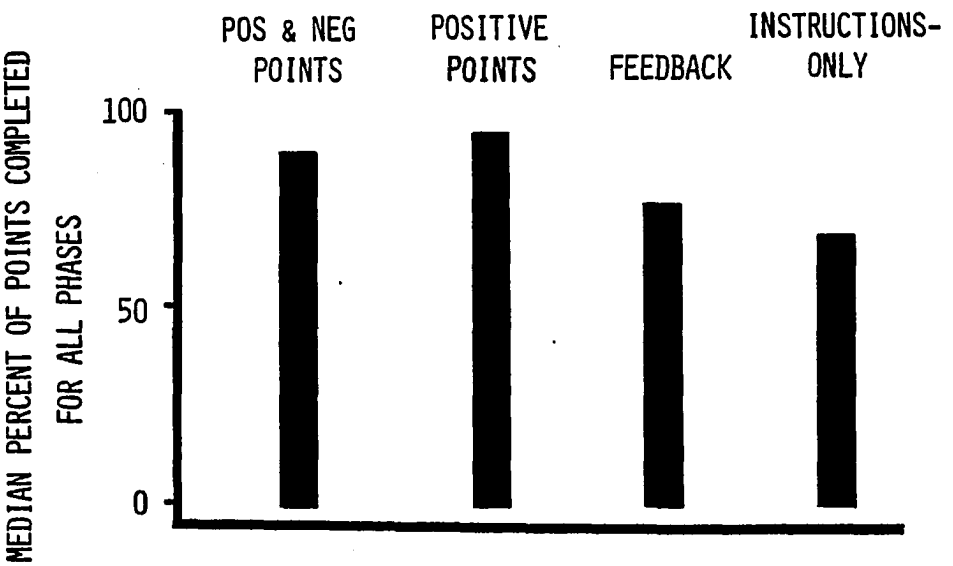
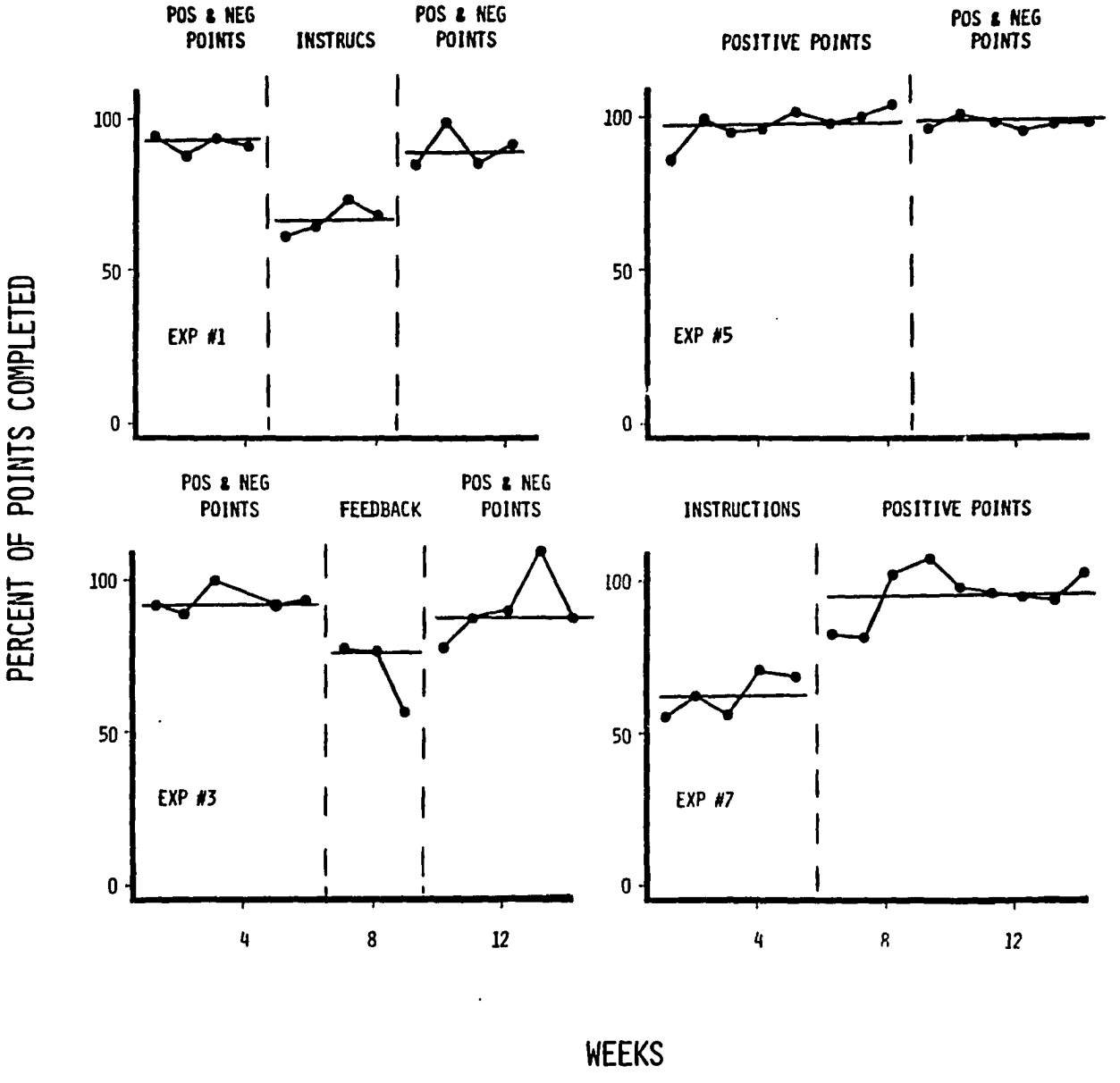


