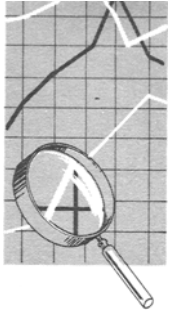

chapter 14

Response: The Student Must Do Something

IN ORDER to learn, the student must respond—he must do something. At first glance, it might be thought that the response variable is absent from learning by motion pictures. But many important responses, such as thinking and emoting, are internal and hence not obvious. As we have already seen, physiological measures, such as the psychogalvanic reflex, show that the viewer does make emotional responses to a film. He also responds with images and thoughts. These perceptual and ideational responses are extremely important. For example, two people watch an Indian ceremonial dance. They both view the same scene, but one comes away with a profound sense of the meaning of pagan worship and the other with only something to laugh at. Similarly, the expert who is examining an antique responds differently from the novice and learns much more about its history and value. If a student makes only irrelevant responses to a film, we will not expect him to learn anything relevant.

Need for Research on Responses to Pictures

As a point of departure, we assume that ideational responses —thoughts and images—follow the same laws as overt responses. This hypothesis should be sharply distinguished from the older behavioristic one that all thoughts are incipient peripheral responses. We are not primarily interested in the anatomical locus of the response—whether in the vocal cords or in the brain—but rather in the laws which it follows.

There is considerable evidence suggesting that ideational responses do follow the same laws as overt ones. Psychotherapists have shown that thoughts are influenced by motivation and reinforcement in the same way that overt responses are, although being less effortful, they may require less reinforcement (Dollard and Miller, 1950). Even the visual images of dreams are no exception. For example, Holmberg (1950) showed that the members of a primitive tribe who were frequently exposed to extreme hunger dreamed primarily about food. Images and thoughts can compete with each other just as overt responses do—it is hard to think of two things simultaneously. Thus if students are daydreaming, they are less likely to be making relevant responses to the lecture or film. Just as overt responses can be chained together, one thought can lead to another and thoughts can lead to action. Experimental evidence (Grose, 1953) shows that there is almost complete generalization from the cue produced by the overt response of saying a word aloud to the cue produced by thinking the word.

The foregoing type of analysis can serve as a point of departure, but we need to know more about the perceptual, ideational, and emotional responses which people make to pictures, and more about how these responses lead to action. We need to develop nonverbal techniques for studying images and perceptions.

We should try to find out whether the reporting of responses to films can be improved by using trained observers—being careful, however, not to train them to reflect the experimenter's prejudice.

A careful description of the many ways a student can respond to a picture will be completely different from the usual stereotype of the student sitting passively in the dark. It will help to break down some of the interfering attitudes which transfer from the entertainment to the instructional film. More significantly, it will serve as a logical foundation for research aimed at improving the student's responses to films.

Basic Response Units Must Be Present

Transmission-communication analogies can be misleading. Pictures do not automatically transmit knowledge; they can only sup-

ply cues activating those habits that the individual already has. If the student does not have the prerequisite habit units, our films will not arouse motivation, communicate knowledge, or teach the skill.

The motion picture cannot create any completely new response units; it can only repattern and recombine those that the viewer already can make to the visual and auditory cues which it presents. The function of the instructional film is to use audio-visual cues to elicit new combinations and sequences of responses, and to attach responses to new patterns of cues. As we have already seen, the motion picture will be a superior way of doing this in those situations in which it is superior for reproducing and directing attention to the crucial cues. It will also be superior if it is able to marshal a wider variety of superior cues for eliciting the correct responses. An example of this latter advantage is the case in which the basic movements of a skill can be elicited easily by copying someone else's movement but cannot be elicited easily by purely verbal direction. A limitation is the case in which the movements are so novel (as in an elaborate ice-skating figure for someone who has never skated) that they cannot be elicited by demonstration but must be learned by laborious trial and error.

