Programmed Instruction: Within-Subject Analysis of Four Types of Instructional Material

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PROGRAMMED INSTRUCTION: WITHIN-SUBJECT ANALYSIS OF FOUR TYPES OF INSTRUCTIONAL MATERIAL

by

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Skinner (1958) expressed the need for an increase in the effectiveness and efficiency of education. In particular, he suggested that programmed instruction could provide such efficiency. The present study used a within-subject design to compare the effects of four types of instructional materials: those requiring overt construction responses, overt discrimination responses, covert reading of text with highlighted key words, and covert reading of standard text. The material requiring overt responding produced greater learning than did the covert reading materials, with or without highlighting. There was no difference found between the two types of overt responding; nor were there differences between the two types of covert reading materials. Thus, this study supports the assumption that overt responding is more effective. However, the overt response materials also required proportionately more time. Therefore, this study failed to demonstrate a benefit of overt responding in terms of efficiency.
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CHAPTER I

INTRODUCTION

Skinner (1958) noted that "[t]here are more people in the world than ever before, and a far greater part of them want an education. The demand cannot be met simply by building more schools and training more teachers. Education must become more efficient." (p. 969) After nearly 40 years, that statement is all the more true. There are now estimated to be over 267 million people living in the United States alone (U.S Bureau of the Census, 1997). Programmed instruction was intended to address the issue of effectively and efficiently educating the increasing world population.

In this chapter, I will (a) provide a brief historical overview of programmed instruction research and theory, (b) propose a working definition of programmed instruction, (c) review the research literature for support of the theoretically critical features of programmed instruction, and (d) point to future, systematic research to ascertain the critical variables responsible for the effectiveness of programmed instruction in various forms and settings.

Programmed instruction (PI) became an active area of research during the 1950s, and continued through the 60s and into the 70s (Silverman, 1978; Tobias, 1973). After that time, there appears to have been waning interest in empirical studies of program design elements. However, many psychologists and educators have
applied, and continue to apply, programmed instruction to training in their areas of
specialty. For example, PI has recently been applied to the teaching of music (Deal,
1985; Greenfield & Codding, 1985), chemistry (Koleoso, 1985), psychology (Fernald
& Jordan, 1991), and teacher training (Wesley, Krockover, & Devito, 1985).

With the increasing availability of microcomputer technology, researchers are
demonstrating renewed interest in programmed instruction, often under the name of
computer-based instruction. Computer-based instruction, also commonly referred to
as computer-based training or computer-aided instruction, simply refers to the use of
computers in an attempt to teach or train, without reference to the format of
instruction. Given the capacity of computers to present sequences of text and
graphics, as well as to identify correct textual responses, much of CBI has involved
programmed instruction; however, there are numerous examples of CBI that are
nothing more that textual material presented via computer. Unfortunately, many of
the "studies" in this new wave of programmed-instruction research are simply
demonstrations or comparisons of computer-based programmed instruction to a
nonspecific, lecture format. There have been relatively few studies designed to isolate
the effects of one or more variables on the effectiveness of programmed instruction.

Given the number and diversity of applications of programmed instruction, it
is critical to evaluate, not only programmed instruction as a whole, but specific
dimensions of programmed instruction. In later sections of this chapter, I will be
specifically reviewing those studies that attempt to isolate one or more components of
programmed instruction.
Toward a Definition of Programmed Instruction

The terminology “programmed instruction” has been used to describe both paper-based and computer-based instruction. For the present purpose, I will include both modes of instruction and will make little distinction between them, except where differences may be important to the isolation of variables in PI research.

This terminology has also been used to refer to such endeavors as teaching an infant to run (Auxter, Walton, Baker, & Tressler, 1986) and increasing orientation and mobility of a blind, multi-handicapped child (Harley, Long, Merbler, & Wood, 1987). I will exclude such studies because the programs involve a teacher, who is actively engaged in making changes in the response requirements, based on student responding. In such cases, the stimulus presentations are not structured in advance, and thus are not “programmed.”

The only other defining characteristic of programmed instruction, as I see it, is the involvement of prompts for student responding. Without this restriction, all reasonably organized textbooks would qualify as programmed instruction, in that they purport to add to the reader’s repertoire in a structured sequence.

Materials referred to as programmed instruction also differ in terms of the type of response required, whether or not feedback is provided, the form of the feedback (when provided), the ratio of questions to text, and many other variables that may influence the effectiveness of the materials. However, given that standard usage seems to include all of the various forms, until there are data to show that one is unequivocally more effective, further restriction of the term is not reasonable.
Review of PI Research

Skinner (1958) outlined what he considered to be the requirements of effective programmed instruction, to be delivered via teaching machines. Essentially, the requirements, as outlined, are: (a) Clear specification of learning objectives, (b) Small steps, (c) Logical/developmental sequencing of information, (d) Fading/vanishing of prompts, (e) Active/overt responding, and (f) Immediate feedback/reinforcement. Each of these requirements is supported by theory, but it is important to obtain empirical verification. Programmed instruction researchers often refer to the units or small steps within a program as “frames.” Generally, the learner is exposed to only one frame at a time and is prompted to make a response before advancing to the next frame.

Learning Objectives, Small Steps, Logical Sequences, and Prompts

To date, I have found no research on the specification of learning objects, the size of steps used, the necessity of a logical sequence, or how to go about fading prompts. Much like shaping in the operant laboratory, these details have been left mostly to “art” and laboratory lore. Various authors have suggested techniques for the creation of PI programs that include these components, each of which differs in some small way (see Brethower, Markle, Rummler, Schrader, & Smith, 1964; Englemann & Carnine, 1982; Evans, Homme, & Glasser, 1962; Tiemann & Markle, 1990). For example, though Skinner suggested extremely small step sizes be used, it has been suggested by others that program authors should begin with a minimal number of
steps, each step being rather large, and add only those additional steps that are
needed, based on pilot testing (Tiemann & Markle, 1990). Given a lack of data, I will
not suggest a best practice with regard to these variables.

Active Responding

One of the primary reasons for the development of programmed instruction
(rather than standard text material) is the assumption that overt student responding is
necessary (or beneficial) for learning to occur. Perhaps for this reason, it has been the
most extensively researched area within the field of PI. Early research on overt
responding provided more questions than answers. A number of studies demonstrated
greater learning produced by overt responding versus reading the same material with
no responding or covert responding; however, an equal number of studies showed
equivalent effects (Silverman, 1978; Tobias, 1973).

In an attempt to make sense of the disparate results, Holland and Kemp (1965)
developed the blackout ratio – the proportion of words that can be removed from the
instructional material without changing the error rate within the program – as a
measure of how well the material was programmed. The assumption is, if the
blackout ratio is high, responding is relatively unrelated to the text material, so it
should not be surprising that responding doesn’t greatly affect learning. An analysis
of the programs used in several early studies showed that those programs that yielded
greater learning from overt responding had a relatively low blackout ratio, whereas
those programs that produced equivalent learning with and without overt responding
had a relatively high blackout ratio (Kemp & Holland, 1966). Essentially, this shows that if the responding bears no relation to a large portion of the program content, on which the student is to be tested, there will be no benefit from the responding. Holland (1967) then suggested that a low blackout ratio, in combination with a low error rate, should be an effective predictor of a good program.

I have found no research published since 1967 that addressed the blackout ratio. For that matter, there has been relatively little recent research addressing overt responding. However, a few studies continue to suggest that overt responding is an important advantage in programmed instruction. Tudor (1995) and Tudor & Bostow (1991) produced greater performance improvement when overt responding was required than when otherwise-identical, read-only materials were provided. Whether or not an overt response was required, the “correct answer” was provided at the top of the following frame. Thus, the only significant difference between the two conditions was the absence of a word or phase, and the requirement of typing that word or phrase, in the overt-response condition. A replication study (Miller and Malott, in press) reproduced the findings of Tudor (1995).

Three studies by Schloss, Schloss, and Cartwright (1984, 1985a, 1985b) also showed greater learning with overt responding than with read-only materials. Interestingly, groups receiving materials with highlighted words rather than blanks for responding also did significantly better than read-only groups. However, when the posttest items were directly related to responses made within the program, the overt-response materials produced greater learning than did the highlighted-word materials.
The fact that overt-responding produced greater learning only when the test items were closely related to responses made within the program supports Markle's (1990) assertion that responding needs to be relevant to the terminal objectives of the program to be effective.

Response Mode

The issue of response mode is related to active responding. Theorists have separated responses in programmed instruction into at least two major categories: discrimination responding (usually multiple choice), and construction responding. Construction responding has been further broken down into exemplification (providing examples of concepts, given a definition) and providing short fill-in-the-blank (usually one-word) responses.

Skinner (1968) asserted that construction responses were preferable, because they require the learner to make a complete response, rather than to simply select from a number of options. More recently, Markle (1990) and Mager (1988) have made similar assertions. In particular, they argue that the construction responses will yield better results when the terminal response is a construction response. There have been few data to support this contention to date, although there have been attempts (Shimamune, 1992; Vunovich, 1995). Shimamune (1992) presented students with materials that either required no responding, discrimination responding, or construction responses. All groups made significantly greater pretest-to-posttest improvements than did a control group, which received no training, but no significant
differences were found between response modes, when the terminal response was a construction response. However, when the terminal response was a discrimination response, the group that received the discrimination-response materials performed significantly better than did the group receiving the construction-response materials. This finding suggests that the response mode in training should be discrimination when the mode of the terminal response is discrimination.

When the terminal response was a construction response, the construction-response materials failed to produce better results than did the discrimination-response materials. A possible confound that may account for this is the nature of the terminal (exemplification) response in this study. The learner was asked to provide an example of the concept of a goal-directed systems design. Given that the exemplification-response group received no discrimination-response training, it is possible that, during testing, they were unable to determine whether or not the example they had come up with was correct. Further research should incorporate a group that receives both discrimination-response and exemplification-response training, to determine if the combination is more beneficial than either alone for the exemplification-style terminal response.

The research by Shimamune (1992) suggests that, in some cases, the type of responding required by the program is important. However, it will be necessary to replicate these results before such an assumption should be made. The current study is an attempt at such replication. Assuming the response mode is important, much
research will be needed to discover the best response mode for training various types of terminal responses.

Immediate Feedback

Skinner (1954) proposed that immediate feedback within the program was a critical factor determining learning. In programmed instruction, feedback generally refers to information regarding the correctness of a response. Usually, it is simply that the correct answer is provided. However, in one study (Lhyle & Kulhavy, 1987) a group that received scrambled feedback and a group that received feedback presented in standard word order were required to copy the feedback. The subjects that received the scrambled feedback were required to unscramble it in the process of copying. Both groups performed better than a control group, which received no feedback. Furthermore, the group receiving the scrambled feedback, and unscrambling it, performed significantly better than the group receiving and copying standard feedback. Barbetta, Heron, and Heward (1993) obtained similar results by having developmentally disabled learners actively correct errors made in sight-word instruction. The researcher modeled the correct pronunciation of any missed word, as a formal prompt for the learner to repeat the correct response form.

Crosbie and Kelly (1994) assessed the effects of an imposed postfeedback delay on performance in programmed instruction. Results indicated that a noncontingent, postfeedback delay of 10 seconds produced better performance than did no delay, when the feedback remained on the screen during the delay. Imposing
the 10-s delay did not increase time to completion, though it did increase learning. The most likely analysis is that learners used the delay to study (read the material again), but reduced wasted time in another component of the program. The lack of effect when the computer screen was blank during the postfeedback delay supports the hypothesis that subjects benefited from extra studying. This research supports the use of feedback, and further suggests that the program should require the student to actively respond to it.

It will be important (technologically) to determine whether the immediacy of feedback is required, or if delayed feedback would be as effective. Particularly with paper-based instruction, it is difficult to arrange for the learner to receive immediate feedback, while preventing learners from looking ahead to the answer. Anderson, Kulhavy, and Andre (1971) determined that, if subjects were able to look ahead to the answers, the feedback did not produce any significant benefit; however, if subjects could be prevented from “peeking,” the feedback produced greater learning. If delayed feedback was found to be effective, the problem of reading ahead could be eliminated. In computer-based instruction, the computer can be programmed to present the feedback only after a response has been made, thus avoiding this problem.

It is notable here that programmed feedback can only be provided if there is an overt-response requirement. Thus, given that feedback does produce greater learning (assuming you can prevent reading ahead), the direct value of overt-responding may be of little applied relevance. However, it will still be of theoretical interest.
Learning-Based Incentives

Most programmed instruction research does not involve any added contingencies on posttest performance. If any contingency is added, it is simply points for participation. As an extension of Tudor (1995), Miller and Malott (in press) assessed the impact of learning-based incentives on the effects of an overt-response requirement. Overt-response materials produced greater increases in performance than did materials not requiring overt responding, regardless of programmed incentives for posttest performance. Thus, it appears, at least initially, that added contingencies on the posttest do not greatly affect learning via programmed instruction. This finding is consistent with Skinner’s (1958) contention that external motivation would be unnecessary in PI, due to the reinforcing effects of producing a high rate of correct answers. Further analysis will be needed to assess the contingencies operating within the program when no contingencies are added for posttest performance.

Time

Carrol (1963) suggests that, all else being equal, the greater the time on task, the greater the increment in learning. Certainly, with much programmed instruction, this holds true. It often takes considerably longer for a learner to work through a program involving overt responding than it does to read similar subject matter (Tobias, 1973). Unfortunately, few empirical data are available on this topic.
Of the studies reviewed here, only four reported the time taken on different types of instructional materials. Tudor (1995) found that subjects required to type an overt response took an average of 10 minutes longer (average completion time was not reported) than subjects reading identical materials without an overt-response requirement. Interestingly, Miller and Malott (in press), using the same materials, found no significant correlation between completion time and pretest-to-posttest improvement. In both cases, the overt-response materials produced greater learning than the read-only materials. As mentioned earlier, Crosbie and Kelly (1994) found that imposing a 10-s postfeedback delay increased learning, but did not increase completion time. Also, Fernald and Jordan (1991) compared a standard text to its accompanying programmed study guide and found that students using the study guide spent significantly less time studying than did students using the textbook, yet there test scores were equal. This at least suggests that PI has the potential of realizing its goal of producing more efficient learning, and certainly indicates that the positive relation between time and learning is not ubiquitous.

Social Validity

Few of these studies assessed subject preference. Crosbie and Kelly (1994) found that subjects not only performed better with a postfeedback delay with feedback remaining available; they preferred it to all other conditions in the study. Preference for the more effective materials is not, however, guaranteed. Schloss et al. (1985b) found that, although materials requiring overt responding produced greater
learning, students preferred materials with highlighted words and no questions. One possible variable to address is the program error rate. Although I have found no research to support this hypothesis, it seems reasonable that students would tend to prefer materials requiring overt responses when the error rate is very low and they often then receive positive feedback, whereas they would tend to prefer to not make overt responses when the error rate is high and much of the feedback is corrective.

Social validity data may be especially important when programmed instruction is applied to special populations, where learner resistance to educational situations is common. Also, if a part of the educational goals of the program is to interest the student in the material being learned, using a preferred, though slightly less effective, condition may be worth considering.

Future Directions

In addition to further research on the previous topics, the following areas may be of significant value to programmed instruction theory and technology.

Prompts

Markle (1990) asserts that formal prompts should not be used, because responding to a formal prompt is not “meaningful,” which is to say, it will not produce as much learning. I have found no research directly addressing this. To the contrary, Skinner made extensive use of formal prompts (e.g., Holland and Skinner, 1961), but gradually faded (or vanished) them. It seems reasonable that one should
avoid using formal prompts toward the end of a program, because the learner may rely on the formal prompt and, thus, be unable to make the correct response in its absence. However, early in a program, especially when teaching relatively unfamiliar content and terminology, it may be necessary to include formal prompts.

Much of the research showing that overt responding is beneficial involved programs that make use of formal prompts (e.g., Miller & Malott, in press; Tudor, 1995; Tudor & Bostow, 1991). Even though the responding involved directly copying a word in many cases in early portions of the programs, learning was improved. Research is needed to determine in what circumstances formal prompts are acceptable, and when it is more beneficial to use thematic prompts.

**Linear and Branching Programs**

This is an old issue (Skinner, 1954), but has become especially important with the increasing prevalence of computer-based instruction. Branching programs are designed to give corrective instruction specific to the errors made by a specific learner. Depending on the answer given, the learner would be provided a different set of follow-up frames specifically designed to address the error made. Linear programs are designed to present the same sequence of frames to all learners irrespective of their errors.

Although Skinner (1958) preferred linear programs, it may be that a branching system will be required to significantly increase the effectiveness and efficiency of education. One of the disadvantages brought on by increasing the student-to-teacher
ratio in traditional classrooms is the inability of the teacher to customize the instruction to the needs of each student (as a private tutor/mentor could). Linear programming may be subject to a very similar limitation to the extent that program users are not entirely homogeneous. By programming the material such that students can skip material they have already mastered and receive only that training which directly addresses their individual needs, we may begin to see the increases in efficiency programmed instruction was designed to produce.

In computer-based instruction, branching programs can be designed that cause no inconvenience to the user. In paper-based instruction, however, it is cumbersome to flip to the appropriate branch. The technology would benefit from a comparison of a branching program with the identical frames presented in a linear format. If the branching program proves to be equally effective and takes less time, it would be of great practical value. Unfortunately, I found no such research in the literature.

**Within-Subject Design**

Even within the field of applied behavior analysis, most research on programmed instruction has been conducted using group designs. One notable exception is the overt-response work by Tudor (1995) and the follow-up study by Miller and Malott (in press). In many cases, within-group variability, coupled with small sample sizes, may mask effects. Although difficult, making use of within-subject, repeated-measurement designs may provide a more powerful design option.
The main difficulty with this approach is the development of a series of equally difficult, independent units of instruction. In many cases, the design of programmed instruction is driven by the need to teach a specific subject matter, which is logically progressive (i.e., each concept builds on the previous). To compare within subject, it may be necessary to develop instructional programs in four or more unrelated, relatively obscure topics.

Getting Back to the Basics

Many of the reviewed studies are specifically tied to the setting in which they are conducted. Often the materials and research design are tailored more to suit the application than the research. There is nothing wrong with research of this variety, but it needs to be tempered with research specifically designed to measure the effects of specific variables. Without this more controlled research, many useful technological advances may be overlooked in favor of options that are more expedient to implement. Presumably, this is the current case, as most of the published research on programmed instruction is essentially a validation of programmed instruction being more effective than a lecture format of the same subject matter. The specifics of the program often are not even provided.

Recapitulation

Though there have been over 40 years of research in the area of programmed instruction, many of the original questions have not been satisfactorily answered.
although it is widely accepted that programmed instruction is more effective than standard text or lecture formats. The task at this point, as always, is to isolate the presumed critical variables and to assess the relative effects of each. To review the findings to date:

1. It can be reasonably assumed that materials requiring overt responding will produce greater learning than will standard text materials, provided the material has been adequately programmed (has a low blackout ratio).

2. It is not clear, however, whether it is important that the response form in training be the same as that of the terminal response.

3. Feedback has been shown to enhance learning, but more research will be needed to determine the extent and manner to which students should be required to interact with the feedback. Furthermore, whether feedback needs to be immediate remains to be seen.

4. Research will need to be conducted to determine whether there is an appropriate role for formal prompts in programmed instruction, and if so, what that role is.

5. It will be useful to determine the best procedure for specifying learning objectives, choosing step sizes, and logically sequencing frames of information. However, it is not clear how one would subject such procedures to experimental analysis.

Incorporating new areas of research (e.g., linear vs. branching programs), methodological rigor (e.g., within-subject designs and materials specifically designed
to assess program variables), and social validation, will help us more reliably develop instructional materials that are effective, efficient, and enjoyable for the learner.

The Current Study

The study to be described and discussed throughout the next three chapters was designed to address the following questions:

1. Does overt responding with feedback increase learning?

2. Is the type of response required in the program (construction or discrimination) a critical variable when the posttest requires construction responding?

3. Will highlighting important words in the text also produce increases in learning over non-highlighted, read-only materials?

Given the data previously presented, it seemed likely that overt responding with feedback would produce greater learning than read-only materials, but another systematic replication of such findings seemed reasonable. Question 2, regarding type of response, stems from Markle’s (1990) assertion that the response mode in training should match that of the terminal response, and Shimamune’s (1993) data that showed that construction and discrimination responding in training produced equivalent pretest-to-posttest improvement on a construction-response posttest. The final question is meant to address the data obtained by Schloss et al. (1984, 1985a, 1985b) showing a significant effect of highlighting words.
CHAPTER II

METHOD

Subjects and Setting

Twenty-four undergraduate students from Western Michigan University volunteered to serve as subjects. Students enrolled in Psychology 360\(^1\) were offered 20 Optional Activity Points for participation in a 2-hour study. All sessions were held in a 20-station computer laboratory in a campus building. During data analysis, it was discovered that 14 of the original 24 subjects had not completed part of one or more sections of the instructional program\(^2\). For this reason, 14 additional subjects were recruited. Data are thus presented for 24 subjects.

Materials

The instructional program used in this study is a modification of the program used by Tudor (1995), which is, in turn, a modified version of a program developed by Bostow (1989) to teach the principles of programmed instruction. Tudor selected 189 frames from the original 315-frame program to construct four sections with non-overlapping content, thus allowing for within-subject analysis of program variables.

\(^1\) Concepts and Principles of Behavior Analysis

\(^2\) It is likely that the failure to complete all sections was due to computer problems.
Tudor's version had been programmed using an authoring system (Teacher Turned Author, 1985) that is no longer available. I transferred the content of the program to another authoring system (PC-CAI, 1988) to allow modifications necessary for the present study. A small number of changes were made to the program content to accommodate the transfer. For example, two graphics from the original version were replaced with ASCII text representations, because PC-CAI does not support graphics.

Tudor (1995) constructed a 60-item fill-in-the-blank test with 13, 16, 15, and 16 test items corresponding to concepts and principles from sections 1, 2, 3, and 4 of the program. Each test item is similar in wording to information presented in the program frames. For purposes of the present study, I created a computer-presented version of the test using the PC-CAI authoring system. The test questions and answers are provided in Appendix A.

Dependent Variables

The previously discussed test was used as both pretest and posttest. Thus, the primary dependent variable in this study was the difference between pretest and posttest scores. Given that the instructional program consisted of four independent sections, and the individual test items corresponded to concepts and principles from a specific section, the test could be used to assess the learning produced by each section of the instructional program. In addition to test performance, the within-program error rate and time spent were measured for each program section.
Independent Variable

Four identical-content versions of the instructional program were developed; they were construction-response, discrimination-response, highlighted-word, and read-only. These four types of instructional material served as the values of the independent variable in this study. Figures 1, 2, 3, and 4 display identical-content sequences from the construction-response, discrimination-response, highlighted-word, and read-only versions of the program.

Construction-Response Materials

In the construction-response (fill-in-the-blank) version of the program, the student was presented with a short block of text with a word or short phrase missing (a blank). The student was then prompted to type the missing word(s). The student was allowed two attempts at typing the answer. A correct response on either attempt produced a "Correct" message and advanced the student to the next frame. An incorrect response on the first attempt produced an "Incorrect" message and repeated the same frame. An incorrect response on the second attempt produced a message of the form "The correct answer was <ANSWER>." The frame text and answers from the construction-response version are reproduced in Appendix B.
2. 'Echoic' behavior is an exact duplication of the verbal behavior of someone else.

When a parent points to a bird and says 'say bird' to a child and the child subsequently says 'bird,' this is an example of an _____ response.

Type your answer here: [echoic]

The answer was ECHOIC

3. We are often asked to repeat what someone else has said. If it is an exact duplication, it is an example of an _____ response.

Type your answer here: [echoic]

The answer was ECHOIC

Figure 1. Frame Sequence Excerpted From the Construction-Response Program.

Discrimination-Response Materials

The discrimination-response (multiple-choice) version consisted of the same text and blank as the construction-response version, but also included two to four options from which the student was prompted to select by typing the corresponding letter. Correct and incorrect responses were treated in the same fashion as in the construction-response version. The frame text and answers from the discrimination-response version are reproduced in Appendix C.
2. 'Echoic' behavior is an exact duplication of the verbal behavior of someone else.

When a parent points to a bird and says 'say bird' to a child and the child subsequently says 'bird,' this is an example of a(n) _____ response.

A. Incorrect
B. Echoic
C. Intraverbal
D. Contiguous

Type your answer here: [B]

The answer was ECHOIC

3. We are often asked to repeat what someone else has said. If it is an exact duplication, it is an example of a(n) _____ response.

A. Intraverbal
B. Contravened
C. Echoic
D. Contingent

Type your answer here: [echoic]

The answer was ECHOIC

Figure 2. Frame Sequence Excerpted From the Discrimination-Response Program.
Highlighted-Word and Read-Only Materials

The highlighted-word version presented the same text, but the blank was filled in with the correct “answer” in all capital letters. The read-only version was identical to the highlighted-word version, except the “answer” was not differentiated from the rest of the text in any way. In both of these versions, the student was prompted to advance to the next frame by pressing the <Enter> key. These versions are not presented in appendices, to avoid redundancy.

2. 'Echoic' behavior is an exact duplication of the verbal behavior of someone else. When a parent points to a bird and says 'say bird' to a child and the child subsequently says 'bird,' this is an example of an ECHOIC response.

3. We are often asked to repeat what someone else has said. If it is an exact duplication, it is an example of an ECHOIC response.

Figure 3. Frame Sequence Excerpted From the Highlighted-Word Program.

2. ‘Echoic’ behavior is an exact duplication of the verbal behavior of someone else. When a parent points to a bird and says ‘say bird’ to a child and the child subsequently says 'bird,' this is an example of an echoic response.

3. We are often asked to repeat what someone else has said. If it is an exact duplication, it is an example of an echoic response.

Figure 4. Frame Sequence Excerpted From the Read-Only Program.
Experimental Design

This study used a within-subject design to assess the effects of four types of instructional material on learning. Each subject received all four types of instruction, each one of the four sections of the program. For example, Subject 1 received the construction-response, discrimination-response, highlighted-word, and read-only versions of program sections 1, 2, 3, and 4, respectively. Each subject was randomly assigned to a different sequence such that the design was fully counterbalanced to account for any possible sequence effects. Thus, a comparison could be made between the effects of each type of instruction, using each subject as his or her own control, by comparing the pretest-to-posttest improvement of each subject on the test questions associated with each type of instruction (program section).

