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An experimental analysis of proctor prompting behavior in a personalized instruction course.

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AN EXPERIMENTAL ANALYSIS OF PROCTOR PROMPTING

BEHAVIOR IN A PERSONALIZED INSTRUCTION COURSE

A Dissertation Presented

By

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Submitted to the Graduate School of the
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Department of Psychology

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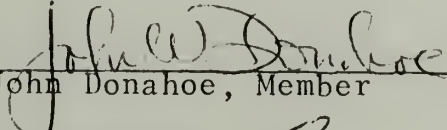
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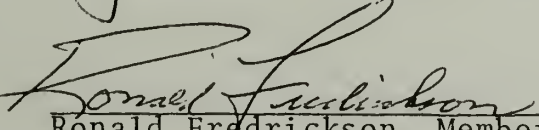
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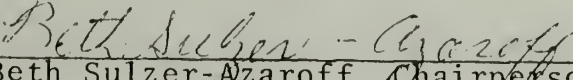
ABSTRACT

An Experimental Analysis of Proctor Prompting
Behavior in a Personalized Instruction Course

June 1977

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The present study analyzed one aspect of proctor-student interactions in Personalized System of Instruction (PSI) quiz scoring sessions. When a student has omitted a quiz answer, or has supplied an unclear, partial, or erroneous quiz answer, the proctor may (a) supply the student with the correct answer and have the student repeat it (informational prompting), (b) provide varying degrees of additional information until the student emits the correct response (informational prompting), (c) tell the student where to find the correct answer and try again later (noninformational prompting), or (d) simply mark the answer wrong and say nothing. To determine the strategies that proctors used during quiz scoring, nine proctors in a PSI Introductory Psychology course tape-recorded their quiz scoring sessions throughout the semester. Tape recordings of proctoring sessions during the first three weeks of the course indicated that proctors used informational prompting strategies approximately 50% of the time an unclear, omitted, or incorrect quiz answer

was encountered.

Informational prompting strategies may be very helpful during teaching or training portions of instruction. However, to maintain a system of instructional quality control, the effects of training eventually need to be _evaluated_ to determine whether the student's verbal behavior is under the control of the appropriate terminal stimuli (in this case, the quiz items), and, if not, appropriate remedial steps should be taken to transfer stimulus control from the instructional material to the terminal stimuli. Since the additional stimuli provided by informational prompting do not constitute terminal stimuli and may have controlled the quiz taker's behavior, it would appear that noninformational prompting would be a more desirable alternative to use during quiz-scoring sessions.

A proctor training package was developed to teach noninformational prompting behaviors. The training package consisted of a written program, with accompanying study questions, that provided a rationale for using only noninformational prompting during evaluation sessions, and a six-step noninformational prompting strategy, with illustrative examples of its use. The training sequence included a quiz over the written prompting program, followed by a videotaped roleplaying session, during which three proctors rotated as student, proctor, and observer/notetaker for situations involving omitted, unclear, and incorrect quiz answers. Dur-

ing role-playing and videotape playback, the experimenter and notetaker provided differential reinforcement and corrective feedback according to the guidelines specified in the written program. The nine proctors were trained three at a time in multiple-baseline fashion. The results indicated that proctor's use of noninformational prompting strategies increased from 50% during pretraining quiz-scoring sessions to over 90%. Individual data analysis revealed that seven of the nine proctors increased their use of noninformational prompting procedures immediately following training.

To validate the importance of proctor prompting training, each proctor listed all unclear, omitted, or incorrect quiz items for each quiz scoring session. The items listed for each session were presented four units after the student originally encountered them. Proctors also presented one initially correct item and parallel items from a quiz form other than the one the student had taken. Parallel items were those items keyed to the same study material as the items scored unclear, omitted, or incorrect. The results indicated that when students had passed a unit quiz, only 41% of informationally prompted and parallel items were later answered correctly. However, when proctors noninformationally prompted quiz answers, 80% of the items were later answered correctly. Informational and noninformational prompting strategies had equal effects when used in quiz

scoring sessions in which students did not pass unit quiz-
zes. Results were discussed in terms of the importance of
noninformational prompting during evaluation to maintain
instructional quality control. Relative cost and benefits
of the training program, its use in other instructional
systems, strategies for training larger numbers of proctors
without increasing instructor time, and validation of the
nonreactivity of taperecorded proctor sessions, are dis-
cussed.

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Introduction

In recent years, many instructors have applied the
principles of behavior in designing and teaching college
courses. Two recent reviews (Johnson & Ruskin, 1977; Robin,
1976) have identified five major systems of instruction
based upon behavior analysis, although many variations have
been incorporated to meet local needs. The basic features
of most of these systems include the specification of re-
sponses to be learned, some performance criteria that stud-
ents must meet before proceeding to new material, some means
of scheduling opportunities for students to demonstrate mas-
tery of the objectives, usually repeatable without penalty,
and immediate feedback on performance. The majority of be-
havioral instruction courses have been called Personalized
Instruction courses because college students are personally
involved in the implementation of the instructional system.
Most Personalized Instruction courses emphasize student
verbal performance (written or oral).

One variant of behavior instruction, the Personalized
System of Instruction (PSI), was designed by Fred S. Keller
(e.g., 1968) and J. Gilmour Sherman (e.g., 1967) a dozen
years ago. Since its conception it has enjoyed increasingly
widespread implementation in many diverse college courses in
over 30 countries. The basic features of the system in-

clude:

1. Breaking down course material into units, usually in printed form. Actually, any permanent source of information for the student to master is acceptable, such as tapes, video, slides, and the like. Accompanying each unit are clearly stated objectives or study questions for the student to use to master the material.

2. The unit perfection requirement for the advance through the unit sequence, usually referred to as a mastery criterion. The student can begin a new unit only when he or she has demonstrated mastery of the previous unit on a written or oral quiz. The mastery criterion is usually set at 90 percent correct on the unit quiz.

3. Lack of penalty for failure to demonstrate mastery on a unit quiz. That the student eventually demonstrates mastery of the unit material is all that counts, no matter how many times it takes to demonstrate it.

4. The go-at-your-own-pace feature or self-pacing. The student determines when he or she will begin each unit in the instructional sequence.

5. The use of student peers as proctors, who score the unit quizzes immediately after they are taken.

6. The use of non-permanent sources of information, such as lectures, discussions or demonstrations, as motivational devices, rather than as sources of critical information.

The effectiveness of PSI has been compared many times with   more traditional forms of instruction in many disciplines, including psychology (e.g., Born, Gledhill, & Davis, 1972; McMichael & Corey, 1969), physics (e.g., Green, 1971), sociology (e.g., Clark, 1975), engineering (e.g., Koen, 1971), and economics (e.g., Tietenberg, 1975). Kulik, Kulik, and Carmichael (1974), in review of such comparative studies, have indicated that, in general, PSI produces superior examination performance and higher student ratings than the more conventional lecture discussion format.

Woodarski and Buckholdt (1975), however, have observed that even if we assume that personalized instruction produces significantly better examination performance and student attitudes than traditional instructional methods, we would still not know which components contribute to its success and which do not. Some advocates argue that its superiority is due to the effects of student tutoring behaviors, while others argue that frequent quizzing and feedback techniques produce the observed differences. Some critics, on the other hand, argue that it is the additional student time required that accounts for the differences. Still others argue that it is the unit-perfection requirement for advancing to new course material that is most important. Indeed, evidence for the superiority of one complex teaching method over another is only the first step in a systematic

analysis of the effectiveness of any procedure or method.

Many researchers have begun to investigate these questions by conducting component analyses of personalized instruction. The importance of such research lies in the design of the most efficient instructional package for effective teaching. It may be that some components of PSI contribute little or nothing to student performance and satisfaction, while others may contribute very heavily.

Fortunately, most of the component analyses that have been undertaken report clearly specified instructional procedures, allowing for adequate assessment of the generalizability of the findings to specific types of contingency managed instruction. In fact, most of the research on components of behaviorally based college instruction has been conducted using procedures that very closely resemble the original descriptions of PSI (Keller, 1968; Sherman, 1967). This is especially true of the research that has been conducted on the use of proctors in personalized instruction.

The Proctor Component in Personalized Instruction
Description

Possibly the most important feature in the Personalized System of Instruction is the presence of undergraduate students who serve as "peer-tutors" in the classroom. Keller has called the use of undergraduates or "proctors" to help teach a college course "the real discovery of PSI" and Sher-

man (1971b) has called it PSI's most distinguishing feature.
Malott and Svinicki (1969) suggest that an entire college
curriculum could be run on the basis of tuition alone by
using student peers as "proctors."

In the early formulations of PSI the definition and
functions of the "proctor" were discussed in some detail.
Keller (1968) explained that the use of proctors in a course
"permits repeated testing, immediate scoring, almost un-
avoidable tutoring, and a marked personal-social enhancement
of the educational process." Since that time the role of
the proctor has been discussed in great detail. In most PSI
courses the proctor immediately scores and evaluates the
student's performance on successive quizzes over units of
material throughout the semester, points out to the students
any relevant portions of material that have not been mas-
tered, explains any apparent difficulties that a student may
have before or after he takes a quiz, suggests ways of im-
proving student study behaviors, shapes appropriate examin-
ation skills, prompts consistent progress throughout the
course, and adds greatly to the personalization of a college
course (Keller, 1968, 1969; Born & Zlutnick, 1972; Born,
Gledhill & Davis, 1972). Indeed, the proctor staff can in
many ways determine the success or failure of a PSI course
(Born & Zlutnick, 1972).

External proctors. Many behavioral instructors have
discussed the selection of proctors. Keller (1968) origin-

ally advised that the proctor be

> an undergraduate who has been chosen for his mas-
> tery of the course content and orientation, for
> his maturity of judgment, for his understanding of
> the special problems that confront students as
> beginners, and for his willingness to assist.

Following Keller's lead, the most prevalent method of se-
lection has been to obtain the services of external proctors
to serve the length of the entire course. This type of
proctor is usually a graduate student or advanced under-
graduate majoring in the course discipline. The PSI News-
letter (June, 1974) recently reported that about 80% of all
PSI courses presently offered follow these procedures.

Semb (1975) has described an excellent set of specific
procedures for selecting "external" proctors. Students who
complete his PSI course at a high rate are actively recruit-
ed for proctoring during the subsequent semester. About
half-way through the semester, all students are invited to
submit applications to be a proctor during the following
semester. Current proctors and the course manager rate each
applicant in terms of "sociability," "dependability," "know-
ledge of materials," and "overall ability to be a manager."
The instructor reviews the applicants' quiz folder as well.
Those who are rated the highest are invited to attend a role-
playing interview, during which the applicant proctors a
confederate's quiz while two proctors rate the applicant's
proctor behaviors on an 18-item scale. Those who are rated

highest are then invited to be proctors. Proctors receive two hours credit for every six hours per week of proctoring. The proctor's grade is based upon class attendance and performance on the final exam.

Calhoun (1975) attempted to specify demographic, academic and other variables that were highly correlated with his proctors' behaviors. While none of these variables were related (external proctor attendance, exams administered, exams passed by proctors themselves, number of student retakes, students' initial scores on exams and rate of student progress) students of experienced proctors progressed through the course more rapidly. Thus, the natural repertoire a proctor brings with him to the proctoring situation may be of little importance beyond the general specifications outlined by Keller (1968).

Internal proctors. Although several authors have noted the problems associated with organizing and coordinating advanced undergraduates as proctors (external proctors) (Edwards, 1972; Gallup, 1971; Sherman, 1971a, 1971b), few report on the use of students concurrently enrolled in the course as proctors (internal proctors). There seem to be three procedures that are undertaken with respect to this potential population of proctors. The most widespread system of "internal" proctor selection was originally described by Sherman (1971a, 1971b) and has often been called the rotating internal proctor system (Wilson & Tosti, 1972). In

Sherman's system, students who successfully pass the first
unit may volunteer their services as proctors for that day.
In a class containing 100 students, the first 10 are chosen.
The students who missed out on proctoring earlier units may
become proctors by being among the first students to suc-
cessfully master the later units, and so on. Thus, each day
internal proctors are selected from those students who have
demonstrated mastery of the greatest number of course units
and are present in class. These proctors then score all
units up to the last unit that they have mastered. In this
system virtually everyone has a chance to proctor by gaining
the lead in progress through the units in the course.
Slower students even get their chance when the first wave
of students complete the course.

Two other internal proctor procedures have been re-
ported. First, there is fairly widespread use of the stud-
ent concurrently enrolled in the course as interviewer of
his classmates. The oral interview technique (Ferster,
1968) employs the use of several oral interviews of approx-
imately 10 minutes in duration preceeding each "unit" or
chapter quiz. The student is usually required to give one
interview for every one he takes, making the position invol-
untary. Both student and faculty reactions are very favor-
able. Students have evaluated the interview technique as
more effective in aiding mastery of material than lecture-
examination methods, providing more effective interactions

with other students to increase learning, making them more actively involved in the course, and significantly improving study habits (Sheppard & MacDermott, 1970).

Second, three reports (Alba & Pennypacker, 1972; Edwards, 1972; Ensign, Edwards, & Powers, 1971) briefly describe a system of selecting proctors in which the student concurrently enrolled in the course voluntarily commits himself to proctor for the entire semester. Edwards (1972) and Ensign, Edwards, and Powers (1971) report successful use of the procedure, but further assessment, especially at the logistical level, is warranted since there could be problems in relying upon a student to consistently demonstrate mastery of the course units faster than the fastest students in the course.

Several advantages to internal proctor systems have been noted. First, proctors are freshly acquainted with the material since they have recently mastered the units themselves. The problem of assuring that external proctors have adequately reviewed the material they are to proctor is eliminated. Second, the problem of salaries or course credits for external proctors is eliminated. Internal proctors have been successfully used on a voluntary basis, or can be awarded a certain number of points toward final examination scores. Third, proctor absenteeism is no longer a problem, since the students who are present and willing on any given day serve as the proctors. Fourth, the more advanced the

student may be, the more likely it is that he may overload
the student with excess information at the expense of the
student's mastery of course material. The problem of proctor
mini-lecturing and answer-fabricating is more typical of
graduate students, and, to a lesser extent, advanced under-
graduates and is more sharply reduced with internal proctors
(Sherman, 1971a, 1971b). Students who serve as internal
proctors are more willing to say that they do not know an
answer to a question, and will send their fellow classmates
to the assistant or instructor, thus giving those in charge
more contact with the individual student and more control
over answering special problems students may have (Edwards,
1972; Sherman, 1971a, 1971b). Finally, internal proctors
are reported to obtain very high final examination scores,
higher than those who do not proctor (Johnson, Sulzer-
Azaroff, & Maass, 1976; Sherman, 1971a, 1971b). This is to
be expected, since proctors are exposed to more questions
based upon the course material, engage in repeated verbal
exchange regarding the material and are exposed to nearly
every conceivable error through diverse student contact.
The instructor, however, must maintain more direct contact
and closer involvement with internal proctors due to their
relative lack of sophistication in handling student diffi-
culties with course content.

One report on the use of internal proctors shows that
their evaluations of their proctoring opportunities are con-

sistently positive. They show significant shifts toward be-
coming a major in the discipline, report greater interest in
the course as compared to their other courses, report a high
likelihood of returning in a later semester to be an exter-
nal proctor, and state that they will probably use these
same procedures to teach their classes, if they become
teachers. Apparently the student as teacher learns more and
enjoys it more than the student as student alone (Edwards,
1972).

Many professors have reported to the present author
that they would feel uncomfortable using undergraduates, es-
pecially students enrolled in a course, as "teachers" of
other students. We must emphasize that this skepticism is
unfounded when the role of the proctor is more closely ex-
amined. Hess (1971) has aptly stated that the proctors are
the monitors of fellow students' progress through the same
material they have previously mastered and are not sources
of critical information. The instructor who relegates to
the proctor the role of information dispenser misses the
point. The proctor is not a teaching assistant in the tra-
ditional sense. Keller (1974) has said that the most ef-
fective proctor is the student whose knowledge base and
other aspects of his repertoire more closely resembles that
of the student taking the course than that of the instruct-
or. His job is "that of decreasing the gap of understanding
between the student and instructor." Perhaps the most im-

portant aspect of the proctor is the ability to communicate subtleties of the course content in a way that is easily understandable. There are many times when a highly educated lecturer fails to establish such communication when discussing course content with an undergraduate.

The choice between external graduate proctors, external undergraduate proctors and internal proctors probably also interacts with the level of course objectives and required quiz performance. In addition to the advantages and disadvantages cited above, we suggest that instructors read Smith and Weitzer's (1977) excellent description of the factors that need to be weighed when choosing proctors.

Evaluation

External proctors and student performance. Three experiments have attempted to directly assess the value of the proctor component within the Personalized System of Instruction. Calhoun (1976) performed a component analysis of some of the distinguishing features of PSI, and provided evidence for the importance of immediate feedback. Four of the six groups in his study received immediate feedback on quiz performance from a proctor. For the remaining two groups, feedback was delayed until the next class, and came either from a proctor or in written form. Calhoun found that achievement was high whenever feedback was immediate. Performance was significantly lower in the two conditions where

feedback was delayed. Unfortunately both groups for whom feedback was delayed did not have small units or self-pacing. Future research will have to discover the effects of the interactions between these three components to conclude that immediate feedback was the important variable in the performance differences that Calhoun observed.

