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Teachers and Students: Reflections on Social Control and Future Performance

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To instruct consists of arranging controls between teacher, student, and subject matter. Initial controls must emanate from the teacher since those of the subject matter are minimal, crude, or missing. Teachers mand students to behave in certain ways with respect to a given subject matter. Eventually, however, the teacher must transfer the teacher mediated and managed control of the student to natural controls functioning directly through student interaction with the subject matter. Difficulty in doing this occurs due to the reinforcers for both student and teacher derived from social contact. Nevertheless, the student eventually must be taught to interact with the subject matter independent of teacher involvement if the student is to maintain effective contact with the subject matter beyond the period of formal instruction.

In his autobiography, Nathaniel Southgate Shaler (1909) relates the following incident in his first contact with Agassiz as a teacher:

> . . . Agassiz brought me a small fish, placing it before me with the rather stern requirement that I should study it, but should on no account talk to anyone concerning it, nor read anything relating to fishes, until I had his permission so to do. To my inquiry "What shall I do?" he said in effect: "Find out what you can without damaging the specimen; when I think that you have done the work I will question you." In the course of an hour I thought I had compassed that fish; it was rather an unsavory object, giving forth the stench of old alcohol . . . . Many of the scales were loosened so that they fell off. It appeared to me to be a case for a summary report, which I was anxious to make and get on to the next stage of the business. But Agassiz, though always within call, concerned himself no further with me that day, nor the next, nor for a week. At first, this neglect was distressing; but I saw that it was a game, for he was, as I discerned rather than saw, covertly watching me. So I set my wits to work upon the thing, and in the course of a hundred hours or so thought I had done much—a hundred times as much as seemed possible at the start. I got interested in finding out how the scales went in series, their shape, the form and placement of their teeth, etc. Finally, I felt full of the subject and probably expressed it in my bearing; as for words about it, then, there were none from my master except his cheery "good morning." At length on the seventh day, came the question "well?" and my disgorge of learning to him as he sat on the edge of my table puffing his cigar. At the end of the hour's telling, he swung off and away, saying "That is not right." Here I began to think that after all perhaps the rules for scanning Latin verse were not the worst infliction in the world . . . . I went at the task anew, discarded my first notes, and in another week of ten hours a day labor I had results which astonished myself and satisfied him. Still there was no trace of praise in words and manner. He signified that it would do by placing before me about half a peck of bones, telling me to see what I could make of them, with no further directions to guide me. I soon found that they were the skeletons of half a dozen fishes of different species; the jaws told me that much at first inspection. The task evidently was to fit the separate bones together in their proper order. Two months or more went to this task with no other help than an occasional looking over my grouping with the stereotyped remark: "That is not right." Finally, the task was done and I was again set upon alcoholic specimens—this time a remarkable lot of specimens representing, perhaps, twenty species of the side-swimmers or Pleuronectidae.
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> I shall never forget the sense of power in dealing with things which I felt in beginning the more extended work on a group of animals. I had learned the art of comparing objects, which is the basis of the naturalist's work. At this stage I was allowed to read and to discuss my work with others about me. I did both eagerly . . . . (pp. 98–99)

In this incident, Shaler describes considerations particularly important to educators because a major aspect of teaching any subject matter is teaching how to talk about that subject matter and teaching the appropriate circumstances for such talking. If we are teaching biology, students must learn to talk about biology, and beyond that, they must talk about it for what are construed to be the appropriate reasons. This means that in that field, as in any, students must make commonly shared responses to stimuli, and those behaviors must be maintained by certain reinforcers which will remain present and effective after the student concludes training.

Such a goal is true for any discipline. For example, when students confront the

stimuli in the field of archaeology, teachers of that subject matter want students to learn to emit the responses shared among those who "know" that subject matter. If the stimulus is hearing the word "shard," the response must be related to old broken pieces of pottery because archeologists emit such a response in common. However, teachers also concern themselves, or should, with why that appropriate response is made. The consistency with which any response is made will be determined by the nature of the circumstances and consequences of emitting it, but beyond that level of analysis educators cannot be indiscriminate about the kinds of contingencies that will make the response probable.