Procedures

The experimental sessions took place in a classroom with 20 IBM-compatible Intel-286 computers. After reading and signing the informed-consent form, each subject was given a disk containing the appropriate program sections, the pretest, and the posttest. Subjects received oral instructions regarding how to insert the disk, begin the program, and advance from the pretest, through the sequence of program sections, and to the posttest. Subjects were also informed that they could take a break between any of the program sections, but not during a section, because time was being recorded. No subject took a break. The entire sequence took approximately 2 hours for each subject.
CHAPTER III

RESULTS

Pretest-to-Posttest Improvement

Each of the four types of instructional materials produced statistically significant improvements from pretest-to-posttest (Table 1)\(^3\). A visual analysis of the within-subject differences in pretest-to-posttest improvement produced by the four

<table>
<thead>
<tr>
<th>Type of Instruction</th>
<th>Mean Improvement</th>
<th>Paired-t</th>
<th>df</th>
<th>p</th>
<th>Adjusted-p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction-Response</td>
<td>32.30</td>
<td>8.93</td>
<td>23</td>
<td>0.00</td>
<td>0.00*</td>
</tr>
<tr>
<td>Discrimination-Response</td>
<td>31.76</td>
<td>9.54</td>
<td>23</td>
<td>0.00</td>
<td>0.00*</td>
</tr>
<tr>
<td>Highlighted-Word</td>
<td>22.39</td>
<td>7.13</td>
<td>23</td>
<td>0.00</td>
<td>0.00*</td>
</tr>
<tr>
<td>Read-Only</td>
<td>19.29</td>
<td>6.05</td>
<td>23</td>
<td>0.00</td>
<td>0.00*</td>
</tr>
</tbody>
</table>

* Significant at the 0.01 level

\(^3\) In all cases of multiple-comparisons, the adjusted-p value refers to the p value obtained using a Bonferroni correction for family-wise error rate. The family-wise error rate is the increased probability of obtaining a significant sample statistic, due to running more than one test, when there is no population difference (Type I error).

Adjusted-p = 1 - (1 - p)\(^c\); where c is the number of comparisons made (Howell, 1992).
types of instruction suggests that the construction-response and discrimination-response materials do not differ significantly from each other, but that both produce greater improvements than do the highlighted-word and read-only materials. The highlighted-word and read-only materials do not appear to differ significantly from each other (Figure 5). Statistical analysis shows that both the construction-response and discrimination-response materials produced significantly greater pretest-to-posttest improvement than did the read-only materials. Furthermore, the discrimination-response materials produced significantly greater improvement than did the highlighted-word materials (Table 2). There were no significant differences between pretest-to-posttest improvements for the four program sections (Table 3).

![Figure 5. Mean Effects of Four Types of Instructional Material.](image-url)
Table 2

$t$-Tests of Learning as a Function of Type of Instructional Material

<table>
<thead>
<tr>
<th>Type of Instruction</th>
<th>Mean Difference</th>
<th>Paired-$t$</th>
<th>df</th>
<th>p</th>
<th>Adjusted p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction vs. Discrimination</td>
<td>0.54</td>
<td>0.15</td>
<td>23</td>
<td>0.88</td>
<td>1.00</td>
</tr>
<tr>
<td>Construction vs. Highlighted</td>
<td>9.91</td>
<td>2.51</td>
<td>23</td>
<td>0.02</td>
<td>0.11</td>
</tr>
<tr>
<td>Construction vs. Read-Only</td>
<td>13.01</td>
<td>2.92</td>
<td>23</td>
<td>0.01</td>
<td>0.05*</td>
</tr>
<tr>
<td>Discrimination vs. Highlighted</td>
<td>9.37</td>
<td>2.93</td>
<td>23</td>
<td>0.01</td>
<td>0.04*</td>
</tr>
<tr>
<td>Discrimination vs. Read-Only</td>
<td>12.47</td>
<td>3.29</td>
<td>23</td>
<td>0.00</td>
<td>0.02*</td>
</tr>
<tr>
<td>Highlighted vs. Read-Only</td>
<td>3.09</td>
<td>0.91</td>
<td>23</td>
<td>0.37</td>
<td>0.94</td>
</tr>
</tbody>
</table>

* Significant at the 0.05 level

Table 3

$t$-Tests of Learning as a Function of Program Section

<table>
<thead>
<tr>
<th>Program Section</th>
<th>Mean Difference</th>
<th>Paired-$t$</th>
<th>df</th>
<th>p</th>
<th>Adjusted p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 1 vs. Section 2</td>
<td>-3.13</td>
<td>-0.76</td>
<td>23</td>
<td>0.46</td>
<td>0.97</td>
</tr>
<tr>
<td>Section 1 vs. Section 3</td>
<td>-5.06</td>
<td>-1.36</td>
<td>23</td>
<td>0.19</td>
<td>0.71</td>
</tr>
<tr>
<td>Section 1 vs. Section 4</td>
<td>2.45</td>
<td>0.52</td>
<td>23</td>
<td>0.61</td>
<td>0.99</td>
</tr>
<tr>
<td>Section 2 vs. Section 3</td>
<td>-1.93</td>
<td>-0.50</td>
<td>23</td>
<td>0.62</td>
<td>0.99</td>
</tr>
<tr>
<td>Section 2 vs. Section 4</td>
<td>5.58</td>
<td>1.50</td>
<td>23</td>
<td>0.15</td>
<td>0.62</td>
</tr>
<tr>
<td>Section 3 vs. Section 4</td>
<td>7.51</td>
<td>1.69</td>
<td>23</td>
<td>0.10</td>
<td>0.48</td>
</tr>
</tbody>
</table>
Time

Subjects spent significantly more time on a given section of the program when using the construction-response materials (mean = 21.09 min) than when using the discrimination-response (mean = 17.09 min), highlighted-word (mean = 11.91 min), or read-only (mean = 12.30 min) materials. Furthermore, the discrimination-response materials required significantly more time than did the highlighted-word materials (Table 4). However, regression analysis showed no significant correlation between time spent within a program section and pretest-to-posttest improvement on the questions related to that section for any of the four types of instruction (Table 5). Also, no differences were found between the mean completion times for the four program sections (Table 6). Data on time are based on 23 subjects, because one subject did not record start and stop times.

Error Rate

The construction-response materials produced a significantly higher within-program error rate (mean = 0.37) than did the discrimination-response materials (mean = 0.09); mean difference = 0.28, paired-\(t(23) = 6.65, p < 0.01\). Furthermore, within-program error rate was significantly correlated with pretest-to-posttest improvement for the construction-response materials; \(r = 0.50, F(1,22) = 7.35, p = 0.01\). However, data from the discrimination-response materials show no such correlation; \(r = 0.02, F(1,22) = 0.01, p = 0.94\).
Table 4

$t$-Tests of Time as a Function of Type of Instructional Material

<table>
<thead>
<tr>
<th>Type of Instruction</th>
<th>Mean Difference</th>
<th>Paired-t</th>
<th>df</th>
<th>p</th>
<th>Adjusted-p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction vs. Discrimination</td>
<td>4.00</td>
<td>2.98</td>
<td>22</td>
<td>0.01</td>
<td>0.04*</td>
</tr>
<tr>
<td>Construction vs. Highlighted</td>
<td>9.17</td>
<td>6.94</td>
<td>22</td>
<td>0.00</td>
<td>0.00**</td>
</tr>
<tr>
<td>Construction vs. Read-Only</td>
<td>8.78</td>
<td>5.37</td>
<td>22</td>
<td>0.00</td>
<td>0.00**</td>
</tr>
<tr>
<td>Discrimination vs. Highlighted</td>
<td>5.17</td>
<td>4.54</td>
<td>22</td>
<td>0.00</td>
<td>0.00**</td>
</tr>
<tr>
<td>Discrimination vs. Read-Only</td>
<td>4.78</td>
<td>2.79</td>
<td>22</td>
<td>0.01</td>
<td>0.06</td>
</tr>
<tr>
<td>Highlighted vs. Read-Only</td>
<td>-0.39</td>
<td>-0.28</td>
<td>22</td>
<td>0.78</td>
<td>1.00</td>
</tr>
</tbody>
</table>

* Significant at the 0.05 level

** Significant at the 0.01 level

Table 5

Correlation Between Time and Pretest-to-Posttest Improvement

<table>
<thead>
<tr>
<th>Type of Instruction</th>
<th>Pearson-(r)</th>
<th>(F)</th>
<th>df</th>
<th>p</th>
<th>Adjusted (p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction-Response</td>
<td>0.16</td>
<td>0.53</td>
<td>1.21</td>
<td>0.48</td>
<td>0.92</td>
</tr>
<tr>
<td>Discrimination-Response</td>
<td>0.10</td>
<td>0.23</td>
<td>1.21</td>
<td>0.64</td>
<td>0.98</td>
</tr>
<tr>
<td>Highlighted-Words</td>
<td>0.10</td>
<td>0.20</td>
<td>1.21</td>
<td>0.66</td>
<td>0.99</td>
</tr>
<tr>
<td>Read-Only</td>
<td>0.14</td>
<td>0.44</td>
<td>1.21</td>
<td>0.51</td>
<td>0.94</td>
</tr>
</tbody>
</table>

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**Table 6**

$t$-Tests of Time as a Function of Program Section

<table>
<thead>
<tr>
<th>Program Section</th>
<th>Mean Difference</th>
<th>Paired-$t$</th>
<th>df</th>
<th>p</th>
<th>Adjusted p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 1 vs. Section 2</td>
<td>-0.61</td>
<td>-0.32</td>
<td>22</td>
<td>0.75</td>
<td>1.00</td>
</tr>
<tr>
<td>Section 1 vs. Section 3</td>
<td>2.48</td>
<td>1.53</td>
<td>22</td>
<td>0.14</td>
<td>0.59</td>
</tr>
<tr>
<td>Section 1 vs. Section 4</td>
<td>1.30</td>
<td>0.74</td>
<td>22</td>
<td>0.47</td>
<td>0.98</td>
</tr>
<tr>
<td>Section 2 vs. Section 3</td>
<td>3.09</td>
<td>1.82</td>
<td>22</td>
<td>0.08</td>
<td>0.40</td>
</tr>
<tr>
<td>Section 2 vs. Section 4</td>
<td>1.91</td>
<td>0.85</td>
<td>22</td>
<td>0.41</td>
<td>0.96</td>
</tr>
<tr>
<td>Section 3 vs. Section 4</td>
<td>-1.18</td>
<td>-0.56</td>
<td>22</td>
<td>0.58</td>
<td>0.99</td>
</tr>
</tbody>
</table>

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CHAPTER IV

DISCUSSION

Overt Responding and Feedback

As this study was designed to address technological issues, rather than theoretical issues, no attempt was made to separate the effects of overt responding from the effects of contingent feedback. It would have been possible to prepare materials that required a response, but gave no indication of whether the response was correct, however, that would be an extremely unusual type of instruction, and would be of little or no direct practical utility. As mentioned earlier, it is not possible to provide contingent feedback in the absence of a response requirement. Thus, though both types of materials involving overt responding produce greater learning than do the read-only materials, it is not possible, on the basis of the current data, to determine whether this result is a function of the response requirement, or the contingent feedback.

Contrary to Schloss et al. (1984, 1985a, 1985b), the highlighted-word materials did not produce greater learning that the read-only materials. It is difficult to account for the disparate results, given that the feedback procedures and general frame format within each program were identical. Schloss et al. (1984) found that overt responding produced better results than highlighted words when the posttest
contained questions directly related to those that appeared in the program. The data from the current study, along with that of Schloss et al., indicate that overt responding is preferable. Given that one of the tenets of programmed instruction is the clear specification of learning objectives (Skinner, 1958), if the outcome measure does not contain questions related to those in the program, it could be reasonably argued that program was poorly designed to meet the objectives.

Type of Instructional Material

The construction-response and discrimination-response materials both produced approximately the same mean pretest-to-posttest improvement. These data bring into question Markle’s (1990) assertion that the response mode in training must be the same as that of the terminal response. It appears that, at least when the terminal response is a fill-in-the-blank, construction response of the variety used in this study, the two types of overt-response materials are equally effective. One consideration is that, although the students were not familiar with the subject matter, the terminology contained relatively few words that could be expected to be novel to the average undergraduate student. It is possible that, with unfamiliar terminology (e.g., medical terminology, foreign languages, or chemical symbols), construction-response training would yield better results, due to specific practice in writing or typing the unfamiliar terms.
Time

Carroll (1963) stated that, all else being equal, learning is a function of the time spent studying. This statement appears to be upheld in that the construction-response materials produced more learning than the read-only materials, and students spent more time working on the construction-response materials. However, the relation breaks down when it is noted that students also spent significantly longer on the construction-response materials than on the discrimination-response materials, while the two types of instruction produced the same amount of learning. Furthermore, within each type of instructional material (when all else is closer to equal), there is no significant correlation between the time spent studying and pretest-to-posttest improvement.

Efficiency of Instruction

As a rough measure of program efficiency, one can divide mean improvement by the time spent within the program section. The resulting quotient represents the amount of learning (percent increase from pretest to posttest) per unit time (minute). Construction of such quotients is suggestive of which materials are most efficient; in this case the discrimination-response and highlighted-word materials have the highest learning-per-unit-time ratios (Table 7). I should note, however, that there were no statistically significant differences between the efficiency (as defined here) of the materials used in this study. I have found no other quantitative analyses of program
efficiency in the literature, therefore I cannot say with any degree of certainty whether or not other researchers have produced more efficient instruction.

Table 7

Amount of Learning per Unit Time by Type of Instruction

<table>
<thead>
<tr>
<th>Type of Instruction</th>
<th>Mean Improvement</th>
<th>Mean Time</th>
<th>Learning/Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction-Response</td>
<td>32.30</td>
<td>21.09</td>
<td>1.53</td>
</tr>
<tr>
<td>Discrimination-Response</td>
<td>31.76</td>
<td>17.09</td>
<td>1.86</td>
</tr>
<tr>
<td>Highlighted-Words</td>
<td>22.39</td>
<td>11.91</td>
<td>1.88</td>
</tr>
<tr>
<td>Read-Only</td>
<td>19.29</td>
<td>12.30</td>
<td>1.57</td>
</tr>
</tbody>
</table>

Error Rate

The within-program error rate, of course, only pertains to the construction-response and discrimination-response materials. As I suggested earlier, it is reasonable to assume that students would prefer materials in which they produced a greater proportion of correct responses, thus contacting more reinforcers. I did not collect social validity data; however, anecdotally, a few subjects did report that they were "frustrated" by the construction-response materials. It will be important for future research to assess learner preferences.
Conclusions

The results of the current study support the contention of programmed-instruction designers that materials requiring overt responses will produce greater learning than materials not requiring overt responses (Mager, 1988; Markle, 1990; Skinner, 1954). However, such materials do require proportionately more time to complete; thus Skinner’s (1958) call to make education more efficient was not fully realized in this study.

Contrary to the assumptions of Markle (1990) and others (Englemann & Carnine, 1982; Mager, 1988), the form of the response during the program need not always be the same as that of the terminal objective. This study shows that, at least under the present conditions, both construction-response and discrimination-response materials can produce equal improvement on a construction-response test.

Finally, this study confirmed the findings of Schloss et al. (1985b) that overt responding can produce greater learning that highlighted words. However, it failed to replicate any benefit of highlighting over the learning produced by read-only materials without highlighting.
Appendix A

Questions and Answers
From the Pretest / Posttest
You are beginning the Pretest

This test has 60 questions and should take approximately 20 minutes to complete.

Press Enter:

__________________________________________________________

Please enter your first name here:

Please enter your last name here:

Thank You, <First Name>

Press Enter:

__________________________________________________________

During the test, there will be a blank embedded in a screen of test. When you come to the blank in your reading, carefully type your answer. After you have typed your response, press the 'ENTER' key to advance to the next screen. Because this is a test, you will not be told whether or not your answer was correct. However, you will be given a percent correct at the end.

Please enter the current clock time here:

Thank You

Press Enter:

__________________________________________________________

1. When a series of reinforcement contingencies are arranged such that a behavior is progressively strengthened while being paired with a variety of stimuli, the process is called _____ instruction.

Type your answer here:

(*PROGRAMMED*)
2. When two words or phrases occur together in a sentence, they are being ______.

Type your answer here:

(*CONTIGUOUSLY PAIRED*)

3. A component supplied within a screen presentation that increases the likelihood of a correct answer is called a(n) ______.

Type your answer here:

(*PROMPT*)

4. Automated programs that require _____ responses are, for the most part, preferable to those that require responses selected from several alternatives.

Type your answer here:

(*CONSTRUCTED*)

5. A screen presentation which presents a great deal of material yet requires little from the student is called a(n) ______ ______.

Type your answer here:

(*LECTURE FRAME*)

6. The evaluation diagram used in program construction is called a(n) ______ ______.

Type your answer here:

(*RULE MATRIX*)

7. Your looking into the refrigerator and saying "There is a head of lettuce" would be an example of a(n) ______ response.

Type your answer here:

(*TACT*)
8. When a student responds with a certain answer only to presentations which share a common property, we say a(n) _____ has been developed by the program.

Type your answer here:

(*DISCRIMINATION*)

9. A hint is a kind of prompt which causes a response that is not precisely the same as the prompt and is an example of a(n) _____ prompt.

Type your answer here:

(*THEMATIC*)

10. The weakening of a student's tendency to respond to successive presentations on a computer that results from incorrect responses is technically called _____.

Type your answer here:

(*EXTINCTION*)

11. The basic unit of information presentation in programmed instruction is called a(n) _____.

Type your answer here:

(*FRAME*)

12. Most terminal objectives of a program depend upon _____ concepts along the way which are the building blocks of a program's internal structure.

Type your answer here:

(*SUBORDINATE*)

13. A(n) _____ stimulus, or prompt, is added to raise the probability that a correct response will be made.

Type your answer here:

(*SUPPLEMENTAL*)
14. Both the answer and the _____ of the rule and examples within a frame should be
determined before a frame is composed.

Type your answer here:

(*ORDER*)

15. An answer and the _____ of the rule and examples within a frame should be
determined before a frame is composed.

Type your answer here:

(*ORDER*)

16. In many frames the general statement comes first and a(n) _____ comes second.

Type your answer here:

(*EXAMPLE*)

17. Good programmed instruction requires the student to make a(n) _____ response
to material that is presented.

Type your answer here:

(*OVERTLY*)

18. A response that precisely corresponds to a response just heard is called a(n) _____ response.

Type your answer here:

(*ECHOIC*)

19. Screen presentations involving _____ _____ questions tend to strengthen
mistakes.

Type your answer here:

(*MULTIPLE CHOICE*)
20. Another word for likelihood is _____.

Type your answer here:

(*PROBABILITY*) or (*LIKELIHOOD*)

21. A verbal response that describes an event or thing out in the environment is called a(n) _________.

Type your answer here:

(*TACT*)

22. Technically speaking, the term _____ refers to a class of responses, all of which successfully achieve reinforcement.

Type your answer here:

(*OPERANT*)

23. One measure of the quality of an instructional program is the _____ that the student will make an error at any given frame.

Type your answer here:

(*PROBABILITY*) or (*LIKELIHOOD*)

24. The rule-then-example frame format is deductive. It moves from the general to the _____.

Type your answer here:

(*SPECIFIC*)

25. The correct sequencing of _____ by the programmer will lead to the most efficient learning on the part of the student.

Type your answer here:

(*RULES*)
26. If you are asked to repeat what someone has just said and do so with an exact duplication it is called a(n) _____ response.

Type your answer here:

(*ECHOIC*)

27. A word or fragment which appears prior to a screen presentation, but not currently, that increases the tendency to give a correct answer is technically called a(n) _____.

Type your answer here:

(*PRIME*)

28. A(n) _____ _____ is a behavioral goal a program is constructed to achieve at its end.

Type your answer here:

(*TERMINAL OBJECTIVE*)

29. _____ is a technical term that means that a response is strengthened, i.e., its probability is increased.

Type your answer here:

(*REINFORCEMENT*)

30. The process called _____ is exemplified by giving the same response to slightly different stimuli.

Type your answer here:

(*GENERALIZATION*)
31. Most people would respond with the word "Blue" to complete the phrase, "Red, White and ..." This is because these words have been ________ in the past.

Type your answer here:

(*CONTINUOUSLY PAIRED*)

32. Effective instruction involves the consideration of three variables. The setting, the response, and the ________.

Type your answer here:

(*CONSEQUENCE*)

33. An added stimulus within a screen presentation that dictates the physical character of a response is called a(n) ________.

Type your answer here:

(*FORMAL PROMPT*)

34. ________ is a change in a person's tendency to do something that results from principles of conditioning.

Type your answer here:

(*LEARNING*)

35. When a student makes an error in programmed instruction, most likely, it is the fault of the ________.

Type your answer here:

(*PROGRAMMER*)

36. An occasion, some sort of response to it, and a strengthening consequence which then follows, are the basic components of what is called a(n) ________ of ________.

Type your answer here:

(*CONTINGENCY OF REINFORCEMENT*)
37. Skills are built cumulatively in a well designed program; the programmer, therefore, must outline the _______ _______ that lead up to the final skills at the end of the program.

Type your answer here:

(*SUBORDINATE OBJECTIVES*)

38. A good behavioral (terminal) objective specifies a(n) _______ of _______.

Type your answer here:

(*CONTINGENCY OF REINFORCEMENT*)

39. When a computer responds with the reaction "correct" or "incorrect" it _______ _______ a correct or incorrect response the student has just made.

Type your answer here:

(*DIFFERENTIALLY REINFORCER*)

40. _______ away supplementary stimulation too rapidly will increase a student's error rate in a program.

Type your answer here:

(*FADING*)

41. Objectives within a program are arranged in a(n) _______ sequence by the programmer while constructing its structure.

Type your answer here:

(*DEVELOPMENTAL*)
42. In one type of instructional program called a(n) ____ program, instructional frames are revised until student error rates are very low to reduce the negative effects of being wrong.

Type your answer here:

(*LINEAR*)

43. A programmer will seek the help of a(n) ____ immediately after constructing the first program presentation sequence.

Type your answer here:

(*EXPERT*) or (*SUBJECT-MATTER EXPERT*)

44. A verbal response made to another's prior verbal behavior having a different form is called a(n) ____.

Type your answer here:

(*INTRAVERBAL*)

45. A statement which describes or implies a condition, a response, and consequences in a general or comprehensive way is called a(n) ____.

Type your answer here:

(*RULE*)

46. The presentation on the computer screen may begin with a comprehensive leading statement and then move to a(n) ____.

Type your answer here:

(*EXAMPLE*)
47. During presentation of a program's developmental structure the author constructs a diagram to evaluate whether elements are ______.

Type your answer here:

(*RELATED*)

48. The evaluation diagram is used to determine the _____ of concepts within the finished program.

Type your answer here:

(*ORDER*)

49. The reference diagram used in composing program structure is also useful in determining where to place _____ frames.

Type your answer here:

(*REVIEW*)

50. _____ are placed along the vertical and horizontal axes of the matrix.

Type your answer here:

(*RULES*)

51. The slow reduction of components from one screen presentation to the next is called ______.

Type your answer here:

(*FADING*)

52. An answer to a question is an example of a(n) _____ response.

Type your answer here:

(*INTRAVERBAL*)
53. Primes and prompts are examples of ____ stimulation.

Type your answer here:

(*SUPPLEMENTARY*)

54. Instruction is most effective when a consequence immediately follows appropriate behavior. Technically, we way that reinforcement should be ____ on a response or answer.

Type your answer here:

(*CONTINGENT*)

55. A complete instructional program should contain frames that were deliberately constructed to ____ one concept to another.

Type your answer here:

(*RELATE*)

56. Learning that one was correct ____ the tendency to give the answer again in the future.

Type your answer here:

(*INCREASES*)

57. As a general rule, the answer blank should appear near the ____ of the frame because the student may not read beyond that point.

Type your answer here:

(*END*)

58. The strength of answers a student can give at the beginning of a program was established by his or her ____ of conditioning.

Type your answer here:

(*HISTORY*)
59. The end-products of a program are called it's _____ _____.

Type your answer here:

(*TERMINAL OBJECTIVE*)

60. An instructional program is not technically teaching if we observe no ____ in behavior.

Type your answer here:

(*CHANGE*)

You have reached the end of the pretest. You may take a short break at this time, if you so desire. Type "1" and press "Enter" at the a:-> when you are ready to begin the instructional program.

Please enter the current clock time here:

Thank You

Press Enter:
Appendix B

Frame Text and Correct Answers From the Construction-Response Program

50
This program is based on
Preparing Automated Instruction
by Kale M. Kritch and Darrel E. Bostow

You are beginning Part 1
This section has 48 frames and should take approximately 20 minutes to complete.

Press Enter:
______________________________________________________________________________

Please enter your first name here:
Please enter your last name here:

Thank you, <First Name>

Press Enter:
______________________________________________________________________________

The instructional program you are beginning will teach you about the principles of learning and instructional design. It is very important that you follow the directions, because they will tell you how to work through the program. It is also important that you read all the material that appears on each computer screen very carefully, because you will receive a test following the program.

Press Enter:
______________________________________________________________________________

In Part 1 of this instructional program there will be a blank embedded in a screen of information. When you come to the blank in your reading, carefully type your answer. Be careful in spelling, because the computer occasionally has problems with misspelled words. After you have typed your response, press the 'ENTER' key to advance to the next screen.

Please enter the current clock time here:

Thank You

Press Enter:
______________________________________________________________________________
61. A dictionary defines a frame as 'an open border or case for enclosing a picture...' or '... a structure for admitting or enclosing something such as a window, for example.' At this moment you are looking into a computer monitor screen which is a kind of picture or window frame. The words you are reading are surrounded by an outline we call a _______.

Type your answer here:

The answer was FRAME

62. A dictionary defines the word page as 'one side of a leaf of something printed or written, as a book.' In computer or 'automated' instruction, material is presented in successive frames similar to the pages of a book, but when working with a computer, there is technically no 'leaf' or page that is read or turned, and the term _______ is, therefore, more appropriate than the term 'page' when describing successive presentations of material.

Type your answer here:

The answer was FRAME

63. A frame is the basic building block or teaching unit in programmed instruction. In a well-constructed program, each frame strengthens behavior the student will be able to emit at the _______ of the Program.

Type your answer here:

The answer was END

64. Learning is acquiring new behavior and involves principles of conditioning. It is concerned with what people do. A hungry baby learns to open his or her mouth in response to approaching food. We say _______ has taken place when food in the mouth strengthens or increases the probability of mouth-opening behavior.

Type your answer here:

The answer was LEARNING
65. Learning can be defined as a change in the probability or tendency for a person to do something. However, we can be absolutely sure a change has happened only when we actually observe the new behavior. If we want to verify that a person knows how to do something we need to arrange the right conditions and watch him or her actually _____ or perhaps say the response (behavior).

Type your answer here:

The answer was DO

66. _____ is the change in a person's tendency to do something that results from principles of conditioning.

Type your answer here:

The answer was LEARNING

67. Knowledge can be defined as 'potential behavior.' A person doesn't need to be currently engaging in some behavior for us to correctly say that he or she knows how to do that behavior or response. We confirm or verify that a person knows how to do the behavior when we actually _____ the person do the behavior.

Type your answer here:

The answer was OBSERVE or SEE

68. When we teach a person to do or say something we can be sure he knows how to do or say it only if we _____ him do or say it.