Figure 2. Percentage of required points completed for four experiments. Horizontal solid lines indicate the median percentage completed in each phase. These graphs portray Experiments 1, 3, 5, and 7 described in Table III.



or Instructions-Only condition.)

Not only the average of the tasks, but also the individual tasks showed high completion percentages when points were used. Removal of the points and removal of the feedback produced decreases in performance for some but not all tasks. For instance, individual and group meeting attendance continued at high percentages of completion; data presentation also remained high, if the task had been started prior to the removal of the points and/or feedback; but literature review, hours worked, writing and editing all fell dramatically. (The remaining four tasks were difficult to categorize--log, research proposal and non-recurring tasks--because they were not required often enough, and output graphs because they took only 2-3 minutes per week to complete and thus were not generally sensitive to the experimental manipulations.)

There was no difference between the performance of the Ph.D. students as supervisees and the performance of the M.A. supervisees. The Ph.D. students showed similar high performance under the complete system and a similar deterioration as components were removed.

The social validity analysis showed that the M.A. and Ph.D. students generally supported all features of the supervisory system, except for the use of negative points. Students rated highly the individual and group meeting, positive points toward recommendation, weekly feedback on performance, and use of deadlines. Consistently, the most positively rated feature was the one-on-one meeting with the supervisor. (When this task was made optional in the Instructions-Only condition

in Experiment 7, all eight students had requested and were holding half-hour weekly meetings within six weeks into the semester.) The most poorly rated feature was the negative point procedure; students frequently stated that its use made the entire system unenjoyable.

When their performance dropped to low levels, five M.A. students (represented 13% of the admittees over the four years) requested special, additional behavioral contracting procedures for completing their research tasks. These students supplemented loss of money, record albums and/or the use of daily deadlines in order to complete their work. Four of the five students requested these special procedures during the writing of their manuscripts. (None of the contractors' data are included in the Results section data.)

Comparison Between the Behavioral-System and the Standard-System

Students in the Behavioral-System started work on thesis activities sooner after beginning the Master's Program than Standard-System students; much more so if points were contingent (see Figure 3).

Under the Behavioral-System, a greater percentage of M.A. admittees graduated (81% compared to 57% for other departmental students), and they did so in less time (a median of 20 months compared to 28 months, a reduction of two semesters). The M.A. students in this system rated more highly the quantity and quality of research-supervision than M.A. students under the Standard-System (see Table IV).

Figure 3. Latency in months from entrance to graduate program to start of three research tasks. In each comparison, the Positive and Negative Points condition has 7 students, Instructions has 8 (both groups under one faculty advisor), Standard (employed 20 hours or less per week) has 21 students (under 10 different advisors), Standard (employed more than 20 hours per week) has 16 (under 6 advisors, 4 of whom overlap both Standard groups).