No teacher desires, or should desire, correct responding to be maintained by circumstances and consequences that will not be present or possible for the learner after the student leaves the instructional setting. Whatever controls the learner's behavior before he or she departs the teaching situation must continue in force if teaching or training is to "carry over," that is, if the behavior is to be repeated on subsequent occasions of encounter with the same stimuli outside of the teaching situation. As Johnston (1979) concisely puts it,

> Therapeutic [and educational] efforts are of little value if their effects are exhibited only under a single set of stimulus conditions or in the presence of a single stimulus, such as the therapist or experimenter [or educator]. In the interest of both effectiveness as well as efficiency, it is imperative that behavioral changes produced under special training conditions often also occur under non-training circumstances. (p. 1)

Often, a student writes or states or performs correctly while taking a course, for example biology. Yet after he or she leaves the course, that student does not respond in similar ways to later encounters with that subject matter. Another student in that same class might also emit appropriate responses during the course, and in addition continue to do so throughout life. Within the classroom, while the coursework was in progress, the responses of these two students may have been almost identical. But although their behavioral topographies were essentially the same, most educators would construe that they succeeded with only the latter student.

The differences in the two students during the training period resided not in their behaviors, which were alike, but in the nature of the controls over their behaviors, which were different. Whatever evoked and consequated the first student's behavior during the course was not part of later situations of encounter with the stimuli of that field. For the student whose training was successful the same or similar kinds of discriminative and consequative stimuli were present both in the course and on the occasions of later contact with the stimuli in that field, so the behaviors were maintained.

Of course, a person under control of reinforcers extrinsic to the subject matter when a student, may later come under control of reinforcing stimuli natural to the phenomena. The world is sufficently complex that a number of accidents may bring this about. But teaching implies that subject matter competence under stimulus control of variables within the subject matter not be left to accident. In the classroom relevant stimulus controls must be strengthened while occasioning and reinforcing stimuli not intrinsic to the subject matter must be faded. However, bringing specified behaviors under the control of new reinforcers which are subject related often takes time. Abrupt transfer often fails. The students who work only for the grade in school and assume that once out on the job they automatically will emit the necessary behavior for better reasons often find to their dismay that this does not happen. They wonder why they "liked" their apparently relevant forestry classes so much, but do not like being a forester. Something must have been lacking in their education. But what could it have been if they did, in fact, study the sorts of things that foresters need to know? The answer is that while in school the behavior of those students was not evoked by the appropriate set of stimuli nor maintained by the appropriate class of reinforcers.

SOCIAL RELATIONS IN SHIFTING CONTROL

Subject Matter Control and Teacher Control

The above miscarriage of instruction may be explained as follows: The teacher tells the student what to do and how to do it. The teacher also administers the consequences for doing it. The teacher gives out grades, praise, and approval, or withholds them. The natural consequences of interacting with the phenomenological realm of the content area do not directly shape the behavior of the student. If the teacher knows the correct behaviors, they can be shaped and temporarily maintained in the learners, but they will not be sustained when the student leaves school, because the student will also be leaving behind the reinforcers and punishers which shaped, and now would maintain those behaviors.

To correct this situation and to insure that student behaviors will be maintained beyond the training period, the locus of evoking and reinforcing stimuli must be transferred from the teacher (or from peers) to the phenomena of concern, that is, to the subject matter under study. It is also necessary to transform the class of reinforcers maintaining the behaviors of the students from grades, tokens, praise, approval, and other live teacher centered reinforcers to that class of more subtle reinforcers natural to the student's interaction with the subject matter. The behavior of the student must become independent of the teacher and the school. It must instead come to be maintained by the automatic consequences derived from the interaction between student and subject matter. (See Vaughn and Michael, 1982, for a discussion of automatic reinforcement.)

An important source of automatic reinforcement is how effectively behavior controls the environment. As Skinner states in Technology of Teaching (1961, p. 20), "The sheer control of nature is itself reinforcing." (Also see Skinner, 1953, p. 77 and following pages.) Controlling the environment automatically reinforces (a factor of obvious survival value for the species), and the degree of control over the environment proportionally relates to one's effective behaviors. Effectiveness accrues from behavior coming under control of increasingly minute and specific properties of the environment, that is, in common language, from "making" finer and finer discriminations, and also from coming under control of increasingly prevalent properties of the environment, that is, from "making" broader and more abstract generalizations.