Type your answer here:

The answer was SEE or OBSERVE

69. Teaching is the arrangement of conditions that expedite learning; it is changing behavior through the use of conditioning principles. Teaching involves the setting in which something is done, the response, and consequences that happen when the student is correct. Effective teaching involves how many factors? (spell out your answer)

Type your answer here:

The answer was THREE
70. If we define 'teaching' as the arrangement of conditions that result in strengthening of behavior, teaching has not happened if we observe no _____ in behavior.

Type your answer here:

The answer was CHANGE

71. Merely presenting information or going through certain motions is not enough. A teacher or instructional program is not technically _____ if the student doesn't learn.

Type your answer here:

The answer was TEACHING

72. Effective instruction involves the consideration of three variables. The setting, the _____, and the consequences.

Type your answer here:

The answer was RESPONSE

73. Conditioning is the strengthening of a particular behavior resulting from reinforcement. In 'operant conditioning' a kind of response becomes more likely in a particular situation when it is 'reinforced.' Reinforcement is a technical term that means a response is strengthened, i.e., its probability is increased. When a teacher says 'correct' to an answer that is given, that kind of answer is usually strengthened. We call the teacher's response a _____ for the student's answer.

Type your answer here:

The answer was REINFORCER
74. Instruction (i.e., operant conditioning) is most effective when reinforcement immediately follows appropriate behavior. Technically, we say that reinforcement should be contingent on a response or answer. Since the letter grade at the end of a course occurs after the passage of considerable time, a grade is not typically immediately ____ on appropriate studying and probably doesn't reinforce much studying.

Type your answer here:

The answer was CONTINGENT

75. Because the consequences for studying in the normal classroom situation are usually delayed, little ____ of behavior normally occurs.

Type your answer here:

The answer was REINFORCEMENT

76. Teaching machines have a distinct advantage over the normal situation with a teacher and a class of students. With a teaching machine, such as a computer, the student can respond frequently and, if the program is carefully designed, his or her answer will be immediately reinforced and therefore ____.

Type your answer here:

The answer was STRENGTHENED

77. Automated instruction can produce faster and more thorough learning, because it can more precisely arrange what is called a reinforcement contingency (or contingency of reinforcement). It incorporates all three terms -- the environmental situation (the computer screen and program), the behavior (the correct answer), and the consequence (usually getting it right). It can arrange the setting in which the answer is to occur, evaluate the appropriateness of the answer given, and immediately ____ the student's response.

Type your answer here:

The answer was REINFORCE
78. Automated or computer-based instruction, when correctly designed, can teach more effectively than a classroom teacher because it can deliver _____ more frequently and precisely.

Type your answer here:

The answer was REINFORCEMENT

79. In classes with many students and only one teacher there is little opportunity for personal interaction; the student must remain passive most of the time. With automated instruction the student can respond frequently. Finding out that he or she is correct (i.e., being successful), is a _____ for nearly all people; it strengthens that kind of answer as well as his or her tendency to continue trying.

Type your answer here:

The answer was REINFORCER

80. Every instructional situation or episode involves a setting, a response, and a consequence. Therefore, technically speaking, every instructional situation involves a _____ of reinforcement.

Type your answer here:

The answer was CONTINGENCY

81. The technical phrase 'contiguous pairing' means that things come together at the same time. 'Contiguous' is close to meaning 'simultaneous.' Hearing a dinner bell immediately followed by the presence of dinner is an example of _____ pairing.

Type your answer here:

The answer was CONTIGUOUS

82. When a teacher points to a microscope and says 'this is a microscope' he or she is _____ pairing two stimuli, the object and the verbal stimulus 'microscope.'

Type your answer here:

The answer was CONTIGUOUSLY
The teacher might then prompt the student with the direction 'Say microscope' (as the student looks at the object). When in the presence of the microscope, the student's response 'microscope' receives teacher approval, a contingency of reinforcement has been arranged. The student's response ('microscope') is strengthened (or, technically, ____ ) by the teacher's reaction.

Type your answer here:

The answer was REINFORCED

The teacher has brought together an object and a verbal response and has supplied approval. The teacher has therefore arranged all three terms we call a ____.

Type your answer here:

The answer was CONTINGENCY

The object (the microscope) and the verbal stimulus 'microscope' were contiguously ____.

Type your answer here:

The answer was PAIRED

Sometimes the instructional goal is to 'pin down' one specific verbal response to one particular stimulus. For example, 'Mrs. Brown' is the name a student is to call his teacher. She responds to the student only when the student says 'Mrs. Brown' in addressing her. When a response is reinforced only in the presence of one stimulus and not in the presence of any other stimuli, it will eventually be emitted only in the presence of that particular ____.

Type your answer here:

The answer was STIMULUS
87. Mrs. Brown gives her attention 'differentially.' She differentially reinforces the student's behavior depending on the name he uses. If she doesn't pay attention when the student uses other names the tendency to say those names declines (or technically, extinguishes). The process of differential reinforcement involves extinguishing some responses while _____ one specific response.

Type your answer here:

The answer was REINFORCING

88. Mrs. Brown doesn't respond if the student addresses her as 'Mrs. Smith,' but does respond when he addresses her as 'Mrs. Brown.' This is an example of _____ reinforcement.

Type your answer here:

The answer was DIFFERENTIAL

89. Differential reinforcement increases the tendency to emit a response in the presence of a restricted set of stimuli. When this happens, the process is technically called 'discrimination.' If a child calls all teachers 'Mrs. Brown,' discrimination (has/has not) _____ occurred.

Type your answer here:

The answer was HAS NOT

90. The process during which strengthening consequences are delivered for correctly responding only in the presence of one stimulus and not responding that way in the presence of other stimuli is technically called _____ _____.

Type your answer here:

The answer was DIFFERENTIAL REINFORCEMENT

91. A high rate of response in the presence of one stimulus and low rates in the presence of other stimuli is evidence of the process called _____.

Type your answer here:

The answer was DISCRIMINATION
92. The stimulus, e.g. Mrs. Brown, is called a discriminative stimulus. In her presence, a student's verbal response 'Mrs. Brown' is likely to be reinforced by her attention. But in the presence of Mr. Sims, the response 'Mrs. Brown' is not likely to be reinforced. Mr. Sims is a stimulus in the presence of which extinction (for saying 'Mrs. Brown') is in effect. The sight of Mr. Sims is technically an S-delta for saying 'Mrs. Brown' because it is associated with _____ (i.e., non-reinforcement).

Type your answer here:

The answer was EXTINCTION

93. Instruction involves the arrangement of what is called a _____ of _____. (Provide the complete answer, including 'of'.)

Type your answer here:

The answer was CONTINGENCY OF REINFORCEMENT

94. A _____ stimulus is one in the presence of which a specific response is likely to be reinforced.

Type your answer here:

The answer was DISCRIMINATIVE

95. Much of our experience in life is haphazard. We learn that doing something 'works' in some situations and not in others. We slowly adapt in that we learn when to do something and when not to do it. Technically speaking, our behavior is strengthened and weakened by experience with different _____ contingencies.

Type your answer here:

The answer was REINFORCEMENT
96. But haphazard experiences yield many more responses that go unreinforced. Learning occurs more slowly this way. Errors reduce our enthusiasm. Learning is faster and motivation is greater when one's responding gets frequently reinforced. When a series of reinforcement contingencies are arranged such that a behavior is progressively strengthened while a variety of stimuli are being contiguously paired, the process is called 'programmed' instruction. If instruction is well-programmed, the student almost never makes a(n) _____.

Type your answer here:

The answer was ERROR

97. Programmed instruction produces progressive strengthening. Given that a student remains most motivated when he or she is usually responding correctly, a program should first require answers that are _____ rather than difficult.

Type your answer here:

The answer was EASY

98. A well-designed instructional program converts stimuli which do not effectively evoke specific responses to stimuli that subsequently do. After arranging a series of instructional contingencies, a microscope becomes a _____ stimulus for saying 'microscope.'

Type your answer here:

The answer was DISCRIMINATIVE

99. In teaching a student a concept, a program first induces discrimination between clearly different 'examples' and 'non-examples.' Obvious examples are to become the discriminative stimuli and obvious non-examples are chosen to reduce the tendency to give that answer. In programmed instruction, supplementary stimulation refers to an added stimulus or prompt that increases the probability of a correct response. The 'p' and the 't' in the following blank are instances of the concept called a p_____t.

Type your answer here:

The answer was PROMPT
A _____ stimulus, or prompt, is added to raise the probability that a correct response will be given to a correct example.

The answer was SUPPLEMENTARY

Prompting is a way of keeping motivation higher because it increases the likelihood that the student will give _____ answers.

The answer was CORRECT

However, in good programmed instruction, supplementary stimulation is progressively 'faded' out of successive frames. The objective is to get the student to respond correctly to a stimulus situation without added stimuli. Eventually, a _____ will be unnecessary.

The answer was PROMPT

In the preceding series of frames the 'p' and the 't' were initially present in frames where you were to give 'prompt' as an answer. This supplementary stimulation was _____ out of the subsequent frames.

The answer was FADED

Later in this program different kinds of prompts will be discussed (i.e., formal, and thematic prompts). Initially, you will be discriminating between clear examples and non-examples of prompts. But later you will be induced to generalize within the class of stimuli called prompts. The program's objective is to get you to recognize that certain kinds of stimuli are all examples of prompts. The process called generalization is exemplified by giving (the same/different) _____ response(s) to slightly different stimuli.

The answer was THE SAME
105. A concept is a class of stimuli that have a common property or set of
group of properties. Concept formation is the process of inducing a student to _____ within
a class of stimuli (examples) and to discriminate between examples and non-
examples.

Type your answer here:

The answer was GENERALIZE

106. The programmer strives to achieve generalization of a response such as saying
the word 'contingency.' To do so, he or she constructs a program that presents a
variety of frames all calling for the same _____.

Type your answer here:

The answer was RESPONSE

107. A frame is a context. It is an environment; a set of circumstances. It is a
background against which a student is to emit a response. The answer to the frame
is the missing element. A program can systematically change the 'background'
while repeatedly asking for and strengthening the same response. In doing so it is
inducing what is technically called _____ of the response.

Type your answer here:

The answer was GENERALIZATION

108. A good frame cannot be constructed without first identifying the answer that
is to be given by the student. Giving the answer is a small part of engaging in the
performance appropriate to the terminal contingencies of the program. In most
cases the student will not be learning new words, but will instead be learning to
say the words in sentences that are new to him or her. In most cases he or she will
be using old words in ____ ways.

Type your answer here:

The answer was NEW
You have reached the end of part 1 of this instructional program.

Please enter the current clock time here:

Thank You

Press Enter:

This would be a good opportunity to take a short break if you care to do so. Enter 2 at the a:> prompt to begin Part 2.

Press Enter:
This program is based on
Preparing Automated Instruction
by Kale M. Kritch and Darrel E. Bostow

You are now beginning Part 2
This section has 48 frames and should take approximately 20 minutes to complete.

Press Enter:

__________________________________________

Please enter your first name here:

Please enter your last name here:

Thank you, <First Name>

Press Enter:

____________________________________________________________________

In Part 2 of this instructional program there will be a blank embedded in a screen of information. When you come to the blank in your reading, carefully type your answer. Be careful in spelling, because the computer occasionally has problems with misspelled words. After you have typed your response, press the 'ENTER' key to advance to the next screen.

Please enter the current clock time here:

Thank You

Press Enter:
1. In a very large room or in a mountain canyon you can shout and then hear an _____ come back to you. Teaching involves getting the student to respond the same way the teacher (or programmer) responds. This process involves duplication or imitation.

Type your answer here:

The answer was ECHO

2. 'Echoic' behavior is an exact duplication of the verbal behavior of someone else. When a parent points to a bird and says 'say bird' to a child and the child subsequently says 'bird,' this is an example of an _____ response.

Type your answer here:

The answer was ECHOIC

3. We are often asked to repeat what someone else has said. If it is an exact duplication, it is an example of an _____ response.

Type your answer here:

The answer was ECHOIC

4. A good speaker (teacher) prepares a listener to say the same thing by 'working up to it.' The speaker uses 'familiar' words and examples and repeats 'points' in several different ways. In doing so the speaker strengthens the listener's tendency to _____ the same thing.

Type your answer here:

The answer was SAY

5. One way of describing verbal instruction is that it is the progressive _____ of the student's echoic or 'duplic' behavior.

Type your answer here:

The answer was STRENGTHENING
6. A series of frames progressively strengthens ____ or 'duplic' behavior.

Type your answer here:

The answer was ECHOIC

7. Many people actually 'hear' themselves saying the words as they read them. When we 'read' words we respond at a private (covert) level. In other words, we also respond sub-______.

Type your answer here:

The answer was SUB-VOCALLY

8. We respond ____ to words with which we are 'familiar' and weakly to words that are not well-conditioned stimuli.

Type your answer here:

The answer was STRONGLY

9. One important goal in programmed instruction is to strengthen the student's echoic or duplic behavior because this sets the stage for responding correctly when no echoic or textual stimulus is currently _____.

Type your answer here:

The answer was PRESENT

10. But previously reinforced sub-vocal responding may generate a powerful tendency to say something at the point the blank occurs. When one responds with a word for which there is no textual or echoic stimulus, this kind of behavior is called intraverbal. Intraverbal responses (do/do not) ____ have a currently present stimulus they duplicate like a duplic response.

Type your answer here:

The answer was DO NOT
11. Intraverbal behavior is more difficult to establish because it is not simply duplicating a stimulus. When one is asked 'What is two plus two?' the appropriate response is not the echoic response of saying 'What is two plus two?' but is, instead, saying 'four.' Saying 'four' is not an echoic or duplic response, but is a(n) _____ response.

Type your answer here:

The answer was INTRAVERBAL

12. Getting a child to count 'by ones' involves strengthening his or her tendency to say 'three' after saying 'one, two, ...'. Since the verbal response 'three' is different from the verbal stimulus 'one, two, ...' it is not a duplic response, but a(n) _____ response.

Type your answer here:

The answer was INTRAVERBAL

13. Giving the response 'Paris' to the question 'What city is the capital of France?' is an example of _____ behavior. It has a different form than the question.

Type your answer here:

The answer was INTRAVERBAL

14. The frame you are reading at this moment is a series of verbal stimuli. Because you are not duplicating a response when you supply an answer, the answer is an example of a(n) _____ response.

Type your answer here:

The answer was INTRAVERBAL

15. Contiguously pairing the stimulus 'one, two, ...' with the response 'three' is the procedure used to teach a child to count. The parent or teacher first has the child emit _____ behavior which copies the stimuli in a chain of responses.

Type your answer here:

The answer was ECHOIC or DUPLIC
16. A fundamental objective of all well-programmed instruction is to slowly reduce the contribution of auditory or textual stimuli, thereby converting what was once duplic behavior into primarily _____ behavior.

Type your answer here:

The answer was INTRAVERBAL

17. Saying 'one, two, ...' to the child is the appropriate stimulus, but the child must overtly _____ with 'three' and earn some sort of reinforcement if much strengthening is to occur.

Type your answer here:

The answer was RESPOND

18. Programmed instruction can produce faster and more thorough learning than conventional classroom situations because in the standard classroom situations the typical student is not induced to _____ frequently.

Type your answer here:

The answer was RESPOND

19. A 'fact' is a statement about the world. In a standard testing situation a student is asked to write or state a fact in response to a question. Because the question has a different physical (topographical) form than the response it evokes, the student's answer is an example of a(n) _____ response.

Type your answer here:

The answer was INTRAVERBAL

20. Appropriately or not, much of current instruction involves the establishment of student intraverbal behavior. The student learns to give facts about science, music, mathematics, geography, history, etc. The student does not give these facts in direct response to the world of 'things,' but in response to classroom or test _____.

Type your answer here:

The answer was QUESTIONS
21. An answer to a question is an example of a(n) ____ response.

Type your answer here:

The answer was INTRAVERBAL

22. Another important kind of verbal behavior is the 'tact.' A tact is a verbal response that makes contact directly with the world of things or events. When a student is asked to name an object, the object is the important source of stimulation. When a student names an object his response is not intraverbal, but is a(n) ____.

Type your answer here:

The answer was TACT

23. If you learn from someone else that there is an apple in the refrigerator and then tell another person 'there is an apple in the refrigerator,' your behavior is intraverbal. The 'source of information' was someone else's verbal behavior. However, if you had opened the refrigerator and directly observed an apple, saying 'there is an apple in the refrigerator' would be an example of a(n) ____ response, because it was a response to the apple as a stimulus.

Type your answer here:

The answer was TACT

24. Roughly speaking, intraverbal behavior is acquired from experience with other 'words,' while tact behavior arises from direct experience with the ____.

Type your answer here:

The answer was WORLD

25. So-called 'book learning' is largely ____ behavior, while naming and describing events and processes when actually observing them is 'tact' behavior.

Type your answer here:

The answer was INTRAVERBAL
26. A child may learn to say 'three' after hearing the question 'What number comes after two?' But when shown three objects and asked 'How many are there?' he or she may not say 'three.' This suggests that a response acquired as a(n) _____ cannot automatically 'be used' as a tact.

Type your answer here:

The answer was INTRAVERBAL

27. Good instruction, whether taught by a teacher or a teaching machine, must arrange a variety of conditions that give rise to what the student learns. These 'conditions' are the different kinds of stimuli that evoke behavior. Teaching 'about' the world is not enough. 'Head knowledge' must eventually be applied directly to the world. Intraverbal responses must be readily convertible into _____ responses and other kinds of practical behavior.

Type your answer here:

The answer was TACT

28. An important goal of instruction is to get the student to do or say some specific response, for example, to vocalize the word 'pencil.' When the child imitates or copies your prompt 'pencil,' his response is correctly called an imitative or _____ response.

Type your answer here:

The answer was ECHOIC

29. You could teach a child to say that he or she should remember to bring a pencil to school with him each day. In doing so, you would repeatedly ask the question 'What should you bring to school each day?' while strengthening his response 'pencil,' perhaps in the early stages with an added prompt. But the child could learn to correctly say he or she 'should bring a pencil' without 'knowing what a pencil is.' In other words, upon being shown a pencil, the child might not correctly identify it or label it with the response 'pencil.' More precisely, we would say the child could emit the response 'pencil' as an intraverbal, but not as a _____.

Type your answer here:

The answer was TACT
30. This program presents various arrangements of word patterns. It is building or strengthening new functional relationships in your verbal behavior. It both establishes and strengthens these responses in relation to the various word patterns. To most frames, your response is a(n) _____.

Type your answer here:

The answer was INTRAVERBAL

31. A good teacher or program relates many stimuli with a response and many responses with a stimulus. To guarantee adequate strengthening, the teacher or program will require the student to _____ emit the answer.

Type your answer here:

The answer was OVERTLY

32. When a student embarks upon a program, he or she is incapable of emitting the terminal behavior under the specified conditions. We say the terminal responses have a very _____ probability of occurrence.

Type your answer here:

The answer was LOW

33. A good program begins where the student is; it makes use of already established behavior. The student should readily respond to the first frames and questions. If the student is to be successful, or in other words, if he or she is to find the program to be reinforcing, terminal responses or answers (should/should not) be required at the beginning of the program.

Type your answer here:

The answer was SHOULD NOT

34. In progressively moving toward terminal behavior a good program begins by asking for answers already having a high _____ of occurrence.

Type your answer here:

The answer was PROBABILITY
35. An 'operant' is a class of responses which all successfully achieve some sort of reinforcement. To get another person's attention you can make a loud noise, clear your throat, call him by his name, or use the vulgar 'hey.' All of your responses can be classified together because they have the common property of getting the person's attention. Responses which have a common property belong to the same ______.

Type your answer here:

The answer was CLASS

36. The term 'operant' was created to automatically suggest that the behavior 'operates' on the environment to produce reinforcement. It is sometimes used imprecisely to identify a specific response. Technically speaking, the term 'operant' refers to a ______ of responses all of which successfully achieve reinforcement.

Type your answer here:

The answer was CLASS

37. Answers a teacher or programmer does not expect are called 'incorrect' or 'errors.' But when a student emits a so-called wrong answer or an error, this is still a ______ probability response for him or her.

Type your answer here:

The answer was HIGH

38. The probability of a student's response is determined by his or her history of conditioning as well as the immediate frame material. A programmer can firmly establish a history of conditioning by carefully arranging a series of frames with appropriate material and responses. The programmer can also carefully select the material he or she places in the current frame. Therefore, most so-called wrong answers are largely the responsibility of the ______ and are not the 'fault' of the student.

Type your answer here:

The answer was PROGRAMMER
39. An error is a programmer's evaluation of a response, it is not an inherent characteristic of behavior. An error is the result of the nature of a given frame of material and the student's _____ of conditioning.

Type your answer here:

The answer was HISTORY

40. One measure of the quality of an instructional program is the likelihood, or technically speaking, the _____ the student will make an error at any given frame.

Type your answer here:

The answer was PROBABILITY

41. Years ago a controversy existed between advocates of 'linear' programming and 'branching' programming. A branching program treated errors as natural, something a student was expected to do while he or she learned. On the other hand, creators of linear programs revised them until the error rates were very low. If errors are a product of a person's instructional history and the current situation combined, they are defects that are the responsibility of the teacher or _____, not the student.

Type your answer here:

The answer was PROGRAMMER

42. Making an error is aversive or mildly punishing to most of us. A branching program not only allows but expects errors, automatically introducing a negative factor, because the student will often be _____.

Type your answer here:

The answer was WRONG or INCORRECT

43. While research has yet to present a clear picture, we should expect that a student would find working on a well-refined linear program to be (more/less) _____ reinforcing than working on a branching program.

Type your answer here:

The answer was MORE
44. If you were to teach someone how to do a fine technical skill, you would not first demonstrate how not to do it, because his tendency to do it the wrong way might increase as a result of seeing it done that way first.

Type your answer here:

The answer was INCREASE

45. Branching programs frequently employ multiple-choice 'foils.' If the student selects the correct answer, he or she moves ahead in the program. If the student selects a 'foil,' the program branches to remedial frames and then back to the main program frame series. A good 'foil' is one that is very plausible, yet wrong, and therefore tests a fine discrimination. But during the early stages of instruction, the student may respond weakly to the correct answer, and seeing plausible foils could increase the tendency to emit the wrong answers.

Type your answer here:

The answer was INCREASE

46. There are occasions where multiple choices are appropriate in a linear program, perhaps to verify already learned responses or for review. But generally, multiple choices should not be used in 'instructional' frames, because they strengthen answers.

Type your answer here:

The answer was WRONG

47. Selecting an alternative from an array of choices is a different kind of response than 'constructing' the response on one's own. A weak response can be more easily emitted if it is 'cued' by a stimulus. A correct response listed as an alternative is a powerful cue. A student who is only weakly inclined to emit the correct response can more easily do so if the correct response is already there to choose from. We could, therefore, assume a higher probability of responding is indicated by a correctly constructed answer than by a correctly selected answer.

Type your answer here:

The answer was CONSTRUCTED
48. Multiple-choice frames would appear to be a good way to introduce a new response in the early stages of instruction, because reading the correct alternative would help the student emit the response for the first time. However, the pairing that results from the remaining foils would ___ incorrect responses.

Type your answer here:

The answer was STRENGTHEN

You have reached the end of part 2 of this instructional program.

Please enter the current clock time here:

Thank You

Press Enter:

This would be a good opportunity to take a short break if you care to do so. Enter 3 at the a:> prompt to begin Part 3.

Press Enter:
This program is based on
Preparing Automated Instruction
by Kale M. Kritch and Darrel E. Bostow

You are beginning Part 3
This section has 40 frames and should take
approximately 20 minutes to complete.

Press Enter:

Please enter your first name here:

Please enter your last name here:

Thank you, <First Name>

Press Enter:

In Part 3 of this instructional program there will be a blank embedded in a screen of
information. When you come to the blank in your reading, carefully type your
answer. Be careful in spelling, because the computer occasionally has problems with
misspelled words. After you have typed your response, press the 'ENTER' key to
advance to the next screen.

Please enter the current clock time here:

Thank You

Press Enter:
1. Instruction changes the likelihood of many student responses. At the beginning of instruction the student may not be able to emit the response(s) or be only weakly inclined to do so in the correct circumstances. A good instructional program first introduces behavior to be learned with powerful prompts, so powerful that the student's answer is nearly always ______.

Type your answer here:

The answer was CORRECT or RIGHT

2. Prompts are withdrawn in successive frames while the context is varied. The correct response is progressively relieved of artificial support in a manner similar to the raising of 'training wheels' on a bicycle. As different words and contexts occur together with the student's correct response, the 'connection' between these various words is strengthened. We call this process c____ __g. (two words)

Type your answer here:

The answer was CONTIGUOUS PAIRING

3. A very subtle and important kind of 'supplementary stimulation' is called priming. A pump is 'primed' by adding water within the chamber to get the movement of fluid started. In programmed instruction, priming is the introduction of words in frames ahead of the frames in which the words are to be given. If you had seen the name of an old acquaintance just before the opportunity to greet the person with his name you would be (more/less) ______ likely to do so correctly.

Type your answer here:

The answer was MORE

4. A supplementary stimulus employed in a previous frame, but not in the current frame is called a p____.

Type your answer here:

The answer was PRIME
5. The new concept presented to you just a moment ago is an example of a _____ for the correct response to this blank.

Type your answer here:

The answer was PRIME

6. A prime and a prompt are two different concepts. A prime is a stimulus that was presented, but is then absent in the current frame. On the other hand, a prompt is a stimulus that is _____ in the current frame material.

Type your answer here:

The answer was PRESENT

7. In this frame, the word prompt is itself a _____ for the answer, because it is present in this frame.

Type your answer here:

The answer was PROMPT

8. The words that appeared in the previous frame had a strengthening effect on your verbal tendencies. Their effects are quickly fading, but they help you to now say that they were a _____ and not a prompt for the answer to this frame.

Type your answer here:

The answer was PRIME

9. One of the most obvious kinds of prompts is called a formal prompt. The element 'form' in formal is important, because the form of the stimulus corresponds to the form of the response. For the blank in this sentence, the word 'formal' is itself a _____ prompt.

Type your answer here:

The answer was FORMAL
10. The 'f' in the following blank is an example of a __ prompt, because it is an approximation of the answer.

Type your answer here:

The answer was FORMAL

11. Both a 'p' as a textual prompt and hearing the voiced 'p' said by someone else are examples of __ prompts, because their physical characteristics are very similar to the response they are to evoke.

Type your answer here:

The answer was FORMAL

12. A prompted response draws its strength from two sources, the student's history of conditioning and the supplementary stimulation of the current prompt. Describing a stimulus as a prompt is correct only if there is already some, at least minimal, __ to say the word.