Johnson and Sulzer-Azaroff (1975a) investigated the relative effectiveness of the proctor component and several proctoring systems in a PSI course. They found that students who did not have proctors score their quizzes immediately after they were taken needed to retake many more quizzes to demonstrate mastery of the course content than students who had proctors. In addition, student performance and progress in the no-proctor condition was highly correlated with "ability," while ability level was not a significant factor in determining student performance and progress when any type of proctor system was employed.

Of greatest significance is the study by Farmer, Lachter, Blaustein and Cole (1972). They showed that the absence of proctors in personalized instruction significantly decreased final examination scores and progress rates, and increased the amount of quiz retaking necessary to master the course content when compared to groups having varying proportions of their unit quizzes proctored.

Subjects in that experiment were randomly assigned to five groups which had either

0%, 25%, 50%, 75%, or 100%   of their 20 unit quizzes
proctored by an external proctor. Frequency of quiz-taking
was maximized to one quiz per class session. Students in
the no-proctor condition   (0%)   were informed that they
had passed or failed a quiz by the end of the class session
in which the quiz was taken, and the corrected answers, if
any, were written in the quiz booklets and redistributed
during the next class session. All students who had at
least some proportion of their quizzes proctored required
significantly fewer quizzes to demonstrate unit mastery than
those in the no-proctor condition. All comparisons between
groups having the varying proportions of their quizzes proc-
tored were nonsignificant. All groups with any proportion
of their quizzes proctored showed significantly faster pro-
gress through the course when compared to the non-proctored
group. Finally, the final exam performance of all students
who had some portion of their quizzes proctored was signif-
icantly higher than non-proctored students. Again there
were no differences in performance among the groups with
varying amounts of their quizzes proctored. These results
show that the proctoring component is necessary to improve
a student's rate of progress through a course and also to
enhance retention of material, as measured by the final ex-
amination. When exposed to proctoring, students achieved
the required level of mastery; in this case, 100%,
with less exposure to quiz materials and in less time than

students in the no-proctor group. Farmer et al. (1972) con-
cluded:

> The greater achievement in a fixed time period,
> such as a semester, is clearly linked to the use
> of proctors. However, in cases where less defin-
> itive conditions are ostensibly responsible for
> progress, slow, and therefore less progress by a
> student during a fixed time is often interpreted
> as chronic deficit in the student's ability or mo-
> tivation. Since proctoring, as opposed to total
> lack of proctoring, can be clearly shown to affect
> rate of student's progress, arguments that attri-
> bute lack of progress to incontrovertible deficits
> on the part of the student may lose plausibility.

Caldwell, Bissonnette, Hochstetter, Klishis, Ripley,
Faruchi, and Radiker (1975) used student assistants in a
different role and found that they did not contribute to
student performance. Specifically, they found no differ-
ences among three groups of students who (a) were required
to see tutors for remediation following two unsuccessful at-
tempts on a unit quiz, (b) had the option to contact tutors
following nonmastery, and (c) could not see tutors following
nonmastery.

However all students received immediate feedback from
graders on the objectives missed on their quiz attempts, but
were not allowed to discuss their answers with the graders.
Since the course used multiple-choice items and tested most-
ly recall learning, immediate feedback probably provided the
crucial contribution to student performance. As Smith and
Weitzer (1977) have indicated, the level of both proctor re-

sponsibility and course objectives probably interact in an
important way to determine the contribution of proctors in
behavioral courses. If quiz items occasion complex student
performances and proctors are given responsibility for shap-
ing student performance, their function may significantly
affect student performance.

Proctoring and student progress. The use of proctors
appears to increase student progress through a personalized
instruction course. As discussed earlier, Farmer et al.
(1972) reported that students achieved mastery with less ex-
posure to quiz materials and in less time when their quizzes
were proctored than when they were not. Both Hursh, Shel-
don, Minkin, Sherman, and Wolf (1975) and Johnson and
Sulzer-Azaroff (1975a) reported that a significant increase
in unit quiz retakes were necessary to complete their
courses when students were not given a chance to discuss
their quizzes with a proctor. However, caution must be
taken to assure that students are not merely taking advan-
tage of the potential subjectivity involved in discussing
answers with their proctors, shaping their proctors to ac-
cept approximations to correct answers and consequently
passing units "without really having mastered" the material.
In a correlational study, Calhoun (1975) found that students
who were proctored by experienced proctors progressed more
quickly through his course than students who had been proc-
tored by first-time proctors. In addition, Sherman (1971b),

Johnson and Sulzer-Azaroff (in press), and Goodall (1972)
suggest that rotating internal proctors have more rapid pro-
gress rates than those who do not proctor, but a selection
factor may be involved here.

Student evaluations of proctors. The large majority of
papers dealing with proctors have focused upon student eval-
uations of the use of proctors and proctors' evaluations of
their own experiences. Papers of both types have been over-
whelmingly favorable, without exceptions. For example, in
two papers students gave highest ratings to proctors on
qualities such as "competence," "encouraging independent
thinking," "willing to assist when difficulties arose," "in-
teresting," "willing to listen to students' understanding of
ideas and concepts," "stimulating work beyond actual course
requirements," and "enthusiastic about their proctoring"
(Hoberock, Koen, Roth, & Wagner, 1972; Born & Herbert,
1971).

Born and Herbert (1971), in a representative survey of
student evaluations of proctors, reported extremely high
ratings of all proctors in their course. Interestingly,
very similar ratings were earned by the best graduate and
undergraduate proctors, indicating that students did not
make their evaluations on the basis of amount of academic
training. In addition, all ratings for the best and "poor-
est" graduate and undergraduate proctors were very high.
Notably, all evaluations of proctor competence were very fa-

vorable, without exception. On a scale ranging from 1 (very negative) to 7 (highly positive) the best as well as the "poorest" graduate and undergraduate proctors attained a mode of 7 on questionnaire items such as "knowing material well enough to grade tests," "fairness in grading," "recommendation of him/her as a proctor for others," and "willingness to help students who had difficulty." Proctors enjoy their duties as well. Hoberock et al. (1972) note that whereas most of their graders in traditional courses in the past have found their work "tedious," more than half of the proctors in the four PSI engineering courses which they taught volunteered to serve without pay. In addition, several articles have been written by proctors who have been enthusiastic about PSI (Bono, 1975, 1976; Ensign, Edwards, & Powers, 1971).

Benefits to proctors. Additional effects upon those who become proctors have been noted, particularly increased likelihood in (a) becoming a major in the discipline, (b) career-oriented goals in the discipline, (c) entering graduate programs in the discipline, and (d) significantly improving graduate record examination scores after the proctoring experience (Edwards, 1972; Hoberock et al., 1972; Nelson, 1970; Sheppard & MacCermott, 1970). For example, Sheppard and MacDermott report that of 12 proctors in their course, nine were seniors, eight of whom were accepted into graduate programs in the discipline. These statistics be-

come especially meaningful when it is realized that prior to the proctoring experience, only three of the eight were majors in the discipline, and only two of the three who were majors had planned to enter a graduate program prior to their proctoring experience. Nelson (1970) reported that students proctoring in the introductory psychology course at Kalamazoo College showed a mean increase of 150 points on the advanced psychology graduate record examination after the proctoring experience, while seniors not assisting in the course had average gains of only 27 points during the same period. Admittedly, these reports do not represent controlled experimentation, yet they cannot be ignored.

Proctor systems compared. Some experimental evidence pertaining to various proctor systems has been found. In one investigation, Hursh, Sheldon, Minkin, Sherman, and Wolf (1975) compared two proctoring procedures. In one condition the proctor was allowed to discuss scored quiz results with the student, enabling her to change the answers after verbal explanations. In the other condition, proctors were not allowed to engage in such discussions. Using an intra-group replication design, they found no difference in first quiz attempt scores per unit between conditions (after changes were made by the students when under discussion conditions), but found that significantly fewer retakes of quizzes were required by the students when in the discussion condition. Specifically, students had to retake 18 percent of their

quizzes when no discussion was allowed, but only 3 percent when discussion was allowed to occur. Students accelerated their progress rates when under the discussion condition, but the general quality of initial quiz responses (before changes) was significantly poorer when they were allowed to verbally support their written responses than whey they were not allowed to engage in such verbal justifications. Specifically, if students, when under "discussion" conditions, had not had their initially incorrect responses changed to "correct" after discussion, they would have had to retake 35 percent of their quizzes. Thus, students were initially better prepared to provide correct answers to quiz questions when they were not given a chance to discuss them.

In another experiment, Whitehurst (1972) found no differences between the quiz and final exam performance of students who handed in answers to study questions to be checked, and those who were orally interviewed by proctors on these study questions. However, the instructional procedures used in this course, including those for proctoring, depart significantly from more typical procedures used.

Of significance was his finding that the use of written study questions and oral tutorial procedures resulted in significantly fewer errors on quizzes and exams than did group discussions or no treatment, which did not significantly differ from each other. When asked which activity was most helpful in preparing for the quizzes and exams, stud-

dents replied that written questions, oral tutorial, and group discussions were helpful, in that order. However, when asked to rate the activities in terms of enjoyability, students ranked them in reverse order, listing group discussion as the most enjoyable, oral tutorial as second most enjoyable and written questions as least enjoyable.

One study investigated the use of external vs. internal performance session managers in the Johnston and Pennypacker (1971) variant of behavioral instruction. In an effort to test whether demonstrated mastery of all of the course material is a vital prerequisite to successful proctoring, Gaynor & Wolking (1974) compared two systems of proctoring. One group was proctored by advanced (external) proctors, while the other group used a variant of Ferster's interview method wherein each student alternated as listener and speaker. The latter group's performance was superior to the externally proctored group as measured by first trial results in the performance sessions and by four instructor-administered review tests. This occurred despite the fact that the internal proctor procedures used in this study departed from the usual in that the student who served as a listener first had not yet demonstrated mastery of the unit. The authors statistically ruled out the effects of "practice" received by students who listened to the performance of others before their own performance. The authors hypothesized that the superior performance of the students

under the internal method was due to proctoring activities.

Three different proctor systems were also compared in a study by Johnson and Sulzer-Azaroff (1975a). They were (a) the constant external proctor system, in which students are proctored by external proctors who have specific students assigned to them for the entire semester; (b) the variable external proctor system in which students are proctored by external proctors who evaluate the quizzes of any student who approaches them during the semester; and (c) Sherman's (1971a, 1971b) rotating internal proctor system in which students are proctored by internal proctors who are required to demonstrate mastery of a unit before proctoring it. Results indicated that there were no differences in student examination performance on four instructor-administered Achievement Tests and a final examination and no differences in number of retakes necessary to demonstrate mastery of the course material among groups. Students generally preferred the proctor system to which they were exposed, although students exposed to more than one system preferred an internal to an external, and a variable to a constant proctor system.

Anderson (1975) conducted a between-groups analysis of internal vs. external proctoring in an introductory biochemistry course. The results showed no significant differences between groups in course grade distribution, final examination performance, or attitude questionnaire, supporting

the previous findings of Johnson and Sulzer-Azaroff (1975a).

Carlson and Minke (1974) found that significantly more students proctored by constant external proctors completed their course, received A's, progressed at a higher rate, and retook fewer quizzes, than students proctored by variable external proctors. Although these results contradict Johnson and Sulzer-Azaroff (1975a), Gaynor and Wolking (1974), and Anderson (1975), the substantially larger class size, learning center format, and grosser measures of student performance in the Carlson and Minke (1974) course may account for the differences.

Internal proctoring and student performance. Given the "no-difference" results in written performance of students who were evaluated by internal or external proctors (Anderson, 1975; Johnson & Sulzer-Azaroff, 1975a) and the superior oral performance of students who were evaluated by internal proctors (Gaynor & Wolking, 1974), the decision between the two types of proctor systems must be based upon other criteria. One question raised by these two studies is: "Do the proctors themselves academically benefit from the proctoring experience?" In an earlier report, Johnson and Sulzer-Azaroff (in press) found that the students who volunteered to be internal proctors at any time in their PSI course attained higher final examination scores than students who did not volunteer to proctor, but selection factors may have biased these results. A new study (Johnson, Sulzer-

Azaroff, & Maass, 1976) was consequently designed to determine whether the internal proctoring experience increases student examination performance. Course material was divided into three segments of four units each. After mastery was demonstrated on each unit within a segment, each student took a segment exam. Three groups were required to proctor the quizzes of 15 classmates in one of the three course segments. Group 1 proctored segment 1 quizzes, group 2 segment 2 and group 3 segment 3. Group 4 did no proctoring. Each student assigned to groups 1-3 was required to proctor at least two quizzes on each unit in the segment in which they were required to proctor. Significantly higher scores on each segment test were earned by the group that proctored the material. Each group also answered more final exam items correctly from the segment that they proctored than the other groups. All correlations between performance on a vocabulary test highly correlated with "ability," and performance on segment tests and final exam were insignificant. Groups also did not differ in rate of progress, mean percent correct on first quiz attempt, or number of quiz retakes necessary in each segment.

Assuming that these results are generalizable to other instructional settings, cost factors may make an internal proctoring system preferable to an external system. If external proctors are financially remunerated for their services, the internal proctor alternative will significantly

decrease the cost of operating personalized instruction. An internal proctor component thus makes personalized instruction feasible for instructors who (a) do not have funds to support external proctors (b) cannot offer course credit for proctoring, or (c) do not have a population of potential external proctors at their disposal. A small staff of external proctors to supervise internal proctoring activities is also more efficient to manage than a large staff of external proctors.

The Johnson, Sulzer-Azaroff, and Maass (1976) study sheds some light upon the differences in results of three earlier studies on internal proctoring. Anderson (1975) and Johnson and Sulzer-Azaroff (1975a) found no differences between the performance of students who were proctored by externals and those who were proctored by internals. Gaynor and Wolking (1974), however, found that students who were proctored by internal proctors performed significantly higher on unit quizzes and instructor-administered tests than students who were proctored by external proctors. The reason for the discrepancy may be that the students proctored by internal proctors in the Gaynor and Wolking (1974) study were also required to engage in internal proctoring them-selves while the students proctored by internal proctors in the Johnson and Sulzer-Azaroff (1975a) and Anderson (1975) studies were not. Further studies comparing internal proctoring and external proctoring with and without required in-

ternal proctoring need to be conducted.

Several other questions are raised by the Johnson, Sulzer-Azaroff, and Maass (1976) study. Assuming that internal proctoring increases examination performance, how much internal proctoring is necessary to produce an educationally significant increase? Johnson et al. suggest that proctoring two quizzes per unit mastered has a desirable effect. Would a smaller amount also produce important increases? Is the general nature of performance increases the same over a wide range of number of quizzes proctored, or do performance increases vary systematically with the number of quizzes proctored? At what point is the increase in the performance gained by internal proctoring offset by the additional time spent proctoring? Are student attitudes toward PSI significantly affected by required internal proctoring? Is so, in what direction? Would such factors vary according to subject matter? Further studies comparing the effects of different amounts of internal proctoring on examination performance and preference need to be conducted.

Self-grading. Another alternative system that reduces the cost factors of external proctor systems is self-grading procedures. Three experiments have systematically investigated self-grading. Blackburn, Semb, and Hopkins (1975) compared the effects of self-grading with external proctor grading in terms of course efficiency and student performance in two experiments. The results of the first study revealed

that mean test time and mean grading time were substantially reduced by self-grading. In addition, self-grading and external proctor grading produced nearly identical student performance as measured by hour review exams, and a final exam. In the second experiment, an additional component was added to the proctor's duties. For each self-graded quiz that a student evaluated as passed, an external proctor randomly checked two questions for correctness and accuracy of student grading. Mean self-grading plus proctor feedback time was about 50 percent less than external proctor grading time. Student performance differences on review and final exams were again negligible. Conard, Spencer, and Semb (1976) replicated Blackburn et al. and found, in addition, that students who were exposed to both self and external proctor grading chose to self-grade their quizzes over 50 percent of the time. The majority of students reported, however, that external proctor grading prepared them better for review and final exams than self-grading.

These three experiments demonstrate effective alternatives to proctor grading. The first was able to eliminate the proctor component and still maintain high student performance. The second was able to reduce the proctors' time while maintaining accuracy of self-scoring and the personal interaction that Keller (1968) deemed necessary. The third study objectively established student preference for self-grading over proctor grading. Further, reliability of self-

grading was very high in each of the three studies (.93, .98 and .96 respectively).

While we strongly agree with Gagne (1970) that ". . . the student must be progressively weaned from dependence on the teachers or other agents external to himself," there are methodological and empirical questions that must be answered before these results can be viewed as definitive. First, the contingencies operating on review and final exam performance in the Blackburn et al. (1970) experiments were not clearly specified in their report. If the contingencies exerted strong delayed control over student study behavior, they may have obscured performance differences. Second, they also fail to mention what procedures guaranteed that the "F for cheating" contingency operated reliably. Third, since quiz retake data were not reported it is impossible to compare external proctors with self-grading along this important dimension. Since all three of these experiments took place in the Child Development course at the University of Kansas, future studies will have to compare proctor systems with self-grading in poorly designed or more difficult courses.