The more this occurs in a particular field of study, the more one tends "to like" it; thus most experts like their fields. Much of the reinforcement responsible for that liking ensues from increasing effectiveness in controlling the environment. A feedback quality characterizes these relationships: the person can "go independent," can "get lost in the subject matter," "be alone with his or her interests," that is, the person gets reinforced by being effective; that results in even greater effectiveness shaped by that reinforcement. It is a reciprocal loop, and it is the kind of stimulus control that governs the behavior of the more effective people.

The teacher, therefore, as a stimulus for learning and the source of mediated reinforcers, must drop out of the instructional equation. It will often be necessary to start with control by an instructor temporarily substituting for control by the subject matter, but direct instructor control must be withdrawn as quickly as possible. The reinforcement, person-based, that instructors administer must give way to the more subtle and often more complex reinforcement from being effective with the subject matter.

Shifting Control

In The Technology of Teaching (1961), specifically chapters five and seven, and indirectly elsewhere (for example in Skinner, 1982), Skinner discusses the problem of maintaining the student's behavior once he or she leaves the classroom. He describes the difficulty of doing so when most of the shaping and con-

trolling of the student occurs through the use of aversive contingencies and recommends the use of reinforcing contingencies.

The lay and professional literature, especially behavioral, gives a great deal of attention to the negative outcomes of punishment. Perhaps still not enough. Beatings with sticks remain endemic in most school systems in this country; one principal in Florida took his duty quite seriously, averaging over two beatings a day to his charges (Klein, 1983). Defenders justify such actions, and those of other painful corporal punishments, not only as the most effective way to maintain discipline and order in the classroom but as a salutary way to contribute to the development of character. Clearly, the personal and social outcomes and costs of the heavy use of severe punishment need continuing and further documentation. (Thematic behavioral research as suggested by Johnston and Pennypacker, 1980, pp. 422–423, would apply well here especially if combined with fiscal analysis of the costs.) Concurrently, also required is additional demonstrating of practical, more effective and more humane means of control, including "mild" punishment such as social censure and bad grades, and most certainly the use of positive reinforcement.

However, problems also occur with the use of positive reinforcers. (See Balsam and Bondy, 1983, for a review of the literature relevant to negative effects on generalization etc. of punishment and reinforcement in applied settings, especially clinical.) One large class of problems, primarily technical, pertains to their scheduling. Few guidelines are available. Though Skinner does not dwell on the technical aspect of the arrangement, he discusses and recommends "stretching the ratio." Another set of problems, with both ethical and practical results equivalent to those of aversive control, relates to positive reinforcers too closely tied to the teacher and the teacher's social relation to the student, and derives largely from the circumstances that denote someone as a student.

The student beginning the study of a new subject matter is often inexperienced and naive relative to the new phenomena. The student's history with that subject matter has not shaped an effective repertoire, and the beginning student is unable to derive reinforcing consequences by operating in that field. If the student is left alone to dabble ineffectively around the edges of the subject matter, the limited entry repertoire may be extinguished.

A "student" is in part so classed because the terminal contingencies for the subject matter controlling his or her repertoire do not initially exist. Arranging those controls defines the instructional task. To produce a scholar's repertoire of responses to the properties of a phenomenon, the community cannot rely on naturally accruing reinforcers and punishers as a direct function of the individual's interaction with those properties. That scheme of acquisition is too slow, too accidental, and too sporadic to meet the social need for systematic, rapid skill building. The artificial contrivance of variables called "instruction" is a time saving arrangement necessary for cultural continuity. Thus teachers must contrive special contingencies, supplementing any natural ones, to bring the student rapidly and systematically under stimulus control of the properties of diverse subject matters.

The task for teachers is not only to shape new responses but to arrange for the maintenance of those responses beyond the formal instruction period. To first bring the student under control of the instructor, the instructor appeals to the student on a "where-is," "as-is" basis, that is, the student must be brought under control using contingencies already effective. When the teacher subsequently designs and implements arrangements which shift control of the learner's behavior to a functional relationship between that behavior and the phenomena under study, the teacher ultimately fades from the relationship.