Type your answer here:

The answer was TENDENCY

13. A thematic prompt is yet another supplemental source of strength, but in the form of a tact or intraverbal response. It is better known as a 'hint.' In a manner similar to the composition of music, a writer can bring in a familiar 'theme.' If a teacher wanted a student to name a color and said 'Red, white, and ...' he would be giving an intraverbal as a stimulus. Most people in the United States would respond with 'blue' because they have experienced extensive __ __ with respect to the words 'red,' 'white' and 'blue.'

Type your answer here:

The answer was CONTIGUOUS PAIRING
14. Stimuli are 'thematically' related because they have a common property or feature. The separate responses 'red,' 'white,' and 'blue' are not formally related; their forms are different. Instead, a person's conditioning history connects words together thematically. We tend to hear certain words together. Later, when one word occurs to us, the others also tend to occur, due to this contiguous pairing in our conditioning history. When one word is said to be a 'synonym' for another, such a word could be used as a _____ prompt.

Type your answer here:

The answer was THEMATIC

15. F____ away supplementary stimulation too rapidly will increase a student's error rate in a program.

Type your answer here:

The answer was FADING

16. The objective of instruction is to get the student to respond with minimal cues, to respond appropriately without help. Help is to be completely terminated. To vanish supplementary stimulation is to _____ it out completely.

Type your answer here:

The answer was FADE

17. You have been introduced to a number of fundamental concepts of programmed instruction. The actual authoring or formation of instructional frames is a complex task. Good programming controls many variables simultaneously. The programmer must understand concepts and employ conditioning principles in a carefully orchestrated manner. Each of the concepts you have learned will help you to create the kind of sequential reinforcement contingencies we call _____ instruction.

Type your answer here:

The answer was PROGRAMMED
18. Most complex tasks you wish to do efficiently require planning ahead. If you were going to paint something, it would probably be wasteful to begin by opening the can of paint first. You would save time, perhaps money, and energy if you determined what your product should look like at the _____ of your work.

Type your answer here:

The answer was END

19. Planning activity, however, delays the physical work that achieves clearly visible signs of progress. Many people skip the early steps of planning because they are not aware of important variables to be considered and because they have not experienced the positive r_____ that comes from careful planning.

Type your answer here:

The answer was REINFORCEMENT

20. Several decades ago, programmed instruction was a much-discussed concept in education. Many would-be programmers hastily constructed programs of frames. They often simply sat down and began to construct frames without the necessary planning. They also didn't know the important conditioning p_____s that must be considered.

Type your answer here:

The answer was PRINCIPLES

21. In taking a driving trip, the selection of roads can be done most effectively if you decide where you are going at the start. The set of behaviors a student can do at the end of a program are the program's results, or technically, its 'terminal objectives.' When the terminal objectives are identified _____, they can be used to determine the character of the program as it is being constructed.

Type your answer here:

The answer was FIRST
22. You don't teach something to someone that the person already knows. The terminal objectives in your program are, therefore, going to be (strong/weak) ______ behaviors in your student's repertoire at the beginning of the program, if they exist at all.

Type your answer here:

The answer was WEAK

23. But to build the strength of weak or currently nonexistent terminal skills, you will need to build a 'bridge' of intermediate contingencies or frames. The nature of these frames will be heavily influenced by the _____ objectives you define as you begin.

Type your answer here:

The answer was TERMINAL

24. Terminal objectives are more helpful when they refer to behavior that is objectively measurable. For example, one objective of the present program is to get you to construct good instructional frames. But the adjective 'good' isn't helpful until 'good' is itself defined with dimensions that can be measured. A better way of stating the objective would include a measurable change in some b_____r.

Type your answer here:

The answer was BEHAVIOR

25. A terminal, or better, behavioral objective is more useful in creating an instructional program when it includes all three terms in what we call a contingency of reinforcement. A contingency includes the setting, the behavior, and the behavior-reinforcer connection. In responding to a frame of material, the frame itself is the setting, the appropriate answer is the behavior and passing on to the next frame when correct is the _____.

Type your answer here:

The answer was REINFORCER
26. (1) the conditions that are to evoke the behavior (i.e., the occasion)
(2) the behavior (precisely stated in measurable dimensions)
(3) the dimensions of the behavior necessary for reinforcement (the criterion).

The three factors above are components of a good _____ objective for an instructional program.

Type your answer here:

The answer was TERMINAL or BEHAVIORAL

27. A good behavioral objective is the specification of a c____ of r____.

Type your answer here:

The answer was CONTINGENCY OF REINFORCEMENT

28. A well-constructed instructional program teaches a student how to do or say something. It establishes and strengthens specific responses while slowly withdrawing help. But a good program teaches more than the specific answers to its frames. It establishes a tendency to engage in similar behavior elsewhere. After all, one objective of education is to prepare the person for life after instruction, i.e., the 'real' _____.

Type your answer here:

The answer was WORLD

29. The terminal objectives of a program should, therefore, describe situations to which behavior should generalize. This is difficult because behavior generalizes to new situations in relation to their similarity to the original conditions of instruction. A programmer can increase generalization by making the program as ____ to the real world as possible.

Type your answer here:

The answer was SIMILAR
30. Acquiring verbal behavior about a 'medium' isn't necessarily the same as acquiring physical interactive skills. The old saying 'talk is cheap' suggests that it is easy to _____ something, but more difficult to do it.

Type your answer here:

The answer was SAY

31. Even though the relationship is far from perfect, first teaching someone to engage in verbal behavior (perhaps the description of appropriate behavior and the reasons for it) will probably increase the likelihood he or she will actually _____ the behavior later.

Type your answer here:

The answer was DO

32. Terminal objectives give a program focus. They influence the nature and order of sub-objectives in the program. Most terminal behaviors of a program depend upon subordinate concepts along the way. These _____ concepts are the 'building blocks' of the program's internal structure.

Type your answer here:

The answer was SUBORDINATE

33. Programming instructional material is a technical skill which uses principles of conditioning arising from laboratory research. While a programmer may understand and be able to apply these learning principles, he or she may lack knowledge in a specific field. A good program cannot be composed alone by a programmer who is a newcomer to a field because he lacks a thorough knowledge of the s_____ concepts that lead to terminal objectives.

Type your answer here:

The answer was SUBORDINATE
34. Good programmed instruction requires knowledge about learning. A subject matter expert may not necessarily compose a good program, because he or she may not know how to apply the important conditioning principles involved in effective instructional frames.

Type your answer here:

The answer was PRINCIPLES

35. A subordinate behavioral objective specifies behavior that is a necessary component of terminal behavior. Were you to teach a person to change a tire, you would not teach him or her to begin in a random fashion. For example, you wouldn't teach how to tighten the lug-nuts first. You would probably teach placement of the car on even terrain and away from traffic. Safety and car position would be subordinate objectives which lead to effective tire changing as a completed terminal performance.

Type your answer here:

The answer was SUBORDINATE

36. Any terminal performance, whether verbal or non-verbal, that interacts with some medium is usually complicated enough to require subordinate objectives. In many, if not most, cases the sequencing of these subordinate objectives should not be done in a random order but in a developmental sequence.

Type your answer here:

The answer was RANDOM

37. The program through which you are currently working is teaching and reviewing conditioning principles and important variables that contribute to effective instruction. The actual composition of effective frames incorporates many of these principles and requires that the programmer pay attention to many variables simultaneously.

Type your answer here:

The answer was MANY
38. There should be no unnecessary stimuli (i.e., words or illustrations) in a frame. Everything a student sees, hears, or reads in an instructional sequence should contribute to increasing the probability of the _____ objectives or performances of the instructional program.

Type your answer here:

The answer was TERMINAL or BEHAVIORAL

39. Ideally, each frame contains only the minimal stimuli necessary to sufficiently strengthen an answer. A well-composed frame is, therefore, condensed. It is brief and compact. There should be no _____ words or sentences.

Type your answer here:

The answer was UNNECESSARY

40. One reason for including extra information might be to introduce extra reinforcers for the student. To do so, interesting stories and anecdotes might be used. This is often done in traditional instruction, such as lecturing. Interesting stimuli may be interspersed within a lecture to keep the student listening. However, well-programmed material that requires active responding makes this unnecessary. The important content to be learned can be made automatically reinforcing by making sure that the student responds frequently and is nearly always c _____.

Type your answer here:

The answer was CORRECT

You have reached the end of part 3 of this instructional program.

Please enter the current clock time here:

Thank You

Press Enter:

This would be a good opportunity to take a short break if you care to do so. Enter 4 at the a:> prompt to begin Part 4.

Press Enter:
This program is based on
Preparing Automated Instruction
by Kale M. Kritch and Darrel E. Bostow

You are beginning Part 4
This section has 51 frames and should take
approximately 20 minutes to complete.

Press Enter:

__________________________________________________________

Please enter your first name here:

Please enter your last name here:

Thank You, <First Name>

Press Enter:

__________________________________________________________

In Part 4 of this instructional program there will be a blank embedded in a screen of
information. When you come to the blank in your reading, carefully type your
answer. Be careful in spelling, because the computer occasionally has problems with
misspelled words. After you have typed your response, press the 'ENTER' key to
advance to the next screen.

Please enter the current clock time here:

Thank You

Press Enter:

__________________________________________________________
1. Most well-prepared frames include what is called a rule. A rule is a verbal statement that describes or implies a relation between things in the world. For example, the sentence 'The frame is the basic element of programmed instruction' is a rule. It implies that if you correctly point to a frame and call it a 'frame' you will usually receive reinforcement from knowledgeable programmers.

Type your answer here:

The answer was RULE

2. Which of the following is more clearly a rule?
   A. Red apples are sweet.
   B. He eats a green apple.

Type your answer here:

The answer was A

3. A complicated subject should be explained progressively. The learner must have the basic tools (i.e., understand certain prerequisites) before he or she can respond successfully to more complicated concepts or rules. In a well-designed instructional program the rules the student learns should, therefore, be presented in a developmental order or sequence.

Type your answer here:

The answer was SEQUENCE

4. But the subordinate objectives will not automatically occur to the programmer in a developmental order. Correct sequencing of these objectives or rules by the programmer will lead to the most efficient learning on the part of the student.

Type your answer here:

The answer was DEVELOPMENTAL

5. After the initial selection or construction of the rules that lead to appropriate terminal behavior, the rules must be arranged in a developmental sequence.

Type your answer here:

The answer was DEVELOPMENTAL
6. One can most effectively compose an essay, for example, by first outlining and ordering one's thoughts. Complete, polished, and grammatically correct sentences are a stage close to the completion of the essay; they are fashioned very late in the process. Similarly, the construction of specific frame material to which the student will respond should appropriately occur _____ in program development.

Type your answer here:

The answer was LATE

7. The developmental sequencing of the rules in a program must be done early. But this cannot be done until many, if not most, of the rules have been collected together. Simple listing of the rules that contribute to program objectives is the _____ step after identifying terminal objectives.

Type your answer here:

The answer was NEXT

8. The first step in the development of an appropriate rule sequence is to simply _____ the rules on a word processor or a sheet of paper.

Type your answer here:

The answer was LIST

9. Concept and rule listing should occur after a thorough review of the content area. Recent acquaintance with the subject matter area makes listing rules easier. Once some have been listed, the list itself will begin to evoke other _____.

Type your answer here:

The answer was RULES
10. Rules should appear in a developmental sequence. This order is based on the accumulation of concepts used within the rules. A program that taught the correct procedure for building a fire in a fireplace would not begin by discussing where to light the wood. It might begin by first discussing different kinds of ____ and the quality of fire they produce.

Type your answer here:

The answer was WOOD

11. Concepts must occur in an ordered pattern and the ____ that incorporate these concepts must also occur in a planned sequence.

Type your answer here:

The answer was RULES

12. The presentation of concepts and rules should not be a haphazard process. Their order must be carefully analyzed before frames are laid out in the final stages of program development. Evans, Homme, and Glasser (1962) developed a systematic way of going about the study of rule-concept interrelationships. Their technique induces the programmer to systematically ____ each rule with each other rule.

Type your answer here:

The answer was COMPARE

13. In rushing off to construct frames that teach a specific rule, a novice programmer might discover one rule depends on another. For example, a program that teaches how to make cake frosting might call for 'powdered' sugar. If the student had not already been taught to discriminate between powdered and granulated sugar, just adding 'sugar' might not produce the right effect. The necessary prerequisite rules about the difference between sugars would probably occur to the programmer if he or she ____ program rules before starting to write frames.

Type your answer here:

The answer was COMPARED
14. Evans, Homme, and Glasser (1962), suggested the construction of a matrix. A matrix is a grid for indicating whether the programmer can think of a relationship between one _____ and another.

Type your answer here:

The answer was RULE

15. Before a rule matrix is constructed, the programmer makes a developmental list of rules. The matrix has a vertical and horizontal axis. The programmer places condensed statements of these rules or perhaps simply words (concepts) that automatically suggest the rules from top to bottom along the _____ axis of the matrix.

Type your answer here:

The answer was VERTICAL

16. The same list of rules is then placed from left to right on the _____ axis of the rule matrix.

Type your answer here:

The answer was HORIZONTAL

17. The cells in the grid are for checkmarks or notes. The programmer is to systematically compare each rule along the vertical axis with each rule along the _____ axis.

Type your answer here:

The answer was HORIZONTAL

18. The systematic comparison of each rule with each other rule is done repeatedly, but each time asking a different question. The question being asked is placed in the upper left-hand corner of the _____ _____.

Type your answer here:

The answer was RULE MATRIX
19. The question in the upper left-hand corner prompts the comparison to be made. For example, an obvious question is 'Are these rules related?' This grid was constructed for the question 'relate?' The programmer will make a ____ in the cell where the appropriate line and column converge.

Type your answer here:

The answer was CHECK

20. Duplicate matrices can be constructed with different questions in the upper left-hand corner of each grid. Or, one large single grid can be used while making different colored checks or notes in the appropriate ____ where the columns and rows converge.

Type your answer here:

The answer was CELLS

21. Questions like 'Are these rules related?' compel the programmer to see common elements in rules. They set the stage for revision of rules for ____ the concepts and rules into a developmental sequence.

Type your answer here:

The answer was ORDERING

22. When preparing a rule matrix for the first time, the programmer only has a general idea of the order of rule presentation. The first listing of rules is usually tentative. Down in the grid, cells filled with checks or notes indicate the two rules compared are ____ to each other.

Type your answer here:

The answer was RELATED

23. The relation between rules indicated by checks may suggest that one ____ of presenting the two rules is better than another.

Type your answer here:

The answer was ORDER or SEQUENCE
24. No computer program that converts the marks on a rule matrix into a best order of rules currently exists. Instead, the programmer must 'eyeball' a completed rule matrix and rearrange the rules into a new and better _____.

Type your answer here:

The answer was ORDER or SEQUENCE

25. Another important function of a good rule matrix (or set of matrices) is its use in determining where review frames should appear in a program. A rule or concept may be introduced at one point in a program and then come into play again at a later point. If a student had not recently seen or given a concept as an answer he or she might _____ it.

Type your answer here:

The answer was FORGET

26. The strength of answers the student is learning to give weakens as time goes by and other material is presented. A program of any size will teach many concepts and the student needs repeated opportunities to emit the concept in appropriate contexts. The old stage trick of keeping many saucers spinning on the top of sticks is a kind of analogy. Every so often the performer has to accelerate the spin of each saucer. Likewise, _____ frames should occur frequently to re-strengthen behavior important for later instruction.

Type your answer here:

The answer was FORGET

27. A good instructional program should have internal unity. There are common themes, facts, or principles that recur as new notions are introduced. Concepts are associated and the programmer needs to point this out. For example, in the present program 'reinforcement' is a fundamental and recurring concept. Many other concepts like 'linear,' 'error,' 'probability,' etc., can be explained adequately only when the student understands the concept of reinforcement. A thorough instructional program should contain certain frames that were deliberately constructed to _____ one concept to another.

Type your answer here:

The answer was RELATE
28. Comparison of one rule with another may suggest relationships. It may imply the review frames necessary before a new rule is introduced. A programmer is more likely to build frames that contiguously pair terms (to 'relate' them) if he or she has constructed a good ______ with cells that show the interrelationships.

Type your answer here:

The answer was RULE MATRIX

29. A purpose of the rule matrix is to induce systematic ____ of each rule with each other rule.

Type your answer here:

The answer was COMPARISON

30. The original listing of rules placed vertically and horizontally on the rule matrix is a beginning step. Analysis of the rule matrix notes within the cells will suggest a better ____ of the rules.

Type your answer here:

The answer was ORDER or SEQUENCE

31. The rule matrix will also suggest where _____ frames should occur in the sequence to re-strengthen concepts already learned.

Type your answer here:

The answer was REVIEW

32. The next step before the actual composition of frames is to reorder the rule list. It is helpful to list the rules double spaced, vertically on large sheets of paper. The extra space between rules will be used for prompts calling for the ____ of old concepts.

Type your answer here:

The answer was REVIEW
33. Experienced programmers have found that students pay closest attention to the sentence in a frame that contains the blank. Material presented after the blank is often skipped because the student can sometimes give the _____ answer without reading this material.

Type your answer here:

The answer was CORRECT

34. For efficient instruction everything presented within a frame should play a role in achieving the program objectives. When the student neglects to read important material, its presentation is wasted. If the probability of further reading falls immediately after the blank is read, the blank should appear near the ____ of the frame.

Type your answer here:

The answer was END

35. As a general rule, the answer blank should appear near the end of a frame because the student may not _____ beyond this point.

Type your answer here:

The answer was READ

36. Evans, Homme, and Glasser (1962) discussed the nature and order of sentences within a frame. Sentences can progress from 'rule' to 'application.' The most obvious internal order is to present the rule as the first sentence in the frame. The second sentence then gives an example, but requires the student to apply the _____ to a specific situation.

Type your answer here:

The answer was RULE

37. An obvious internal order of sentences in a frame is the presentation of a ____ first, then examples of it.

Type your answer here:

The answer was RULE
38. Presenting the rule first and the examples later is one order format Evans, Homme, and Glasser (1962) catalogued in their 'RU-EG' system. The more _____ statement is presented first and the specific statement is presented second.

Type your answer here:

The answer was GENERAL

39. The rule-then-example frame format is deductive. It moves from the general to the _____.

Type your answer here:

The answer was SPECIFIC

40. But the format can be reversed; the direction can be inductive. Then, the student is required to draw a conclusion and supply the appropriate _____ that has been exemplified.

Type your answer here:

The answer was RULE

41. 'Keep it simple' is a good rule for frame construction. A frame should ordinarily introduce only one rule at a time. The introduction of too much material at once in a frame will reduce the likelihood of a correct _____.

Type your answer here:

The answer was ANSWER or RESPONSE

42. New programmers tend to compress too much into each frame in an effort to save time. But this is a bad policy because it doesn't strengthen separate responses adequately and may increase the probability of _____.

Type your answer here:

The answer was ERROR
43. A 'lecture' frame may contain a great deal of new information (i.e., new intraverbal connections). It is a poor programming technique because it does not give an opportunity for the student to _____ and earn reinforcement.

Type your answer here:

The answer was RESPOND

44. A frame that presents new (and possibly unnecessary) material without the opportunity for the student to actively respond is often called a _____ frame.

Type your answer here:

The answer was LECTURE

45. A programmer uses an outline he or she has derived from the rule matrix(s). This outline is the order of concepts and rules for the program in general. But when actual frames are to be constructed, it is helpful to specify the order of material within frames in advance of actually constructing them. An outline of rule-example and example-rule sequences should be constructed _____ the actual composition of sentences within each frame.

Type your answer here:

The answer was BEFORE

46. A solid building is constructed from a good blueprint. A builder does not start out just nailing one board to the next, he or she schedules and orders the construction activity. A programmer is chaotic when he or she begins to compose frames without some sort of blueprint. The blueprint or _____ of rules and examples should be determined by matrix inspection before a frame is composed.

Type your answer here:

The answer was ORDER, SEQUENCE, or OUTLINE
47. The answer a student is to give to a frame is derived from the list of rules and concepts that is the backbone of the program. The programmer's choice of the answer required by a frame will influence the content organization within the frame. Therefore, the answer should be determined _____ the frame is composed.

Type your answer here:

The answer was BEFORE

48. Both the answer and the _____ of the rule and examples within a frame should be determined before a frame is composed.

Type your answer here:

The answer was ORDER

49. A program is far from being complete when the author has finished the first edition of the frame series. While concepts and rules may be well ordered, gaps in the knowledge of the programmer will sometimes result in weak or inaccurate frames. The next step after completing the first complete 'rough draft' of frames is to have another _____ in the subject matter field edit for technical accuracy.

Type your answer here:

The answer was EXPERT

50. Experts don't know everything, however. A careful review by an additional expert may discover technical inaccuracy, but it may not indicate whether a program is adequate for the predicted student population. Two experts may agree that the frames are technically accurate and well-ordered, yet students may make many _____ while working through the program.

Type your answer here:

The answer was ERRORS
51. The limits of automated instruction are unknown. It is often said that there are
many skills that cannot be taught with a teaching machine, social interaction, for
example. But many of these content areas await creative programmers. Many
components of social interaction, for example, can be taught separately. A so-
called 'real life' situation might come near the end of instruction. The process
could be facilitated by a teaching machine. Instruction in the 'real' situation might
be more rapid if a person could be first taught to _____ what he would do.

Type your answer here:

The answer was SAY

Congratulations, you have reached the end of this instructional program.

Please enter the current clock time here:

   Thank You

Press Enter:

This would be a good opportunity to take a short break if you care to do so. Please
enter 6 at the a:> prompt to begin the posttest.

Press Enter:
Appendix C

Frame Text and Correct Answers From the Discrimination-Response Program
This program is based on
Preparation Automated Instruction
by Kale M. Kritch and Darrel E. Bostow

You are beginning Part 1
This section has 48 frames and should take
approximately 20 minutes to complete.

Press Enter:

Please enter your first name here:

Please enter your last name here:

Thank you, <First Name>

Press Enter:

The instructional program you are beginning will teach you about the principles of
learning and instructional design. It is very important that you follow the directions,
because they will tell you how to work through the program. It is also important that
you read all the material that appears on each computer screen very carefully, because
you will receive a test following the program.

Press Enter:

In Part 1 of this instructional program there will be a blank embedded in a screen of
information. When you come to the blank in your reading, type letter corresponding
to the best answer from the options below. After you have selected your response,
press the 'ENTER' key to advance to the next screen.

Please enter the current clock time here:

Thank You

Press Enter:
1. A dictionary defines a frame as 'an open border or case for enclosing a picture...' or '... a structure for admitting or enclosing something such as a window, for example.' At this moment you are looking into a computer monitor screen which is a kind of picture or window frame. The words you are reading are surrounded by an outline we call a _______.

A. Page
B. Frame
C. Window
D. Screen

Type your answer here:

The answer was FRAME

2. A dictionary defines the word page as 'one side of a leaf of something printed or written, as a book.' In computer or 'automated' instruction, material is presented in successive frames similar to the pages of a book, but when working with a computer, there is technically no 'leaf' or page that is read or turned, and the term _______ is, therefore, more appropriate than the term 'page' when describing successive presentations of material.

A. Page
B. Frame
C. Window
D. Screen

Type your answer here:

The answer was FRAME

3. A frame is the basic building block or teaching unit in programmed instruction. In a well-constructed program, each frame strengthens behavior the student will be able to emit at the _______ of the program.

A. End
B. Beginning

Type your answer here:

The answer was END
4. Learning is acquiring new behavior and involves principles of conditioning. It is concerned with what people do. A hungry baby learns to open his or her mouth in response to approaching food. We say ____ has taken place when food in the mouth strengthens or increases the probability of mouth-opening behavior.

A. Behavior
B. Extinction
C. Learning
D. Performance

Type your answer here:

The answer was LEARNING

5. Learning can be defined as a change in the probability or tendency for a person to do something. However, we can be absolutely sure a change has happened only when we actually observe the new behavior. If we want to verify that a person knows how to do something we need to arrange the right conditions and watch him or her actually ____ or perhaps say the response (behavior).

A. Do
B. Think
C. Observe

Type your answer here:

The answer was DO

6. ____ is the change in a person's tendency to do something that results from principles of conditioning.

A. Behavior
B. Performance
C. Motivation
D. Learning

Type your answer here:

The answer was LEARNING
7. Knowledge can be defined as 'potential behavior.' A person doesn't need to be currently engaging in some behavior for us to correctly say that he or she knows how to do that behavior or response. We confirm or verify that a person knows how to do the behavior when we actually _____ the person do the behavior.

A. Observe
B. Suggest
C. Make

Type your answer here:

The answer was OBSERVE

8. When we teach a person to do or say something we can be sure he knows how to do or say it only if we _____ him do or say it.

A. Make
B. See

Type your answer here:

The answer was SEE

9. Teaching is the arrangement of conditions that expedite learning; it is changing behavior through the use of conditioning principles. Teaching involves the setting in which something is done, the response, and consequences that happen when the student is correct. Effective teaching involves how many factors?

A. Two
B. Three
C. Four
D. Five

Type your answer here:

The answer was THREE
10. If we define 'teaching' as the arrangement of conditions that result in strengthening of behavior, teaching has not happened if we observe no _____ in behavior.

A. Interest
B. Change
C. Reinforcer
D. Bias

Type your answer here:

The answer was CHANGE

11. Merely presenting information or going through certain motions is not enough. A teacher or instructional program is not technically _____ if the student doesn't learn.

A. Teaching
B. Learning
C. Lecturing
D. Presenting information

Type your answer here:

The answer was TEACHING

12. Effective instruction involves the consideration of three variables. The setting, the _____, and the consequences.

A. Reinforcer
B. Response
C. Motivation
D. Duration

Type your answer here:

The answer was RESPONSE
13. Conditioning is the strengthening of a particular behavior resulting from reinforcement. In 'operant conditioning' a kind of response becomes more likely in a particular situation when it is 'reinforced.' Reinforcement is a technical term that means a response is strengthened, i.e., its probability is increased. When a teacher says 'correct' to an answer that is given, that kind of answer is usually strengthened. We call the teacher's response a _____ for the student's answer.

A. Prompt  
B. Setting  
C. Behavior  
D. Reinforcer

Type your answer here:

The answer was REINFORCER

14. Instruction (i.e., operant conditioning) is most effective when reinforcement immediately follows appropriate behavior. Technically, we say that reinforcement should be contingent on a response or answer. Since the letter grade at the end of a course occurs after the passage of considerable time, a grade is not typically immediately _____ on appropriate studying and probably doesn't reinforce much studying.

A. Contingent  
B. Extinction  
C. Prompting

Type your answer here:

The answer was CONTINGENT

15. Because the consequences for studying in the normal classroom situation are usually delayed, little _____ of behavior normally occurs.

A. Responding  
B. Reinforcement  
C. Observing

Type your answer here:

The answer was REINFORCEMENT
16. Teaching machines have a distinct advantage over the normal situation with a
teacher and a class of students. With a teaching machine, such as a computer, the
student can respond frequently and, if the program is carefully designed, his or
her answer will be immediately reinforced and therefore _____.