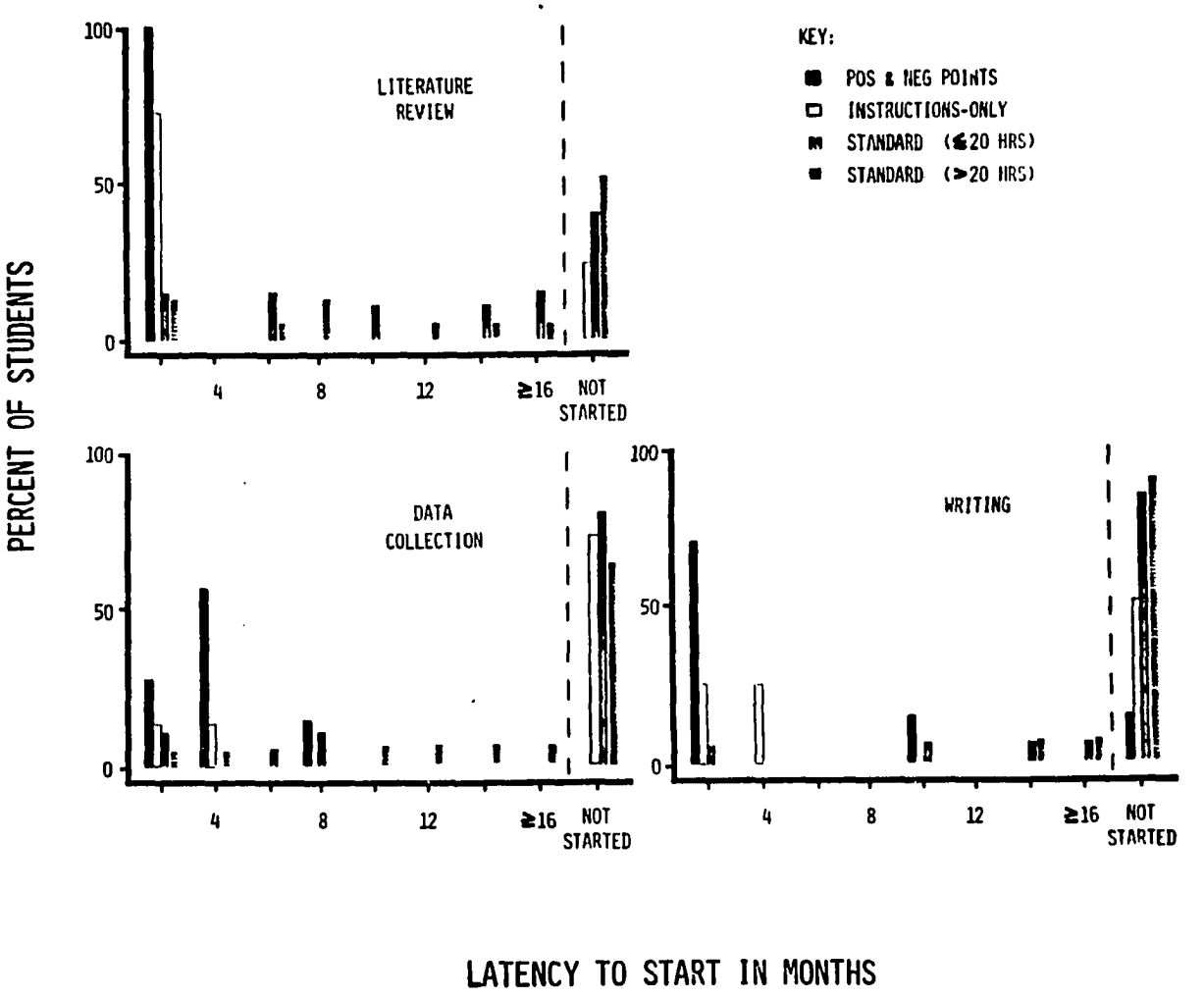


Table IV. Comparisons between Behavioral- and Standard-System Masters students.

Table IV

Comparisons Between Behavioral- and Standard- System Masters Students

Comparisons	Supervisory Systems	
	Behavioral	Standard
Evaluation by Students:		
1) Quantity of supervision[a]	91%	54%
Quality of supervision[a]	91%	70%
N (students)	11	16
Median months in program at time of evaluation	8 mos.	16 mos.
Range	4-20 mos.	4-32 mos.
Evaluation by faculty:		
2) Overall quality of research[a]	61%	60%
Overall quality of write-up[a]	70%	85%
Overall quality of student's orals defense[a]	74%	75%
N (students)	12	13
N (advisors)	1	6
From University records:		
3) Students graduated	81%	57%
N (students enrolled)	20	50

[a]Percentage of raters circling 'A' or 'B'; these are the letters at the positive end of the rating scale.