The most useful techniques for the instructor who must initially bring the student under control of the teaching situation involve the heavy use of social

controls, because all learners possess a social repertoire that can be exploited. The subsequent phase in the instructional process will shape an effective set of responses under direct control of the subtle and complex stimuli in the phenomena to be studied. Whereas the salient and gross features of the target phenomena might naturally consequate simple and unrefined responses by the novice, the subtle and complex features of the same phenomena can naturally and directly consequate only the behavior of the person who has been shaped and conditioned especially for such interactions.

Instructors, then, must initially use social controls to shape behaviors effective in eventually bringing the student's repertoire under direct control of the properties of whatever is studied. The ultimate repertoire of student responses, initially shaped in great part by the teacher's mands, eventually consists largely of those subject related responses independent of such social control. After a student learns, through heavy teacher manding, how to interact effectively with some essential features of the subject matter, the teacher must arrange for the transfer of stimulus control of the learner to the subject matter, and such natural and direct control will refine and maintain the behavior of the student. Particular steps in fading social control will vary depending on conditions of the teaching task but usually the teacher fades his or her consequation first, to be supplanted by reinforcement through direct interaction with the subject matter. Later, the teacher also fades the contrived antecedent stimuli as the student becomes effective at optimizing her or his own contacts with the phenomena under study. When the teacher stops leading the student as well as mediating the student's consequences, the student is said to have reached the stage of independent scholarship.

How to fade teacher controls too strongly dependent on a social relation presents a number of technical problems and is an issue resolvable only through a technical description on how to design instructional systems. (For a good discussion of how to design instruction within the framework of Skinner's analysis of verbal behavior, see Johnson and Chase, 1981.) Nevertheless, the basic principle can be stated simply. Shaler gives the gist of it in the narrative concerning Agassiz: set up arrangements for teaching behavior to be controlled by the student's contact with the subject matter and reinforced by changes in the student's behavior due to that contact. This goal implies that concern with the arrangements under which students contact the subject matter ranks first, not personal interaction with the teacher.

Contact with the teacher constitutes only one of a number of design alternatives considered. Culturally, the teacher serves as a mediational device, and in a formal technical sense, is one. The fact that he or she might present material should not be confused with teaching. Subject matter information is also found in other mediational devices, for example, books, films, and computer software. Confounding subject matter knowledge with that of teaching occurs easily, especially at the university level. But until everyone recognizes that difference, the evaluative and organizational resources for good behavioral engineering will not be available because presumably unnecessary; and good teaching will continue to be confused with good questionnaire ratings, student approval, and warm relations with students. (For a general discussion of the relation between university fiscal systems and instructional innovation see Vargas, 1980. For a specific description of the effect of types of measures on instructors' behavior see Fraley, 1980.)

Seduction of Educators by the Wrong Class of Reinforcers

Many educators have made a virtue of keeping students under strong personal control and have tended to ignore transferring the learners to control by the subject matter. This is a concern also voiced by others. Cahn (1973), a philosopher, in his critique of American higher education quotes with approval Sidney Hook's

statement that, "A teacher who becomes 'just one of the boys,' who courts popularity, who builds up personal loyalty in exchange for indulgent treatment, has missed his vocation. He should leave the classroom for professional politics." As Cahn himself notes, "He may become a friend of the students but in so doing fail to teach them anything" (p. 40). By losing sight of the ultimate goal of bringing students' behavior under the relatively independent control of the phenomena being studied, teachers have done a disservice to students and have perverted their own roles. The strong interpersonal dynamics that often characterize the initial mand control of student behavior have been endowed with ultimate virtue. What should be a helpful temporary bond, initiating and maintaining study behavior with its own class of temporary reinforcers, is given an enduring status exceeding that of the students' relationship with the subject matter. It is declared to be of great importance that the bond between teacher and student be nourished and perpetuated as an instructional facet of independent merit, and therefore teacher centered forms of instruction where this bond can take place are extolled.

