

Envisioning Cultural Practices

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Graphic visualization has demonstrated its value for organizing transactional data and modeling complex phenomena in a wide variety of fields, from theoretical physics to medicine. Behavior analysts have historically used a variety of graphic tools not only for presentation but also for analysis and teaching. As they turn increasingly to the analysis and design of cultural practices, the phenomena behavior analysts study are becoming increasingly complicated. Many cultural practices of interest are embedded in extensive webs of interlocking practices and contingencies that can be difficult to grasp comprehensively. Building on contingency diagrams, which have proven to be useful for the analysis of operant behavior, and graphic tools developed for object-oriented systems analysis, this paper suggests graphic tools for capturing the interlocking contingencies that constitute cultures. These diagrams offer a broad-bandwidth technology for analyzing and designing cultural practices.

Key words: cultural practices, interlocking contingencies, graphic visualization

Graphic visualization is useful, and even essential, for organizing and understanding complexity in many fields (Bertin, 1983; Tufte, 1983, 1990). Developing iconographies that allow one to see previously hidden relationships and comprehensively capture conceptual advances is often important for scientific progress:

Intellectual innovation often requires, above all else, a new image to embody a novel theory. Primates are visual animals, and we think best in pictorial or geometric terms. Words are an evolutionary afterthought. . . . Icons are primary molders of our thoughts, and the search for fundamentally new representation is one of the most important efforts a scholar can make. (Gould, 1995, pp. 10, 12)

Behavior analysts rely heavily on the visual analysis of data, and have developed multiple graphic approaches for representing behavioral events (e.g., Chisholm & Cook, 1995; Michael & Shafer, 1995; see also Lee, 1994), including contingency diagrams (Malott, 1992a). Contingency diagrams are particularly valuable for teaching the concepts of the science of behavior by helping students to trace how basic

elements combine to produce complex repertoires (Malott, 1992b; Malott, Whaley, & Malott, 1993; Mattaini, 1995a).

As behavior analysts turn to the analysis and design of cultural practices, the level of complexity becomes an order of magnitude greater, and the need for ways to capture, coherently and contextually, the conditions and events relevant to such analyses correspondingly increases (Biglan, 1995). Systems analysts have struggled with similar issues and have come to rely heavily on graphic tools for identifying and tracing multiple objects and events in their transactional associations (e.g., Coad & Yourdon, 1991; Yourdon, 1989). Related strategies have potential for cultural analysis and design as well. This paper traces initial efforts to develop a graphic language for analyzing cultural practices and the interlocking contingencies within which they are embedded.

UNITS OF CULTURAL ANALYSIS

Skinner (1981) argued that the causes of human behavior lie in selection by consequences at three levels: natural selection at the biological level, operant conditioning at the behavioral level, and the evolution of social en-

I thank Janet S. Twyman for helpful comments on earlier drafts.

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vironments at the cultural level. Behavior analysts have only begun to explore cultural selection (see, e.g., several contributions in Lamal, 1991). Biglan (1995) recently outlined basic principles for cultural analysis and for changing cultural practices; that is, cultural design. Cultural design, the applied side of cultural analysis, seeks to increase the incidence and prevalence of beneficial cultural practices and decrease the extent of detrimental ones by making changes in the interlocking contingencies that instantiate cultural entities.

As described by Glenn, cultural practices "involve repetition of analogous operant behavior across individuals of a single generation and across generations of individuals" (Glenn, 1991, p. 60). Most important issues of our time involve such cultural practices, from those supported by the micro-culture of the family (which may be targeted in family therapy) to those supported by peer, ethnic, religious, organizational, and national cultures. Cultural practices include patterns of social exchange (kindness, some forms of violence), language, political action, and many other extraordinarily complicated social conditions and events.