TABLE IV
(Continued)

Comparisons	Supervisory Systems	
	Behavioral	Standard
Median months to earn degree	20 mos.	28 mos.
Range	16-36 mos.	16-52 mos.
Students still in program	19%	20%
Median months at time of monitoring records	24 mos.	44 mos.
Range	20-24 mos.	30-56 mos.
Students who have dropped from program	0%	23%

Two measures of quality showed that research from the Behavioral- and Standard-Systems was comparable. First, faculty advisors evaluated Behavioral-System research as generally comparable to that produced by the other M.A. graduates, though the primary research supervisors in this system were doctoral students (Table IV). But they did rank quality of the write-up higher for the Standard-System; however, this may reflect more on the somewhat idiosyncratic style the faculty advisor recommends for the Behavioral-System students than on the supervisory structure itself. Second, 21% (3 of 14) of the Behavioral-System graduates published their thesis research, while 17% (7 of 41) of the Standard-System graduates did so. However, one of the faculty advisors in the Standard-System accounted for 45% of the submissions and 71% of the acceptances.

Several comments on the above data are relevant. Concerning the survey data of Figure 3, it is possible that the longer latency to start the research tasks showed by Standard-System students resulted from the fact that all Behavioral-System students worked 20 hours or less per week in paid assistantship or outside work, while some of the Standard-System students were employed more than 20 hours per week. Therefore, the experimenter computed latencies for Standard-System students employed the comparable 20 hours or less per week and separately for those employed more than 20 hours per week. However, as Figure 3 shows, there was no appreciable difference between the two types of Standard-System students in their latency to start the tasks.

It is also possible that interpretation of these survey data on

latency (Figure 3) was based on an artificial difference between the groups of students from the Behavioral- and Standard-Systems. As a result of the students having entered the Master's Program in different academic years, they represented different lengths of time in the program when surveyed. Possibly, the Standard-System students were surveyed sooner after beginning the Master's Program than the Behavioral-System students. However, the bias is just the opposite; Behavioral-System students were surveyed an average of 8 months after matriculation and the Standard-System students an average of 16 months.

Latency data were not collected for the Positive Points and Feedback conditions, because a sufficiently large group of Behavioral-System students was not involved at the start of their M.A. programs.

In the three comparisons of Table IV, again Behavioral-System students were employed 20 hours or less per week; and Standard-System students were also employed 20 hours or less per week in the comparison of quantity and quality of supervision, but the remaining two comparisons have an uncontrolled mix of students with part-time and full-time employment.

For the second comparison of Table IV, research from students' M.A. orals was reviewed for two years. In this time period, 100% (12 of 12) of the Behavioral-System graduates were rated; however, only 43% (13 of 30) of the Standard-System graduates were rated, for various uncontrollable reasons.

In the third comparison, the experimenter removed from the analysis four of the 20 students enrolled in the Behavioral-System during the three years these data were collected. These were one student who

was employed full-time, taking 48 months to graduate, and three students who switched to Standard-System advisors. Removed from the 50 students enrolled in the Standard-System over the two years were three students who switched to other M.A. programs in the department after enrollment.

CHAPTER IV

Discussion

Within-System

There was a clear separation of effects among the components of the Behavioral-System. In other words, across the seven experiments, the percentage of points completed was remarkably consistent for a given experimental condition, while no overlap occurred in the ranges of phase medians among the Point, Feedback, and Instruction conditions. This was true in spite of the fact that the same students were not present throughout all of the experimental manipulations. And, this was also true regardless of whether the student's initial exposure was to the Point or Instruction conditions, whether the sequence of conditions the student received was negative points to positive, negative to feedback, negative to instruction, instruction to positive, or positive to negative, and whether the phase lengths were 3, 10, or 19 weeks in duration. Thus, replication across a variety of conditions and subjects suggests considerable reliability and generality. This is what Sidman (1960, Chapter 4) calls "systematic replication".

Based on the present findings, one might expect 85-90% of admittees to the Behavioral-System to graduate--75% to work at high rates of completion and to enjoy their experience under the system as described, and 10-15% to request extra procedures; these students would average 20 months in the Master's Program, completing a 30-48 credit

hour degree requirement. For reasons unknown, the remaining 10-15% would not finish under this system. (Across the four years, four M.A. and one Ph.D. student dropped from the Behavioral-System; the Ph.D. student was the only admittee to drop from the program, however. The extent of their objections, if any, to the requirements of the system were unclear.)

Between Systems

Compared to Standard-System students, Behavioral-System students start thesis activities sooner after admittance; a greater percentage of these students graduate; and they do so in less time. However, the two groups of students were difficult to make equivalent because the students were under different faculty advisors, and also, the students admitted to the Behavioral-System were a non-random sample of the students admitted to the Applied Behavior Analysis program.