A. Extinguished
B. Prompted
C. Strengthened
D. Unchanged

Type your answer here:

The answer was STRENGTHENED

17. Automated instruction can produce faster and more thorough learning, because it
can more precisely arrange what is called a reinforcement contingency (or
contingency of reinforcement). It incorporates all three terms -- the environmental
situation (the computer screen and program), the behavior (the correct answer),
and the consequence (usually getting it right). It can arrange the setting in which
the answer is to occur, evaluate the appropriateness of the answer given, and
immediately ____ the student's response.

A. Reinforce
B. Extinguish
C. Prompt
D. Repeat

Type your answer here:

The answer was REINFORCE

18. Automated or computer-based instruction, when correctly designed, can teach
more effectively than a classroom teacher because it can deliver ____ more
frequently and precisely.

A. Shock
B. Instructions
C. Prompts
D. Reinforcement

Type your answer here:

The answer was REINFORCEMENT
19. In classes with many students and only one teacher there is little opportunity for personal interaction; the student must remain passive most of the time. With automated instruction the student can respond frequently. Finding out that he or she is correct (i.e., being successful), is a _____ for nearly all people; it strengthens that kind of answer as well as his or her tendency to continue trying.

A. Prompt  
B. Reinforcer  
C. Response  
D. Setting

Type your answer here:

The answer was REINFORCER

20. Every instructional situation or episode involves a setting, a response, and a consequence. Therefore, technically speaking, every instructional situation involves a(n) _____ of reinforcement.

A. Contingency  
B. Frame  
C. Unit  
D. Prompt

Type your answer here:

The answer was CONTINGENCY

21. The technical phrase 'contiguous pairing' means that things come together at the same time. 'Contiguous' is close to meaning 'simultaneous.' Hearing a dinner bell immediately followed by the presence of dinner is an example of _____ pairing.

A. Contingent  
B. Contiguous  
C. Coincidental  
D. Learning

Type your answer here:

The answer was CONTIGUOUS

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22. When a teacher points to a microscope and says 'this is a microscope' he or she is ___ pairing two stimuli, the object and the verbal stimulus 'microscope.'

A. Contingently
B. Conscientiously
C. Contiguously
D. Contraverted

Type your answer here:

The answer was CONTIGUOUSLY

23. The teacher might then prompt the student with the direction 'Say microscope' (as the student looks at the object). When in the presence of the microscope, the student's response 'microscope' receives teacher approval, a contingency of reinforcement has been arranged. The student's response ('microscope') is strengthened (or, technically, ___) by the teacher's reaction.

A. Prompted
B. Extinguished
C. Motivated
D. Reinforced

Type your answer here:

The answer was REINFORCED

24. The teacher has brought together an object and a verbal response and has supplied approval. The teacher has therefore arranged all three terms we call a ___.

A. Contingency
B. Frame
C. Prompt
D. Computer

Type your answer here:

The answer was CONTINGENCY
25. The object (the microscope) and the verbal stimulus 'microscope' were contiguously _____.

A. Related  
B. Paired  
C. Reinforced  
D. Extinguished

Type your answer here:

The answer was PAIRED

26. Sometimes the instructional goal is to 'pin down' one specific verbal response to one particular stimulus. For example, 'Mrs. Brown' is the name a student is to call his teacher. She responds to the student only when the student says 'Mrs. Brown' in addressing her. When a response is reinforced only in the presence of one stimulus and not in the presence of any other stimuli, it will eventually be emitted only in the presence of that particular _____.

A. Response  
B. Behavior  
C. Contingency  
D. Stimulus

Type your answer here:

The answer was STIMULUS

27. Mrs. Brown gives her attention 'differentially.' She differentially reinforces the student's behavior depending on the name he uses. If she doesn't pay attention when the student uses other names the tendency to say those names declines (or technically, extinguishes). The process of differential reinforcement involves extinguishing some responses while ____ one specific response.

A. Reinforcing  
B. Extinguishing  
C. Observing  
D. Contiguously pairing

Type your answer here:

The answer was REINFORCING
28. Mrs. Brown doesn't respond if the student addresses her as 'Mrs. Smith,' but does respond when he addresses her as 'Mrs. Brown.' This is an example of _____ reinforcement.

A. Contiguous
B. Differential
C. Extinction
D. Paired

Type your answer here:

The answer was DIFFERENTIAL

29. Differential reinforcement increases the tendency to emit a response in the presence of a restricted set of stimuli. When this happens, the process is technically called 'discrimination.' If a child calls all teachers 'Mrs. Brown,' discrimination _____ occurred.

A. Has
B. Has not

Type your answer here:

The answer was HAS NOT

30. The process during which strengthening consequences are delivered for correctly responding only in the presence of one stimulus and not responding that way in the presence of other stimuli is technically called _____ _____.

A. Contiguous pairing
B. Contiguous reinforcement
C. Differential extinction
D. Differential reinforcement

Type your answer here:

The answer was DIFFERENTIAL REINFORCEMENT
31. A high rate of response in the presence of one stimulus and low rates in the presence of other stimuli is evidence of the process called _____.

A. Generalization  
B. Discrimination  
C. Pairing  
D. Extinction

Type your answer here:

The answer was DISCRIMINATION

32. The stimulus, e.g. Mrs. Brown, is called a discriminative stimulus. In her presence, a student's verbal response 'Mrs. Brown' is likely to be reinforced by her attention. But in the presence of Mr. Sims, the response 'Mrs. Brown' is not likely to be reinforced. Mr. Sims is a stimulus in the presence of which extinction (for saying 'Mrs. Brown') is in effect. The sight of Mr. Sims is technically an S-delta for saying 'Mrs. Brown' because it is associated with _____. (i.e., non-reinforcement).

A. Reinforcement  
B. Pairing  
C. Extinction  
D. Prompts

Type your answer here:

The answer was EXTINCTION

33. Instruction involves the arrangement of what is called a(n) _____.

A. Contingency of pairing  
B. Contingency of reinforcement  
C. Contiguity of pairing  
D. Slice of pizza

Type your answer here:

The answer was CONTINGENCY OF REINFORCEMENT
34. A(n) ____ stimulus is one in the presence of which a specific response is likely to be reinforced.

A. Associated  
B. Discriminative  
C. Paired  
D. Reinforced

Type your answer here:

The answer was DISCRIMINATIVE

35. Much of our experience in life is haphazard. We learn that doing something 'works' in some situations and not in others. We slowly adapt in that we learn when to do something and when not to do it. Technically speaking, our behavior is strengthened and weakened by experience with different _____ contingencies.

A. Reinforcement  
B. Pairing

Type your answer here:

The answer was REINFORCEMENT

36. But haphazard experiences yield many more responses that go unreinforced. Learning occurs more slowly this way. Errors reduce our enthusiasm. Learning is faster and motivation is greater when one's responding gets frequently reinforced. When a series of reinforcement contingencies are arranged such that a behavior is progressively strengthened while a variety of stimuli are being contiguously paired, the process is called 'programmed' instruction. If instruction is well-programmed, the student almost never makes a(n) ____.

A. Response  
B. Prompt  
C. Reinforcer  
D. Error

Type your answer here:

The answer was ERROR
37. Programmed instruction produces progressive strengthening. Given that a student remains most motivated when he or she is usually responding correctly, a program should first require answers that are ____ rather than difficult.

A. Easy
B. Hard

Type your answer here:

The answer was EASY

38. A well-designed instructional program converts stimuli which do not effectively evoke specific responses to stimuli that subsequently do. After arranging a series of instructional contingencies, a microscope becomes a(n) ____ stimulus for saying 'microscope.'

A. Paired
B. Reinforced
C. Discriminative
D. Aversive

Type your answer here:

The answer was DISCRIMINATIVE

39. In teaching a student a concept, a program first induces discrimination between clearly different 'examples' and 'non-examples.' Obvious examples are to become the discriminative stimuli and obvious non-examples are chosen to reduce the tendency to give that answer. In programmed instruction, supplementary stimulation refers to an added stimulus or prompt that increases the probability of a correct response. The 'p' and the 't' in the following blank are instances of the concept called a p____t.

A. Plant
B. Prompt
C. Print
D. Pendant

Type your answer here:

The answer was PROMPT
40. A ____ stimulus, or prompt, is added to raise the probability that a correct response will be given to a correct example.

A. Supplementary  
B. Reinforced  
C. Weak  
D. Paired

Type your answer here:

The answer was SUPPLEMENTARY

41. Prompting is a way of keeping motivation higher because it increases the likelihood that the student will give ____ answers.

A. Incorrect  
B. Extinguished  
C. Correct  
D. Erroneous

Type your answer here:

The answer was CORRECT

42. However, in good programmed instruction, supplementary stimulation is progressively 'faded' out of successive frames. The objective is to get the student to respond correctly to a stimulus situation without added stimuli. Eventually, a ____ will be unnecessary.

A. Reinforcer  
B. Setting  
C. Response  
D. Prompt

Type your answer here:

The answer was PROMPT
43. In the preceding series of frames the 'p' and the 't' were initially present in frames where you were to give 'prompt' as an answer. This supplementary stimulation was ____ out of the subsequent frames.

A. Faded
B. Prompted
C. Reinforced
D. Paired

Type your answer here:

The answer was FADED

44. Later in this program different kinds of prompts will be discussed (i.e., formal, and thematic prompts). Initially, you will be discriminating between clear examples and non-examples of prompts. But later you will be induced to generalize within the class of stimuli called prompts. The program's objective is to get you to recognize that certain kinds of stimuli are all examples of prompts. The process called generalization is exemplified by giving ____ response(s) to slightly different stimuli.

A. The same
B. Different

Type your answer here:

The answer was THE SAME

45. A concept is a class of stimuli that have a common property or set of properties. Concept formation is the process of inducing a student to ____ within a class of stimuli (examples) and to discriminate between examples and non-examples.

A. Discriminate
B. Generalize
C. Prompt
D. Reinforce

Type your answer here:

The answer was GENERALIZE
46. The programmer strives to achieve generalization of a response such as saying the word 'contingency.' To do so, he or she constructs a program that presents a variety of frames all calling for the same ____. 

A. Stimulus  
B. Reinforcer  
C. Response  
D. Prompt

Type your answer here:  

The answer was RESPONSE

47. A frame is a context. It is an environment; a set of circumstances. It is a background against which a student is to emit a response. The answer to the frame is the missing element. A program can systematically change the 'background' while repeatedly asking for and strengthening the same response. In doing so it is inducing what is technically called ____ of the response.

A. Generalization  
B. Discrimination  
C. Reinforcement  
D. Prompting

Type your answer here:  

The answer was GENERALIZATION

48. A good frame cannot be constructed without first identifying the answer that is to be given by the student. Giving the answer is a small part of engaging in the performance appropriate to the terminal contingencies of the program. In most cases the student will not be learning new words, but will instead be learning to say the words in sentences that are new to him or her. In most cases he or she will be using old words in ____ ways.

A. Old  
B. New  
C. Incorrect

Type your answer here:  

The answer was NEW
You have reached the end of part 1 of this instructional program.

Please enter the current clock time here:

Thank You

Press Enter:

This would be a good opportunity to take a short break if you care to do so. Enter 2 at the a:> prompt to begin Part 2.

Press Enter:
This program is based on
Preparing Automated Instruction
by Kale M. Kritch and Darrel E. Bostow

You are now beginning Part 2
This section has 48 frames and should take
approximately 20 minutes to complete.

Press Enter:

Please enter your first name here:

Please enter your last name here:

Thank you, <First Name>

Press Enter:

In Part 2 of this instructional program there will be a blank embedded in a screen of information. When you come to the blank in your reading, type letter corresponding to the best answer from the options below. After you have selected your response, press the 'ENTER' key to advance to the next screen.

Please enter the current clock time here:

Thank You

Press Enter:
1. In a very large room or in a mountain canyon you can shout and then hear a(n) ____ come back to you. Teaching involves getting the student to respond the same way the teacher (or programmer) responds. This process involves duplication or imitation.

   A. Answer
   B. Echo

Type your answer here:

   The answer was ECHO

2. 'Echoic' behavior is an exact duplication of the verbal behavior of someone else. When a parent points to a bird and says 'say bird' to a child and the child subsequently says 'bird,' this is an example of a(n) ____ response.

   A. Incorrect
   B. Echoic
   C. Intraverbal
   D. Contiguous

Type your answer here:

   The answer was ECHOIC

3. We are often asked to repeat what someone else has said. If it is an exact duplication, it is an example of a(n) ____ response.

   A. Intraverbal
   B. Contraverbed
   C. Echoic
   D. Contingent

Type your answer here:

   The answer was ECHOIC
4. A good speaker (teacher) prepares a listener to say the same thing by 'working up to it.' The speaker uses 'familiar' words and examples and repeats 'points' in several different ways. In doing so the speaker strengthens the listener's tendency to _____ the same thing.

A. Teach
B. Reinforce
C. Say

Type your answer here:

The answer was SAY

5. One way of describing verbal instruction is that it is the progressive _____ of the student's echoic or 'duplic' behavior.

A. Strengthening
B. Weakening
C. Elimination
D. Extinction

Type your answer here:

The answer was STRENGTHENING

6. A series of frames progressively strengthens _____ or 'duplic' behavior.

A. Incorrect
B. Contiguous
C. Intraverbal
D. Echoic

Type your answer here:

The answer was ECHOIC
7. Many people actually 'hear' themselves saying the words as they read them. When we 'read' words we respond at a private (covert) level. In other words, we also respond sub-_____.

A. Sub-vocally  
B. Subcutaneously  
C. Substantially  
D. Submissively

Type your answer here:

The answer was SUB-VOCALLY

8. We respond _____ to words with which we are 'familiar' and weakly to words that are not well-conditioned stimuli.

A. Weakly  
B. Occasionally  
C. Strongly

Type your answer here:

The answer was STRONGLY

9. One important goal in programmed instruction is to strengthen the student's echoic or duplic behavior because this sets the stage for responding correctly when no echoic or textual stimulus is currently _____.

Type your answer here:

The answer was PRESENT
10. But previously reinforced sub-vocal responding may generate a powerful tendency to say something at the point the blank occurs. When one responds with a word for which there is no textual or echoic stimulus, this kind of behavior is called intraverbal. Intraverbal responses **do not** have a currently present stimulus they duplicate like an echoic response.

A. Do
B. Do not

Type your answer here:

The answer was DO NOT

11. Intraverbal behavior is more difficult to establish because it is not simply duplicating a stimulus. When one is asked 'What is two plus two?' the appropriate response is not the echoic response of saying 'What is two plus two?' but is, instead, saying 'four.' Saying 'four' is not an echoic or duplic response, but is a(n) **intraverbal** response.

A. Echoic
B. Intraverbal
C. Incorrect
D. Duplic

Type your answer here:

The answer was INTRAVERBAL

12. Getting a child to count 'by ones' involves strengthening his or her tendency to say 'three' after saying 'one, two, ...' Since the verbal response 'three' is different from the verbal stimulus 'one, two, ...' it is not an echoic response, but a(n) **intraverbal** response.

A. Intraverbal
B. Duplic
C. Contingent
D. Paired

Type your answer here:

The answer was INTRAVERBAL
13. Giving the response 'Paris' to the question 'What city is the capital of France?' is an example of ____ behavior. It has a different form than the question.

A. Echoic
B. Duplic
C. Intraverbal
D. Nonverbal

Type your answer here:

The answer was INTRAVERBAL

14. The frame you are reading at this moment is a series of verbal stimuli. Because you are not duplicating a response when you supply an answer, the answer is an example of a(n) ____ response.

A. Duplic
B. Intraverbal
C. Nonverbal
D. Echoic

Type your answer here:

The answer was INTRAVERBAL

15. Contiguously pairing the stimulus 'one, two, ...' with the response 'three' is the procedure used to teach a child to count. The parent or teacher first has the child emit ____ behavior which copies the stimuli in a chain of responses.

A. Nonverbal
B. Echoic
C. Intraverbal
D. Unlearned

Type your answer here:

The answer was ECHOIC
16. A fundamental objective of all well-programmed instruction is to slowly reduce the contribution of auditory or textual stimuli, thereby converting what was once echoic behavior into primarily _____ behavior.

A. Intraverbal
B. Duplic
C. Echoic
D. Nonverbal

Type your answer here:

The answer was INTRAVERBAL

17. Saying 'one, two, ...' to the child is the appropriate stimulus, but the child must overtly _____ with 'three' and earn some sort of reinforcement if much strengthening is to occur.

A. Respond
B. Reinforce
C. Echo

Type your answer here:

The answer was RESPOND

18. Programmed instruction can produce faster and more thorough learning than conventional classroom situations because in the standard classroom situations the typical student is not induced to _____ frequently.

A. Stand
B. Respond
C. Make errors

Type your answer here:

The answer was RESPOND
19. A 'fact' is a statement about the world. In a standard testing situation a student is asked to write or state a fact in response to a question. Because the question has a different physical (topographical) form than the response it evokes, the student's answer is an example of a(n) _____ response.

A. Duplic
B. Intraverbal
C. Echoic
D. Tact

Type your answer here:

The answer was INTRAVERBAL.

20. Appropriately or not, much of current instruction involves the establishment of student intraverbal behavior. The student learns to give facts about science, music, mathematics, geography, history, etc. The student does not give these facts in direct response to the world of 'things,' but in response to classroom or test _____.

A. Questions
B. Answers

Type your answer here:

The answer was QUESTIONS.

21. An answer to a question is an example of a(n) _____ response.

A. Intraverbal
B. Nonverbal
C. Echoic
D. Duplic

The answer was INTRAVERBAL.
22. Another important kind of verbal behavior is the 'tact.' A tact is a verbal response that makes contact directly with the world of things or events. When a student is asked to name an object, the object is the important source of stimulation. When a student names an object his response is not intraverbal, but is a(n) _____.

A. Echoic  
B. Intraverbal  
C. Tact  
D. Nonverbal

Type your answer here:

The answer was TACT

23. If you learn from someone else that there is an apple in the refrigerator and then tell another person 'there is an apple in the refrigerator,' your behavior is intraverbal. The 'source of information' was someone else's verbal behavior. However, if you had opened the refrigerator and directly observed an apple, saying 'there is an apple in the refrigerator' would be an example of a(n) _____ response, because it was a response to the apple as a stimulus.

A. Intraverbal  
B. Tact  
C. Echoic  
D. Duplic

Type your answer here:

The answer was TACT

24. Roughly speaking, intraverbal behavior is acquired from experience with other 'words,' while tact behavior arises from direct experience with the _____.

A. World  
B. Other verbal behavior

Type your answer here:

The answer was WORLD
25. So-called 'book learning' is largely ____ behavior, while naming and describing events and processes when actually observing them is 'tact' behavior.

A. Echoic
B. Duplic
C. Intraverbal
D. Nonverbal

Type your answer here:

The answer was INTRAVERBAL

26. A child may learn to say 'three' after hearing the question 'What number comes after two?' But when shown three objects and asked 'How many are there?' he or she may not say 'three.' This suggests that a response acquired as a(n) ____ cannot automatically 'be used' as a tact.

A. Echoic
B. Tact
C. Intraverbal
D. Duplic

Type your answer here:

The answer was INTRAVERBAL

27. Good instruction, whether taught by a teacher or a teaching machine, must arrange a variety of conditions that give rise to what the student learns. These 'conditions' are the different kinds of stimuli that evoke behavior. Teaching 'about' the world is not enough. 'Head knowledge' must eventually be applied directly to the world. Intraverbal responses must be readily convertible into ____ responses and other kinds of practical behavior.

A. Echoic
B. Tact
C. Duplic

Type your answer here:

The answer was TACT
28. An important goal of instruction is to get the student to do or say some specific response, for example, to vocalize the word 'pencil.' When the child imitates or copies your prompt 'pencil,' his response is correctly called an imitative or _____ response.

A. Intraverbal  
B. Tact  
C. Echoic  
D. Nonverbal

Type your answer here:

The answer was ECHOIC

29. You could teach a child to say that he or she should remember to bring a pencil to school with him each day. In doing so, you would repeatedly ask the question 'What should you bring to school each day?' while strengthening his response 'pencil,' perhaps in the early stages with an added prompt. But the child could learn to correctly say he or she 'should bring a pencil' without 'knowing what a pencil is.' In other words, upon being shown a pencil, the child might not correctly identify it or label it with the response 'pencil.' More precisely, we would say the child could emit the response 'pencil' as an intraverbal, but not as a _____.

A. Echoic  
B. Duplic  
C. Tact  

Type your answer here:

The answer was TACT
30. This program presents various arrangements of word patterns. It is building or strengthening new functional relationships in your verbal behavior. It both establishes and strengthens these responses in relation to the various word patterns. To most frames, your response is a(n) _____.

A. Intraverbal
B. Tact
C. Echoic
D. Error

Type your answer here:

The answer was INTRAVERBAL

31. A good teacher or program relates many stimuli with a response and many responses with a stimulus. To guarantee adequate strengthening, the teacher or program will require the student to _____ emit the answer.

A. Overtly
B. Covertly

Type your answer here:

The answer was OVERTLY

32. When a student embarks upon a program, he or she is incapable of emitting the terminal behavior under the specified conditions. We say the terminal responses have a very ____ probability of occurrence.

A. High
B. Low

Type your answer here:

The answer was LOW
33. A good program begins where the student is; it makes use of already established behavior. The student should readily respond to the first frames and questions. If the student is to be successful, or in other words, if he or she is to find the program to be reinforcing, terminal responses or answers _____ be required at the beginning of the program.

A. Should
B. Should not

Type your answer here:

The answer was SHOULD NOT

34. In progressively moving toward terminal behavior a good program begins by asking for answers already having a high _____ of occurrence.

A. Error
B. Pitch
C. Probability
D. Duration

Type your answer here:

The answer was PROBABILITY

35. An 'operant' is a class of responses which all successfully achieve some sort of reinforcement. To get another person's attention you can make a loud noise, clear your throat, call him by his name, or use the vulgar 'hey.' All of your responses can be classified together because they have the common property of getting the person's attention. Responses which have a common property belong to the same _____.

A. Stimulus
B. Response
C. Class
D. Intraverbal

Type your answer here:

The answer was CLASS
36. The term 'operant' was created to automatically suggest that the behavior 'operates' on the environment to produce reinforcement. It is sometimes used imprecisely to identify a specific response. Technically speaking, the term 'operant' refers to a _____ of responses all of which successfully achieve reinforcement.

A. Class  
B. Contingency  
C. Contiguity

Type your answer here:

The answer was CLASS

37. Answers a teacher or programmer does not expect are called 'incorrect' or 'errors.' But when a student emits a so-called wrong answer or an error, this is still a _____ probability response for him or her.

A. High  
B. Low

Type your answer here:

The answer was HIGH

38. The probability of a student's response is determined by his or her history of conditioning as well as the immediate frame material. A programmer can firmly establish a history of conditioning by carefully arranging a series of frames with appropriate material and responses. The programmer can also carefully select the material he or she places in the current frame. Therefore, most so-called wrong answers are largely the responsibility of the _____ and are not the 'fault' of the student.

A. Student  
B. Programmer  
C. President of the United States

Type your answer here:

The answer was PROGRAMMER
39. An error is a programmer's evaluation of a response, it is not an inherent characteristic of behavior. An error is the result of the nature of a given frame of material and the student's _____ of conditioning.

A. History  
B. Future  
C. Brand

Type your answer here:

The answer was HISTORY

40. One measure of the quality of an instructional program is the likelihood, or technically speaking, the _____ the student will make an error at any given frame.

A. Probability

Type your answer here:

The answer was PROBABILITY

41. Years ago a controversy existed between advocates of 'linear' programming and 'branching' programming. A branching program treated errors as natural, something a student was expected to do while he or she learned. On the other hand, creators of linear programs revised them until the error rates were very low. If errors are a product of a person's instructional history and the current situation combined, they are defects that are the responsibility of the teacher or _____, not the student.

A. Programmer  
B. Student

Type your answer here:

The answer was PROGRAMMER
42. Making an error is aversive or mildly punishing to most of us. A branching program not only allows but expects errors, automatically introducing a negative factor, because the student will often be _____.

A. Right  
B. Wrong

Type your answer here: 

The answer was WRONG

43. While research has yet to present a clear picture, we should expect that a student would find working on a well-refined linear program to be _____ reinforcing than working on a branching program.

A. More  
B. Less

Type your answer here: 

The answer was MORE

44. If you were to teach someone how to do a fine technical skill, you would not first demonstrate how not to do it, because his tendency to do it the wrong way might _____ as a result of seeing it done that way first.

A. Decrease  
B. Increase

Type your answer here: 

The answer was INCREASE
45. Branching programs frequently employ multiple-choice 'foils.' If the student selects the correct answer, he or she moves ahead in the program. If the student selects a 'foil,' the program branches to remedial frames and then back to the main program frame series. A good 'foil' is one that is very plausible, yet wrong, and therefore tests a fine discrimination. But during the early stages of instruction, the student may respond weakly to the correct answer, and seeing plausible foils could ______ the tendency to emit the wrong answers.

A. Increase
B. Decrease

Type your answer here:

The answer was INCREASE

46. There are occasions where multiple choices are appropriate in a linear program, perhaps to verify already learned responses or for review. But generally, multiple choices should not be used in 'instructional' frames, because they strengthen ______ answers.

A. Correct
B. Incorrect
C. Intraverbal
D. Echoic

Type your answer here:

The answer was WRONG
47. Selecting an alternative from an array of choices is a different kind of response than 'constructing' the response on one's own. A weak response can be more easily emitted if it is 'cued' by a stimulus. A correct response listed as an alternative is a powerful cue. A student who is only weakly inclined to emit the correct response can more easily do so if the correct response is already there to choose from. We could, therefore, assume a higher probability of responding is indicated by a correctly _____ answer than by a correctly selected answer.

A. Chosen
B. Constructed
C. Intraverbal

Type your answer here:

The answer was CONSTRUCTED

48. Multiple-choice frames would appear to be a good way to introduce a new response in the early stages of instruction, because reading the correct alternative would help the student emit the response for the first time. However, the pairing that results from the remaining foils would ____ incorrect responses.

A. Weaken
B. Strengthen
C. Decrease
D. Eliminate

Type your answer here:

The answer was STRENGTHEN

You have reached the end of part 2 of this instructional program.

Please enter the current clock time here:

Thank You

Press Enter:

This would be a good opportunity to take a short break if you care to do so. Enter 3 at the a:=> prompt to begin Part 3.

Press Enter:
This program is based on
Preparing Automated Instruction
by Kale M. Kritch and Darrel E. Bostow

You are beginning Part 3
This section has 40 frames and should take approximately 20 minutes to complete.

Press Enter:

Please enter your first name here:
Please enter your last name here:

Thank you, <First Name>

Press Enter:

In Part 3 of this instructional program there will be a blank embedded in a screen of information. When you come to the blank in your reading, type letter corresponding to the best answer from the options below. After you have selected your response, press the 'ENTER' key to advance to the next screen.