There is as yet only limited agreement on the essential units of cultural analysis, an important consideration in the development of any science. One issue is what behavior analysts mean by *culture*. Skinner defined culture as "the contingencies of social reinforcement maintained by a group" (1984/1987, p. 74). Note that this is an extremely inclusive definition, and it was probably meant to be. From this perspective, much of social behavior, including most verbal behavior, falls within the purview of cultural analysis; and a broad range of organized groups, from the smallest (e.g., a family) to the largest (e.g., a nation), appear to fit Skinner's definition of cultures. This definition is similar to but not identical with Harris's ("the learned repertory of thoughts and actions exhibited by the members of social groups," 1979, p.

47), but is clearly more inclusive than common anthropological definitions that focus on the practices of distinctive societies or ethnic groups.

The natural line of fracture between the second (operant behavioral) and third (cultural) levels of selection appears to occur at the point at which operants are transmitted among persons and shaped and maintained by organized networks of social reinforcement. Although this assertion may be controversial, there may be no essentially different processes at work in cultural entities of varying sizes (although of course larger groups involve substantially more complexity). If all involve similar core processes, it may be possible to study those processes first in simpler cultures and move later to those that are more complex, an approach that may be particularly useful for advancing a science in its early stages.

Others have suggested ways to establish the "bright lines" (Ainslie, 1993) among levels of selection. Vargas (1993) distinguishes between *natural selection* and *cultural selection* as follows:

By "natural selection" I mean those effects that occur when the organism's behavior *directly* contacts the physical, biological, and behavioral properties of contingencies relevant to selection consequences. . . . The 3-term contingency relationship of much of infrahuman organism behavior exemplifies natural selection. By "cultural selection" I mean those effects that occur through the contact of the organism's behavior with another organism's behavior that *mediates* its contact with physical, biological, and behavioral contingencies relevant to selection consequences. The 4-term contingency relationship of verbal behavior thus requires a prior verbal community; a culture. (p. 20)

For Vargas, the essential distinction between the behavioral and cultural levels of selection is mediation by the behavior of another, but this does not yet clearly establish the basic unit. He also notes that "nonverbal behavior is the target for natural selection, and verbal behavior the target for cultural selection" (p. 20), which suggests that cultural analysis primarily examines con-

tingent relations between verbal behavior and other events.

In answer to the question, "What exactly is being selected?" in cultural evolution, Skinner suggests, "within a given group, the answer seems to be practices—better ways of hunting, gathering, growing, making tools, and so on" (in Catania & Harnad, 1988, p. 36). Although understanding cultural phenomena requires analysis of contingency interlocks (and that is the purpose of the tools suggested in this paper), for purposes of cultural design, the accessible targets of change are the cultural practices that are involved in the interlocking contingencies. Certainly for applied work, utility is an important consideration, and a focus on the practice seems valuable.

One reviewer of this paper suggested that, in a scene involving a teacher reading to students, the interlocking behaviors of teacher and students need to be accounted for simultaneously in defining the practice of interest; this is a compelling point. It is analogous to Lee's (1994) description of the units of behavior analysis as "things done"—not just acts, but the act and its consequences, that is, the two-term contingency. In this case there are interlocking two-term (or more) contingencies. Recognition of interlocking contingencies predates discussions of cultural analysis and design; Skinner discussed transactions between speaker and listener, for example (1957, 1989). McGinnies (1970), who attempted to construct a coherent social psychology in reinforcement terms, stated that "social behavior is evidenced whenever two or more organisms, either directly or indirectly, serve both to prompt and to reinforce one another's performances" (p. 1). The level of complexity involved at the cultural level, however, is often substantially greater.

Many of the actions of any socialized person have been learned from other members of the cultures within which he or she is embedded. Some (e.g., cooking, driving a car) are maintained largely by nonsocial contingen-

cies, whereas others (e.g., doing homework) are maintained largely by socially mediated contingencies. Both seem to fit the basic definitions of cultural practices, however; cooking and homework are done differently in different cultures. Where the active contingencies are socially mediated in the material that follows, I will attempt to clarify that in the diagrams.