Educators use the cloak of "humanism" to obscure a functional analysis of these relationships. Often they deplore the "cold impersonal" perspective of behavior analysis, and refuse to look at what reinforces and maintains teachers' behaviors. It can be very rewarding for a teacher to control others; to specify and to manage what they do. The respect, more often deference behavior, paid to teachers reinforces many professional and nonprofessional actions. These classes of reinforcers easily seduce teachers. Teachers, like most professional people, are already skilled in everyday social behavior, but the vast complexities of behavior technology, especially instruction, make acquiring skill in instructional technology slow and difficult. It is therefore much easier for the behavior of the teacher to remain under control of the reinforcers of mand dominated relationships than to come under control of change in learner behavior with respect to the subject matter and the resources expended to produce that change. Yet variables directly related to that change and its costs must control the behavior of instructors and become the locus of reinforcement for them.

The students' foremost need is to learn. That result must remain the primary locus of reinforcement for the instructor and not the teaching behaviors that facilitate learning. Teachers must not lose sight of their products because they have fallen in love with their tools. And the warm, human, friendly, interpersonal relationship with learners is only a "tool," not an end in itself. Interpersonal control as a technique may be used with the beginning student who lacks sufficient skills in a new area to derive enough reinforcement from it to maintain study behaviors, but this technique should be faded as the student becomes skilled enough to be transferred to control of stimuli intrinsic to that area content. Such an objective especially pertains to graduate instruction.

It's easy to miss the point with graduate students due to their near collegial status. Both faculty and students confound the socialization function of graduate school with Friday afternoon get togethers at the local pub, enthusiastic participation in department politics, and unpaid (except in social coin) errand boy or girl activities for the department chairperson. Some faculty make a virtue out of necessity when they assert that their affairs with their graduate students perform an educative function. In a situation where approval and guidance are so eagerly sought, graduate students themselves don't sort out these controls well. But the proper kinds of controls and what these imply are neatly brought out by Ferster (1970) in his reminiscences about the pigeon lab at Harvard:

> I don't remember any experiment being called "great" or "bad" or anyone being given credit for doing something especially useful or valuable. Some experiments led to further planning, new apparatus, exciting conversations, new theoretical arrangements of data and procedures or a rush to tell everyone about them, while others enabled less behavior

of this kind. I don't know whether Skinner was conscious of the lack of personal praise in interpersonal relations in the laboratory. I certainly was not. My behavior was generated by the natural reinforcement of the laboratory activity. But some of the graduate students found the absence of personal support difficult.

Recently a distinguished psychologist, who had come to Harvard when he was a student to study under Skinner in the pigeon lab, reminded me of an incident which illustrated the personal styles around the laboratory then. After completing the professional seminar, the main classroom experience in the Harvard curriculum, he appeared before Skinner saying that he was ready to do research in the pigeon laboratory. He asked what he should start on. The conversation was awkward; the student did not receive the kind of support and encouragement that he expected, especially since he had come to Harvard for the single purpose of working under Skinner. Finally, in the heat of frustration, he complained, "Aren't I even going to get a pigeon box?" This remark galvanized Skinner who dashed out of his office into the pigeon laboratory around the corner shouting, "Charlie, he needs a pigeon box," and left. I dutifully took one of the unused Sears and Roebuck ice chests we used as the shells for pigeon experimental spaces, handed it to him, and left. The student was then left with the problem of assembling all of the components and constructing the equipment he needed. Although neither Skinner nor I remembered the incident, the anger and disappointment could be detected after all these years. Yet he went on to complete an experiment which was an original departure from the main experimental program of the pigeon laboratory and which still remains in the literature as a base for much research and thinking. I don't know whether this particular student would have gone on to do some valuable work had Skinner supported his ideas personally, or had I given him equipment and supervised his day to day work in an experiment related to ours. But I think many others would have become pale imitations of Skinner and Ferster rather than the original, imaginative, aggressive scientists they did become. (p. 43)

Teachers who hinder the transfer from themselves to the subject matter because they are "hooked" on social reinforcers do a substantial disservice to their students by confusing learning with "loving." That disservice yields poor scholarship by shaping an excessive dependence upon the teacher. Such teachers send out students unable to resume their studies until they can find another mentor to act as a reinforcing agent. In education there can be no real humanism except through a functional analysis of the relationships between students, teachers, and subject matter. Legitimate concern for students is a facet of an expertise in the process of instruction attainable through the science and technology of behavior analysis. Surrender to what "feels good," yielding to the easy control of strongly conditioned social stimuli, is not an acceptable substitute. The primary goal of the teacher is not to get students to like him, or her, but to make students effective.

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