It has been suggested that immediate feedback is a crucial variable in the effectiveness of behavior instruction. In most contingency-managed courses, such feedback has been provided by a proctor, and recently by students themselves. A proctor could also be a computer terminal, a grading machine, or any other source of immediate feedback. However,

if course quizzes are designed to occasion complex verbal performances and course objectives go "beyond the level of recall," it may be important for the proctor to provide more than just simple feedback on quiz performance. Recent research has shown that complex verbal and social behaviors of proctors can be trained to affect both proctor evaluation behavior and student performance. Such findings may negate the similarities between different proctor systems, and any other immediate feedback procedures.

Proctor training. Most personalized courses have detailed proctor answer keys for the unit quizzes, and weekly proctor meetings designed to review course materials and discuss difficulties. Some instructors that are using these procedures feel they are very helpful and are all that is really needed, since proctors have previously mastered the course material and have acquired relevant knowledge from other courses within the same discipline. Additionally, Born and Zlutnick (1972) suggest that the proctor be required to pass quizzes over each unit of material, if mastery was not demonstrated in a previous semester. Born (1971b) and Kosma and Kulik (1976), however, have written more formal training manuals for proctors based upon their experience with the system. Increasing interest among behavioral instruction researchers has focused upon the possible advantages that may be gained by such rule specification for proctors.

Five papers report the use of special proctor seminars and instructional materials for proctors.[1] Weaver and Miller (1975) have developed a training package for proctors that focuses upon three desirable proctor behavior constellations: (a) monitoring the course progress of the assigned students ("preparation behaviors"), (b) assisting the students with questions they have over the course material through prompting correct responses ("prompting behaviors"), and (c) scheduling reinforcing consequences following correct responses to increase and maintain the behavioral repertoire of the students ("praise behaviors"). More specifically, the training package engages the proctors in the following sequence of behaviors: (a) preparation behaviors, which include greeting the student, reviewing the student's folder to see how he is progressing, and asking if there are any questions over the unit quiz about to be taken, (b) prompting behaviors, which include prompting attempts to answer a question, prompting definitions of terms in the answer, prompting explanations and examples of terms used in the answer, and providing other prompts, and (c) praise behaviors, which include social reinforcement for student progress (if warranted), for correct responses both prompted and unprompted, and for demonstrating mastery of a unit.

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[1]All of the proctor training packages to be discussed here have been used and evaluated with external proctors only.

Weaver and Miller used a multiple baseline design to intro-
duce each component of the training package. When each
phase of the training package was introduced, it produced
significant increases in the corresponding proctor behaviors
being trained, as measured in subsequent proctoring sessions.
The authors note, however, that it is not known whether both
the training manual and the role-playing sessions were ne-
cessary to produce the appropriate responses.

Robin and Cook (1975) have also developed a successful
and excellent proctor training package that consists of
role-playing and instructor-proctor discussion followed by
feedback on actual classroom proctoring. Their training
sessions focus upon nine behavioral dimensions of proctor-
ing: greeting behavior, clear feedback, evaluative comment,
telling student to proceed, listening without interruption,
clear pass-fail statement, closing comment, non-quiz related
course question, and administrative behavior. The package
differs, then, from Weaver and Miller's in its lack of a
training manual and mastery quizzes, and the addition of
actual classroom feedback on proctoring.

Robin and Cook used a multiple baseline design across
subjects to assess the effectiveness of their package. Six
proctors in their PSI course were selected on the basis of
the authors' judgment that they would benefit from such
training. Observers scored the presence and frequency of
each of the nine proctor behaviors in each proctor session,

according to the authors' behavioral definitions. A multiple baseline design across subjects was used to evaluate the effects of the entire training package. The results of the experiment indicated that the package was effective in producing increases in overall rates of correct proctoring behaviors for five of the six subjects tested. Specifically, the package produced consistent increases in greeting behavior, clear feedback, evaluative comments, administrative behavior, and clear pass-fail statements, across subjects. Pretraining baselines for telling students to proceed, and listening without interruption were close to 100 percent, while the package had no consistent effects upon non-quiz related course question behavior, or closing comment behaviors, across subjects.

Robin and Cook's results extend the work of Weaver and Miller in that both training and evaluation were conducted in ongoing PSI classrooms. As Robin and Cook note, this permutation may produce better in-class proctor performance than training conducted in simulated practice sessions. In addition, Robin and Cook evaluated the effects of a training package that was based upon a more detailed task analysis of relevant proctor behaviors.

A third proctor training package has been developed by Coldeway and Schiller (1975). That package incorporates an animated film that presents both effective and ineffective proctor procedures. An instructor's manual is also included

which guides seminar discussion of the film. A proctor training guide presents an outline for planning and implementing proctor training. Finally, a guide to proctor selection and evaluation procedures is provided. The training package focuses upon the application of behavior principles to increase student performance in, and preference for, personalized instruction. Personal reports indicate that the package is very successful, although the contributions of each of its components is unknown.

The relative effectiveness of the components of each of the packages discussed so far is unknown, due to the differences in evaluation procedures between studies. Comparisons of the differential effects of proctor training package components are needed. In addition, as both Weaver and Miller, and Robin and Cook note, these evaluations have not assessed the effects of proctor training upon those for whom proctor behavior changes are intended--the student.

One component of proctor training that plays an especially important role in proctor effectiveness is accuracy of quiz scoring. Semb (1975) has instituted a simple procedure for improving proctor accuracy. A scored quiz is collected from each proctor each day and is rescored for accuracy. On a separate sheet of paper the rescorer comments on how well the proctor graded each item. These feedback sheets are then distributed at the next class meeting and any discrepancies are discussed. Semb reports that with

this procedure interscorer agreement increased from a mean
of 87 percent in one group of proctors and 89 percent in an-
other group to 98 percent in each. The feedback schedule
was reduced to once every three days and high levels of ac-
curacy were still maintained. However, the effects of in-
creased proctor scoring accuracy upon student performance
were not assessed.

Sulzer-Azaroff, Johnson, Dean, and Freyman (1976) con-
ducted a three-semester case study and experimental analysis
of proctor quiz scoring accuracy. In the first semester,
reliability of proctor quiz scoring revealed a low inter-
scorer agreement index of .83. In addition, only 2.8 per-
cent of all quizzes taken in the course were evaluated to be
below the mastery criterion. In the second semester, accur-
acy treatment procedures for proctors were instituted in
multiple baseline fashion, and consisted of the instructors
showing the proctor the interscorer agreement indices that
had been computed for the quizzes that the proctor had scored
to date. The instructors also told the proctors that they
could earn an "A" for proctoring by increasing or maintain-
ing the accuracy of their quiz scoring behavior. The re-
sults of the individual data collected from the multiple
baseline were inconclusive due to the reactivity caused by
the proctors themselves conducting quiz rescoring. However,
quiz retakes increased from 2.8 percent of the total in the
previous semester to 11 percent, and mean final exam per-

formance increased from 77 percent to 85 percent. Finally, quiz items that were inaccurately scored as correct were traced to corresponding final exam questions; 79 percent of those final exam answers were incorrect. This compared to only 37 percent of final exam items answered incorrectly when the corresponding quiz items had been consistently scored as incorrect by both proctor and reliability checker.

In the third semester, a functional analysis of the relation between both quiz scoring accuracy and accuracy training, and student examination performance was conducted. Two times during the semester, each proctor was given a list of items for a sample of students that she proctored. These items consisted of previous quiz items that were scored reliably or unreliably as correct or incorrect. Accuracy training involved an intensive two-hour session during which proctors were informed that reliability was being assessed, and were shown all reliability indices that had been computed to date on the quizzes that they had scored. Proctors also examined quizzes that had been rescored, for discrepancies between their scoring and the reliability checker's scoring, and practiced rescoring quizzes and computing reliability indices in pairs. Finally, proctors were informed that while a "B" would be awarded for attending all class sessions and proctor meetings, an "A" could be earned by increasing or maintaining their quiz scoring accuracy. Proctors were introduced to treatment in multiple baseline fa-

shion. Results indicated that the proportion of items that the proctor and reliability checker scored inconsistently decreased and remained low each time accuracy training was introduced. In addition, the student performance data validated the introduction of accuracy training. In 61 percent of the cases, the student was unable to correctly recall an inaccurately scored item. In 56 percent of the cases in which the item was consistently scored as incorrect, however, the student answered the item correctly. Together, the Semb (1975) and Sulzer-Azaroff et al. (1976) studies indicate the importance of accuracy training to maintain quality control in personalized instruction courses.

Davis (1976) provided effective instructor feedback in a small advanced undergraduate course. He supplemented proctor feedback by providing instructor feedback on five-unit major examinations. He either told individual students to keep working (control procedure), particiate more in class meetings, improve mastery test answers, or more carefully answer the study questions. In comparison to the control procedure used in the first and third segments of the course, students receiving the various forms of instructor feedback during the second segment of the course increased their rates of the behavior specified in the feedback they received. Mastery test and study question feedback also affected improvements in mastery test, study question, and major exam per-

formance. Suggestions to increase participation in class discussions had their intended effects but did not result in improvements in mastery quiz, study question or subsequent segment examination performance. Such results may have more significance for instructors training students in upper level major courses or attending selective universities such as the one at which this study was conducted (Dickenson College). Davis' study suggests that instructor comments that are specific in nature may lead to specific changes in instructor and student behavior. It remains to be seen whether such procedures will be effective when other instructors or proctors implement them.

Proctor training has been shown to have a significant effect upon proctor performance in reports that measured proctor behavior. One study has shown that one kind of training has positive effects upon student performance. The effects of proctor training need to be replicated in courses varying in complexity of objectives and quizzes to determine whether elaborate training procedures will always be beneficial in behavior instruction courses.

Proctor component summarized. In summary, many papers have focused upon the proctor component in personalized instruction. Student and instructor evaluations of both internal and external proctors are overwhelmingly favorable. Beneficial collateral effects upon those who proctor in behavioral courses have been informally reported, as well.

Three papers have demonstrated that the proctor component as an instructional package is functionally important to performance and progress in personalized instruction courses (Calhoun, 1976; Farmer et al., 1972; Johnson & Sulzer-Azaroff, 1975a). While it appears that immediate feedback is the most important aspect of the proctor component (Calhoun, 1976), research demonstrating its importance has been conducted in courses that did not provide formal proctor training in certain behaviors. Proctor training in appropriate administrative, social, prompting, and accuracy behaviors has increased such proctor behaviors in the personalized classroom (Semb, 1975; Sulzer-Azaroff, Johnson, Dean, & Freyman, 1976; Robin & Cook, 1975; Weaver & Miller, 1975) and the positive effects of accuracy training upon student performance has been demonstrated (Sulzer-Azaroff et al., 1976). Given improvements in student performance as a function of proctor training, immediate feedback from other sources such as machines or self-scoring may not be as effective as immediate feedback from proctors trained in certain behaviors when required student performance is complex. Further research should analyze the effects of different aspects of the proctor component.

Three papers have shown that, in the absence of formal proctor training of certain behaviors, internal and external proctor systems are at least equally effective (Anderson, 1975; Gaynor & Wolking, 1974; Johnson & Sulzer-Azaroff,

1975a). There is also evidence to suggest that students learn more when they proctor than when they do not (Johnson, Sulzer-Azaroff, & Maass, 1976), although the amount of proctoring necessary to produce differences is unknown. Self-grading has also been shown to be as effective as external proctor grading, under certain conditions.

Some fruitful directions for further research on the proctor component can be specified. Further research is necessary to determine whether using trained external proctors leads to better student performance than internal proctoring or self-grading. In addition, the possibility of training internal proctors and self-graders needs to be explored. A significant study would generate controlled data comparing the effects of trained and untrained external, internal, and self proctoring upon student performance and preference. Further investigation into the behaviors of both students and proctors during the proctoring sessions may provide important information on the most optimal proctor system for a personalized instruction course. Such research may also provide a more precise analysis of the effects of different subcomponents of any proctor system used in a personalized course.

At present it appears that a convenient subdivision of proctor behavior would include administrative functions, social reinforcement, immediate feedback, and corrective feedback. Although it has not been systematically evaluated,

one can well imagine the effects of inappropriate proctor administrative behavior on the operation of a personalized course! We have already seen that lack of immediate feedback at least increases quiz retaking and reduces student progress through a self-paced, personalized course. The present experiment addresses the corrective feedback behaviors of proctors, and, as such, represents an attempt to begin to analyze proctor-student verbal interactions during proctor sessions.

When a student has omitted a quiz answer, or has supplied an unclear, partial, or erroneous quiz answer, some of the most important student-proctor verbal episodes result. The presence of any one of these classes of quiz responses can set the occasion for one or more of several proctor behaviors. The proctor may either (a) supply the student with the correct answer (and possibly have the student repeat it), (b) provide varying degrees of supplementary stimuli (S^D's) or prompts until the student emits the correct response, (c) tell the student where to find the correct answer and to try again later, or (d) simply mark the answer wrong and say nothing.

A question arises as to which of the four strategies are most appropriate in an evaluation setting, such as quiz scoring sessions. Theoretically, the student is merely emitting echoic behavior in the first case, and, because transfer of stimulus control is not automatic the student

may not emit the same or similar verbal behavior in the absence of the very specific S^D's (in this case, the answer itself) provided by the proctor (Ferster, 1965; Skinner, 1957). In the second case, as in the first, it is the additional discriminative stimuli provided by the proctor that set the occasion for the correct student response. In most situations these are not the stimuli in the presence of which the instructor desires students to respond. Both of these strategies may be very helpful during teaching or training portions of instruction, such as when a question arises during unit study. However, to maintain a system of instructional quality control, the effects of training eventually need to be <u>evaluated</u> to determine whether the student's verbal behavior is under the control of the appropriate terminal stimuli (in this case, the quiz items) and, if not, appropriate remedial steps should be taken to transfer stimulus control from instructional material to the terminal stimuli. Each time the proctor engages in strategies (a) and (b) above during quiz scoring sessions, the evaluative component of instruction has been eliminated, and therefore the instructor has no guarantee that mastery of the terminal objective has been achieved. Indeed, programmed instruction research has shown that when supplementary discriminative stimuli are overused or are not completely faded out, student responses may be controlled by these stimuli, and may not be under the control of either the critical features of

instruction or the terminal stimuli that embody the critical properties (Anderson, Faust, & Roderick, 1968; Faust & Anderson, 1967; Royer, 1969). From the preceeding discussion, it would appear that strategies (c) and (d) above would be more desirable alternatives to use during quiz-scoring sessions, as they would preserve the evaluative component in the instructional process.

Two empirical questions concerning the nature of proctor corrective feedback behavior during quiz-scoring sessions can be raised at this point. How often do proctors provide supplementary S^D's during quiz-scoring sessions in a typical personalized course? When supplementary stimuli are provided during evaluation, will students' behavior be controlled by the appropriate terminal stimuli at a later point in time? In addition, the effects of a proctor training package designed to eliminate proctor provision of supplementary S^D's during evaluation and increase other corrective strategies was also evaluated. Specifically, the effects of proctor prompting training upon (a) proctor behavior during quiz-scoring sessions, and (b) student maintenance of verbal behavior of course material, were measured.

CHAPTER II
Method

Subjects and Course Personnel

Fifty of the 57 students enrolled in an introductory psychology course served as subjects. Students were not explicitly informed that the course would operate in a PSI format when they registered for it. However, some students may have known that the instructors would probably be using PSI procedures, since the experimenter had used them to teach 12 previous introductory psychology courses. Each student was given a consent form explaining the nature of the procedures to be used during the experiment, a general statement of the importance of the study to the improvement of future classroom instruction, and a promise to disclose the exact nature of the investigation upon its completion (see Appendix I). Only those students who signed the form and returned it to the instructors during the first week of class served as subjects. Such precautions were undertaken because audiotaping was involved in the experimental procedures. All 50 subjects remained in the course for the duration of the experiment.

Nine proctors selected prior to course operation also served as subjects. Each proctor also agreed to sign the consent form. Proctors were also unaware of the nature of the study throughout the semester.

Course personnel included two instructors who were team-teaching the course, one graduate teaching assistant, the nine advanced undergraduate students who were selected to be external proctors, an advanced undergraduate course manager who had taken a PSI course during the previous semester, and three research assistants. The research assistants coordinated the distribution of unit quizzes, and retention testing during the semester. The author explained the nature of the investigation and experimental questions to the three research assistants at the outset of the semester. No internal proctors were used in the course.

Materials

The course assignments were taken from: Principles of Everyday Behavior Analysis, by L. Keith Miller; Introductory Psychology, by Walter Vernon; Contemporary Psychology, by Edmund Fantino and George Reynolds; and Towards a Self-Managed Life Style, by Robert Williams and James Long. The course material was divided into 21 units, each consisting of a 20-40 page reading assignment with accompanying study materials. The study material varied from concept-programmed material (Miller & Weaver, 1976), to short-answer study questions, to fill-in items, depending upon the reading assignment. In each case, the study material was designed to occasion frequent written active responding, to emphasize major points in the readings, and to integrate major concepts

and principles. In addition, three parallel forms of a quiz, designed to take approximately 25 minutes each to complete, and containing 10-15 multiple-choice, fill-in, but mostly short-answer questions, accompanied each unit. Each quiz had a corresponding answer key that contained answers plus a reference to a specific study guide item or set of study items for each question. In addition, each item on each quiz in the course was written on five three-by-five-inch index cards. Each index card was coded. The first two numbers of the code corresponded to the unit number from which the item was taken, the third corresponded to the unit form, and the last two indicated the unit form question number. Thus, for example, the index card coded 15B12 contained question #12 on unit 15, form B.