Glenn and Malagodi (1991) suggest that the essential unit of cultural evolution is the *permaclone*, a term borrowed from Harris (1979). The basic elements of the *permaclone* are described as "1) repeated enactments of a scene, 2) by a group of individuals, 3) the personnel of which group changes gradually over time" (p. 8); "enactments" therefore are seen as basic. Practices are components of interlocking contingencies. Those interlocking contingencies (the content of the *permaclone*) lead to cultural outcomes. Glenn and Malagodi, however, suggest that the practices themselves (e.g., an action on the part of a teacher) are not the essential units; rather, the set of interlocking contingencies (instantiated by the scene) that support those practices are. That set, then, leads to an outcome—a certain level of educational achievement. This view, although it is somewhat different than the one presented in the present paper, has the advantage of clearly focusing attention on the interlocks.

The definition of cultural practice, however, is still problematic. Some suggest that a practice be defined as the multiple behaviors involved in interlocking social contingencies, but this appears to differ from Skinner's use of the term, or Glenn's description ("repetition of analogous operant behavior across individuals," 1991, p. 60). Practices clearly involve multiple instances, as do operants, but I believe that it is reasonable to use the term *cultural practice* to refer to an operant transmitted (and often maintained) by a culture; this definition is consistent with both Skinner's and Glenn's usages. I may be wrong here; it may ultimately

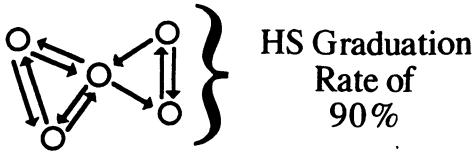


Figure 1. Interlocking cultural practices associated with an aggregate outcome (adapted from Glenn, 1988).

prove more helpful to use the term instead to refer to entire webs of interlocking behaviors; but I believe that the approach taken here is a useful beginning for applied work.

A key to understanding cultural practices is that the practices themselves consist of behavior; Skinner stated that they involve “no new behavioral process” (in Catania & Harnad, 1988, p. 38). This observation provides a valuable access point for analyses of sociocultural phenomena. Practices are often reinforced by members of a cultural entity because of aggregate advantages for the group (Glenn, 1991) and is a process that may require a heavy overlay of rule governance (cf. Malott, 1988). Glenn (1988) offered the diagram shown in Figure 1 (slightly adapted here) to depict how interlocking practices are associated with an outcome. This schematic is essentially conceptual; it simply indicates that interlocking practices supported by cultures produce, and are selected by, the aggregate outcome. This paper might be seen as an effort to identify tools to further specify and detail the left side of Glenn’s figure and to suggest some tools that may help cultural analysts move beyond the general and abstract to the identification of specific data items that can then be explored empirically. Approaches for explicating the links between the left side of Glenn’s diagram (interlocking contingencies) and the right (aggregate outcomes) are also needed. Many behavior analysts have relied on the work of anthropologist Marvin Harris (1979, 1989) for understanding some of those connections (e.g., Biglan, 1995; Glenn, 1991).

Cultural practices are selected, according to Skinner (Catania & Harnad, 1988), on two levels. Selection can occur through differential survival of entire cultural entities in which the practices are embedded (e.g., celibacy among the Shakers probably contributed to the almost total extinction of that culture). Most cultural selection, however, occurs at the level of the practice. Practices that work better—produce better outcomes or aggregate outcomes—for the group, its members, or those who have power in the group (Biglan, 1995) are therefore reinforced by members of the group. Much, though not all, selection of this type probably involves rule governance and verbally mediated behavior.

Operants consist of functionally equivalent classes of acts, not of single events. The frequency with which an organism emits instances of such a class is a central datum in the science of behavior (Michael, 1995). With regard to cultural practices, which are special cases of operant behavior, the frequency (incidence, prevalence) with which the practices occur is also central. There is an additional level of complexity, however, present at the cultural level—practices are not emitted only by a single organism, but by a class of persons, whom I refer to here as *actors*. The datum of interest is often the frequency with which any member of the class (say, high school students in a community) emits the practice of interest (attends school).