Cost-Effectiveness

The cost of implementing the Behavioral-System under other faculty advisors would be low. For example, consider the advisor to have 9 M.A. and 3 Ph.D. students. Little development costs need occur, since the various components have already been prepared;[1] day-to-day management of the system could be done by an M.A. student, requiring 2 hours

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[1]Description of the research tasks, general procedures, the computer-feedback program (Dillon & van Haaren, in press) and output forms are available from Dr. Richard W. Malott, Department of Psychology, Western Michigan University, Kalamazoo, Michigan 49008.

per week. The faculty advisor would provide 5 hours of supervision per week--one 30 minute, individual meeting with each of the three doctoral students and with three of the M.A. students (held tri-weekly), plus 2 hours of group supervision. The doctoral students would provide 4½ hours per week of individual supervision. This 9½ hours of supervision time could manage 108 hours of graduate research-activity, with most students completing 90% or more of their required points. (A weekly output of 108 hours is representative of work-totals recorded by students in this research.)

In some graduate programs, a faculty advisor might supervise only M.A. students and no Ph.D. students. By using weekly individual meetings of 15 minutes with each M.A. student, the Behavioral-System should continue to produce high levels of performance, even without Ph.D.-student supervisors. Thus, the faculty advisor would provide 4½ hours per week of supervision (including both individual and group time) for 9 M.A. students.

The Behavioral-System would provide other benefits to the advisee in addition to research supervision. For example, the individual meeting in this experiment also increased faculty involvement with the student in other important areas. Periodically, the student and advisor discussed the student's professional plans, other coursework, personal relations within the supervisory system and the department, and the student's general well-being (each recommended by Benet, 1977). And other graduate requirements which also have little formal structure (as with the research requirement) were easily incorporated into the

individual meeting with the advisor. Assistantship tasks, the reading, writing and generating of ideas that also are preparatory to completing competency examinations and the review paper were discussed regularly. But, regardless of the above benefits, in order to implement this supervisory approach in other graduate training programs, the advisor's supervision time will have to be accounted for when developing academic loads (Spriestersbach & Henry, 1978).

Social Validation

Several procedures increased student support for the Behavioral-System. Across seven studies, the point condition produced the highest performance; but, of the two types of points used, only the positive condition would seem most suitable for the continued, long-term effectiveness of the system. Second, the opportunity to earn extra points was viewed as important, although no more than 10% extra tasks were completed by students in any one of the experiments. However, the students valued the flexibility of being able to increase their percentage over 100% or to raise a percentage that was below 90%. Finally, the individual and group meeting tasks might be considered the "glue" that held the entire system together. The weekly individual meeting set the occasion for regular discussion, problem-solving, and much attention and feedback on the student's research progress. And students reported high support for the large-group meeting because of two requirements--each student presented his or her research during the semester and each audience-member had to make one comment (or more)

on the research just presented.

Generally, participants in the Behavioral-System viewed this structured approach to research-supervision as in their best interests. During one study, the experimenter discussed with the students the possibility of removing the entire supervisory-system structure--in effect, replacing the Behavioral-System with typical Standard-System supervision. Following a group discussion, the 11 students who were in the experiment at that time voted on the proposal. Eight of the students (73%) approved the removal of the structure, but only if it needed to be removed for "research purposes". They generally regarded the removal as detrimental to their progress in completing their research. The remaining three students voted against the removal under any circumstances; however, their vote was confounded by the fact that the percentages of points completed for these students were currently below the 90% standard.

Future Research

Of further experimental interest would be the replication of this supervisory system with non-behaviorally trained graduate students. Since the research on the present system impacts mainly on the requirement of timeliness of research activity, research evaluating procedures to improve the quality of theses and dissertations would also be important. From the experimenter's experience, the greatest area of potential improvement in quality might be in generating an appropriate research question, one that is of publishable quality. Perhaps a

fruitful approach would be the development of an "ensampler" (Gilbert, 1978, Chapter 6), that is, a guide to the performer that is followed when the exact nature of the problems the performer faces is not known. Finally, the development of a low-cost training program for the research supervisors would be important, since the present system relied heavily on the contingency-shaping of these skills.

In conclusion, the Behavioral-System produced a greater percentage of graduates in a shorter length of time, and with research of comparable quality, than traditional supervisory approaches. The amount of faculty supervision time was roughly 5 hours per week for 12 students. Maybe most important for the system's long-term effectiveness, the participants valued their involvement--the M.A. and Ph.D. students and the faculty advisor for the quantity and quality of supervision, and the Ph.D. students also for the practicum experience of supervising M.A. research.

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