Students were also administered a 100-item multiple choice pretest covering all of the course material, during the first week. In addition, each student had a personal quiz folder containing a cumulative progress record, completed quizzes, and other relevant information. Nine cassette tape recorders and 15 60-90 minute cassette tapes for recording proctor-student interactions during quiz-scoring were used in the study. Quiz and retention answer forms were freely available to students and proctors. Finally, a comprehensive examination containing 20 short essay and 20 multiple-choice questions was used as a summative evaluation instrument. Fifteen of these questions each covered mater-

ial from several units. Students had no prior exposure to any of the final exam questions.

Setting

The course operated in two medium-sized classrooms with movable chair desks, from 11 a.m. to 1 p.m. every Tuesday and Thursday, and from 12:20 to 2:45 p.m. every Friday, for 14 weeks during the 1976 Spring semester. On Tuesdays and Thursdays one room was used for quiz-taking, and the other room was used for studying and proctoring. On Fridays the rooms were used for films, discussions, demonstrations, and laboratory activities.

General Procedures

On the first course day, the instructors described the general procedures of the course (see Appendix II). After receiving a mastery score on a "readiness" quiz covering both the course procedures and a paper discussing PSI (Kulik et al., 1974), and completing the course pretest, each student was assigned to a proctor. Student assignment was random, with the proportion of students to each proctor not exceeding 6:1. Proctors were numbered in alphabetical order, and the first student to demonstrate mastery on the readiness quiz was assigned to proctor #1, the second to proctor #2, and so on, unitl all students had been assigned to a proctor. During the course of the semester, each stud-

ent self-paced through the course, attaining mastery scores on 21 units based upon the reading assignments. The mastery criterion was defined as achievement of 90% correct responses on the unit quizzes. Students were required to take each unit as many times as necessary to meet the mastery criterion. When a student required more than one quiz to demonstrate mastery of a unit, a parallel (i.e., not identical) quiz form was available. On those rare occasions when more than three different quizzes on the same unit were needed to demonstrate mastery, the instructors provided consultation and additional items. Each student took a comprehensive final examination based upon the units after mastering all 21 units in proper succession. The two instructors scored all final exams taken before the end of the semester by comparing the students' answers with a key. The two instructors and nine external proctors scored all final exams taken at the end of the semester, in a group session.

In addition, a demonstration, workshop, laboratory, discussion, or lecture was scheduled each Friday except the first. The content of such activities was related to the assignments covered in the units. Although no additional information covered in the Friday activities appeared on any quiz or the final exam, each student was required to select and attend any four sessions during the semester and submit a worksheet that accompanied each. All worksheets were completed during and throughout the class period. An addition-

al course credit was given to any student who attended all 13 Friday sessions and submitted the 13 corresponding worksheets.

During the course, the instructors and course manager supervised the day-to-day operation of the course, answered student questions on the course material, arbitrated student-proctor disagreements during quiz scoring, and provided informal remediation and enrichment discussions and references for interested students. Finally, progress points affecting five percent of the student's grade were earned by mastering units at a consistent pace. The total course grade was determined by the number of units mastered, progress points earned, Friday sessions attended and worksheets completed, and score on the final exam.

Proctoring

After a student completed a unit quiz, a proctor immediately graded each item as either "correct," "unclear," or "incorrect," on the basis of how closely it matched the answer provided on the proctor answer key. For all questions marked "unclear," the student was required to justify or explain. If the student's oral answer satisfied the proctor, the answer was scored as "correct."

Although a student demonstrated mastery of a unit with a 90% score or higher, all errors or unclear answers had to be corrected to the proctor's satisfaction. Whenever stud-

ents could not clarify or correct their imperfect answers during the scoring session, but scored between 90 and 100% on the unit quiz, they returned to their materials, located the relevant passages, and reported back to their proctor with the correct answer, before leaving for the day. Thus a 100% mastery criterion was in effect in the course, although students were not required to retake a quiz of they scored between 90 and 100%. When students attained mastery on a unit quiz, they were congratulated and allowed to study for the next unit. When students failed to achieve criterion, they were told which portions of the unit assignment and study questions needed review before attempting a retake on a parallel form of the unit quiz, and they could ask any and all questions about the unit. No quizzes were scored by the instructors or graduate teaching assistant.

Data Collection Procedures

Beginning with the second week and for the remaining weeks in the semester, proctors tape recorded all of their quiz-scoring sessions. Each proctor obtained his own cassette tape and recorder from one of the research assistants each class day. Prior to scoring each quiz, proctors recorded on their tapes the date, and the student's name, unit and quiz form that was to be proctored.

Each proctor was also instructed to list the unit, form, and number of each unclear, omitted, or incorrect

item (as originally scored) for each student on the inside of the student's personal quiz folder, after the student left for the day. Each proctor then presented to the appropriate student each of those listed items, four units after the student originally encountered the item. Thus, for example, all unclear, omitted, or incorrect items on a student's unit four quiz were presented after the unit eight quiz had been scored. These identical items will be called retention items for the remainder of this dissertation. Proctors also presented a parallel (generalization) question with each unclear, omitted, or incorrect item. Parallel items were defined as those items on the three quiz forms for a given unit that were keyed to the same study items. Each proctor was cautioned to make sure that all parallel items presented were in fact actually new, i.e., had not been encountered on a parallel quiz form that the student may have been required to take. Finally, a baseline of retention of items that were correctly answered initially was collected by having each proctor randomly select and present three items from the appropriate unit that the proctor initially scored as correct. No retention and generalization data were collected on the last four units in the course.

At the beginning of each class session, each proctor obtained index cards containing the appropriate retention and generalization items for each student. After each quiz had been scored, the proctor shuffled the student's items

and presented them to the student. The student wrote the index card code and answer to each item on a retention answer form. Proctors were instructed to offer no assistance to students while they were answering these items. All retention and generalization items were scored outside of class by the research assistants, and no feedback was given to students about their performance on them. Proctors were allowed to tell the student only the unit from which the item was taken.

Each proctor was instructed to make sure that all students at least attempted to answer each retention and generalization question. If a student omitted an item the proctor said to the student, "Are you sure that you cannot answer question #_____?" This was done to guarantee that the student attended to each retention item presented. After the proctor received some answer to each retention item, the index quiz cards and retention answer sheets were returned to one of the research assistants. Due to the increase in number of daily proctor responsibilities, proctors were informed that an "A" for proctoring was possible only if the above procedures had been carefully executed. The research assistants reported any procedural errors made by the proctors to the experimenter.

Students in the course were told in the course policy and on the first day of class that items would be presented to them from past units after their quizzes were scored, but

their performance on such items would in no way affect their grade. They were asked to cooperate by completing each item presented, and were told that we were investigating procedures to improve classroom learning in mastery courses.

The procedures involved in the present study thus altered the author's typical personalized course in two ways. First, each student-proctor interaction was taperecorded. Second, each proctor's daily activities were substantially increased in number.

Proctor Training

All proctors participated in a weekly seminar during which course problems, instructional technology, and administrative concerns and proctor social behavior were discussed. During the first session of the seminar, the instructors provided verbal instructions on appropriate correction procedures for quiz errors and unclear answers to the proctors. In brief, proctors were told to request that the student attempt to clarify all answers that were ambiguous or unclear, to the proctor's satisfaction. They were also told not to give away answers or to give students too much help, since the students would eventually have to answer questions without their assistance on the final exam, where errors would count. They were also instructed not to give "minilectures" to students, or otherwise tell them critical information. We explained that their role was to

evaluate, diagnose poor performance, and tell students where to locate appropriate material to restudy in the reading assignments and study materials. Although some tutoring was allowed and encouraged, proctors were explicitly told that such interactions should never take place during quiz-scoring. No data on the amount of proctor tutoring were collected. These verbal instructions approximate those given to proctors in many PSI courses (e.g., Born & Zlutnick, 1972; Green, 1974; Johnson & Ruskin, 1977).

After six class sessions of audiotape baseline data were collected, proctors were successively introduced to a training program in prompting and correction procedures, in multiple baseline fashion. Training programs were conducted by the experimenter during the fourth, seventh, and eleventh weeks of the semester. Three proctors were randomly selected to attend each training session.

The training program consisted of one three-and-a-half-hour session conducted by the experimenter. During the session, proctors were given a brief mastery quiz over a written program on proctor prompting, prepared by the experimenter. The program was distributed to the appropriate proctors at the end of the last class session preceeding a training session. The written prompting program was expanded and adapted in part from material contained in Miller (1974) and Markle (1969). Basically, the program

1) differentiates between instructional and eval-
    uative components of instruction,

2) differentiates between informational and non-
    informational prompts,

3) gives several types and examples of informa-
    tional and noninformational prompts,

4) recommends that only noninformational prompts
    be used during quiz-scoring sessions,

5) suggests a six-step noninformational prompting
    strategy,

6) applies the strategy to circumstances in which
    students provide omitted, unclear, and incor-
    rect quiz answers, and

7) contains summaries, common student questions
    and objections, and study questions through-
    out.

During the prompting training sessions, proctors also

role-played appropriate correction procedures for evaluative

and nonevaluative student-proctor interactions, with one an-

other. Proctors rotated as student, proctor, and observer/

notetaker for situations involving (a) student help during

studying, (b) omitted, (c) unclear, and (d) incorrect quiz

answers. During role playing, the experimenter provided

differential reinforcement and corrective feedback accord-

ing to the guidelines specified in the written program (see

Appendix III).

Each role-played interaction was also videotaped and

played back upon completion. Prior to playback, the obser-

ver/notetaker was requested to summarize the good and bad

proctor behaviors emitted and the "proctor" and "student"

also made comments. During videotape playback, the experimenter gave differential reinforcement and corrective feedback. Each proctor was invited to make comments or ask questions during playback. The video-tape recorder was often stopped and portions were often replayed during the training sessions.

Dependent Measures

Proctor performance. Each week, the three research assistants computed from each proctor's tape the proportion of appropriately corrected quiz answers that had initially been unclear, incorrect, or omitted. As each proctoring session was scored, the research assistants referred to the student's answer sheet, the quiz form, and the answer key corresponding to the session, when necessary. Appropriate correction procedures were defined as any question or statement made to the student that did not contain any additional information other than that contained in a quiz item. For example, proctors were correcting appropriately when they restated the item with no information other than that contained in the item, or when they requested that the student justify or explain his answer, provide an original example, define any terms used in his answer, or give a complete restatement after prolonged interaction. Proctors were not appropriately correcting an answer when they provided information from the text or study guide or answer key not

contained in the quiz item, or gave informational prompts like, "It is very similar to the answer you gave in number two"; "It is related to the concept of _____ that you learned in the last unit" (thematic prompts); or "It begins with an 'r'"; "The answer describes this diagram (proctor draws a diagram)" (formal prompts). Appropriate and inappropriate prompting procedures were thus defined in terms of the presence or absence of supplementary discriminative stimuli not contained in the terminal quiz items, and were mutually exclusive and exhaustive categories.

The three research assistants were trained in appropriate scoring procedures by reading the instructional material on prompting, independently rescoring each other's initially scored tapes, computing interscorer agreement indices, and discussing disagreements with each other and the experimenter on a weekly basis. The experimenter and research assistants discussed several instances of prompting on the initial tapes that were scored. After two weekly sessions with the experimenter, the assistants had no further problems scoring proctor prompting episodes as appropriate or inappropriate. All scoring was conducted in three small research rooms provided to the experimenter for his personalized course materials and managers.

Student performance. To validate the proctor training procedures, the following measures were taken: (a) the percentage of all unclear, omitted, and incorrect answers that

were <u>appropriately</u> <u>corrected</u> by proctors and <u>answered</u> <u>correctly</u> by students during retention sessions, (b) the proportion of all unclear, omitted and incorrect answers that were <u>inappropriately</u> <u>corrected</u> by proctors and <u>answered</u> <u>correctly</u> by students during retention sessions, and (c) the proportion of <u>initially</u> <u>correct</u> items by proctors that were <u>answered</u> <u>correctly</u> by students during retention sessions, was computed.

<u>Reliability</u>

<u>Experimental</u> <u>procedures</u>. Due to mechanical and electrical difficulties many student-proctor interactions were not successfully recorded. The percentage of all taperecorded quiz scoring sessions was calculated for each proctor. The mean for all proctors was 35% (N = 332) with a range of 30% to 51%.

The precision with which the proctors implemented the retention item procedures was assessed by comparing the items contained on 10% of the students' retention answer sheets to the items scored incorrectly on the students' quiz answer sheets. Any discrepancy in item presentation was defined as a disagreement. Reliability indices were calculated by dividing the number of agreements by the number of agreements plus disagreements. The percentage of agreements was 95%.

To ascertain that students had not been previously ex-

posed to the parallel items presented during the retention segments of quiz-scoring sessions, reliability checkers computed the percentage of all parallel items presented during the semester that did not appear on any retake quizzes that the student may have taken. The mean percentage for all proctors was 96% with a range of 92% to 100%.

Proctor behavior. Interlistener agreement of proctor prompting behavior was assessed by randomly rescoring ten percent (N = 20) of each proctor's taped quiz-scoring sessions per week. The number of inappropriate prompting statements indicated by the rescorer was compared to the number of inappropriate prompting statements indicated by the initial tapescorer. An interscorer agreement index was calculated by dividing the smaller number by the larger number. The percentage of agreement was 99%. An additional ten percent (N = 20) of all scored tapes were divided into two minute intervals, and interval-by-interval agreement between scorers was assessed in the manner previously described. Percentage agreement was 96%.

Student behavior. Interscorer agreement on student behavior was assessed by randomly selecting and rescoring ten percent of all unit quizzes taken throughout the course. In addition, ten percent of all retention item answer sheets were rescored. In both cases, any discrepancy in grading or scoring an item as correct or incorrect was defined as a disagreement. The number of agreements was divided by the

number of agreements plus disagreements to determine a reli-
ability index. All proctors and students were notified that
the reliability of unit quizzes would be assessed. Relia-
bility of quiz scoring was .91. Reliability of retention
item scoring was .96.

All reliability procedures were conducted by the three
research assistants. Instructions were provided to the re-
search assistants for each measurement that was reassessed.
Reliability was always assessed independent of the initial
measurement. Although two of the research assistants were
aware of which proctors were in each training group during
initial tape scoring, all reliability measures were con-
ducted at the end of the semester. Thus it was nearly im-
possible for the assistants to assess whether training had
occurred during rescoring. The high reliability indices
supported the assumption that scorer bias was minimal if at
all existent.

C H A P T E R   I I I
Results

Proctor Performance

The effects of the prompting training program were
evaluated for each of the three proctor groups as part of
a multiple baseline design. The results are presented in
Figure 1. Mean percentage of correctly prompted quiz an-
swers are plotted for successive blocks of two to three
class sessions for each group of proctors. The median num-

Insert Figure 1 about here
----

ber of tape-recorded quizzes scored in each block of class
sessions for each group was 8 (range = 6-14). The median
number of omitted, unclear or incorrect items per tape-re-
corded quiz was 3 (range 0-6). Thus each data point in
Figure 1 represented approximately 8 x 3 or 24 prompting
occasions.