GRAPHIC TOOLS

The processes by which cultural practices are established and maintained, according to Skinner, consist of the basic behavioral relations identified by the science of behavior (e.g., reinforcement, extinction, discrimination, establishing and abolishing operations). A graphic language for capturing cultural-level events therefore can build on what is already known, but needs to be able to organize more data elements at a higher conceptual level,

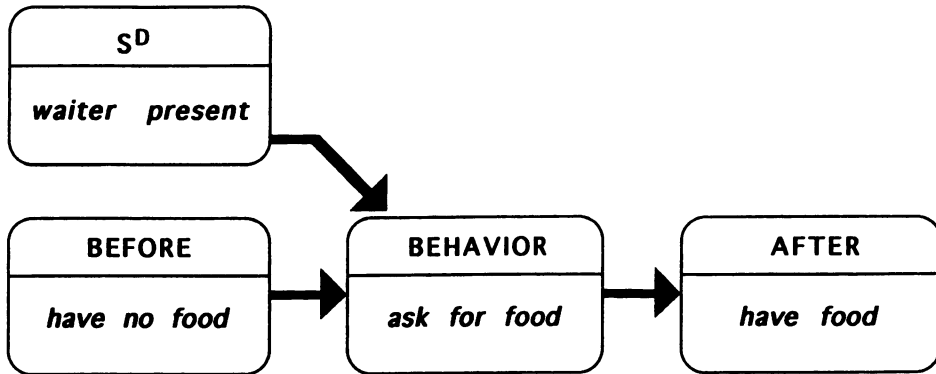


Figure 2. A standard contingency diagram (Malott, 1992a).

allowing the transactional structure to emerge. The objective, no doubt only partially achieved here, is to develop new ways to specify contingency interlocks more clearly and precisely. As Tufte indicates (Tufte, 1983, 1990), the purpose of graphic visualization is not to simplify, but rather to make the complex comprehensible.

Analyzing, designing, and changing interlocking cultural practices are at least as complex as understanding and affecting processes in other fields in which visualization has proven to be important, and graphics can be similarly important for this work, not only for presentation and teaching, but perhaps most crucially for analytic purposes. Major advantages of graphic depictions include their increased bandwidth, which enables the observer to see multiple interacting phenomena "all at once"; and their utility for differentially viewing the phenomena from a variety of perspectives, each emphasizing one or more dimensions and deemphasizing others that are less relevant to the viewer's purpose.

Analyzing events at the cultural level requires tools for identifying and specifying not only the practices of interest but also the way these practices interlock with those of other classes of actors (e.g., the connections among the acts of drug dealers, drug users, law enforcement personnel, peers of the dealer, neighborhood residents, and policy makers). The complexities in-

involved are substantial, and it is no surprise, therefore, that achieving specificity and comprehensiveness in this work is difficult. It is certainly possible to analyze verbally the contingencies that affect the behavior of each class of actor (see, e.g., Newman, 1992, who discusses contingencies associated with the actions of drug users, drug dealers, and policy makers). But to be able to truly capture the transactional unity of these variables, it may be most helpful to find ways to view them all as an organic, interrelated whole.

Contingency Diagrams

Although many behavior analysts have diagrammed contingent relationships among behaviors, antecedents, and consequences in various ways, one current standard is Malott's contingency diagram (Malott, 1992a, 1992b; Malott et al., 1993; Mattaini, 1995a). At its most basic, a contingency diagram portrays the behavior of interest and at least one consequence that affects its frequency; Malott usually includes the state of affairs prior to the behavior (the "motivating condition") and often the occasion (the discriminative stimulus) as well. See, for example, Figure 2.