Please enter the current clock time here:

Thank You

Press Enter:
1. Instruction changes the likelihood of many student responses. At the beginning of instruction the student may not be able to emit the response(s) or be only weakly inclined to do so in the correct circumstances. A good instructional program first introduces behavior to be learned with powerful prompts, so powerful that the student's answer is nearly always _____.

A. Incorrect  
B. Correct  
C. A tact  
D. An intraverbal

Type your answer here:

The answer was CORRECT

2. Prompts are withdrawn in successive frames while the context is varied. The correct response is progressively relieved of artificial support in a manner similar to the raising of 'training wheels' on a bicycle. As different words and contexts occur together with the student's correct response, the 'connection' between these various words is strengthened. We call this process c______g.

A. Contiguous pairing  
B. Contingent extinguishing  
C. Contiguous reinforcing  
D. Contingent pairing

Type your answer here:

The answer was CONTIGUOUS PAIRING

3. A very subtle and important kind of 'supplementary stimulation' is called priming. A pump is 'primed' by adding water within the chamber to get the movement of fluid started. In programmed instruction, priming is the introduction of words in frames ahead of the frames in which the words are to be given. If you had seen the name of an old acquaintance just before the opportunity to greet the person with his name you would be _____ likely to do so correctly.

A. More  
B. Less

Type your answer here:

The answer was MORE
4. A supplementary stimulus employed in a previous frame, but not in the current frame is called a p____.

   A. Prompt
   B. Prime
   C. Prone

Type your answer here:

   The answer was PRIME

5. The new concept presented to you just a moment ago is an example of a _____ for the correct response to this blank.

   A. Prime
   B. Prompt
   C. Reinforcer
   D. Tact

Type your answer here:

   The answer was PRIME

6. A prime and a prompt are two different concepts. A prime is a stimulus that was presented, but is then absent in the current frame. On the other hand, a prompt is a stimulus that is _____ in the current frame material.

   A. Absent
   B. Present

Type your answer here:

   The answer was PRESENT
7. In this frame, the word prompt is itself a _____ for the answer, because it is present in this frame.

A. Prime
B. Prompt
C. Reinforcer

Type your answer here:

The answer was PROMPT

8. The words that appeared in the previous frame had a strengthening effect on your verbal tendencies. Their effects are quickly fading, but they help you to now say that they were a _____ and not a prompt for the answer to this frame.

A. Reinforcer
B. Prompt
C. S-delta
D. Prime

Type your answer here:

The answer was PRIME

9. One of the most obvious kinds of prompts is called a formal prompt. The element 'form' in formal is important, because the form of the stimulus corresponds to the form of the response. For the blank in this sentence, the word 'formal' is itself a _____ prompt.

A. Prime
B. Thematic
C. Formal
D. Delayed

Type your answer here:

The answer was FORMAL
10. The 'f' in the following blank is an example of a f____ prompt, because it is an approximation of the answer.

A. Functional
B. Formal
C. Fundamental
D. Thematic

Type your answer here:

The answer was FORMAL

11. Both a 'p' as a textual prompt and hearing the voiced 'p' said by someone else are examples of _____ prompts, because their physical characteristics are very similar to the response they are to evoke.

A. Thematic
B. Functional
C. True
D. Formal

Type your answer here:

The answer was FORMAL

12. A prompted response draws its strength from two sources, the student's history of conditioning and the supplementary stimulation of the current prompt. Describing a stimulus as a prompt is correct only if there is already some, at least minimal, t____ to say the word.

A. Trend
B. Tendency
C. Truancy

Type your answer here:

The answer was TENDENCY
13. A thematic prompt is yet another supplemental source of strength, but in the form of a tact or intraverbal response. It is better known as a 'hint.' In a manner similar to the composition of music, a writer can bring in a familiar 'theme.' If a teacher wanted a student to name a color and said 'Red, white, and ...' he would be giving an intraverbal as a stimulus. Most people in the United States would respond with 'blue' because they have experienced extensive conditioning with respect to the words 'red,' 'white' and 'blue.'

A. Contingent pairing
B. Constant pairing
C. Congruent pairing
D. Contiguous pairing

Type your answer here:

The answer was CONTIGUOUS PAIRING

14. Stimuli are 'formally' related because they have a common property or feature. The separate responses 'red,' 'white,' and 'blue' are not formally related; their forms are different. Instead, a person's conditioning history connects words together thematically. We tend to hear certain words together. Later, when one word occurs to us, the others also tend to occur, due to this contiguous pairing in our conditioning history. When one word is said to be a 'synonym' for another, such a word could be used as a prompt.

A. Formal
B. Thematic
C. Prime

Type your answer here:

The answer was THEMATIC
15. F____ away supplementary stimulation too rapidly will increase a student's error rate in a program.

A. Formal
B. Floating
C. Forking
D. Fading

Type your answer here:

The answer was FADING

16. The objective of instruction is to get the student to respond with minimal cues, to respond appropriately without help. Help is to be completely terminated. To vanish supplementary stimulation is to ____ it out completely.

A. Fade
B. Flash
C. Flood
D. Stomp

Type your answer here:

The answer was FADE

17. You have been introduced to a number of fundamental concepts of programmed instruction. The actual authoring or formation of instructional frames is a complex task. Good programming controls many variables simultaneously. The programmer must understand concepts and employ conditioning principles in a carefully orchestrated manner. Each of the concepts you have learned will help you to create the kind of sequential reinforcement contingencies we call ____ instruction.

A. Lecture
B. Behavioral
C. Programmed
D. Structured

Type your answer here:

The answer was PROGRAMMED
18. Most complex tasks you wish to do efficiently require planning ahead. If you were going to paint something, it would probably be wasteful to begin by opening the can of paint first. You would save time, perhaps money, and energy if you determined what your product should look like at the ____ of your work.

A. Beginning
B. End

Type your answer here:

The answer was END

19. Planning activity, however, delays the physical work that achieves clearly visible signs of progress. Many people skip the early steps of planning because they are not aware of important variables to be considered and because they have not experienced the positive r____ that comes from careful planning.

A. Retribution
B. Rigor
C. Reinforcement

Type your answer here:

The answer was REINFORCEMENT

20. Several decades ago, programmed instruction was a much-discussed concept in education. Many would-be programmers hastily constructed programs of frames. They often simply sat down and began to construct frames without the necessary planning. They also didn't know the important conditioning p____s that must be considered.

A. Prompts
B. Primes
C. Principles
D. Potatoes

Type your answer here:

The answer was PRINCIPLES
21. In taking a driving trip, the selection of roads can be done most effectively if you decide where you are going at the start. The set of behaviors a student can do at the end of a program are the program's results, or technically, its 'terminal objectives.' When the terminal objectives are identified, they can be used to determine the character of the program as it is being constructed.

A. First  
B. Last  
C. Hastily

Type your answer here:

The answer was FIRST

22. You don't teach something to someone that the person already knows. The terminal objectives in your program are, therefore, going to be behaviors in your student's repertoire at the beginning of the program, if they exist at all.

A. Strong  
B. Weak

Type your answer here:

The answer was WEAK

23. But to build the strength of weak or currently nonexistent terminal skills, you will need to build a 'bridge' of intermediate contingencies or frames. The nature of these frames will be heavily influenced by the objectives you define as you begin.

A. Primary  
B. Terminal  
C. Endpoint  
D. Intermediate

Type your answer here:

The answer was TERMINAL
24. Terminal objectives are more helpful when they refer to behavior that is objectively measurable. For example, one objective of the present program is to get you to construct good instructional frames. But the adjective 'good' isn't helpful until 'good' is itself defined with dimensions that can be measured. A better way of stating the objective would include a measurable change in some b____r.

A. Behavior  
B. Badger  
C. Bridger  
D. Bungee jumper

Type your answer here:  

The answer was BEHAVIOR

25. A terminal, or better, behavioral objective is more useful in creating an instructional program when it includes all three terms in what we call a contingency of reinforcement. A contingency includes the setting, the behavior, and the behavior-reinforcer connection. In responding to a frame of material, the frame itself is the setting, the appropriate answer is the behavior and passing on to the next frame when correct is the _____.

A. Response  
B. Reinforcer  
C. Prompt  
D. Prime

Type your answer here:  

The answer was REINFORCER
26. (1) the conditions that are to evoke the behavior (i.e., the occasion)  
(2) the behavior (precisely stated in measurable dimensions)  
(3) the dimensions of the behavior necessary for reinforcement (the criterion).  

The three factors above are components of a good _____ objective for an instructional program.  

A. Terminal  
B. Behavioral  
C. Prime  
D. A and B  

Type your answer here:  

The answer was TERMINAL and BEHAVIORAL  

27. A good behavioral objective is the specification of a c____ of r____.  

A. Contiguity of response  
B. Contingency of responding  
C. Contingency of reinforcement  
D. Contingency of responding  

Type your answer here:  

The answer was CONTINGENCY OF REINFORCEMENT  

28. A well-constructed instructional program teaches a student how to do or say something. It establishes and strengthens specific responses while slowly withdrawing help. But a good program teaches more than the specific answers to its frames. It establishes a tendency to engage in similar behavior elsewhere. After all, one objective of education is to prepare the person for life after instruction, i.e., the 'real' ______.  

A. Seal  
B. World  

Type your answer here:  

The answer was WORLD

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29. The terminal objectives of a program should, therefore, describe situations to which behavior should generalize. This is difficult because behavior generalizes to new situations in relation to their similarity to the original conditions of instruction. A programmer can increase generalization by making the program as _____ to the real world as possible.

A. Offensive  
B. Flattering  
C. Similar  

Type your answer here:  

The answer was SIMILAR  

30. Acquiring verbal behavior about a 'medium' isn't necessarily the same as acquiring physical interactive skills. The old saying 'talk is cheap' suggests that it is easy to _____ something, but more difficult to do it.  

A. Do  
B. Say  

Type your answer here:  

The answer was SAY  

31. Even though the relationship is far from perfect, first teaching someone to engage in verbal behavior (perhaps the description of appropriate behavior and the reasons for it) will probably increase the likelihood he or she will actually _____ the behavior later.  

A. Talk about  
B. Do  
C. Avoid  

Type your answer here:  

The answer was DO
32. Terminal objectives give a program focus. They influence the nature and order of sub-objectives in the program. Most terminal behaviors of a program depend upon subordinate concepts along the way. These concepts are the 'building blocks' of the program's internal structure.

A. Terminal
B. Subordinate
C. Focus

Type your answer here:

The answer was SUBORDINATE

33. Programming instructional material is a technical skill which uses principles of conditioning arising from laboratory research. While a programmer may understand and be able to apply these learning principles, he or she may lack knowledge in a specific field. A good program cannot be composed alone by a programmer who is a newcomer to a field because he lacks a thorough knowledge of the concepts that lead to terminal objectives.

A. Striated
B. Subordinate
C. Sensitive

Type your answer here:

The answer was SUBORDINATE

34. Good programmed instruction requires knowledge about learning. A subject matter expert may not necessarily compose a good program, because he or she may not know how to apply the important conditioning principles involved in effective instructional frames.

A. Principles
B. Parsimony
C. Planning

Type your answer here:

The answer was PRINCIPLES
35. A subordinate behavioral objective specifies behavior that is a necessary component of terminal behavior. Were you to teach a person to change a tire, you would not teach him or her to begin in a random fashion. For example, you wouldn't teach how to tighten the lug-nuts first. You would probably teach placement of the car on even terrain and away from traffic. Safety and car position would be _____ objectives which lead to effective tire changing as a completed terminal performance.

A. Terminal
B. Initial
C. Subordinate
D. Superordinate

Type your answer here:

The answer was SUBORDINATE

36. Any terminal performance, whether verbal or non-verbal, that interacts with some medium is usually complicated enough to require subordinate objectives. In many, if not most, cases the sequencing of these subordinate objectives should not be done in a _____ order but in a developmental sequence.

A. Logical
B. Planned
C. Random

Type your answer here:

The answer was RANDOM
37. The program through which you are currently working is teaching and reviewing conditioning principles and important variables that contribute to effective instruction. The actual composition of effective frames incorporates many of these principles and requires that the programmer pay attention to ______ variables simultaneously.

A. One  
B. Many  
C. Few  
D. Two

Type your answer here:

The answer was MANY

38. There should be no unnecessary stimuli (i.e., words or illustrations) in a frame. Everything a student sees, hears, or reads in an instructional sequence should contribute to increasing the probability of the ______ objectives or performances of the instructional program.

A. Subordinate  
B. Terminal  
C. Initial

Type your answer here:

The answer was TERMINAL

39. Ideally, each frame contains only the minimal stimuli necessary to sufficiently strengthen an answer. A well-composed frame is, therefore, condensed. It is brief and compact. There should be no ______ words or sentences.

A. Unnecessary  
B. Useful  
C. Common

Type your answer here:

The answer was UNNECESSARY
40. One reason for including extra information might be to introduce extra reinforcers for the student. To do so, interesting stories and anecdotes might be used. This is often done in traditional instruction, such as lecturing. Interesting stimuli may be interspersed within a lecture to keep the student listening. However, well-programmed material that requires active responding makes this unnecessary. The important content to be learned can be made automatically reinforcing by making sure that the student responds frequently and is nearly always c____.

A. Contingent
B. Contiguous
C. Correct

Type your answer here:

The answer was CORRECT

You have reached the end of part 3 of this instructional program.

Please enter the current clock time here:

Thank You

Press Enter:

This would be a good opportunity to take a short break if you care to do so. Enter 4 at the a:> prompt to begin Part 4.

Press Enter:
This program is based on
Preparing Automated Instruction
by Kale M. Kritch and Darrel E. Bostow

You are beginning Part 4
This section has 51 frames and should take approximately 20 minutes to complete.

Press Enter:

________________________________________

Please enter your first name here:

Please enter your last name here:

Thank you, <First Name>

Press Enter:

________________________________________

In Part 4 of this instructional program there will be a blank embedded in a screen of information. When you come to the blank in your reading, type letter corresponding to the best answer from the options below. After you have selected your response, press the 'ENTER' key to advance to the next screen.

Please enter the current clock time here:

Thank You

Press Enter:

________________________________________
1. Most well-prepared frames include what is called a rule. A rule is a verbal statement that describes or implies a relation between things in the world. For example, the sentence 'The frame is the basic element of programmed instruction' is a(n) _____. It implies that if you correctly point to a frame and call it a 'frame' you will usually receive reinforcement from knowledgeable programmers.

A. Rule
B. Example

Type your answer here:

The answer was RULE

2. Which of the following is more clearly a rule?

A. Red apples are sweet.
B. He eats a green apple.

Type your answer here:

The answer was RED APPLES ARE SWEET

3. A complicated subject should be explained progressively. The learner must have the basic tools (i.e., understand certain prerequisites) before he or she can respond successfully to more complicated concepts or rules. In a well-designed instructional program the rules the student learns should, therefore, be presented in a developmental order or _____.

A. Sequence
B. Randomly

Type your answer here:

The answer was SEQUENCE
4. But the subordinate objectives will not automatically occur to the programmer in a _____ order. Correct sequencing of these objectives or rules by the programmer will lead to the most efficient learning on the part of the student.

A. Random
B. Developmental

Type your answer here:

The answer was DEVELOPMENTAL

5. After the initial selection or construction of the rules that lead to appropriate terminal behavior, the rules must be arranged in a _____ sequence.

A. Developmental
B. Random
C. 'Natural'

Type your answer here:

The answer was DEVELOPMENTAL

6. One can most effectively compose an essay, for example, by first outlining and ordering one's thoughts. Complete, polished, and grammatically correct sentences are a stage close to the completion of the essay; they are fashioned very late in the process. Similarly, the construction of specific frame material to which the student will respond should appropriately occur _____ in program development.

A. Early
B. Late
C. Constantly

Type your answer here:

The answer was LATE
7. The developmental sequencing of the rules in a program must be done early. But this cannot be done until many, if not most, of the rules have been collected together. Simple listing of the rules that contribute to program objectives is the _____ step after identifying terminal objectives.

A. Final  
B. Next  
C. Third  

Type your answer here: 

The answer was NEXT

8. The first step in the development of an appropriate rule sequence is to simply _____ the rules on a word processor or a sheet of paper.

A. Sequence  
B. List  
C. Write frames for  

Type your answer here: 

The answer was LIST

9. Concept and rule listing should occur after a thorough review of the content area. Recent acquaintance with the subject matter area makes listing rules easier. Once some have been listed, the list itself will begin to evoke other _____.

A. Subject matter areas  
B. Program Frames  
C. Rules  
D. Sequences  

Type your answer here: 

The answer was RULES
10. Rules should appear in a developmental sequence. This order is based on the accumulation of concepts used within the rules. A program that taught the correct procedure for building a fire in a fireplace would not begin by discussing where to light the wood. It might begin by first discussing different kinds of _____ and the quality of fire they produce.

A. Wood  
B. Gas stoves  
C. Matches

Type your answer here:

The answer was WOOD

11. Concepts must occur in an ordered pattern and the _____ that incorporate these concepts must also occur in a planned sequence.

A. Frames  
B. Rules  
C. Programs  
D. Programmers

Type your answer here:

The answer was RULES

12. The presentation of concepts and rules should not be a haphazard process. Their order must be carefully analyzed before frames are laid out in the final stages of program development. Evans, Homme, and Glasser (1962) developed a systematic way of going about the study of rule-concept interrelationships. Their technique induces the programmer to systematically _____ each rule with each other rule.

A. Analyze  
B. Describe  
C. Compare  
D. Formulate

Type your answer here:

The answer was COMPARE
13. In rushing off to construct frames that teach a specific rule, a novice programmer might discover one rule depends on another. For example, a program that teaches how to make cake frosting might call for 'powdered' sugar. If the student had not already been taught to discriminate between powdered and granulated sugar, just adding 'sugar' might not produce the right effect. The necessary prerequisite rules about the difference between sugars would probably occur to the programmer if he or she _____ program rules before starting to write frames.

A. Compared
B. Analyzed
C. Pondered
D. Constructed

Type your answer here:

The answer was COMPARED

14. Evans, Homme, and Glasser (1962), suggested the construction of a matrix. A matrix is a grid for indicating whether the programmer can think of a relationship between one _____ and another.

A. Frame
B. Rule
C. Programmer

Type your answer here:

The answer was RULE

15. Before a rule matrix is constructed, the programmer makes a developmental list of rules. The matrix has a vertical and horizontal axis. The programmer places condensed statements of these rules or perhaps simply words (concepts) that automatically suggest the rules from top to bottom along the _____ axis of the matrix.

A. Horizontal
B. Vertical

Type your answer here:

The answer was VERTICAL
16. The same list of rules is then placed from left to right on the ____ axis of the rule matrix.

A. Horizontal
B. Vertical

Type your answer here:

The answer was HORIZONTAL

17. The cells in the grid are for checkmarks or notes. The programmer is to systematically compare each rule along the vertical axis with each rule along the ____ axis.

A. Horizontal
B. Vertical
C. Temporal

Type your answer here:

The answer was HORIZONTAL

18. The systematic comparison of each rule with each other rule is done repeatedly, but each time asking a different question. The question being asked is placed in the upper left-hand corner of the ____ ______.

A. Contingency diagram
B. Rule list
C. Horizontal axis
D. Rule matrix

Type your answer here:

The answer was RULE MATRIX
19. The question in the upper left-hand corner prompts the comparison to be made. For example, an obvious question is 'Are these rules related?' This grid was constructed for the question 'relate?' The programmer will make a _____ in the cell where the appropriate line and column converge.

A. Check  
B. Rule  
C. Frame  

Type your answer here:  

The answer was CHECK  

20. Duplicate matrices can be constructed with different questions in the upper left-hand corner of each grid. Or, one large single grid can be used while making different colored checks or notes in the appropriate _____ where the columns and rows converge.

A. Frames  
B. Cells  
C. Matrices  
D. Grids  

Type your answer here:  

The answer was CELLS  

21. Questions like 'Are these rules related?' compel the programmer to see common elements in rules. They set the stage for revision of rules for _____ the concepts and rules into a developmental sequence.

A. Constructing  
B. Listing  
C. Ordering  

Type your answer here:  

The answer was ORDERING
22. When preparing a rule matrix for the first time, the programmer only has a general idea of the order of rule presentation. The first listing of rules is usually tentative. Down in the grid, cells filled with checks or notes indicate the two rules compared are _____ to each other.

A. Unrelated  
B. Similar  
C. Related  
D. Analogous

Type your answer here:

The answer was RELATED

23. The relation between rules indicated by checks may suggest that one _____ of presenting the two rules is better than another.

A. Order  
B. Frame layout

Type your answer here:

The answer was ORDER

24. No computer program that converts the marks on a rule matrix into a best order of rules currently exists. Instead, the programmer must 'eyeball' a completed rule matrix and rearrange the rules into a new and better _____.

A. Frame  
B. Order  
C. Rule

Type your answer here:

The answer was ORDER
25. Another important function of a good rule matrix (or set of matrices) is its use in determining where review frames should appear in a program. A rule or concept may be introduced at one point in a program and then come into play again at a later point. If a student had not recently seen or given a concept as an answer he or she might _____ it.

A. Tact
B. Diagram
C. Forget

Type your answer here:

The answer was FORGET

26. The strength of answers the student is learning to give weakens as time goes by and other material is presented. A program of any size will teach many concepts and the student needs repeated opportunities to emit the concept in appropriate contexts. The old stage trick of keeping many saucers spinning on the top of sticks is a kind of analogy. Every so often the performer has to accelerate the spin of each saucer. Likewise, _____ frames should occur frequently to re-strengthen behavior important for later instruction.

A. Review
B. Instructional
C. Lecture

Type your answer here:

The answer was REVIEW
27. A good instructional program should have internal unity. There are common themes, facts, or principles that recur as new notions are introduced. Concepts are associated and the programmer needs to point this out. For example, in the present program 'reinforcement' is a fundamental and recurring concept. Many other concepts like 'linear,' 'error,' 'probability,' etc., can be explained adequately only when the student understands the concept of reinforcement. A thorough instructional program should contain certain frames that were deliberately constructed to relate one concept to another.

A. Review
B. Relate

Type your answer here:

The answer was RELATE

28. Comparison of one rule with another may suggest relationships. It may imply the review frames necessary before a new rule is introduced. A programmer is more likely to build frames that contiguously pair terms (to 'relate' them) if he or she has constructed a good rule matrix with cells that show the interrelationships.

A. Rule Matrix
B. Reinforcement Contingency
C. Echoic response

Type your answer here:

The answer was RULE MATRIX

29. A purpose of the rule matrix is to induce systematic comparison of each rule with each other rule.

A. Generalization
B. Desensitization
C. Comparison
D. Induction

Type your answer here:

The answer was COMPARISON
30. The original listing of rules placed vertically and horizontally on the rule matrix is a beginning step. Analysis of the rule matrix notes within the cells will suggest a better ____ of the rules.

A. Frame  
B. Relation  
C. Order

Type your answer here:

The answer was ORDER

31. The rule matrix will also suggest where ____ frames should occur in the sequence to re-strengthen concepts already learned.

A. Informational  
B. Instructional  
C. Review  
D. Lecture

Type your answer here:

The answer was REVIEW

32. The next step before the actual composition of frames is to reorder the rule list. It is helpful to list the rules double spaced, vertically on large sheets of paper. The extra space between rules will be used for prompts calling for the ____ of old concepts.

A. Comparison  
B. Review  
C. Reframing  
D. Relation

Type your answer here:

The answer was REVIEW
33. Experienced programmers have found that students pay closest attention to the sentence in a frame that contains the blank. Material presented after the blank is often skipped because the student can sometimes give the _____ answer without reading this material.

   A. Wrong
   B. Correct
   C. Echoic

Type your answer here:

   The answer was CORRECT

34. For efficient instruction everything presented within a frame should play a role in achieving the program objectives. When the student neglects to read important material, its presentation is wasted. If the probability of further reading falls immediately after the blank is read, the blank should appear near the ____ of the frame.

   A. Beginning
   B. Middle
   C. End

Type your answer here:

   The answer was END

35. As a general rule, the answer blank should appear near the end of a frame because the student may not ____ beyond this point.

   A. Understand
   B. Answer
   C. Read
   D. Comprehend

Type your answer here:

   The answer was READ
36. Evans, Homme, and Glasser (1962) discussed the nature and order of sentences within a frame. Sentences can progress from 'rule' to 'application.' The most obvious internal order is to present the rule as the first sentence in the frame. The second sentence then gives an example, but requires the student to apply the _____ to a specific situation.

A. Example
B. Frame
C. Concept
D. Rule

Type your answer here:

The answer was RULE

37. An obvious internal order of sentences in a frame is the presentation of a(n) _____ first, then examples of it.

A. Prompt
B. Rule
C. Example
D. Contingency

Type your answer here:

The answer was RULE

38. Presenting the rule first and the examples later is one order format Evans, Homme, and Glasser (1962) catalogued in their 'RU-EG' system. The more _____ statement is presented first and the specific statement is presented second.

A. Specific
B. General
C. Correct
D. Incorrect

Type your answer here:

The answer was GENERAL
39. The rule-then-example frame format is deductive. It moves from the general to the _____.

A. Rule
B. Concept
C. Frame
D. Specific

Type your answer here:

The answer was SPECIFIC

40. But the format can be reversed; the direction can be inductive. Then, the student is required to draw a conclusion and supply the appropriate _____ that has been exemplified.

A. Example
B. Rule

Type your answer here:

The answer was RULE

41. 'Keep it simple' is a good rule for frame construction. A frame should ordinarily introduce only one rule at a time. The introduction of too much material at once in a frame will reduce the likelihood of a correct _____.

A. Answer
B. Frame
C. Rule

Type your answer here:

The answer was ANSWER
42. New programmers tend to compress too much into each frame in an effort to save time. But this is a bad policy because it doesn't strengthen separate responses adequately and may increase the probability of _____.

A. Reinforcement
B. Success
C. Error
D. Correct response

Type your answer here:

The answer was ERROR

43. A 'lecture' frame may contain a great deal of new information (i.e., new intraverbal connections). It is a poor programming technique because it does not give an opportunity for the student to _____ and earn reinforcement.

A. Prompt
B. Respond

Type your answer here:

The answer was RESPOND

44. A frame that presents new (and possibly unnecessary) material without the opportunity for the student to actively respond is often called a _____ frame.

A. Lecture
B. Good
C. Instructional
D. Review

Type your answer here:

The answer was LECTURE
45. A programmer uses an outline he or she has derived from the rule matrix(s). This outline is the order of concepts and rules for the program in general. But when actual frames are to be constructed, it is helpful to specify the order of material within frames in advance of actually constructing them. An outline of rule-example and example-rule sequences should be constructed _____ the actual composition of sentences within each frame.

A. Before
B. After

Type your answer here:

The answer was BEFORE

46. A solid building is constructed from a good blueprint. A builder does not start out just nailing one board to the next, he or she schedules and orders the construction activity. A programmer is chaotic when he or she begins to compose frames without some sort of blueprint. The blueprint or _____ of rules and examples should be determined by matrix inspection before a frame is composed.