Prior to training, proctors correctly prompted student
verbal repertoires approximately 50% of the time an imper-
fect quiz answer was given. Following training, however,
proctors' appropriate corrective feedback increased to over
90%. For example, during the first block of class sessions
that were recorded, proctors 1-3 did not provide supplement-
ary stimuli for 18.2% of their students' imperfect quiz an-
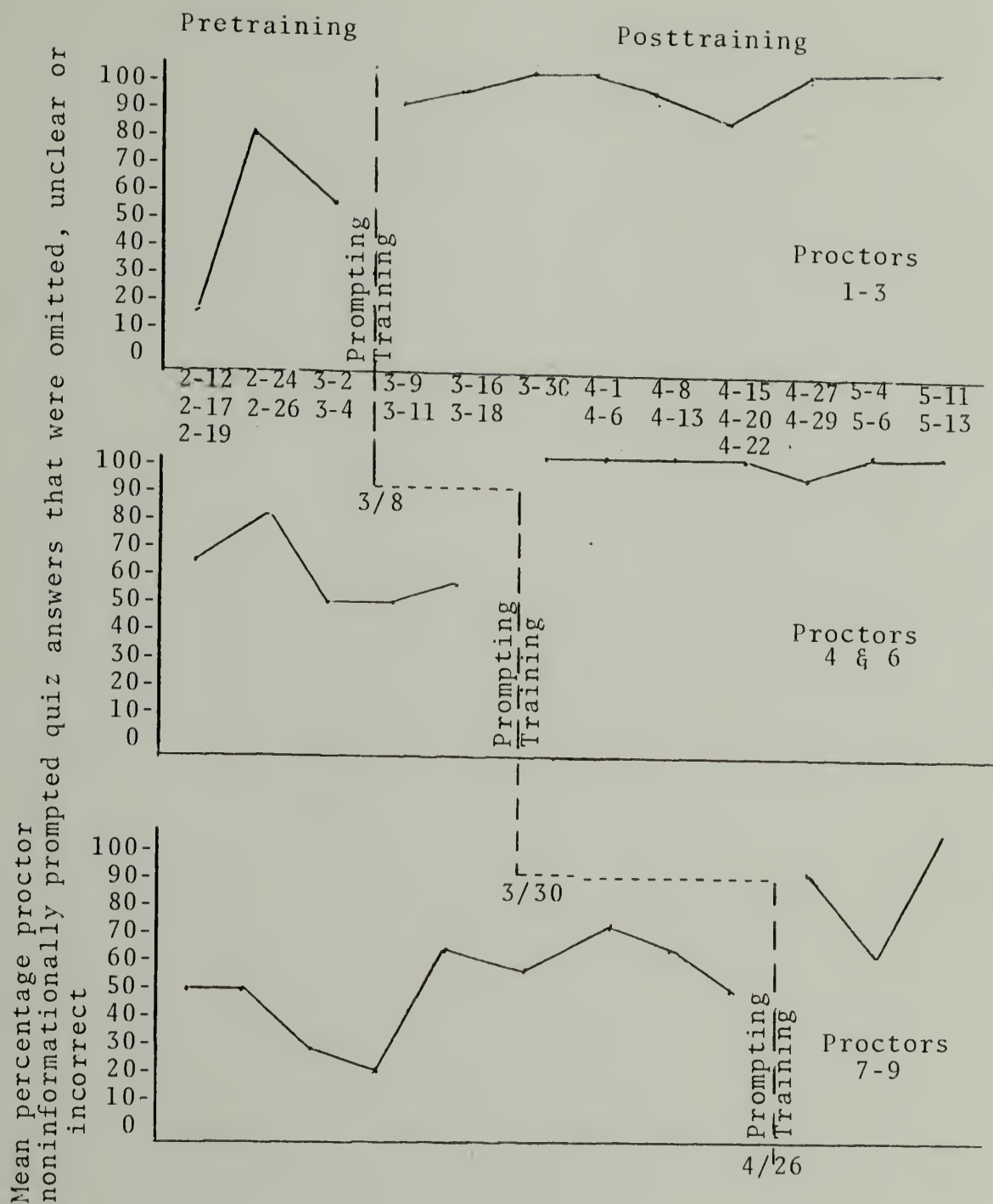
Figure 1. Mean percentage
proctor noninformationally prompted quiz an-
swers that were initially omitted, unclear or incor-
rect. Groups are plotted in multiple baseline fashion
as a function of prompting training.

swers. During the second block, appropriate prompting oc-
curred for 80% of their students' imperfect quiz answers.
During the last block of baseline class sessions, appropri-
ate prompting decreased to 58.9% of their students' imper-
fect quiz answers. During the block of class sessions fol-
lowing prompting training, however, proctors 1-3 appropri-
ately prompted on 92.4% of the occasions on which their
students supplied imperfect answers. During five of the re-
maining eight blocks of class sessions, proctors 1-3 never
provided supplementary stimuli when students had written im-
perfect quiz answers. The exact percentages of correct
prompting for each group for each block of class sessions
are presented in Table 1. The effects of prompting training
upon the mean percentage of appropriately prompted quiz
items were analyzed in a chi-square which was significant
$(x^2_{22} = 99.05, p < .0001)$.

Insert Table 1 about here

The effects of prompting training on each of the nine
proctors is presented in Table 2. Individual data analysis
revealed that seven of nine proctors showed substantial in-
creases in appropriate correction procedures immediately
following prompting training. Proctor 5's data were elimin-
ated from the analysis due to the sparsity of proctor ses-
sions that she successfully recorded. There were many ses-

Table 1

Mean Percentage Correctly Prompted Quiz Answers for Each Proctor Group

Proctors 1-3	18.2	80	58.9	95.3	95	100	100	89.6	95.5	100	100	100
Proctors 4 & 6	66	83	50	47.9	55	100	100	100	100	90.1	100	100
Proctors 7-9	50	50	29	20	60	52	72	64.8	48.4	87.5	60	100

sions during which Proctor 5's tape recorder did not operate correctly. Proctor 5 was also heard to repeatedly complain about having her student interactions taperecorded, saying that it made her and her students "nervous" and "unnatural." Although Proctor 5 did agree to sign the consent-to-tape form, she remarked after the first class session that no transcriptions from taperecorded student-proctor sessions could "really reflect a natural proctor-student interaction." Following training of Proctors 4 and 6, Proctor 8 began to show sporadic increases in appropriate prompting. These increases stabilized at well above 90% following direct training.

Insert Table 2 about here

Student Performance

Students assigned to proctors 1-3 scored an average of 30% correct on the course pretest. Students assigned to proctors 4 and 6 averaged 27% correct on the pretest. Students assigned to proctors 7-9 averaged 24% correct on the pretest.

To control for the possible effects of student restudy for required quiz retakes, each identical (retention) and parallel (generalization) item was categorized according to whether the corresponding prompted item appeared on a quiz

Table 2

Mean Percentage Correctly Prompted Quiz Answers for Each Proctor

Proctor												
1	20.2	91.7	50	100	--	100	100	100	90.9	90	93.4	100
2	18.2	85.8	--	85.8	90	100	--	80	--	100	100	100
3	16.2	62.5	62.5	100	100	100	100	88.9	100	100	100	100
4	66	75	50	66.8	--	100	--	100	100	83	--	100
6	--	90	50	29	55	100	100	--	100	100	100	--
7	42	67	0	20	67	--	53	--	30.8	85	47.2	--
8	60	33	56	--	63	57	91	76.2	66	87.5	100	100
9	56	50	31	--	50	47	--	53.4	--	90	32.8	100

that the student has passed or had not passed. Table 3 shows the mean percentage of correctly answered identical and parallel items for both passed and failed quizzes. When proctors appropriately prompted incorrect, omitted, or un- clear answers on quizzes that students had passed (i.e., scored >90%), 72% of the corresponding 416 items were an- swered correctly. However, when proctors inappropriately prompted incorrect, omitted, or unclear answers on quizzes that students had passed only 39% of the corresponding 144 items were answered correctly.

Insert Table 3 about here

When proctors appropriately prompted incorrect, omit- ted, or unclear answers on quizzes that students had not mastered, 76% of the corresponding 140 items were answered correctly. When proctors inappropriately prompted incor- rect, omitted, or unclear answers on quizzes that students did not master, 70% of the corresponding 43 items were an- swered correctly.

In order to use a parametric statistical test on these data, they were first subjected to an arc sin transformation of proportions. This transformation has been purported to normalize nominally categorized data (Winer, 1962; Langer & Abelson, 1972). Since the identical and parallel items were scored and classified as either correct or incorrect, the

Table 3

Mean Percentage Correctly Answered Identical and Parallel
Items as a Function of (a) Whether the Proctor Correctly
or Incorrectly Prompted the Corresponding Quiz Items and
(b) Whether the Student Demonstrated Mastery on the Unit
Quiz

Student Demonstrated Mastery on Quiz Attempt

	Correctly Prompted	Incorrectly Prompted
identical (retention) items	81 (N = 302)	40 (N = 105)
parallel (generalization) items	57 (N = 114)	38 (N = 39)
identical and parallel items combined	72 (N = 416)	39 (N = 114)

Student Did Not Demonstrate Mastery on Quiz Attempt

	Correctly Prompted	Incorrectly Prompted
identical (retention) items	84 (N = 100)	74 (N = 30)
parallel (generalization) items	55 (N = 40)	61 (N = 13)
identical and parallel items combined	76 (N = 140)	70 (N = 43)

arc sin transformation was appropriate. Following an arc sin transformation of proportions, the difference between performance on correctly and incorrectly prompted quiz items on quizzes that the student had passed was subjected to a z test, which was highly significant (z = 6.18, p < .0000001). The difference between later performance on correctly and incorrectly prompted quiz items on quizzes that the student had not passed was also subjected to a z test, which was not significant (z = .76, p >.22).

Appropriate prompting had its greatest impact upon student retention of initially unclear, omitted, or incorrect quiz items on quizzes that the student had passed. When these items were appropriately prompted, students correctly answered 81% of them four units later. However when these items were inappropriately prompted, students answered only 40% of them four units later. This difference was also subjected to a z test, following an arc sin transformation of proportions, which was highly significant (z = 7.91, p < .0000001). Appropriate prompting of quiz items on quizzes that the student had not passed also had a positive effect upon student retention. When these items were appropriately prompted, students correctly answered 84% of them four units later. When these items were inappropriately prompted, students correctly answered 74% of them four units later. However, when this difference was also subjected to a z test, following an arc sin transformation, it was not significant

$(\underline{z} = 1.3, \underline{p} > .10)$.

Noninformational prompting strategies also had a posi-
tive effect upon student generalization from initially un-
clear, omitted, or incorrect quiz items on quizzes that the
student had passed. When their corresponding quiz items
were appropriately prompted, students correctly answered 57%
of the generalization items four units later. However, when
their corresponding quiz items were inappropriately prompted,
students correctly answered only 38% of the generalization
items four units later. This difference was also subjected
to a $\underline{z}$ test following arc sin transformation, which was sig-
nificant $(\underline{z} = 1.9, \underline{p} < .03)$. The difference between gener-
alization performance on correctly and incorrectly prompted
items from quizzes that the student had not passed, however,
was not significant $(\underline{z} = .36, \underline{p} > .35)$. Finally, students
correctly answered 63% of the 1326 retention items corres-
ponding to initially correct and hence unprompted quiz an-
swers.

To control for the possibility that the use of appro-
priate prompting strategies depended upon the type of quiz
item that was unclear, omitted, or incorrect, each identical
and parallel quiz item was classified as either a definition
item, a discrimination item, an application item, or none of
the above (see Appendix IV). Table 4 reveals that the per-
centage of correctly and incorrectly prompted retention and
generalization items were nearly identical across item type

levels.

Insert Table 4 about here

Table 4

Mean Percentage Correctly and Incorrectly

Prompted Quiz Items by Quiz Item Type

		Correctly Prompted	Incorrectly Prompted
Identical (retention) items (N = 537)	Definition	78	22
	Discrimination	74	26
	Application	76	24
	Other	80	20
Parallel (generalization) items (N = 206)	Definition	80	20
	Discrimination	76	24
	Application	78	22
	Other	81	19

C H A P T E R   I V

Discussion

The results of the present study demonstrate the importance of unprompted evaluation of student mastery to maintain an ongoing system of instructional quality control. Prompting strategies that occasion a student's already existing but weak verbal repertoire, without providing supplementary (informational) antecedent control, make the initial evaluation of student mastery more predictive of later student performance. Prompting strategies that involve the presentation of supplementary (informational) discriminative stimuli do not guarantee that student verbal performance will be controlled by the intended terminal stimuli of instruction. In other words, informational prompting strategies may occasion correct student responding, but such responses are not likely to maintain in the future, when informational prompts are not available. However, noninformational prompting strategies are more likely to occasion the same responses that are given in the future when noninformational prompts are not available. Thus, responses occasioned by noninformational prompts during quiz scoring are more likely to be representative of students' later behavior than responses occasioned by informational prompts.

These results also suggest, however, that the use of informational prompting strategies during evaluation some-

times results in later student performance that is controlled by the terminal stimuli of instruction. Future analysis of proctor prompting during evaluation need to identify the kinds of prompts, if any, that consistently guarantee that student performance will be maintained by the terminal stimuli of instruction. Future research should also be conducted on the nature of prompting behavior during instruction. What kind of prompts are useful in teaching students with various entering repertoires? The present study has not addressed this question. It does, however, indicate that when informational prompting statements like those made to students in the present course are used during evaluation of mastery, student quiz performance is less likely to be indicative of unit mastery. Regardless of whether students learn from good prompting procedures, these data suggest that mastery should be evaluated without additional instruction. The present data indicate only that informational prompting may be "inappropriate" or "incorrect" when it is used during evaluation. Indeed, a noninformationally prompted evaluation setting, such as that which should occur during proctor quiz scoring, would be an ideal environment in which to evaluate the effects of different kinds of prompting strategies implemented during instruction.

Two comparisons of the present data suggest that proctors may not need to avoid informational prompting during evaluation, if it is clear that the student will be retaking

a unit quiz. First the difference between informationally and noninformationally prompted quiz items on quizzes that students were required to retake was nonsignificant. Second retention and generalization performance on informationally prompted items when the student had passed a quiz was much lower than retention and generalization performance on informationally prompted items when the student was required to retake a quiz. These results probably occurred because students required a further evaluation to demonstrate unit mastery. It is likely that students restudied unit material, particularly those concepts about which they wrote unclear or incorrect quiz answers, before retaking a unit quiz.

In any case, if students do poorly on a unit quiz, or feel they are progressing too slowly through the course, they may pressure the proctor to provide supplementary stimuli during quiz scoring (Miller, 1974; Sulzer-Azaroff, Johnson, Dean, & Freyman, 1976). One solution may be to allow proctors to provide minimal supplementary S^D's on request during quiz scoring, as long as the student is required to respond to other terminal stimuli pertaining to the prompted concepts at a later time. A logistically easy procedure would be to require a student to correctly respond to a quiz item that parallels an informationally prompted item before the next unit quiz is taken. Whether proctors **should** engage in informational prompting when students fail

to demonstrate mastery remains a question for further investigation.

It is interesting to note that following appropriate prompting on quizzes that the student had mastered, it was more likely that students would maintain correct responding to questions that they initially answered unclearly or incorrectly, than questions that they initially answered correctly. Conversely, following prompting with supplementary S^D's, students were less likely to maintain correct responding to questions that they initially answered unclearly or incorrectly, than questions that they initially answered correctly. A further investigation would have to classify prompted items as answered correctly or incorrectly by the student, before these results could be adequately explained. For example, if appropriate prompting resulted in correct student performance, the proctor's additional instruction on unclear or incorrect answers may be partially responsible for the longer maintenance on these items than the initially correct answers. Why appropriate prompting occasions behavior that maintains longer than the behavior occasioned by informational prompting remains a question for future research that looks at the specific informational prompts that proctors use during instruction and evaluation. Perhaps when such data are collected, investigators may be able to compare the kinds of supplementary S^D's provided for student error in effective branching programs to the specific

kinds of proctor prompts that are occasioned by unclear or
incorrect quiz answers. Such a comparison may help to spe-
cify effective and ineffective instructional and evaluation
prompts.

The present study demonstrates one effective training
program for eliminating inappropriate prompting during quiz
scoring, preserving the evaluative component of instruction,
and assuring that the essential contingency between mastery
and progress through the course is consistently implemented.
Empirically validated prompting training programs add to the
standardization of evaluation, which is often difficult to
guarantee when constructed essay responses and multiple per-
sonnel are involved. Such outcomes should make instructors
less skeptical about relegating the evaluation of their in-
struction to others, and more likely to involve undergradu-
ates in the process. Given that proctoring improves student
performance (Johnson, Sulzer-Azaroff, & Maass, 1976) this
would be a desirable effect of such training programs.

An advantage of the present prompting training program
is that the desired proctor behavior is brought under con-
trol relatively easily and that such behavior is maintained
throughout the semester. The data also suggest that the ap-
propriate prompting behavior actually increases long after
training has occurred. Apparently initial program control
is improved by direct contact with the natural consequences
that follow appropriate prompting behavior.

There is no reason to suspect that the effectiveness of
the present training program is limited to personalized in-
struction courses such as the one used in the present study.
Rather, the behaviors trained in the present prompting pro-
gram would most likely be useful whenever person-to-person
contact is involved, as in many training and evaluation pro-
grams. Instructors using both personalized teaching proce-
dures with other course content, and other instructional
procedures need to provide data supporting the effectiveness
of their ongoing training program.

When instructors supervise large numbers of proctors
they might consider an alternative to instructor-led role-
playing and videotape sessions in the training program. We
have successfully replicated the present training effects by
using graduate assistants and undergraduate course managers,
who have received prompting training, to in turn train others
in effective prompting strategies. Once several proctors
have been videotaped, it would also be possible to have
other proctors score appropriate and inappropriate instances
of prompting from their tapes, under trained proctor super-
vision. A large number of permutations are in fact possi-
ble, and could be subjected to experimental validation.

An examination of the proctor behavior data suggests
two problems with the use of a multiple baseline design in
evaluating proctor training effects. First, the present
training program became less effective the more delayed into

the semester that it was introduced. Most of the proctors reported that a change to appropriate prompting strategies following a history of proctor sessions that included inappropriate prompting occasioned student complaining and other negative collateral behavior. Students apparently began to rely upon their proctors for assistance in attaining mastery scores, and were reported to write less in the quiz room and discuss more quiz answers in the proctoring room, perhaps to profit by proctor statements pertaining to unclear concepts. Proctors trained early in the semester rarely reported such problems, probably due to early enforcement of appropriate evaluation conditions before "dependencies" developed. For these reasons, we suggest that proctor training programs be instituted at the beginning of a course.