The size of the functional units is important. A skilled performer is likely to have a repertoire of many complex sequences, each of which can be elicited as a large, already organized unit. For him the learning task may be to recombine only a few of these larger units. By contrast, the novice may have to try to copy each separate detail, and thus have many more functional units to recombine. This will make his task of learning from a demonstration much more difficult so that he will need a much slower rate of development and more repetition.

If the producer clearly realizes the points we have been making, he will be less likely to expect the impossible; he will be more likely to use his maximum ingenuity to develop techniques for using those cue-response units that are in the repertoire of the target audience. Similarly, the teacher should recognize these limitations. He should make a list of the response units (e.g., skills) demanded

by the film. If any student does not have these response units, the deficiency should, if it is possible, be corrected before the film is presented.

Learning from Demonstrational Films as Delayed Imitation

Miller and Dollard (1941) have analyzed the important role of imitation in social learning. They have pointed out that the technique of demonstration is an efficient way to elicit the correct response and reduce wasteful trial and error. May (1946) has analyzed learning from demonstration films as a case of delayed imitation. Delayed imitation should be harder than immediate imitation—the difficulty becoming greater the longer the delay. May's analysis suggests the desirability of providing opportunities for practice as soon as possible after the demonstration. One way of accomplishing this is to insert pieces of black leader at strategic places so that it is easy to stop the film while the student practices. A better way will become available with the completion of the development of the magazine-loading motion picture projector described by Lumsdaine (1953, p. 83) which is designed to stop at any desired point and leave the still frame on the screen at full illumination. May's analysis also points to the need for studies of the effects of delay (i.e., the visual memory-span and retention curve) on different types of materials.

Delayed imitation is mediated, presumably, by imagery or self-instructions which are elicited immediately by the demonstration and reinstated later during the practice. Thus, Thompson (1944) has found that learning from a demonstration is hindered by conditions which would be expected to interfere with these mediating responses and helped by conditions favoring them. Her study suggests that it is desirable to label or number the parts or tools to be manipulated and to design the commentary to help the observer to formulate for himself an adequate set of verbal directions for performing the skill.

Participation and Mental Practice

As would be expected from the preceding analysis, learning can be improved by requiring the student to rehearse relevant responses during a film. Good experiments have been performed on this variable. We should note that these are not experiments comparing response versus no response; they are rather experiments on procedures designed to increase the relevance and amount of response by forcing the student to respond in a way that the experimenter can observe.

Hovland, Lumsdaine, and Sheffield (1949) reported an experiment using a sound filmstrip to teach students to memorize the military phonetic alphabet. They found that much better learning occurred if, instead of the conventional passive review of each section of the alphabet, the audience was required to recite aloud in unison each letter-word combination. Similarly, in the more complex conceptual task of learning information about the heart and the circulation of the blood, the Yale Motion Picture Research Project's staff (1947) found that learning was improved by inserting into the film questions designed to increase participation and motivation. These and other studies show that the participation procedure can be used to increase the effectiveness of films.

Analytical Studies

We know that participation can improve learning. We need additional, analytical research, however, to increase our basic understanding of the types of response which are necessary and the variables involved. Such research will help us to use participation most effectively in a wide variety of situations. For example, a study by Roshal (1949) suggests that introducing participation too early into a sequence that is paced too fast may even interfere with other responses which are necessary for learning. A study by Jaspen (1950) shows that a slower rate of development can increase the effectiveness of the participation procedure. The results of these studies would fit in with the view that practice only makes

perfect when the correct responses are practiced. If the film presentation has not been adequate to elicit correct responses, practice in the form of participation cannot help much and may even tend to fixate some wrong responses. As would be expected from this type of analysis, Kimble and Wulff (1953) found that increasing the amount of guidance given during participation exercises makes them more effective.

Michael and Maccoby (1953) found equal gains from overt and covert participation, an additional gain from knowledge of results, and persistence of the difference between participation and nonparticipation groups in spite of a warning to all groups that they would be tested after the film. They also found that the effect of participation questions tended to be specific to the material rehearsed as would be expected if the main function of these questions was to elicit specific responses rather than to raise the general level of motivation. These studies, and others described by Lumsdaine (1953, pp. 86-89), represent excellent progress toward a more detailed analysis of an important variable influencing the teaching effectiveness of graphic materials. This analysis should be continued; similar analyses should be made of other important variables.