A. Order
B. Sequence
C. Outline
D. All of the above

Type your answer here:

The answer was ORDER, SEQUENCE, and OUTLINE

47. The answer a student is to give to a frame is derived from the list of rules and concepts that is the backbone of the program. The programmer's choice of the answer required by a frame will influence the content organization within the frame. Therefore, the answer should be determined _____ the frame is composed.

A. Before
B. After

Type your answer here:

The answer was BEFORE
48. Both the answer and the _____ of the rule and examples within a frame should be determined before a frame is composed.

A. Number
B. Order

Type your answer here:

The answer was ORDER

49. A program is far from being complete when the author has finished the first edition of the frame series. While concepts and rules may be well ordered, gaps in the knowledge of the programmer will sometimes result in weak or inaccurate frames. The next step after completing the first complete 'rough draft' of frames is to have another _____ in the subject matter field edit for technical accuracy.

A. Student
B. Programmer
C. Expert

Type your answer here:

The answer was EXPERT

50. Experts don't know everything, however. A careful review by an additional expert may discover technical inaccuracy, but it may not indicate whether a program is adequate for the predicted student population. Two experts may agree that the frames are technically accurate and well-ordered, yet students may make many _____ while working through the program.

A. Errors
B. Responses

Type your answer here:

The answer was ERRORS
51. The limits of automated instruction are unknown. It is often said that there are many skills that cannot be taught with a teaching machine, social interaction, for example. But many of these content areas await creative programmers. Many components of social interaction, for example, can be taught separately. A so-called 'real life' situation might come near the end of instruction. The process could be facilitated by a teaching machine. Instruction in the 'real' situation might be more rapid if a person could be first taught to _____ what he would do.

A. Do
B. Say

Type your answer here:

The answer was SAY

Congratulations, you have reached the end of this instructional program.

Please enter the current clock time here:

Thank You

Press Enter:

This would be a good opportunity to take a short break if you care to do so. Please enter 6 at the a:> prompt to begin the posttest.

Press Enter:
Appendix D

Pilot Research and Development of Paper-Based Programmed Instruction
Prior to the research described in Chapters 2, 3, and 4, I developed paper-based instructional materials to teach the eight basic contingencies described in *Elementary Principles of Behavior* (Malott, Whaley, & Malott, 1993). I first developed a multiple-choice test (Appendix E) to assess the extent to which students, after completing Psychology 360, could correctly classify novel examples of contingencies, based on plain-English descriptions. Undergraduate students averaged 60% correct (n = 60); whereas Malott’s graduate students averaged 90% correct (n = 10). Thus, I determined that there was significant room for improvement and materials development was justified.

The project had two main goals: (1) to develop a short set of materials that could be used in a class based on *Elementary Principles of Behavior* (Malott et al., 1993), and (2) to use those materials to conduct research on overt responding in programmed instruction. The experimental questions to be asked were as follows: (1) Does overt responding increase learning? (2) Is discrimination training sufficient when the terminal objective is discrimination, or will construction responding further increase learning? Thus, three versions of the materials needed to be developed; they were a program requiring discrimination and construction responses, one requiring only discrimination responses, and one requiring no overt responding. The version requiring both discrimination and construction responses is presented in Appendix F.

I spent two semesters developing and testing the materials. Throughout that time, I failed to produce reliable pretest-to-posttest improvements with any of the three versions.
Appendix E

Pilot Research Pretest / Posttest
Conceptual Test:
The 8 Basic Contingencies

The following are examples of the 8 basic contingencies, as taught in Dr. Malott's Psy 360/510/610. For each scenario, choose one of the following options.

0. Reinforcement
1. Escape
2. Punishment
3. Penalty
4. Avoidance of the loss of a reinforcer
5. Avoidance of an aversive condition
6. Punishment by the prevention of the presentation of a reinforcer
7. Punishment by the prevention of the removal of an aversive condition

1. Susie is climbing a tree when she hears a slight cracking sound. Shortly thereafter, the limb she is on breaks and she falls to the ground. Thud! Ouch! Later that day she is back to climbing trees. Once again she hears that familiar cracking sound. This time she quickly crawls back to the trunk of the tree. Thus, she does not fall when she otherwise would have. With regard to falling, what type of contingency is responsible for Susie's crawling off of the cracking branch?

Answer:

2. You are walking leisurely across the parking lot at the mall on a busy shopping day. You are about half way to your car when it begins to rain heavily. You run to your car, dive in, and close the door. You're drenched, but at least your out of the rain now. What type of contingency is responsible for your running, rather than walking, to your car?

Answer:

3. Young Herbert is sitting quietly at the dinner table with his sister Sally. His mother is just about to give him his favorite meal when he reaches over and slugs Sally in the arm. Sally begins to cry and Herbert's mother withholds his meal for 5 minutes. Herbert is less likely to slug Sally due to which type of contingency?

Answer:

4. Billy is on the playground minding his own business when one of the older boys puts him in a head lock. The older boy says, "I'll let you go if you admit you're a pansy." Billy quickly admits "I am a pansy," but just when he is about to be released he adds "you %$#@ jerk." The older boy now holds Billy in the head lock until he admits once again that he is a pansy, without the profanity this time. What type of contingency is decreasing Billy's likelihood of swearing at the older boy next time he puts him in a head lock?

Answer:
5. I have horrible vision. As usual, I woke up this morning barely able to see because wasn’t wearing my glasses. I fumbled about for a second or two, then immediately slipped on my glasses. Suddenly I could see everything. More to the point, I could read that novel I’d set down the night before. What type of contingency keeps me putting my glasses on each morning?

Answer:

6. Once again Herbert is sitting quietly with his sister Sally. This time they are watching one of their favorite movies. Sally and Herbert begin to argue. Immediately their mother steps in. She turns off the TV. Herbert and Sally will now have to wait a few minutes before they can continue watching. Assuming they are less likely to argue in the future, what contingency is in operation here?

Answer:

7. About a week later, Herbert and Sally are watching another movie. They begin to argue. They have learned from experience that their mother will turn off the TV when they argue. Fortunately, they have also learned something else. If they apologize to each other right away, their mother will allow them to continue watching TV without interruption. What type of contingency is controlling apologizing?

Answer:

8. I was in the park one day watching two squirrels. Each of them was gathering nuts. After about 20 minutes, one of them scurried over and grabbed one of the other squirrels nuts. The other squirrel immediately pounced on the thief and began to chatter loudly. After another 10 minutes, the same thing happened again. Soon, the one squirrel was constantly grabbing the other squirrels nuts and the other squirrel was chattering and pouncing wildly. Aside from the comedy of the situation, I noticed a possible contingency supporting the behavior of the thieving squirrel. What type of contingency was it?

Answer:

9. You are baby sitting for some neighbor kids and you decide to have a picnic. In the middle of the picnic, the family dog steals the potato chips, much to the distress of the kids. You decide to be the hero and grab the chips from the dog. Just as you reach for the bag, the dog bites down hard on your arm. My guess is you’d be less likely to try to take food from a dog in the future. Why?

Answer:

10. In the process of driving down the road you make a large number of steering responses. If you didn’t steer appropriately, you’d surely crash into something. With regard to potential injury, what type of contingency keeps you making these steering responses?

Answer:
11. You’re playing a game of pinball in the Bernhard Center between classes. You very much enjoy the flashing lights, the sounds, and the sight of the silver ball bouncing around. They have become reinforcers. In the process of the game, you bump the machine from time to time (you use a bit of English). On many occasions, you have bumped the machine and managed to keep the ball in play. What type of contingency is supporting this behavior?

Answer:

12. Later in the game, you bump the machine just a little too hard. The machine flashes “TILT, TILT” and the little silver ball rolls out of sight. The game is over. What type of contingency is responsible for your decreased likelihood of hitting the machine so hard in the future?

Answer:

13. I went to the dentist recently to have a cavity filled. It was a rather deep cavity, thus it’s very sensitive to temperature. So when I took a nice cold drink of water, it produced a rather unpleasant sensation in my tooth. Over the course of the next few days, I noticed a significant decrease in the amount of cold water I was drinking. What type of contingency is responsible for this decrease?

Answer:

14. While I was having my cavity filled, the dentist told me to raise my hand if the drilling became painful. Most of the time, it didn’t hurt at all. The dentist had effectively numbed my entire mouth. Eventually, the dentist was drilling deep into a sensitive area. I raised my hand a bit and immediately he stopped drilling. He started again and all was fine. The next time the drilling began to hurt, I was a little quicker to raise my hand. What contingency is in effect on hand raising?

Answer:

15. You have a “friend” who seems to be unable to shut up. Whenever he starts talking, he seems to just ramble endlessly as long as someone is paying attention. When you first met him, you would be courteous and acknowledge what he said. Over time you became less and less likely to acknowledge his talking, even if it were occasionally interesting, because when you did, he’d talk even longer. What type of contingency is responsible for your decrease in acknowledgment?

Answer:
16. I'm a rather sadistic uncle, so I'd occasionally do things to my niece that the rest of my family didn't think was very nice. Here's an example: If my niece was being loud and getting on my nerves I'd say, "If you can sit quietly on the couch for 2 minutes I'll give you a piggy back ride." The first few times, she'd sit down, but soon she'd be up and being noisy again. After some practice, she was able to sit perfectly still and silent, so I'd give her the piggy back ride as promised. Over time I'd increase the requirement, until she could sit still for incredibly long periods of time. What contingency is responsible for her decrease in getting up and being noisy?

Answer:

17. Incidentally, what sort of contingency was probably controlling my saying, "If you can sit quietly on the couch for 2 minutes, I'll give you a piggy back ride"?

Answer:

18. A few years ago I worked with a developmentally disabled client named Todd. Todd would often walk into the kitchen at inappropriate times and steal food from the refrigerator. Since Todd had a weight problem, the staff decided to intervene. Whenever he would go into the kitchen they would gently turn him around and escort him to his room. The plan was to decrease his food stealing. In actuality, Todd began to steal food more frequently. What type of contingency did the staff add for Todd's food stealing behavior?

Answer:

19. Todd had another interesting behavior problem. Whenever the staff would try to teach him something new, he would begin to hit himself in the head. Of course, this would immediately stop the lesson for a few seconds. When he calmed down, they would resume. This made it very difficult to teach him anything. What type of contingency is most likely maintaining Todd's hitting himself in the head?

Answer:

20. April is an autistic child. A common problem with autistic clients is that they are quite antisocial. Most of the time April would sit alone and watch TV, only occasionally emitting any social behavior. The staff working with her wanted to change that. Whenever April would engage in any social behavior (making eye contact, walking toward someone, making speech sounds, etc.), the staff would immediately give her praise and attention. After only one month of intervention, April had completely stopped emitting social behavior. The intervention has failed. What type of contingency had the staff implemented?

Answer:
Conceptual Homework

The 8 Behavioral Contingencies

This homework assignment is designed to teach (or build on your knowledge of) the concepts of the 8 direct-acting contingencies, as discussed in *Elementary Principles of Behavior* by Malott, Whaley, and Malott. It may be used as an introductory training exercise, or as an exercise to enhance conceptual development.

**Reinforcement**

For the first part of this homework assignment, we’ll review the concept of reinforcement. Just as a reminder, let’s review the definition:

*Definition: Concept Reinforcement Contingency*

- Response-contingent,
- immediate presentation
- of a reinforcer,
- resulting in an increased frequency of that response.

Let’s take a look at a standard Skinner-box example.

Ryan the rat is wandering around the Skinner box, and he happens upon an interesting object protruding from the wall. He sniffs it a few times, and the object moves slightly. Immediately, he receives a pellet of food from a nearby dispenser. Ryan sniffs and presses the object (a lever) again. Again he receives a pellet of food. Ryan presses the lever more and more frequently as time goes on.

Please diagram the contingency on lever pressing.

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<th>Before</th>
<th>Behavior</th>
<th>After</th>
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Following each lever press, Ryan receives a pellet of food.

1. Does the above scenario describe a reinforcement contingency for lever pressing?
   - 0. Yes
   - 1. No

Naturally, someone as bright as you had no trouble with that one. The experimenter was reinforcing lever pressing by presenting contingent food. Now, let’s take a look at something slightly more complex.

Billy (the human) bought himself a guitar. He had spent some time learning where the notes are (at least some of them) and he wanted to play an actual song. Not being very experienced, he selected a nice simple song from his guitar lesson book — Yankee Doodle. It wasn’t his favorite song, but he had heard it before and could be sure, by sound, if he was playing it correctly. He read the notes from the book, “CCDECED CCDECBC CCDEFEDC BBBBBCC.” Then, he tried to play. The first time was very slow, but he had it right. The second time it sounded a little better. After a short time, he was playing it at the right speed over and over again. No mistakes. That sounds good.
Please diagram the contingency described above for playing Yankee Doodle.

Before | Behavior | After

Each time Billy played Yankee Doodle, he heard what he was playing. Playing produced the sound of the song.

2. Does the above scenario involve a reinforcement contingency for playing Yankee Doodle?
   0. Yes
   1. No

I'd bet you didn't have any trouble with that one either. We've gone out of the Skinner box, but it's still reinforcement. It's reinforcement because each time he played the song, he heard the sound of the song, and his behavior became faster and more accurate. By the way, be thinking about the checklist of criteria for diagramming behavioral contingencies while you're doing this. I may try to sneak one by you.

Let's move on to the next scenario.

Dr. Malott woke up today with a voracious appetite, as usual. Being a health fanatic, he always starts his day with a large dish of rolled oats (not those wimpy "quick oats" some people heat in the microwave, but the real thing). He puts the oats, water, some apple juice, hunks of fruit, and cinnamon in a pan and sets it on the stove to cook. Then he sits down on the floor to stretch for awhile, while he waits for the oats. After about 20 minutes, he has a delicious breakfast to eat. Not doubt, he'll be cooking oats again tomorrow.

Dr. Malott receives a delicious pan full of cooked oats about 20 minutes after putting the ingredients in the pan.

3. Does the above scenario describe a reinforcement contingency for putting the ingredients in the pan?
   0. Yes
   1. No

It looks like a reinforcement contingency because he is able to eat the oats after he puts the ingredients in the pan, but it isn't. The delay is too long for reinforcement. We'd call this an analog to reinforcement.

Diagram the contingency for eating the oats.

Each time Dr. Malott takes a bite, he tastes those delicious oats.

4. Is there a reinforcement contingency described for eating the oats?
   0. Yes
   1. No

Dr. Malott will taste those delicious oats as soon as he starts eating, and eating is maintained by the taste of the oats, so that's reinforcement.

**Escape**

Now it's time to add another concept. But, don't lose track of the concept of reinforcement. I'll keep bringing up old concepts throughout the homework. I wouldn't want you to “forget” about one concept each time
we start talking about a new one. Anyway, let’s review the definition of escape before we do anything else.

**Definition: Concept**

**Escape Contingency**

- Response-contingent,
- immediate removal
- of an aversive condition,
- resulting in an increased frequency of that response.

That sounds a lot like reinforcement, doesn’t it? In fact, the only change is that, instead of presenting a reinforcer, we are removing an aversive condition. The future frequency of the response will still be increased.

Now that we’ve had a chance to look at the definition, let’s get to the scenarios.

We stop by the lab to visit our pal Ryan the rat, only to notice that his friend, Rudolph, is receiving a mild shock. Ouch! He presses the lever quickly and the shock is removed. Ahhh, that’s better. The shock is presented several more times. Each time the shock is presented, Rudolph presses the lever and the shock is immediately removed.

Please diagram this contingency.

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<th>Before</th>
<th>Behavior</th>
<th>After</th>
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Here it is: the shock comes on, Rudolph presses the lever, and the shock is removed.

5. What type of contingency is described in the scenario above?
   0. Reinforcement
   1. Escape
   2. None of the above

Okay, now we’ve looked at escape in the Skinner box, but let’s try it with humans (not the shock, the concept).

Joel is in his bathroom. Wow, did that smell come from him? That’s disgusting. He runs as fast as he can from his bathroom. Whew! He can breath again.

Please diagram this rather disgusting contingency on Joel’s running from the bathroom.

Before | Behavior | After

Joe is in the bathroom with an unpleasant stench. When he runs from the room, he can no longer smell it.

6. What type of contingency is described in the scenario above?
   0. Reinforcement
   1. Escape
   2. None of the above

You got it, Joel effectively escaped the aversive stench by running out of the bathroom.

Well, maybe we should take a look at a less repulsive example. Let’s go visit our friend Beth. You might not know her yet, but I’m sure you’ll like her.

Beth is really hungry. She drives to the nearest Taco Bell (not exactly gourmet, but it’ll do). When she gets there, she orders a 7-layer burrito and devours it as quickly as she can. Whoa! She can eat pretty fast. Each time she takes a bite of that burrito she gets a nice pleasant taste in her mouth.

Please diagram the contingency involving Beth’s devouring a burrito.

Before | Behavior | After

I hope you weren’t thrown off by my mention of Beth’s hunger. The actual

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environmental stimulus in this example is the food. Beth has no food in her mouth, she takes a bite of her burrito, she has food in her mouth.

7. What type of contingency is described in the above scenario.
   0. Reinforcement
   1. Escape
   2. None of the above

That one was a little tricky. Hunger (or food deprivation) just makes each bite of food more of a reinforcer. It's still reinforcement (by the presentation of food).

Now let's see what my friend Todd is up to.

Todd is a little bit squeamish. He is watching an episode of *Tales from the Crypt* with some friends. Despite the teasing he'll receive, he covers his eyes when two twins are cutting a man in half, so they can share him. Yick!

Please diagram the contingency on Todd's covering his eyes.

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</table>

Originally, Todd sees a disgusting sight on television. Then he covers his eyes and can no longer see it.

8. What type of contingency is described in the above scenario?
   0. Reinforcement
   1. Escape
   2. None of the above

We might be getting a bit repulsive again, but that's escape (from the aversive scene). Well, on that slightly gruesome note, let's check out another concept.

---

**Punishment**

Sometimes I wish this type of contingency didn't happen, but I'm glad it changes my behavior.

*Definition: Concept*

**Punishment Contingency**
- Response-contingent,
- Immediate presentation
- Of an aversive condition,
- Resulting in a decreased frequency of that response.

Notice how similar this definition is to the definition of reinforcement. There are two fundamental differences: (1) the stimulus being presented is an aversive condition, rather than a reinforcer, and (2) the future frequency of the response decreases, rather than increases. Notice that it still involves the presentation of a stimulus.

Now let's go to a Skinner box scenario.

We visit Ryan the rat again. Ryan is still pressing the lever, and he's still getting food following each press. But, now he also receives a mild electric shock following each press. Hey, that smarts! We take a look at the data kept on a nearby computer and notice that, since the shock has been following lever presses, there has been a significant decrease in Ryan's lever pressing.

There are two contingencies described in the above scenario. First, please diagram the contingency involving the delivery of *food*.

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This is the same contingency we diagrammed earlier. Each lever press produces a pellet of food.
9. Just for a refresher, what type of contingency is this?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. None of the above

Now let’s move on to the contingency involving the presentation of the electric shock.

10. Because the rate of lever pressing decreases, some students have said the behavior is “not pressing the lever” or “pressing the lever less.” What is wrong with those “behaviors?”

11. What is the behavior of interest in this case? ______________________

   ![Before Behavior After Diagram]

In this case, we are interested in the shock. Each lever press produces an electric shock.

12. After the experimenter started delivering shock contingent on lever pressing, the rate of lever pressing ...
   0. Increased
   1. Decreased

13. What type of contingency is this?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. None of the above

Remember, even though we don’t always mention it, there is always a reinforcement contingency (in this case, food presentation) maintaining the response in any punishment contingency (in this case, presentation of the shock).

Well, let’s leave the rat lab now. Don’t worry, we’ll come back again soon. For now, let’s go grab something to drink.

---

I made myself a cup of tea earlier today. I boiled the water, put a tea bag in my cup, poured the boiling water in the cup, and took a big drink. Yow! I should have waited. Boiling water sucks! Next time I won’t take a drink so soon.

Please diagram this contingency.

![Before Behavior After Diagram]

On such occasions, when I take a drink too soon, I get hot tea in my mouth.

14. What type of contingency is described in the above scenario?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. None of the above

Yup, that scalding tea punished my response of drinking so soon. Let’s move on to another occasion where I had some problems with hot food.

I was eating over at my friend Morshed’s house a few years ago. He had cooked some Indian dishes that I had never tried before. One of them, I forget the name, was particularly good, and rather spicy. He told me it had a specific type of pepper in it and offered me one. I’d eaten a lot of peppers, so I didn’t think it could be that bad. I ate the pepper in one quick bite. After a few seconds my mouth began to burn like it had never burned before. I began to eat bread and drink water like mad. Each bite of bread, or drink of water, made my mouth burn just a little bit less.
The above example was a bit long, so let's deal with one behavior at a time. First let's analyze the bread eating.

Before Behavior After

Like it says in the example, each bite of bread reduced the burning sensation in my mouth; making it less painful.

15. What type of contingency is described for eating bread?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. None of the above

Now let's look at eating the pepper.

Before Behavior After

Yes, when I ate the pepper, I received a burning sensation.

16. What type of contingency is described for the response of eating the pepper?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. None of the above

I hope you weren't tricked by the fact that both contingencies involved an aversive condition. I was able to reduce the aversive burning sensation by eating bread (escape), but that same burning sensation punished my pepper eating behavior.

Incidentally, there is another, related contingency that I think is worth looking at.

In the past, I have eaten many peppers. I've eaten banana peppers, jalepeño peppers, etc. I even drank hot salsa at a restaurant once. Usually, I eat the peppers when my friends are around. My friends usually get excited and give me plenty of macho slaps on the back. Sometimes they even buy me a drink.

Please diagram the contingency that has been operating on my pepper eating behavior.

Before Behavior After

Historically, I have received attention, back slaps, and even beer, contingent on eating hot peppers.

17. What type of contingency is described in the above scenario?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. None of the above

You got it, that's a reinforcement contingency maintaining my pepper eating. It's time to move on to another concept.

**Penalty**

You'll probably notice that this concept is similar to punishment, but with a critical difference. In penalty, we remove a reinforcer, rather than presenting an aversive condition. Either way, future responding decreases.

**Definition: Concept**

**Penalty Contingency**

- □ Response-contingent,
- □ immediate removal
- □ or a reinforcer,
- □ resulting in a decreased frequency of that response.

It's also similar to escape. In either case we're removing a stimulus. In the case of escape, we're removing an aversive condition, and response rate increases. In the case of penalty, were removing a reinforcer, and response rate decreases.
Now let’s return to the rat lab.

Ryan’s sister, Rhonda, is in the Skinner box. The arrangement is slightly different than what we’ve seen before. There is a container of food in the corner (and Rhonda is food deprived). Whenever Rhonda presses the lever, she receives a drop of water. Also, the container of food is removed from the chamber for 10 seconds. Because Rhonda has been deprived of water, she presses the lever fairly often, but not as often as she would if the food wasn’t removed after each lever press.

Please diagram the contingency involving the food.

Before Behavior After

| => | => |

There is food in the Skinner box, but each lever press removes it for 10 seconds.

18. What type of contingency is this?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. Penalty
   4. None of the above

How about the contingency involving the water.

Before Behavior After

| => | => |

20. What type of contingency is the one involving George’s getting up and losing his chair?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. Penalty
   4. None of the above

Now we’re talking about a situation in which each lever press produces a drop of water.

19. What type of contingency is that?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. Penalty
   4. None of the above

Excellent! The lever press was being concurrently reinforced, by the presentation of water, and penalized, by the removal of food. Now let’s move on to some human examples.

George was at the bar one night, and he saw a friend of his walk by his table. As soon as he got up to talk to his friend, someone else sat down in his chair. How annoying! At least he got to talk to his friend.

Please diagram the contingency involving the chair.

Before Behavior After

| => | => |

The result of getting up from where he was sitting was that George lost his chair. He had a place to sit, the he lost it when he went to talk to his friend.

21. What type of contingency is that?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. Penalty
   4. None of the above

Getting up produced the opportunity for George to talk to his friend.

18. What type of contingency is this?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. Penalty
   4. None of the above

20. What type of contingency is the one involving George’s getting up and losing his chair?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. Penalty
   4. None of the above

21. What type of contingency is that?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. Penalty
   4. None of the above
Yep, just like in the Skinner box, we have a reinforcement contingency (involving being able to talk to a friend) and a penalty contingency (involving the loss of a chair). Since we’re at the bar, let’s sit down and have a drink.

We’re sitting at the bar and we’ve just ordered our drinks. We each have a glass of our favorite beer (I hope you’re at least 21). We start talking about the last time we were out dancing. I, being flamboyant and uncoordinated, make a gesture and knock my beer to the floor. Well, with any luck, I’ll not do that again.

Diagram the contingency described for my making the flamboyant gesture.

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I had a beer, then I made a silly gesture (much like my dancing), and I lost that beer.

22. What type of contingency is described in the above scenario?
0. Reinforcement
1. Escape
2. Punishment
3. Penalty
4. None of the above

That’s right, penalty by the loss of a beer. All right, let’s take a look at another situation. We’d better leave the bar now, before I spill something else.

Since I spilled that beer before I had a chance to drink any, I guess it’s safe to drive home. In the car, I’m listening to the radio. I can’t hear the radio very well, so I reach down to turn it up. Unfortunately, I hit the tuning button instead of the volume button. Now the R.E.M. song I was listening to is gone, at least temporarily (it may be worth mentioning that I like R.E.M.).

Diagram the contingency on hitting the tuning button.

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Let’s see, I was listening to an R.E.M. song, then I hit the button. Hitting the tuning button removed the song.

23. What type of contingency is described in the above scenario?
0. Reinforcement
1. Escape
2. Punishment
3. Penalty
4. None of the above

Sure enough, my behavior is being penalized by the loss of a reinforcing song. I’d really have preferred to keep listening to that song.

**The four basic contingencies**

Now that we’ve introduced the four basic contingencies, let’s take a look at some more examples of each. You’re probably already so sharp that you’ll be able to classify each of these examples correctly.

Let’s return to the scenario with me in the car. When that R.E.M. song went away, I also heard a loud, crackling “white noise” that I’d generally prefer to not hear.

Diagram the “white noise” contingency.

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My hitting the tuning button had the unfortunate consequence of producing white noise.
24. With regards to the white noise, what type of contingency is described in the above scenario?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. Penalty
   4. None of the above

Notice that more than one contingency can be in operation at the same time. We can have a situation in which a reinforcer is removed (the loss of the song) and an aversive stimulus is presented (the presentation of the white noise). Thus, both penalty and punishment are in effect.

Let's stick with the radio example a little longer. Once I hear the white noise, I immediately hit the tuning button again until the white noise goes away. When the white noise goes away, the R.E.M. song comes back on. Now I'll adjust the volume so I can hear it better.

Let's take a closer look at this new contingency involving the white noise.