A second problem with the multiple baseline design across subjects is the possibility that trained subjects may discuss treatment procedures with the subjects who have not yet been trained. Indeed, an inspection of Table 2 suggests that such discussion of the treatment procedures may have taken place between Proctor 8 and Proctors 4-6 immediately following their training.

Several other minor weaknesses of the present study deserve mention. First, the percent correct responses to the generalization and retention items is lower than we would have expected for both appropriate and inappropriate prompting conditions. It should be noted that there was no guar-

antee that an initially unclear, omitted, or incorrect answer would be correct following appropriate prompting. Less-than-perfect retention and generalization of prompted course concepts may have been partially due to this factor. It is more likely, however, that the percent correct responses to the retention items was low because social controls were the only external contingencies maintaining retention and generalization item answering. Many behavior instruction studies have successfully used social contingencies such as these, arguing that powerful grade-related contingencies occasion further student study behavior which obscures the effects of a treatment. Indeed, Davis (1975) has illustrated such obscured and unobserved effects with mastery criteria manipulations. However, if social controls are not maintained consistently, student performance data may be unreliable. We are presently experimenting with minimal grade contingencies in an effort to increase the reliability of student performance without producing ceiling effects and extra study behavior.

The intertape scorer agreement index was extremely high. This is understandable however when one considers that tape scorers had access to quiz items, answer keys, and student answers during scoring. Thus it was relatively easy to detect the addition of any other information verbally supplied by a proctor before a quiz answer was scored.

This first venture by the experimenter with tape re-

cording proctor and student behavior was met with many prob-
lems. There was a low percentage of successfully recorded
tapes, although randomness was probably assured because the
proctors were usually unaware that their tapes were not re-
cording a quiz scoring session. However, the extent to
which the tape recorders were obtrusive is unknown. We are
currently using en vivo observers to score instances of
prompting, although this may be even more obtrusive. An in-
obtrusive built-in tape recorder in a specially designed
quiz scoring space may be ideal; though ethical issues of
informed consent would have to be considered.

The procedures used for gathering pretest data did not
permit the calculation of gain scores. More sensitive data
may have been collected if entering behavior data had been
separated from data on the effects of the training proce-
dures upon student performance.

The present study, as well as others that investigate
proctor training, may have important implications for the
interpretation of previous research on the proctor component
in personalized instruction. For example, Johnson and Sul-
zer-Azaroff (1975) and Anderson (1975) demonstrated no sig-
nificant differences in student performance when quizzes
were proctored by internal or external proctors. However,
unless viable internal proctor training procedures can be
designed, trained external proctoring may be the procedure
of choice. Self-grading has also been shown to be as effect-

ive as external proctoring, under certain conditions (Blackburn, Senib, & Hopkins, 1975; Conard, Spencer & Semb, 1976). However, in the absence of viable procedures for training self-graders, trained external proctoring may be the procedure of choice. Further research is necessary to determine whether using trained external proctors leads to better student performance than internal proctoring or self-grading, despite their added benefits to student performance (Johnson, Sulzer-Azaroff, & Maass, 1976). In addition, the possibility of training internal proctors and self-graders needs to be explored. A significant study would generate controlled data comparing the effects of trained and untrained external, internal, and self-proctoring upon student performance and preference.

Finally, the evaluation of immediate feedback by trained proctors vs. self-graders or other sources such as machines and computers needs to be conducted. Immediate feedback from sources other than trained proctors may not be as effective as data presently indicate when the required student performance and necessary feedback are complex. Finally, future research might explore the effects of various prompting procedures on student preference.

Research of the present sort represents a finer grain analysis of the proctor feedback role than has been reported in the literature. Future research on other aspects of the proctor component such as social behavior may reveal other

important behaviors which if trained, may lead to even greater differences between behavioral instruction procedures and more traditional methods than have been reported to date.

The present study also extends the proctor training research that has been previously conducted by assessing the effects of proctor training upon student performance. The performance-based retention testing format used in the present study was relatively easy to administer and proved to be a viable way to validate the efficacy of procedures that indirectly affect student performance.

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APPENDIX I

This semester we are evaluating the feedback component of Personalized Instruction Courses. In order to do this we will be <u>tape</u> <u>recording</u> proctor-student interactions. The nature of your participation will be strictly <u>voluntary</u> and contingent upon your signing this form. You should know that your <u>name</u> will be held in the <u>strictest</u> <u>confidence</u>, your <u>grade</u> will <u>in</u> <u>no</u> <u>way</u> be <u>affected</u> by the content of <u>any</u> tape and there will be <u>no</u> <u>discomfort</u> during the entire experiment. There are <u>no</u> <u>special</u> <u>procedures</u> that you must learn or follow during the study and you will be <u>free</u> <u>to</u> <u>discontinue</u> <u>participation</u> at any time during the semester. We will give you <u>complete</u> <u>details</u> on the nature of the study and the results <u>when</u> <u>it</u> <u>is</u> <u>finished</u>. If you agree to participate in helping us improve instruction in mastery courses, please sign below and return this form to us: feel free to ask any questions before you do.

_____   Proctor or student
              (signature)   (circle one)

APPENDIX II

<u>PSI</u> <u>Elementary</u> <u>Psychology</u>

<u>Course</u> <u>Policy</u>

Psychology 101F

Instructors:

Kent R. Johnson   Christie A. Maass

Office: Tobin 518   Office: Tobin 523

Phone: 545-0083

Friday Events leader: Cliff Konold

Office: Tobin 519

Tuesday, Thursday: 11:00 AM - 1:00 PM

Tobin 304, 307

<u>Texts</u>:   Introductory Psychology - Walter M. Vernon

Principles of Everyday Behavior Analysis - L. Keith

Miller

Toward a Self-Managed Life Style - Williams & Long

This is a flexible-paced course in Elementary Psychology implementing the Personalized System of Instruction (PSI). It is designed to give you personal attention, to allow you to move ahead at your own speed, and to be sure that you gain a thorough mastery of some basic concepts of Psychology. It is also designed so that the grade is not a secret, you are not risking all on a final, and there is little room for luck and/or cramming. You can come close to an accurate

estimate of your grade most of the way. The route to an "A" is as clear as we can make it, but it requires work. In fact, a large number of students report that such courses are more work than more traditional courses--but also less anxiety producing, more fun, and more profitable because more is learned. We hope that you feel the same about the course this semester.

Course Construction:

The course has been divided into 21 units based upon the reading materials in the texts. For these units you will be expected to follow the study procedures outlined below, come in to take a quiz, and have an interview with the proctor to whom you have been assigned. There are 14 weeks to the semester. By using the flexible-paced feature to its fullest, you can do 2 or more units a week, finish early, and free your time to work on other courses or goof off during the remainder of the semester!

Each unit has a "quiz" containing a combination of multiple-choice, fill-in-a-missing-word, complete-the-sentence, and short essays. If you get 90-100% correct then both you and we know that you have mastered the material and you can safely and with confidence proceed to the next unit (although we will ask you to check up on those one or two errors if you made them). To give us some feedback on the length of time it takes you to master a unit, we will also

ask you to estimate the amount of time it takes you to master a unit, at the top of your answer sheet. This estimate should include the total amount of time it took you to read, answer study questions, and review for the quiz. Before proceeding to the next unit, however, there will be one more, hopefully rewarding, task to engage in. After you have demonstrated mastery, you and your proctor will indicate this on your progress chart, which contains a cumulative record of your progress through the course to date. The chart will serve as a visible record of your progress, showing how much remains for you to complete, and at what rate you must work to finish the course by a given date. Each of you will have a cumulative record attached to your personal quiz folder.

A proctor will score each answer you make on a quiz as either "correct," "unclear," or "incorrect." You will be required to clarify all answers marked "unclear," verbally. If the proctor is satisfied that you have provided a very clear explanation of your answer, he or she will score your answer as correct. If you cannot clarify your unclear answers, they will be scored as "incorrect."

Although you will demonstrate mastery of a unit with a score of 90% and thus be allowed to proceed to the next unit, you must correct all errors or unclear answers to your proctor's satisfaction. Thus, if you score between 90-100% correct you will be asked to return to your study materials

and text, look up missed concepts and tell your proctor the correct answer before you leave for the day.

Sometimes a quiz question will appear perfectly clear to us but totally ambiguous to you. Be sure to ask for any clarifications of questions before you take it to a proctor to be scored. If per chance you feel that an answer you gave a question is valid but different from the answer the proctor has, feel free to defend it!

If you score less than 90%, we will point out where the problems seem to be, ask you to review the appropriate parts of the unit and try again. If you score less than 90% this time, there is a third form of the quiz which you can take! We will ask you not to try more than twice on any given unit in the same class session, and to restudy at least 15 minutes before attempting a second try in that session. If two quiz attempts prove unsuccessful, more extensive review is probably necessary. When you make more than one error we urge you to take the need for review seriously. It is tempting to take another quiz without restudying, hoping for "better luck." To go ahead, trusting to luck, may work for that day, but your luck will probably run out on later units or the final. An error means that there is some part of the material you have not learned. These quizzes are designed primarily to detect your misunderstandings, and show you what to do to correct them before they lead you to serious trouble. We also ask that you do not

attempt more than one different unit per class session. If you are moving along rapidly and get all items correct on a given unit, you will then (and only then) be allowed to take more than one per session. You will never be penalized for any errors you make on the unit quizzes; once perfected, that is all that counts!

The system is designed to be fair. If you treat it honestly and give it a fair chance you will find that you learn everything and will be rewarded for it. You will not be graded on "the curve." Proctors will not be doing you a favor by letting you pass a unit when you have not earned it and are instructed not to do so. All quizzes turned in will be spot checked again by one of the course assistants. Since you are not penalized for any errors you make, you are better off to work them out before facing the final where errors do count against you.

General Study Procedures for the Vernon and Handout Unit Quizzes:

1. Before reading the unit assignment, read over the outline presented at the beginning of the Vernon text assignment, as well as the topic headings throughout the chapter. For the units that are handouts you should read over the unit assignment introduction and the study questions provided. These should give you a preview and an overview of what the assignment is all about, and will also make the

study questions more meaningful to you as you answer them.

2. Read the unit assignment, from beginning to end, without a break.

3. Begin again at the beginning of the assignment and <u>fill in</u> the completions and questions provided throughout the Vernon text or the study questions accompanying the handouts. Much of the benefit of the study questions occurs only when you actually make the written responses called for. It is tempting just to read along, either "mentally noting" or underlining in the text the answers to the study questions. If you take that route, you will not learn as much, as well, or, in the long run, as quickly. It is also to your benefit to understand, rather than memorize, the material because quiz questions will be presented in form and wording different from the study questions. Furthermore, the final will be an exceptionally difficult study endeavor if you have memorized the early units. All quiz questions will be directly related to the questions and objectives presented in the study guides. Thus, <u>no</u> quiz questions will be asked which you would not have already answered, albeit in another form, had you completed the study guide prior to test-taking. It is our belief and experience that errors and retakes of quizzes will be substantially reduced through <u>written</u> response to the study questions. You may think of your study guide as a replacement of the material that would be presented in lectures related to the material in the text,

giving points of emphasis and de-emphasis, as well as es-
tablishing relations between specific information, both
within and between chapters of text.

4. It has also been our experience that students who fol-
low the above suggested procedures have a much better idea
of what areas of a given unit they have and have not mas-
tered prior to quiz taking. If you have any questions or
doubts about your understanding of any particular objective
or idea in a unit assignment as a result of completing the
above procedures, do not hesitate to consult or confront us
with these before you take the unit test. That way you will
waste less of your time and our time by failing to attain
the required mastery criterion score for the unit quiz.

Although most students have said they have profited
from these study procedures, they are by no means sacred.
Some of you may have more effective means and we urge you
to try them in this course. The study questions and proce-
dures are provided to facilitate independent learning, not
to restrict or hinder you or make you dependent upon them.

General Study Procedures for the Miller Unit Quizzes

The procedures for studying the Miller book are some-
what different. The book has been written in a special way
to more effectively teach you its content. The preface con-
tained in the book describes the specific procedures that
you should follow. When you reach the first "Miller unit"

you will be asked to know these procedures.

Again, you may proceed through the course, finishing early or using the full semester, as you choose. However you are cautioned now that there are many units. It is dangerous to fall behind and all too easy to do so. The results from past semesters show that those who work quickly and finish early get the best grades on the final. We urge each and everyone of you to work as rapidly as possible and finish early. When you finish all 21 units you may take the final and free the end of the semester to concentrate on other courses, or do as you please. At a minimum, to keep on schedule, you should pass 1-1/2 units every week. The progress chart attached to your personal quiz folder will also have suggested rates for early and normal completion of the course. Again, there is no penalty for errors on the quizzes. You may need and take three tries to learn a unit; once learned that is all that counts. After three trials we will ask you to have a chat with us about what it is that you have been answering incorrectly. Your passing the unit will then be contingent upon a short essay paper pertaining to the errors you have been making.

At the close of most of your interviews, your proctor will present you with several items based upon material that you mastered in earlier units. Your grade for the current unit and for the course will not be dependent upon your answers to these questions, so you need not restudy previous

units before taking a unit test. The purpose of this pro-
cedure is to assess retention in a mastery course. The only
requirement is that you at least attempt to answer each of
the items that your proctor presents.

Friday Group Events

For the most part, this Personalized Instruction course
operates as if each student were a class of one. However,
each Friday Cliff Konold will schedule a group activity re-
lated to specific topics in the unit assignments. Activ-
ities will range from films, to laboratory demonstrations,
to guest lecturers, to group discussions. You will be re-
quired to select and attend any four of your choice from the
schedule provided. You will not be required to prepare for
most Friday sessions although each event will have a work-
sheet, which you will complete during the class. You should
sign up for any Friday session that you plan to attend by
the end of the Tuesday session of that week. Sign-up sheets
and brief descriptions of the week's event will be available
at the front of Room 304. No questions pertaining to infor-
mation covered in the Friday events will appear on any unit
quiz or final exam. Finally, an additional course credit
will be awarded to any student who attends all 13 Friday
sessions and submits the 13 corresponding worksheets.

How Do I Get an "A" in This Course?

Mastery of the units in the course will constitute the
bulk of your grade (60%). The final exam will comprise 30%
of your grade. The four Friday events will be worth 5% of
your grade. Finally, 5% of your grade will be dependent
upon your rate of progress through the units in the course.
You will receive a separate grade for each of these four
performance components. These will be averaged according
to the proportions specified above.

Units. Your grade for the unit mastery portion of the
course will be determined as follows:

21 units mastered	= A (95%)
20 units mastered	= A/B (88%)
19 units mastered	= B (83%)
18 units mastered	= C (75%)
17 units or less mastered =	F (60%)

Final exercise. Your grade for the final exam will be
determined as follows:

85-100%	= A
80-84%	= A/B
76-79%	= B
72-75%	= C
Below 72%	= F

Friday events.

4 attended Friday events and worksheets completed =
A (95%)

3 attended Friday events and worksheets completed = B (83%)

2 attended Friday events and worksheets completed = C (75%)

1 attended Friday event and worksheet completed = F (60%)

Progress points. The Friday events and the rate of unit completion each affect your final grade by half a letter. For example, attendance at four Friday events will make the difference between receiving an A or an A/B in the course. Accumulation of progress points will have the same effect on your grade. Progress points will be awarded in the following manner:

completion of unit 2 by February 6th	=	12 pts.
completion of unit 4 by February 13th	=	10 pts.
completion of unit 5 by February 20th	=	4 pts.
completion of unit 7 by February 27th	=	4 pts.
completion of unit 8 by March 5th	=	4 pts.
completion of unit 10 by March 12th	=	12 pts.
completion of unit 11 by March 19th	=	10 pts.
completion of unit 13 by April 2nd	=	9 pts.
completion of unit 14 by April 9th	=	4 pts.
completion of unit 16 by April 16th	=	4 pts.
completion of unit 17 by April 23rd	=	10 pts.
completion of unit 19 by April 30th	=	9 pts.
completion of unit 21 by May 11th	=	8 pts.

100 pts.

You should note that in an effort to accomodate your personal learning rate, we have reduced the point accumulation--and hence the necessity for unit completion--for those weeks during which midterm exams and papers are typically required in traditional courses. For example, midterm requirements usually occur between February 20th and March 5th. Hence, progress points have been reduced to only four for each of these weeks when your workload in other courses is likely to be "heavy."

Grade equivalents for accumulated progress points will be as follows:

    90-100   = A
    85-89   = A/B
    80-84   = B
    75-79   = C
    70-74   = D
    Below 70 =   F

We urge all of you to _pace_ your workload so that you can earn _all_ of the progress points. The emphasis in the term flexible-pacing is on the _pacing_; the term does not imply that you can keep putting off the work!