In view of the effectiveness of instructions for covert verbal rehearsal, it would be interesting to study the effect of instructing the students to respond with visual or kinesthetic imagery. We should also try to introduce practice of this kind into the structure of a film by the anticipation method—i.e., to require students to try to anticipate the correct response by visual and kinesthetic imagery and then to correct their errors after seeing a picture of the correct performance.

Need for New Equipment and New Types of Film

The fact that certain kinds of overt responses are difficult to make under the ordinary conditions of motion picture viewing presents a special challenge to producers and users of instructional

film. But the ordinary conditions of film viewing, which are carried over from the entertainment film in the theater, do not need to be transposed bodily to the instructional film. Various radical innovations should be tried. For example, if one has the proper equipment, one can project a model performance for the student to copy in the shop, on the assembly line, or in the field. For doing this, the "daylight" screen, magazine-loading projector, and the loop-film technique should be very useful. With such a technique, the student can be allowed to project the film, watch it and practice until he has perfected one step, and then move on to the next step.

Type and Timing of Response

In approaching the problem of response we should ask the following questions: What are the cues present at the time the response is made? What kinds of response facilitate learning and what kinds interfere? How much response is needed? What is the proper timing of the response? For example, for a given response, which is the most effective: practice while the picture is being shown, practice immediately after the picture, or delayed practice? It seems reasonable that one should not ask the student to start practicing until he has enough background and orientation so that he will be likely to practice the correct rather than the incorrect responses. We would expect this stage to be reached at different times, depending on the difficulty of the material. Although a study by the Commonwealth Office of Education (1950) concluded that it was best to hold a discussion immediately after the first showing, reinforcing the learning and retarding the rate of forgetting, in dealing with more complex material it might be better to start the practice after the second showing, when the students are more orientated and better able to perform correct responses.

Motivation Favors Relevant Responses

Students who are motivated to learn will be more likely to respond to films by rehearsing and thinking, and less likely to make

irrelevant responses such as daydreaming or going to sleep. One of the important effects of motivation is to favor the occurrence of correct responses. This effect probably accounts for much of the improvement in learning produced by various techniques for increasing motivation, such as warning that an examination will be given. Suitable introductory material should be able to favor correct responses by increasing motivation and also by getting the students set to make specific types of responses.

Rate of Development

The responses which are necessary for learning take time, particularly for the student who begins at a low initial level of experience. This fact is not kept vividly enough in mind by producers of training films; one of the most common errors is to try to pack too much material into too short a film. Makers of training films must resist the desire to save on the cost of film and the maladaptive tendency to generalize from entertainment where fast action is often desirable.

Rate of development is not, of course, a simple, unitary variable; rather it is a term that comprehends a number of more specific factors such as rate of speaking, amount of pausing for emphasis or observation, amount of oral or visual redundancy, and repetition within a film. "Rate of development" treated as an undefined composite has been shown by Jaspen (1950) to be related to the amount of learning from films demonstrating a mechanical assembly. Similarly, Kopstein, Sulzer, and Lumsdaine (1952) have demonstrated that intra-film repetition by use of added examples increased learning in films on micrometer reading. These investigators showed that the "point of diminishing returns" for adding of further instructional examples depended on difficulty of the material and intelligence of the learner, but that in any case there was value in giving more examples than often is done in the "once over lightly" type of training-film treatment.

Assuming that other conditions of learning, such as motivation and reward, are present, repetition should improve learning by increasing the probability that the correct response will occur at least once and by providing an opportunity for it to be practiced repeatedly. There is considerable evidence, summarized by Hoban and van Ormer (1950), that reviews and summaries within a film and repeated showing of the same film can improve learning. In those cases in which the response needs to be attached to more than one relevant cue, repetition with the appropriate variety of stimulus conditions should be particularly desirable.