Before | Behavior | After
--- | --- | ---
⇒ | ⇒

This time, hitting the tuning button is removing the white noise.

25. With regard to the removal of the white noise, what type of contingency is described in the above scenario?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. Penalty
   4. None of the above

How about the R.E.M. song? How is that affecting behavior now?

Before | Behavior | After
--- | --- | ---
⇒ | ⇒

The R.E.M. song is now being presented contingent on pressing the tuning button.

26. What type of contingency is the one involving the presentation of the R.E.M. song?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. Penalty
   4. None of the above

That's right, you can have both an escape contingency (involving the removal of the white noise), and a reinforcement contingency (involving presentation of the song) in effect at the same time, too. Watch out for that type of example. Don't let them throw you off. You have to keep focused on the stimulus and response currently being discussed.

Now let's try some more.

Last Easter, my girlfriend gave me a stuffed frog that croaks out a song when you squeeze its foot. I liked it so much that I would squeeze it two or three times a day. Unfortunately, my roommate didn't like it as much as I did. Every time I squeezed the frog's foot, I'd hear the song, but then my roommate would take my frog away for about 30 minutes. It didn't take long before I stopped squeezing the frog's foot.

Diagram the contingency involving the frog's "singing."

Before | Behavior | After
--- | --- | ---
⇒ | ⇒

Diagram the contingency involving the frog's "singing."
Each time I'd squeeze the foot, I'd hear the singing. Don't forget, I began to increase my squeezing.

27. What type of contingency is that?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. Penalty
   4. None of the above

How about the contingency imposed by my roommate?

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My roommate would remove my frog (take it from me) every time I'd squeeze it's foot.

28. What type of contingency is that?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. Penalty
   4. None of the above

Right again, concurrent contingencies: reinforcement by the presentation of a frog song, and penalty by the removal of the frog. Let's look at another example.

I used to have a client named Jaci. Jaci was a developmentally-disabled child who didn't tie her shoes very often. One of my coworkers thought it would be a good idea to make her a nice breakfast (instead of cold cereal), every morning that she tied her shoes by herself. So for a month, every day Jaci tied her shoes, my coworker would prepare waffles (Jaci's favorite).

Diagram the contingency described above for Jaci's shoe tying.

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Whenever Jaci ties her shoes, my coworker would make her waffles. When they were cooked, Jaci would receive waffles.

29. What type of contingency is described in the above scenario?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. Penalty
   4. None of the above

Well, that sure sounds like reinforcement, but it's not. From the time Jaci tied her shoes, to the time she was able to taste the food, was too long. It takes time to cook waffles. As you can guess, we had to modify the intervention.

When that intervention failed, we decided to try something more immediate. Jaci really enjoyed watching morning cartoons, so we decided to use cartoons in our intervention. Each morning that Jaci tied her shoes, we would immediately turn on the TV and let her watch cartoons for 30 minutes.

Diagram this new contingency for Jaci's shoe tying.

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This time, whenever Jaci tied her shoes, she received the sight of cartoons.

30. What type of contingency is described in the above scenario for Jaci's shoe tying?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. Penalty
   4. None of the above

That intervention worked wonders. After only two weeks, Jaci tied her shoes every day. That's what I call reinforcement!
Avoidance of an aversive condition

Now, let’s move on to another type of contingency. We will be looking at four more types. This second set of four is slightly more complex. They involve the prevention of an otherwise-scheduled stimulus change. Let’s check out the definition of the first of this second set of contingency types.

**Definition: Concept**

Avoidance Contingency

- Response-contingent,
- Immediate prevention
- Of an aversive condition
- Resulting in an increased frequency of that response.

That’s right, we’re not presenting or removing anything. We’re preventing the presentation of an aversive condition. Notice that this increases the frequency of responding. Now let’s check back with those rascally rats in the Skinner box.

Ramone the rat is wandering around the Skinner box. Soon a brief shock comes on. Ouch! When the shock is over, Ramone keeps wandering around. This keeps happening for quite some time. Every 30 seconds, the shock comes on. After a while, Ramone bumps into the lever. Nothing happens. More importantly, the next scheduled shock doesn’t happen. It doesn’t take too long before Ramone is pressing the lever about every 25 seconds and not receiving any shocks.

This is a tad strange. Ramone will receive a shock if he does nothing. If he presses the lever, the next scheduled shock will not occur. Lever pressing prevents the shock.

31. What type of contingency is described above?

0. Reinforcement
1. Escape
2. Punishment
3. Penalty
4. Avoidance of an aversive condition
5. None of the above

You got it. That’s avoidance. We now have a rat that is seemingly pressing a lever that’s producing nothing. That looks a little odd, but we have to keep our eye on what would happen if the rat failed to respond. If the rat did nothing, it would get a shock. If it responds, it doesn’t get shocked. Let’s look at a human situation.

Sue walks outside on a nice sunny day. She sees a large, growling dog in her yard. In the past, Sue has been bitten by large growling dogs, so she goes back inside. No more growling dog, no chance of getting bit.

Diagram the contingency involving Sue walking into the house and the possibility of being bitten by the dog.

Before | Behavior | After

In this case, Sue will be bitten by the dog, if she doesn’t do anything. Walking into the house will prevent that from happening.
32. What type of contingency is described in the above scenario involving the possibility of being bit by the dog?
0. Reinforcement
1. Escape
2. Punishment
3. Penalty
4. Avoidance of an aversive condition
5. None of the above

Sure enough, that's another instance of avoidance. If Sue did nothing, she'd get bit. If she goes back inside, she won't. I hope the other contingency, involving the sight of the dog, didn't throw you off.

Let's analyze that contingency now.

Before Behavior After

⇒⇒

This time, Sue already sees and hears the growling dog. Going back inside removes the sight and sound of the dog.

33. What type of contingency is described in the above?
0. Reinforcement
1. Escape
2. Punishment
3. Penalty
4. Avoidance of an aversive condition
5. None of the above

Right again, that's escape. The growling dog is what we call a warning stimulus. A warning stimulus is an aversive condition, so it's removal will increase behavior. Avoidance contingencies will often involve an escape contingency. Theoretically, there is an escape contingency for every avoidance contingency. But, we call it avoidance if there is an aversive outcome that is being prevented, whether we know about the warning stimulus or not.

Whew! That's enough theory for now. Let's go check on my friend April.

April walks to class every day. She used to cut across peoples' yards, to save time. One day, she was cutting across someone's backyard, and she was bitten by a large, growling dog. Since then, she has been much less likely to cut across people's yards. She almost always walks on the sidewalk, goes around everyone's backyard, and stays clear of that yard with the dog, in particular.

Now, diagram the contingency involving walking across backyards and encountering the dog.

Before Behavior After

⇒⇒

When April walked across a backyard, she was bitten by a dog. If she hadn't done that, she wouldn't have been bitten.

34. What type of contingency reduced the likelihood of April walking across peoples' yards?
0. Reinforcement
1. Escape
2. Punishment
3. Penalty
4. Avoidance of an aversive condition
5. None of the above

That one was a little tricky. Many people would say avoidance, but I bet you didn't. This is just plain, old punishment causing a decrease in April's rate of yard crossing. When April crossed the yard, she got bit. If she did nothing (much like a dead man), she wouldn't get bit. Now, let's look at another scenario.

I used to live in an old house in the "student ghetto" area. As with many old houses, this one had some plumbing problems. Sometimes the temperature of the water would change dramatically, right in the middle of my shower. I'd be comfortably...
washing my hair and, all of a sudden, I'd be drenched with scalding water. Fortunately, about 5 seconds before this happened, the pipes would begin to make a high-pitched squeaking sound. Whenever I heard that sound, I would step out of the way of the water, and wait until the temperature returned to normal.

Let's diagram the contingency involving the hot water.

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Essentially, I'd be scalded with water in about 5 seconds, but if I move out of the way, I won't be scalded.

35. What type of contingency was controlling my stepping out of the water?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. Penalty
   4. Avoidance of an aversive condition
   5. None of the above

Did you put avoidance? If so, excellent! I was able to prevent getting blasted with scalding water by stepping out of the way. If you said escape, you were probably paying attention to the wrong stimuli. The question above is asking about the contingency involving hot water, not squeaking pipes. Let's move on.

**Avoidance of the loss of a reinforcer**

That's right, there's another type of avoidance. Let's check out the definition.

**Definition: Concept**

**Avoidance-of-Loss Contingency**
- Response-contingent,
- Immediate prevention
- Of the loss of a reinforcer
- Resulting in an increased frequency of that response.

Notice that both types of avoidance increase responding. The difference is that one involves the prevention of an aversive condition, while the other involves the prevention of losing a reinforcer.

Let's take a look at a rather complex situation in the Skinner box. I'll break it down into chunks, because otherwise I may lose track of what I'm saying.

**Ryan the rat is back in the Skinner box. As you may recall, Ryan receives a pellet of food when he presses the lever.**

Let's diagram this contingency.

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Once again, lever pressing produces food.

36. Just for review, what type of contingency is this?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. Penalty
   4. Avoidance of an aversive condition
   5. Avoidance of the loss of a reinforcer
   6. None of the above

Okay, this reinforcement contingency is in effect whenever the light in the chamber is on, but not when it is off. (We'd call the light a discriminative stimulus, but that's off the subject.) We notice that there is something happening that we haven't seen before. About every 25 seconds, Ryan stops
pressing the lever, waddles across the Skinner box to where a chain is hanging down, and pulls the chain. Then, he returns to pressing the lever. The strange thing is, the chain pull doesn’t seem to do anything. We ask the experimenter what is happening and he informs us that, if Ryan doesn’t pull the chain, the light will turn off. Then, Ryan won’t have access to food. So, the light will turn off in 30 seconds, unless Ryan pulls the chain, and that light has become a reinforcer.

Yikes! That’s a lot to read at one time.

37. What will happen if Ryan doesn’t pull the chain?
   0. The light will turn off
   1. The light will turn on
   2. The light will not turn off
   3. He’ll receive food

38. What will happen if Ryan does pull the chain?
   0. The light will turn off
   1. The light will turn on
   2. The light will not turn off
   3. He’ll receive food

Let’s diagram the contingency controlling chain pulling.

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The light will turn off, unless Ryan pulls the chain. Chain pulling prevents the removal of the light.

39. What type of contingency is controlling Ryan’s chain pulling?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. Penalty
   4. Avoidance of an aversive condition
   5. Avoidance of the loss of a reinforcer
   6. None of the above

That’s avoidance of the loss of a reinforcer. The light is a reinforcer, because it is associated with the opportunity to get food. Thus, Ryan the rat will pull the chain, because chain pulling prevents the light from turning off.

Now it’s time to leave the lab and return to the human condition.

My friend Dan used to always get a treat when the ice cream truck came to his block. He and the other kids would run to the truck and buy treats. Unfortunately, there was a big bully on a bicycle that would often come by to steal the treats. If he was outside with his treat when the big bully on the bicycle arrived, Dan would lose his treat to the bully. Fortunately, the big bully on the bicycle had a bell on his bike. When Dan heard the bell, he’d run into his house to eat his treat. That way, the bully couldn’t take it away.

Diagram the contingency controlling Dan’s running into the house.

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The bully on the bicycle will take away Dan’s treat, if he stays outside. If Dan runs into the house, he will not lose his treat.

40. What type of contingency maintained Dan’s running into his house?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. Penalty
   4. Avoidance of an aversive condition
   5. Avoidance of the loss of a reinforcer
   6. None of the above

That’s right, avoidance of the loss of a treat (reinforcer). Running inside would prevent the bully from taking Dan’s treat. Now, let’s check on my friend Joel.
Joel is riding his horse. In the past, Joel would spend a lot of his riding time "horsing around." He'd try to ride standing up, ride backward, or other tricks. His parents would always tell him to stop and would not let him ride for a while, when they caught him trick riding. Now he spends almost all of his riding time correctly riding his horse.

Well, I didn't mention any contingency on riding the horse correctly. Presumably, there is a reinforcement contingency maintaining riding, but I didn't mention what it is, so let's analyze trick riding.

Before Behavior After

Whenever he would engage in trick riding, his parents would make him stop riding.

41. What type of contingency is most likely responsible for the decrease Joel's horsing around?

0. Reinforcement
1. Escape
2. Punishment
3. Penalty
4. Avoidance of an aversive condition
5. Avoidance of the loss of a reinforcer
6. None of the above

Some people try to analyze the correct riding as avoidance of the loss of the opportunity to ride, but you're too quick for that. Joel's parent's were using a penalty (specifically, time-out) procedure to reduce his trick riding. If he "horsed around," he had to stop riding for awhile.

Okay, let's look at another situation.

Jody is playing with her toys, as she often does on Sunday afternoons. There doesn't tend to be much else for residents to do in the psychiatric ward of the state hospital. One of the problem behaviors that the staff are working on is her inappropriate verbal behavior. Jody often talks about "the time when the doctor raped her" and other, similar events. Of course, none of these events ever really happened. Historically, the staff would go ask her what was wrong and tell her everything was going to be all right, but the problem just kept getting worse.

Diagram the contingency described for Jody's inappropriate verbal behavior.

Before Behavior After

Whenever Jody made an inappropriate statement, the staff would talk to her. Otherwise, she didn't get much attention.

42. What type of contingency is described above for inappropriate verbal behavior?

0. Reinforcement
1. Escape
2. Punishment
3. Penalty
4. Avoidance of an aversive condition
5. Avoidance of the loss of a reinforcer
6. None of the above

Even though the staff were trying to reduce those responses, there attention was reinforcing it.

Eventually, the hospital hired a behavior analyst, Beth. Beth had read Elementary Principles of Behavior, and she decided to stop reinforcing that inappropriate behavior and add another contingency. Now, every time Jody makes an inappropriate verbal response to a staff member, the staff member is supposed to take away her toys for 5 minutes.
Diagram the contingency Beth asked the staff to implement.

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Jody usually has toys she is playing with. Whenever she makes an inappropriate verbal response, the staff are supposed to remove those toys.

43. Assuming the staff do this, what type of contingency are they using?
   - 0. Reinforcement
   - 1. Escape
   - 2. Punishment
   - 3. Penalty
   - 4. Avoidance of an aversive condition
   - 5. Avoidance of the loss of a reinforcer
   - 6. None of the above

Unfortunately, the staff don’t use that penalty procedure perfectly. As soon as a staff member tells Jody her toys are going to be taken away, she will say something like, “I’m really sorry. I won’t be bad again. Please don’t take away my toys.” Not only that, she often starts to cry. The staff often will give in to this and let her keep playing.

44. What will happen if Jody sits quietly after she has emitted an inappropriate verbal response?
   - 0. She’ll receive toys
   - 1. She’ll lose her toys
   - 2. She’ll get to keep her toys

45. What will happen if she apologizes?
   - 0. She will receive toys
   - 1. She will lose her toys
   - 2. She’ll get to keep her toys

Diagram the contingency on Jody’s apologizing and crying.

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Jody will lose her toys, if she doesn’t do anything. If she apologizes (and cries), she will be able to keep her toys.

46. So, what type of contingency is maintaining Jody’s apologizing and crying?
   - 0. Reinforcement
   - 1. Escape
   - 2. Punishment
   - 3. Penalty
   - 4. Avoidance of an aversive condition
   - 5. Avoidance of the loss of a reinforcer
   - 6. None of the above

This new problem behavior is maintained by avoidance of the loss of toys (reinforcers). It’s time to move on to another concept.

**Punishment by the Prevention of the Presentation of a Reinforcer**

We’ve seen how prevention contingencies can be used to increase behavior, now let’s look at how they can be used to decrease behavior.

*Definition: Concept*

*Punishment-by-Prevention-of-a-Reinforcer Contingency*

- Response-contingent,
- Immediate prevention
- Of a reinforcer
- Resulting in a decreased frequency of that response.

In this type of contingency, a reinforcer will be given, unless the response occurs. Thus, the response prevents the reinforcer.

I worked at a group home for developmental disabilities a few years ago. I had a client named Jack. Jack had a tendency to scream...
and hit himself during lunch (or any other meal). My job during lunch was to feed him. I would give him a bite of food approximately every 20 seconds. That’s just enough time for him to chew. But, if he screamed and/or hit himself, I would wait 30 seconds. After a few days of this, he rarely hit himself or screamed during meals. Actually, eating with him became rather pleasant after that.

47. What would happen if Jack sat quietly?
   0. He’d get a bite of food
   1. He’d lose a bite of food (I’d take it away from him)
   2. I would withhold food for 30 seconds

48. What would happen if Jack screamed or hit himself?
   0. He’d get a bite of food
   1. He’d lose a bite of food (I’d take it away from him)
   2. I’d withhold food for 30 seconds

49. Can a dead man sit quietly?
   0. Yes
   1. No

50. So, what is the response of interest in this example?
   0. Sitting quietly
   1. Screaming and/or hitting
   2. Eating

A dead man can sit quietly, so let’s analyze Jack’s behavior of hitting himself and screaming.

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If Jack did nothing, I’d give him a bite of food. If he screams or hits himself, I’ll withhold that bite of food. So, screaming and hitting will prevent the food.

51. What type of contingency did I implement to decrease Jack’s rate of screaming and hitting himself?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. Penalty
   4. Avoidance of an aversive condition
   5. Avoidance of the loss of a reinforcer
   6. Punishment by the prevention of the presentation of a reinforcer
   7. None of the above

Okay, Jack would receive food if he did nothing, but if he screamed and/or hit himself, he wouldn’t. The food was a reinforcer, and its presentation was prevented by screaming and hitting. That’s punishment by the prevention of a reinforcer. Let’s see what other people do at work.

My friend Wendy works at home for juvenile delinquents. One of the residents, Felicia, had a terrible swearing problem. She had generally good verbal skills, but rarely said a full sentence without at least one profane expression in it. Wendy intervened. At the home, Felicia had to ask the staff for everything she needed, so Wendy used that to her advantage in designing the intervention. Normally, whenever Felicia asked for something, the staff would give it to her. Now, if she swore, she would not get what she had asked for. If she didn’t swear, she’d get what she asked for, just like usual. Already, there has been some decrease in Felicia’s swearing, at least when she’s asking for things.

Diagram the contingency maintaining Felicia’s asking for things from the staff.

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When Felicia asked for things, she generally received them.

52. What type of contingency is maintaining Felicia’s asking for things?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. Penalty
   4. Avoidance of an aversive condition
   5. Avoidance of the loss of a reinforcer
   6. Punishment by the prevention of the presentation of a reinforcer
   7. None of the above

Felicia’s asking was maintained by simple reinforcement. Now, let’s diagram the contingency Wendy implemented for Felicia’s swearing.

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Felicia usually received what she asked for. As Wendy designed it, when Felicia swore, the staff would withhold the item.

53. What type of contingency is decreasing her frequency of swearing?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. Penalty
   4. Avoidance of an aversive condition
   5. Avoidance of the loss of a reinforcer
   6. Punishment by the prevention of the presentation of a reinforcer
   7. None of the above

When she asked for something, Felicia would generally get it. That’s reinforcement. But, if she said a swear word, she wouldn’t get anything. Swearing prevented the delivery of the reinforcer (whatever she was asking for). So swearing is being punished by the prevention of the presentation of a reinforcer.

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**Punishment by the Prevention of the Removal of an Aversive Condition**

**Definition: Concept**

Punishment-by-Prevention-of-Removal Contingency

- Response-contingent,
- Immediate prevention
- Of the removal of an aversive condition
- Resulting in a decreased frequency of that response.

Once again, we are talking about a contingency that will decrease behavior. This time, the behavior will be decreased because it prevents the removal of an aversive condition that would otherwise be removed. Essentially, it maintains a lousy situation. Let’s take a look at some examples.

My dog loves to run around in the woods. Unfortunately, every once in a while, he gets a splinter in his paw. Judging from the whining that my dog usually does then, I'm assuming the splinters are rather painful. Of course, I immediately attempt to pull out the splinter, so my dog won’t be in pain anymore. The first few times, my dog would pull his paw away as soon as I touched the splinter. From my own experience, when you first begin to pull out a splinter, it hurts even more. Pulling his paw away may have removed that increased pain.

Diagram the contingency that may have caused my dog to pull his paw away.

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When I tried to pull out the splinter, I caused my dog pain. His pulling away probably reduced that pain.

54. What type of contingency might have supported my dog’s pulling his paw away when I tried to remove the splinter?
0. Reinforcement
1. Escape
2. Punishment
3. Penalty
4. Avoidance of an aversive condition
5. Avoidance of the loss of a reinforcer
6. Punishment by the prevention of the presentation of a reinforcer
7. Punishment by the prevention of the removal of an aversive condition
8. None of the above

My dog probably pulled away initially, because it reduced an aversive condition. That’s an escape contingency. But, over time, my dog stopped pulling his foot away. He’d sit quietly while I removed the splinter. When the splinter was removed, his paw would feel much better. If he pulled away, his paw would still have a splinter in it.

55. What happens when my dog pulls his paw away?
0. The splinter is removed
1. The splinter remains in his paw

56. What happens when my dog doesn’t pull away?
0. The splinter is removed
1. The splinter remains in his paw

57. What is the behavior of interest in this example?
0. Sitting quietly
1. Pulling his paw away

A dead man can, and usually does, sit quietly, so the behavior is my dog’s pulling his paw away. Let’s diagram this contingency.

Before | Behavior | After

⇒

I will remove the splinter, if my dog stays still. If he pulls away, I won’t be able to. Pulling away prevents the removal of the splinter.

58. What type of contingency is responsible for my the decrease in my dog’s pulling away?
0. Reinforcement
1. Escape
2. Punishment
3. Penalty
4. Avoidance of an aversive condition
5. Avoidance of the loss of a reinforcer
6. Punishment by the prevention of the presentation of a reinforcer
7. Punishment by the prevention of the removal of an aversive condition
8. None of the above

Wow! That’s pretty complex. Many people make the mistake of saying that there is an escape contingency on sitting quietly. But, sitting quietly is not behavior, so we have to look at pulling away. The contingency on pulling away is punishment by the prevention of the removal of the aversive splinter. Sitting quietly is just the result of a decrease in moving.

Let’s check out another situation.

I had a rather rude roommate once. She was incredibly bothered by the neighbor’s loud music. When they played loud music, she would go across the hall to ask them to turn it down. Generally, they would comply. On some occasions, after asking them to turn the music down, she would say inappropriate things about their mothers (things I can’t repeat here). When she said those things, the neighbors would not turn the music down. If
she didn’t say those things, they would. After a while, she stopped making the offending comments.

59. What happened when my roommate asked the neighbors to turn the music down, without the offensive comments?
   0. They would turn the music down
   1. They would say “no”
   2. They would not turn the music down

Diagram the contingency on asking the neighbors to turn down their music.

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When the music was loud, if my roommate asked the neighbors to turn it down, they would.

60. What type of contingency is supporting my roommate's behavior of asking the neighbors to turn the music down?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. Penalty
   4. Avoidance of an aversive condition
   5. Avoidance of the loss of a reinforcer
   6. Punishment by the prevention of the presentation of a reinforcer
   7. Punishment by the prevention of the removal of an aversive condition
   8. None of the above

That’s an example of escape. Her response removes the aversive sound.

61. What happened when my roommate added the offensive comments?
   0. They would turn the music down
   1. They would say “no”
   2. They would not turn the music down

Diagram the contingency on making offensive comments.

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The neighbors would turn the music down, if she didn’t make the comments. Offensive comments prevented them from doing so.

62. What type of contingency is responsible for the decrease in offensive comments about the neighbor's mothers?
   0. Reinforcement
   1. Escape
   2. Punishment
   3. Penalty
   4. Avoidance of an aversive condition
   5. Avoidance of the loss of a reinforcer
   6. Punishment by the prevention of the presentation of a reinforcer
   7. Punishment by the prevention of the removal of an aversive condition
   8. None of the above

When she made the offensive comments, that would prevent the neighbors from turning down the music when they otherwise would have. That makes it punishment by the prevention of the removal of the aversive music.

Let’s take a look at an example from sports.

My friend Dan (no longer running from the neighborhood bully) was on his college football team. When he was playing in the final game of the season, he broke his finger. Now that’s pain! He had the coach tape his fingers together, to prevent them from moving (it hurts less that way). The game was really important to him, so he kept playing. Besides, if he’d gone to sit on the bench, his teammates would have called him a loser (or even worse).
63. What would have happened if he didn’t go back to playing the game (if he stayed on the bench)?
0. His friends would have called him names
1. His friends would have kept calling him names

Diagram the contingency for Dan’s going back onto the field.

Before  | Behavior  | After

Dan would have been harassed by his teammates, if he’d stayed on the sidelines. Going back onto the field prevented the name calling.

64. What type of contingency is supporting continuing to play in the game?
0. Reinforcement
1. Escape
2. Punishment
3. Penalty
4. Avoidance of an aversive condition
5. Avoidance of the loss of a reinforcer
6. Punishment by the prevention of the presentation of a reinforcer
7. Punishment by the prevention of the removal of an aversive condition
8. None of the above

Okay, so avoidance of the aversive chiding from his teammates is supporting his continued playing. While he was playing he kept bumping his finger, which produced a great deal of pain. It’s amazing how often your fingers get hit in a football game. If he was sitting on the bench, he wouldn’t have received that pain. Next time he was injured in a game, he didn’t go back out on the field.

65. What would happen if he sat on the bench?
0. There would be no change in the pain from his finger
1. He’d feel great pain from his finger

66. Can a deadman stay on the bench?
0. Yes
1. No

67. What would happen if he kept playing football?
0. There would be no change in the pain from his finger.
1. He’d feel great pain from his finger

Diagram the contingency involving the pain from his finger being hit repeatedly.

Before  | Behavior  | After

Dan received increased pain soon after going back onto the field.

68. What type of contingency is decreasing the likelihood of Dan’s going back into the game with an injury?
0. Reinforcement
1. Escape
2. Punishment
3. Penalty
4. Avoidance of an aversive condition
5. Avoidance of the loss of a reinforcer
6. Punishment by the prevention of the presentation of a reinforcer
7. Punishment by the prevention of the removal of an aversive condition
8. None of the above

Okay, that’s the last example. It’s a little bit tricky, but it’s punishment (by the presentation of pain). Continuing to play the game caused pain. Soon after going back onto the field, his finger was in great pain from being bumped so much. Many people try to analyze sitting on the bench as avoidance behavior, but dead man can sit. They can’t play football.
Appendix G

Protocol Clearance From the Human Subjects Institutional Review Board
Date: February 2, 1996
To: Matthew Miller
From: Richard Wright, Chair
Re: HSIRB Project Number 96-02-02.

This letter will serve as confirmation that your research project entitled "Overt responding in programmed instructional materials: does it make a difference?" has been approved under the exempt category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note that you must seek specific approval for any changes in this design. You must also seek reapproval if the project extends beyond the termination date. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: February 2, 1997

xc Richard Malott, PSY


*Teacher Turned Author*. (1985). Longwood, FL: Raster Sciences, Inc.