Final _grades_. Your final grade in the course will be determined as follows:

    93-100%   = A
    88-92%   = A/B

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83-87%      =  B
78-82%      =  B/C
73-77%      =  C
67-72%      =  D
Below 67%   =  F
```

We should mention at this point that "Pass-Fail" grading makes little sense in a Personalized course, because "pass" is equivalent to "A." Over 85% of those who have taken our courses have received an "A." Therefore, we urge those who are taking the course on a "Pass/Fail" basis to change this to a "graded" basis, since completion of the course virtually assures an "A" grade.

There will be early finals given for those who finish early--the dates of the early finals will be announced later. All students <u>must</u> take the final exam. As an added incentive for working quickly, we will allow those who have finished early enough to take one of the early finals, to retake the final <u>once</u> more, if their grade on an early final was not satisfactory enough for them. The decision to retake the final is entirely up to you: be sure to pace yourself so that you can take advantage of this opportunity if you need it.

<u>A</u> <u>Word</u> <u>of</u> <u>Caution</u>

If you follow all the rules of the course, you should gain nearly every point with little trouble. Students in

the past who have received poor grades scored poorly on the final exam. In nearly every case such students did things like cram too much, pressure proctors to let them pass units when they didn't deserve to, etc. Don't be one of them!

Daily Procedure for the Course:

On all class sessions you may come in when ready and take a quiz. You may also come in to study in the classroom if you wish and are urged to do so. Many students in the past have found the classroom an effective environment in which to study, and there are people available to answer questions, should you have any. We also suggest that you use the classroom as a study hall so that you can work together with others in the course. Many students in the past have orally "quizzed" each other before taking a unit quiz, for example. Such group interaction may be useful to you, too, and we encourage those students who find these study methods effective to make use of the study hall. When you come in to use the classroom as a study hall, or want to ask questions, please use Tobin 304. When you are ready to take a quiz, come up to the front desk in Tobin 307 and sign out for the particular unit you are working on. Once you have taken a quiz leave it with the assistant in Tobin 307, bring your answer sheet and your personal quiz folder to Tobin 304 and have it corrected by your proctor. Then pick up the next unit assignment or review for a retake quiz, if you are

taking one. <u>Quizzes</u> <u>and</u> <u>folders</u> <u>should</u> <u>never</u> <u>be</u> <u>taken</u> <u>from</u> <u>the</u> <u>classrooms</u>. Because there is some clerical work for the proctors after class, you should come early in the quizzing sessions--at least early enough to be finished 15 minutes before the end of the session. <u>Quizzes</u> <u>will</u> <u>not</u> <u>be</u> <u>given</u> <u>out</u> <u>after</u> <u>30</u> <u>minutes</u> <u>before</u> <u>the</u> <u>end</u> <u>of</u> <u>the</u> <u>session.</u>

In addition to the two available class sessions per week, your proctor will set aside an additional quizzing session during the week, after consulting with the students in his or her group. Be sure to tell your proctor when you will have additional free time during the week so that you can take advantage of these sessions.

When we are not busy with logistical work, or serving as proctors ourselves, we welcome your questions, comments and the chance to talk with you. Part of the reason for this method of teaching is our belief that individual communication and instruction is more to the point, successful, and more effective than a lecture to a large heterogeneous group. Please feel free to chat with us. That is why we are there.

We honestly believe we are following a system that is fair, effective, and not punishing. If you do the work that is asked for, be as fair with the system as it is with you, and avoid falling behind, a happy result is all but guaranteed. As our part of the bargain, we hope that the proposed method (1) will give us a chance to give you more per-

sonal attention, (2) allows you to take advantage of your personal learning rate, taking into account your other course work this semester, and (3) assures that you gain a solid background and understanding of some basic concepts in Psychology. By the end of the course, you should be able to judge for yourself whether or not we have met our objectives! If you have questions about the methods we are using in this course, please ask them now before you begin the course. To assure yourselves that you do in fact understand them, we will ask that you begin the course by taking a quiz over the procedures outlined in this handout, and the article by Fred S. Keller entitled, "Goodbye, Teacher. . ." that is available in the bookstore, and which describes the basic rationale for the methods we are using in the course. We should mention at this point that the readiness quiz is picky. Most of the questions cover course procedures. For example, you will be asked things like, "How many minutes before the end of a session will the quiz room proctor stop giving out quizzes?", "How many units are there in the course?", etc. We will also ask a few short essay questions about the Keller paper. Thus, the readiness quiz is very much unlike any other quiz you will take in the course. Once this readiness unit is mastered, we can all be sure that you understand how and why to take a PSI course.

You are now ready to proceed. Good luck on the readi-

ness quiz and keep up a good pace!

Christie, Cliff & Kent

/scm

APPENDIX III

Appropriate Prompting and Correction Procedures
for Proctors

The Role of Student Responses

Your job as a proctor is to help your students learn the
material in the course. To be successful, you should rely
heavily upon the principle of active responding: People
learn by doing and saying. They learn by doing and saying
because by emitting an observable response of some sort,
consequences from the environment can then operate to main-
tain or change the behavior. In the instructional setting
this means that students will learn more if they make lots
of responses in the presence of instructional material, be-
cause feedback from you, us, or the instructional material
itself will serve to maintain or change particular respon-
ses. Responses in college courses are usually verbal in na-
ture and may be in oral or written form. Many proctors are
not aware of, or forget to use the principle of active re-
sponding when they engage in proctor behavior similar to
the following episode:

```
     Proctor:   (scoring quiz item #4)  No, the answer
                is hypothalamus.  Do you see why that
                is the answer?
     Student:   Yes.  I see (or nods head up and down)
     Proctor:   Good.  Now in #5. . .
```

1. What is the principle of active responding and why does

it enhance learning?

2. Tell one way that the proctor-student episode given above could be improved. Be specific.

What Is Instruction?

As a proctor you are heavily involved in instruction. The three basic components of instruction are (a) presenting a task or materials, (b) providing for student responses, and (c) giving reinforcement and feedback. Instruction involves two basic tasks as well: (a) teaching the student what responses to make, and (b) teaching students when to make them. This is an important distinction. Consider an elementary example that does not involve teaching what responses to make. Assume that the word "wolf" is part of a first grader's speaking vocabulary: however when s/he comes to the word in a sentence s/he is reading, s/he does not say "wolf." S/he does not need to learn the response, since s/he can already say the word. What s/he must learn to do is say the word in another circumstances; i.e., when the sequence of letters w-o-l-f appears.

Now consider a case that does involve teaching what responses to make. Assume a fifth grader who has never encountered the word "analogy." She will have to learn to say the word and perhaps to spell it. Of course she will also have to learn to recognize the word when it appears in printed or oral form and learn the word's meaning, but

these learnings have to do with <u>when</u> to use the word, not with how to make the response itself. A person can learn the response before or at the same time he learns when to make the response. But obviously he cannot learn when to behave in a certain way before he is capable of emitting that behavior in the first place.

3. What are the three basic components of instruction? Given an original example of an instructional sequence and label the three components.

4. Instruction also involves two basic tasks. What are they? Give an original example to illustrate the distinction between the two.

Instruction in our courses relies heavily upon successful student and text-study guide interaction. The success of such independent study depends upon the quality of the instructional materials and what skills and knowledge the student brings to the learning environment. In most cases we find that the student will learn <u>what</u> responses to make. In those cases where she does not, a variety of teaching procedures, such as shaping in smaller steps and prompting, can be used to "tutor" the student.

In teaching students <u>when</u> to make the responses they have learned (i.e., under what conditions; in the presence of what stimuli), we are concerned with <u>developing stimulus control</u>. When a response occurs reliably in the presence of a particular stimulus, we say that the response is under

stimulus control, or that the stimulus controls the response.
The majority of student response deficiencies that you will
encounter will involve inappropriate stimulus control. By
"inappropriate" we are referring to one of several events:
(a) the reliable occurrence of an adequate response in the
presence of an inappropriate stimulus, (b) an inadequate
(i.e., incomplete, vague) response in the presence of an ap-
propriate stimulus, or (c) an inadequate response reliably
occurring in the presence of an inappropriate stimulus.

5.   What do we mean by "developing stimulus control"? When
     can we say that a response is under stimulus control?

6.   The majority of student response errors that you will
     encounter as a proctor will involve _____

     _____. Give an example

     of each type, from your own proctor experience.

Prompting during Instruction

     One sure-fire procedure for sharpening (i.e., improv-
ing) stimulus control is prompting. Prompting involves pro-
viding additional written or oral statements that help a
student give correct answers. Prompting is especially use-
ful during instruction because it helps avoid errors. If
consequences have not been effective in altering error re-
sponses, a student may actually learn and repeat those errors
in the future.

     A prompt is a supplementary stimulus that already con-

trols or partially controls a desired response. A prompt is a written or oral statement that is added to a study question or quiz item (called terminal stimuli) to make the terminal stimulus easier for a student to correctly respond to. There are many different kinds of prompts that one may use during instruction.

7. What is prompting? Why is it useful?

8. What is a prompt? Use the term terminal stimulus in your answer.

Prompts may be either informational or non-informational in content. There are two basic types of informational prompts. Informational prompts may be verbal stimuli that hint about the form or structure of the desired answer. Examples of this type of prompt include (a) providing the number of letters in a word, (b) the number of words in an answer, (c) rhyming words or other sound pattern hints, and (d) syntax clues, like plurality or tense. We call such supplementary stimuli formal prompts. One type of formal prompt is the multiple choice question, in which the form of the answer is given, but must be selected from among alternative forms. Multiple-choice prompts need not be written, as when a proctor provides alternatives for the student to pick from, or indirectly indicates that a student's answer is wrong by providing alternatives in addition to the answer that the student has written (very bad strategies, as we shall see later).

Informational prompts may also give clues about the meaning of an answer. Examples of this type of prompt include providing an indication of (a) the general category of a response (e.g., "it (the answer) is a procedure," or, "it has to do with the nervous system"), (b) relations, such as opposites or synonyms, (c) the relevance of a previous answer or statement a student made to the present answer sought (e.g., "you were just talking about it," "you just discussed or used the term in an earlier item," "so too in number three," "remember number two?," etc. Using previous correct answers as prompts for a later answer is a very common proctor technique and is very useful during instruction (only)), and (d) analogous examples or rules that can be applied to an example. We call this type of supplementary stimulus a thematic prompt.

9. Define formal prompt and give an original example of each type mentioned above, from your own proctoring experience.

10. What is a thematic prompt? Give an original example of each type of prompt, from your own proctoring experience.

Both formal and thematic prompts provide additional information that helps a student give an appropriate response in the presence of a particular stimulus. A third class of prompts involves either a simple restatement of a question without any additional information, or a question or state-

ment irrelevant to the content at hand (e.g., "take a guess,"
"Can you define that for me?," "Are you sure that you can't
answer that question in more detail?," "Give me an original
example."). As a general rule we can say that these <u>nonin-
formational</u> <u>prompts</u> should be tried <u>first</u>, and will probably
be sufficient. If all else fails, thematic and <u>then</u> formal
prompts can be tried <u>during</u> <u>instruction</u>.

11. Differentiate between informational and noninformation-
    al prompts. Give several examples of noninformational
    prompts from your own proctoring experience.

12. List the order in which you should employ the different
    types of prompts <u>during</u> <u>instruction</u>.

Prompts Vs. Giveaways

Some instructional personnel confuse prompting an an-
swer with providing the answer or most of the answer and
asking the student to copy it or repeat it. Many proctors
recall the principle of active responding and slightly im-
prove the proctor-student episode given on page one of this
handout by requiring the student to repeat a proctor-sup-
plied answer, or write it down. <u>This</u> <u>tactic</u> <u>should</u> <u>be</u>
<u>avoided</u> <u>at</u> <u>all</u> <u>costs</u>! A prompt is <u>not</u> a giveaway. Copying
or other echoic behaviors require no understanding on the
part of the student and are behaviors different than defin-
ing, listing, providing an original example or term, or any
other behavior that a study question or quiz item requires.

You should discriminate between these classes of behavior
and not _focl_ yourself or your student into thinking that s/he
knows the answer or knows when to give an answer. Your
students have undoubtedly demonstrated mastery of copying,
echoic, and other imitative behaviors long ago!!! There is
no need to demonstrate that they can echo, again. Although
active responding is very important, the active response
should be _relevant_ _to_ _skills_ _and_ _knowledge_ _being_ _acquired._
Copying echoing, and other forms of imitating are only very
first approximations to the desired behaviors of most col-
lege courses. As a general rule to follow, we ask that you
never _directly_ _provide_ _an_ _answer_ _to_ _a_ _student_ _during_ _either_
instruction _or_ _evaluation._

13. Differentiate between prompts and giveaways. Give
     three original examples of a prompt and a giveaway for
     an unclear or incorrect quiz answer, from your own
     proctoring experience.

14. Why should giveaways be avoided at all costs during
     instruction and evaluation?

Instruction _Vs._ Evaluation _and_ Prompting

     So far we have been discussing prompting and its im-
portance _during_ _instruction._ The prompting procedures we
have described should be very useful to you when you are
helping students while they are studying. However, when the
student has terminated instruction (self-instruction) on a

unit, and has decided to be evaluated, our goal becomes one of determining whether the critical features of the terminal stimuli (i.e., quiz questions) will control the appropriate responses. The only way that we can evaluate whether or not appropriate stimulus control has developed is to determine whether the student can make <u>unprompted</u> correct responses. Thus, while all types of prompting techniques may be very useful during instruction, <u>only</u> <u>noninformational</u> <u>prompting</u> <u>is</u> <u>useful</u> <u>during</u> <u>evaluation</u> <u>of</u> <u>mastery</u>.

It is important that you understand the distinction between instruction and evaluation, and the rationale behind prompting in the former but not the latter. If the student cannot emit unprompted correct answers, then his answers are still dependent upon the supplementary stimuli. These supplementary stimuli will not be present whenever the terminal stimulus is. If you have prompted specific concepts during a quiz-scoring session (evaluation), where errors do not count, there is no reason to believe that the student "knows" those concepts. By "knowing" we mean that the student can reliably emit appropriate responses in the presence of relevant questions (on a test or in conversation), in the absence of hints or prompts. Again, if our goal of appropriate stimulus control development is to be <u>evaluated</u>, the procedures and materials used in the evaluation setting must be arranged so that the student responds only in the presence of the terminal stimulus. A prompted

item is not the same as an unprompted one. Correct answers
to prompted items only indicate that the responses are under
the control of the prompt plus the terminal stimulus, and
not the terminal stimulus alone.

One of our main goals is to make it likely that the
verbal behavior the student acquires in our courses will
maintain in other classroom and nonclassroom environments.
Whenever you provide prompts during evaluation of mastery,
the student is unlikely to emit that behavior elsewhere or
at other times, unless, of course, you plan to be present
whenever a student of yours is discussing the concepts
learned in this course(!). Again, this is true because the
student's natural environment is not likely to contain any
supplementary stimuli that you provide.

As a practical contingency for achieving our long term
goals, we include a final exam in our courses, that all stud-
ents must take to receive a grade (although this is not the
only reason for including one). Everytime you score a quiz
(evaluate) you should remember that your student's final
exam will be scored in his absence (and hence in the absence
of your prompts).

15. Why should informational prompts not be used during
    evaluation (quiz-scoring)? Be detailed.

16. What do we mean when we say that a person "knows" a
    concept or other information? Be technical.

17. A student has demonstrated that she can emit a correct

answer to a terminal stimulus after prompting. What
does this mean to an instructor?

18. Why should you think of the final exam <u>every</u> time you
   score a quiz?

<u>Prompting</u> <u>and</u> <u>Student</u> <u>Error</u> <u>Responses</u>

We previously mentioned that one of the advantages of
prompting is that it reduces errors during instruction. Yet
while prompting helps to avoid student errors, error reduc-
tion does <u>not</u> indicate <u>mastery</u> or "understanding" <u>during</u>
evaluation. While it is likely that as a proctor you will
want your students to make very few if any errors on their
quizzes, remember that using prompting procedures during
evaluation will only cover up student misunderstandings and
lack of knowledge, which are sure to show up again on later
units or the final.

<u>Summary</u> <u>So</u> <u>Far</u>

Your job as a quiz scorer is to evaluate whether or not
the student was correct in deciding to terminate self-in-
struction on each unit when she did. If all the new re-
sponses required in a unit have not been acquired, or ap-
propriate stimulus control by all the content of a unit has
not developed, then the student's decision to terminate
was incorrect. The only way that you can evaluate such mas-
tery is to judge the student's performance in the absence of

prompts that provide supplementary information.

19. What do we mean by mastery of a unit? Be technical.
Tell the best way to evaluate such mastery. Be speci-
fic.

Specific Prompting and Correction Procedures

The procedures described below represent appropriate
prompting procedures to use before and after a student takes
a quiz. You should notice that by "appropriate" prompting
procedures we are referring only to noninformational prompt-
ing; i.e., asking a student a further question that con-
tains no information relevant to the quiz or study question
in addition to that provided in the quiz or study question.
During pre-evaluation interactions with your students, how-
ever, we encourage you to employ formal or thematic prompts,
but only when noninformational prompts have failed. The
following instruction is designed to enable you to help your
students find their own answers. Again, you should never
directly provide an answer to a student. If the student
asks you to answer a question, resist the temptation!

General guidelines. Sometimes a student will come to
you for help before he takes a quiz, and certainly he will
come to you after he has taken a quiz in order to get his
answers scored. The six general procedures you should fol-
low in assisting a student before and after a quiz is taken
are:

1) getting the student to <u>refer</u> <u>to</u> <u>a</u> <u>specific</u> <u>study</u> <u>or</u> <u>quiz</u> <u>item</u>.

2) <u>getting</u> <u>an</u> <u>answer</u> from the student.

3) <u>getting</u> <u>a</u> <u>definition</u> of any term in an answer.

4) <u>getting</u> <u>a</u> <u>justification</u> from the student (an <u>ex</u><u>planation</u>, or why he answered the way he did).

5) <u>getting</u> <u>an</u> <u>original</u> <u>example</u> of the answer, when appropriate.

6) getting the student to <u>clarify</u> her <u>answer</u> by re-stating it <u>in</u> <u>its</u> <u>entirety</u>.

When a student <u>asks</u> a question <u>and</u> <u>refers</u> to a specific course item or items (1), your next goal is to get him to <u>attempt</u> an answer (2). Next, whether the answer the student gave you is correct or not, ask him to <u>define</u> any terms in the answer (3), <u>explain</u> why he believes that the answer is correct (4), and give an <u>original</u> <u>example</u> when appropriate (5). Finally, you should get the student to <u>clarify</u> his answer by stating it from scratch (6).

You must know the material well enough to judge whether an answer is correct and clear. If you are using these non-informational prompts during a quiz scoring session, the answer key should provide you with sufficient materials to do the job well. However, specific questions that occur prior to a quiz may or may not appear on a quiz form answer key. If you ever feel uncomfortable in prompting a certain answer, either before or during a quiz scoring session, call

Kent or Beth over to discuss the question with you and the student.

20. List and describe the six procedures for assisting a student with a course content-related question. Be detailed.

Before a quiz is taken. Some students may ask you questions without referring to any specific study questions. Your first job here is to request the student to refer to a relevant study question or series of study questions (1). If the student has attempted to answer a question (2), you should refer to appropriate places in the text and ask the student to explain why she thinks the answer she has given is correct (4), and define any term in the answer she gave (3). An original example should also be provided, when appropriate (5). Ask the student to compare her answer to the passages in the text that you have located. While many students do not have appropriate study behaviors necessary to extract or interpret information in a text correctly, most often the student will have been simply careless, or will not have put in the appropriate amount of study time necessary. Your basic job is to prompt the student to read the text information carefully and answer study questions concisely and accurately.

If a student has given a sloppy answer to a study question, or an answer that is too brief, request the student to clarify the answer (6). If the oral clarification is

correct, the student was just unsure of her answer. Ask the student to write out fuller answers in the future.

If the student has not attempted to answer the study questions that correspond to the questions he asks, or asks a question about a study question that he has not attempted to answer, you should ask him to return to a study area, re-read the text pages that correspond to the study questions relevant to the question asked, and answer these study questions (2).

If the student returns to you with an answer to the question(s), follow procedures 3-6 outlined above.

If the student still has not answered the question(s), ask her to take a guess (2). You might say something like, "Why don't you take a guess?," or "Go ahead and give it a try." You must make it clear to her that you will not give the answer.

If the student is still having trouble, use thematic or formal prompts, or send her to a course tutor, Beth, or Kent.

By following these procedures you are teaching your students to come to you when they are prepared, and not before. Once they realize you are serious about their coming with some answer, they will try, and you will have helped them learn reasonable study behaviors in the process.

21. Describe the procedures you should follow when a student comes to you with problems related to specific study questions. Be detailed. Give an original exam-

ple from your proctoring experience to illustrate your answer.

22. Briefly describe what you should do in the following situations:

a) the student has given a sloppy answer to a study question and is having a problem with it

b) the student has not attempted to answer a study question about which she has a problem

c) a student has returned to the study area to answer a study question, but returns to you with the question still unanswered.

After a Quiz Has Been Taken

No answer. Every question on the quiz is a chance to teach the student something. If he has no answer, he cannot learn anything. Your first task is to look at the student's quiz and make sure all the questions have been answered. If she hands you a quiz with answers missing, return it before grading it, and ask the student to supply an answer (2). Get the student to at least guess on each question. Tell the student that you cannot grade the quiz without an answer to every question.

If the student does not understand a question, ask her to explain what she thinks the question is asking. If the answer key indicates that it is not what the question is asking, restate the question and use other noninformational

prompts. Then, enter the question on an "unclear question sheet" and submit it at the next proctor meeting.

Finally, tell the student to ask for question clarifications while he is taking a quiz.

23. Describe the procedures you should follow to deal with missing quiz answers. Illustrate your answer with an original example from your proctoring experience.

Unclear answer. Ask the student to clarify any unclear answers (6). Many students will attempt to answer questions in "short-hand." This is not acceptable; we are trying to shape writing skills in the courses. Tell the student that incomplete or vague answers will not be acceptable on the final exam, and to help her perform well by then, you will not accept them either. Don't reinforce brief answers that are not complete or are unclear by scoring them as "correct." Ask the student to explain any unclear answer in detail (4). Ask for definitions (3) of any term in the answer, and get an original example, when appropriate (5). If the answer is acceptable, ask the student to write the clarified answer on his quiz (6).

Ask him to be complete in the future, for such practice will assure a high final exam grade (since the exam is graded in his absence) and will take up less of your time and his time in the proctor sessions. You may also add that clear and complete answers will allow both of you to devote proctor time to other discussions.

If the oral clarification is incorrect, ask the student to <u>define</u> any terms used (3) and <u>explain</u> why she thinks her answer is correct (4). <u>Check</u> her <u>study guide</u> to make sure she answered the appropriate study questions. These are indicated after the answer to each question on the answer keys. If there are none indicated, enter the unit, form, and answer number on an "unclear question sheet," and submit it at the next proctor meeting.

Often the student will have neglected to answer the appropriate study questions. If he has not answered them, tell him that more studying in the form of <u>answering</u> the questions (2) is needed. If he has answered the appropriate study questions but they are sketchy or incorrect, follow procedures 3-6 under <u>Before a Quiz Is Taken</u>.

24. Give an original example of an unclear answer and how you would get the student to clarify it. Assume the clarification is correct.

25. What procedures would you have followed if the clarification given in #24 was incorrect? Be detailed.

Many unclear answers are a function of careless reading. One objective of the course is to have students carefully read quiz questions before they begin answering them. If the student is consistently omitting parts of questions, this may be a clue that the student is not reading quiz items carefully. Most often, a student will admit that he did not carefully read a quiz item. You and such students

should focus on this problem in your proctoring sessions. For starters, you can ask the student to number or letter all parts of a question on her answer sheet and go back and count up the number of parts on each quiz item before going to the next one.

Snow. Another problem with unclear answers may involve a student's attempt to "get by." Some students will answer a question that "sounds like" ours, if they don't know the appropriate answer. Most often in these cases, the student knows that he does not know the answer to the question, but, just to make sure, if the student does not answer the question as it is stated, you should restate the question and use other noninformational prompts. With respect to snow, again, make sure that all unclarified answers are clarified in written form to your satisfaction (6) before an item is counted as correct. Use noninformational prompts and follow procedures 3-5, if necessary. Again, it is likely that the student just needs to study more, when snow is involved.

Sometimes the student will be able to demonstrate mastery of study questions but still not be able to answer a quiz item correctly. This may be a problem of concept integration, or it may be the case that the student's study question answer is under the control of the specific words used in the question, as in memorization. Please refer all such problems to a class tutor, Kent or Beth.

26. Write a sentence or two explaining what you will do
    when each of the following problems arise:

    a) parts of questions are omitted.

    b) snow.

    c) student knows answers to study questions, but can-
       not handle quiz items.

Wrong answer. If an answer is incorrect, ask the stud-
ent to define all terms contained in the answer (3) and ex-
plain why she thinks her answer is correct (4). Refer the
student to study questions keyed to the missed item. Check
the student's study guide to make sure he answered these
study questions. If he has not answered them, tell him that
more review is necessary. If he has answered them, follow
the procedures described under Before a Quiz Is Taken.

       Again, there is a wealth of evidence supporting the
notion that knowledge of results plus correction procedures
that require the student to be active are essential for ef-
fective learning.

27. Outline all the procedures to follow when a student has
    a wrong answer. Be specific.

When to prompt. No prompting should be employed unless
upon your initial scanning of a quiz, it appears that the
student has at least 70% correct. Proctor sessions for
quizzes that appear to be below 70% should be immediately
terminated. They will take up too much time, and the stud-
ent needs more review, or assistance as described under Be-

fore a Quiz Is Taken. As a general rule, no more than three items should be prompted per quiz. Review is necessary if more than three items require noninformational prompting. Again, whenever a student must review a unit, you should tell the student the appropriate study questions (and possibly text pages) that need review.

Under no circumstances should you supply answers, thematic prompts or formal prompts during evaluation. Telling is not teaching: Don't supplement our PSI course with critical information minilectures. Ours are gone for reasons!

28. What is the first thing you should do when a student hands you a quiz to be scored? How much prompting should you do per quiz?

Leftovers

You should prompt a student to attend the next possible class, especially if she must review a unit. When the student retakes a quiz, you should check her study guide before you score the quiz. All study questions must be completed before you score a second form of the same unit.

10% or less errors. If a student attains between 90 and 100% correct on a unit quiz, you should tell him that you intend to check up on the minor errors when he comes to you with his next quiz. Be sure to write down any relevant question about the missed material on the inside of the student's folder. Make sure the questions you ask him are

different than the missed quiz items.

Student evaluations. Before terminating a session, you should prompt comments about the course, the unit, and/or your own behavior as a proctor, if time permits. Such information will be useful to you as well as to us, and will result in a more personalized course for the student.

Arguments. If the student is unwilling to accept the grading of an answer, have her appeal it to Beth or Kent. You should be present during such discussions. Call either of us over when such problems arise. Our judgment will be final.

Listen. Whenever you ask a student to explain an answer, give a definition, etc., you should pay close attention to her response. This will make the student less defensive and will also enable you to prompt more precisely.

Reinforce. Be sure to follow the reinforcement and nonreinforcement procedures covered earlier. Specifically, give praise for all prompted correct answers or portions of answers that are correct. Remember, we are trying to get students to give correct answers on their own. Don't punish their attempts, no matter how poor the try (but don't reinforce poor tries, either!). If you are effective in punishing a student's attempts, you will wind up with a student who will not even try.

29. Tell what you will do in each of the following situations:

a) you have finished scoring a student's quiz, and no
   one is waiting to see you.

b) a student tells you that the way you scored item
   #4 was completely unfair.

c) a student gets a 95 on a unit quiz.

d) a student brings you a retake on unit 3 to score.

30. Write a sentence or two about the following proctor
     behaviors:

a) listening

b) prompting attendence

c) reinforcement vs. punishment

Recap of Prompting Procedures during Quiz Scoring (Evaluation)

DO:

1. Require lots of active responding.

2. Follow procedures 2-6 outlined on page   of this hand-
   out. These involve getting an answer (2), getting de-
   finitions (3), getting justifications or explanations
   (4), getting original examples (5), and getting entire
   restated clarifications (6).

DON'T:

1. Be the primary behaver in the session. The student
   should take that role. Don't essentially answer an
   item for a student, or rephrase a student's vague an-
   swer, as in the following episode:

```
proctor:  In item #4 you define an operant as a behav-
          ior that can be conditioned.  Could you cla-
          rify that for me?
student:  Well, it's any behavior that changes by the
          environment.
proctor:  Yes, any class of behavior that produces a
          common effect on the environment is called
          an operant.  Right?
student:  Yes (or nods head up and down)
proctor:  Good.  Now in #5. . .
```

Let the student clarify the answer.

2. Behave in ways that tell the student that an alterna-
tive answer is correct when only three or less answers
are possible (as in multiple-choice or fill-ins) until
you are ready to deal with that item. The student may
beat you to it and change the answer.

3. Use informational prompts, like supplementary thematic
and formal stimuli. Only noninformational prompts are
acceptable during evaluation.

4. Provide answers by either minilecturing or reading an-
swer keys to the student. Use noninformational prompts,
instead.

5. In any other way provide a student with additional in-
formation contained in instructional materials to oc-
casion appropriate answers to unclear or incorrect quiz
items. Use only noninformational prompts.

31. How would your proctor behavior be different than the
behavior of the proctor in the episode given above?
Be specific.

<u>Common</u> <u>Student</u> <u>Questions</u>

1. "Can you explain 'extinction' to me?"

    Your first job is to get the student to refer to specific course items (1).

2. "What's the answer to question #12?"

    You've got a reference, so your first job is to get the student to attempt an answer (2). You might ask her, "What do you think it is?"

3. "I don't understand question #9."

    You must get an answer from the student (2) first.

4. "Is the definition of extinction the stopping of an event?"

    You've got an attempted definition (3). Answer yes if it is correct and get an original example (5). If it is incorrect, get an explanation of the student's answer (4) and ask him to try again (by using noninformational prompts).

6. "But I thought the question asked for the behavioral result of extinction!"

    If the answer is unclear, you've got an attempted explanation of why the student answered the way she did (4). If the explanation shows that the student does not understand the question, restate it and use other noninformational prompts. If the explanation shows the student understands the question but the answer is incorrect, follow the incorrect answer procedures out-

lined on page ___ . If the explanation shows that the student understands the question but the answer is unclear, get a full clarification by following the unclear answer procedures on pages ___

32. Generate common student questions similar to those above using examples from the material in the course that you are proctoring. Be sure to cover all six appropriate prompting and correction procedures in your examples, and tell how you should respond to each student question or comment.

Common Student Objections

1. "WHY DO I HAVE TO GIVE THE ANSWER; YOU'RE THE TEACHER!!?"
   This, or any other argument against trying should be answered with something like, "Because research shows that you will learn more if you try to get the answer on your own."

2. "WHY CAN'T I SIT HERE AND READ IT; IT'll JUST BE A SECOND!?"
   This or any other comment about getting out of studying should be answered, "Because there are students waiting for help," OR you might point out that the student should take longer to read it, OR you can just signal another student who is waiting to come over.

3. "I JUST DON'T AGREE WITH YOUR ANSWER!"
   Have the student discuss this with you and Beth, or you

and Kent.

33. Generate a list of five original common objections and tell how you would respond to each. Remember, the goal for each episode is to prompt, not tell.

Non-quiz or Study Guide, but Course Content-related Questions

When time permits you might try your hand at more in-depth discussions of course content with a student so desiring. Be ready with a reference or some other enrichment source when possible. If the student is especially interested, tell him he can negotiate with Kent or Beth to have an activity related to the topic count toward the group events points. If you are not familiar with extensions of concepts the student wants to discuss, beyond their treatment in the course, call Beth or Kent and the three of us can discuss the topic. If you have students waiting, send the student to Kent or Beth.

Evaluation

34. Were there any scoring problems related to course content that you have encountered that were not covered in this handout? Please describe them here.

35. Were any portions of this handout unclear? Please be specific.

36. Are there any other comments you would like to make

about this handout or the training session that goes
along with it?

37.   How useful will the training program on prompting and
this handout be to you?   Explain your answer.

APPENDIX IV

Glossary of Terms

Definition Item

Any question that uses words different from those given in the text or study guide in which the student is asked to state the critical features that define a concept and/or rule or comparison of concepts and/or rules that has been given in the text or study guide. The student must answer the question in words that are different from those used in the text or study guide. Technical terms in the question and answer are acceptable as long as they are not parts of verbal chains containing nontechnical terms.

Discrimination Item

A. Any question in which the student is given a new example that illustrates both irrelevant and critical properties of one or more concepts and/or rules. The student must state the terms or rules that are defined by the critical features.

B. Any question in which the student is given a new example that illustrates irrelevant features and none or only some of the critical features that define one or more concepts and/or rules. The student must state that the example does not illustrate the concept(s) or rule(s).

C. Any question in which the student is asked to com-

pare the similar and dissimilar properties of two more con-
cepts or rules, as long as the comparison has not been pre-
sented in the text or study guide.

Application Item

Any question in which the student is given one or more
concepts or rules that have been illustrated in the text or
study guide. S/he is required to state a new example that
illustrates the necessary critical features of the concept(s)
or rule(s) in the context of irrelevant features that have
not been previously presented in the text or study guide.
An application item may contain one or more irrelevant pro-
perties to which the student must add instances of the cri-
tical properties that define the concept or rule, and pos-
sibly other irrelevant features.

Problem Solving Item

A. Any question in which the student is given two or
more concepts and/or rules that have not been jointly illus-
trated in the text. The student must:

1. Give an example that illustrates the critical
features of all the concepts and/or rules.

2. Include in the example irrelevant features that
have not been previously presented in the text or study
guide. or

3. State a new rule that combines the concepts and/

or rules given.

B. Any question in which the student is given a new example that illustrates:

1. the critical properties of two or more concepts and/or rules to which the remaining must be added,

2. one or more features that must be substituted for the critical features that define two or more other concepts and/or rules.

The student's additions (1) or alterations (2) must: a) include irrelevant features contained in the example, b) not be previously illustrated in the text or study guide. New irrelevant features may also be illustrated.

Thus, these problem-solving items involve discrimination and application fo concepts and/or rules not previously related in the text.

Informational Prompting

The presence of supplementary discriminative stimuli not contained in the terminal quiz item.

Non-Informational Prompting

The absence of supplementary discriminative stimuli not contained in the terminal quiz item.