Mattaini (1993, 1995a) suggested several refinements to contingency diagrams that may capture certain properties of operant behavior with additional precision. For example, the sim-

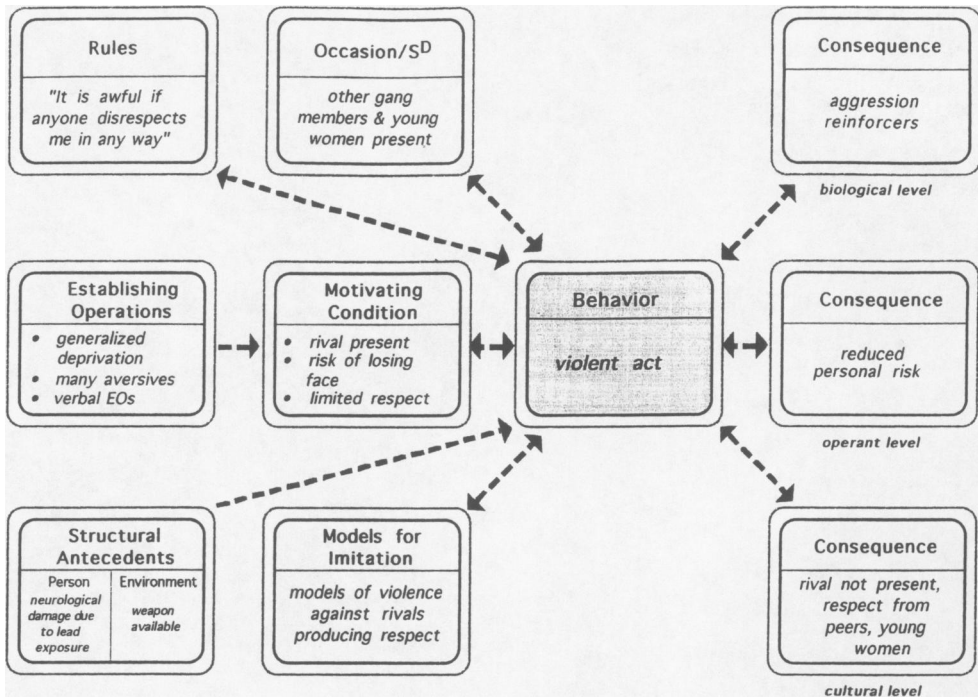


Figure 3. Violent acts directed against a rival group (see Mattaini et al., in press, for further detail).

ple rounded rectangle in Figure 2 can be replaced with the class-and-object symbol used in object-oriented systems analysis (Coad & Yourdon, 1991), which consists of a black rounded rectangle (representing the class) surrounded by a gray (representing a "stack" of underlying instances), when one wishes to indicate multiple members of the class of interest, for example, multiple employees in an organizational database, or multiple functionally equivalent instances of an operant. (All subsequent figures in this paper use the class-and-object notation.) In addition, the arrows on the diagrams might be drawn as dashed rather than solid, to suggest that operant behavior is evoked probabilistically by conditions and events that are contingently related to it, rather than being elicited mechanistically.

Cultural practices (say, acts of gang violence) are often embedded in highly complex webs of antecedents and consequences (Canada, 1995; Mattaini, Twyman, Chin, & Nam, 1996). In-

stances of such behaviors may be in part rule governed ("I lose face if I let that guy from outside the neighborhood disrespect me"), in part learned through imitation (observing other gang members gain respect through violent acts), and may be evoked in part by multiple establishing operations (e.g., high levels of overall deprivation, increasing sensitivity to whatever sources of reinforcement are available) consistent with the matching law (McDowell, 1988). Multiple concurrent consequences may also be active (respect from peers, attention from young women, relief from the learned aversive condition generated by the unharmed presence of a member of another gang).

These concurrent and coercive conditions and events can be portrayed in a more complex contingency diagram such as that shown in Figure 3. Note that this image offers multiple points toward which preventive interventions might be directed, and also demonstrates why unidimensional strategies

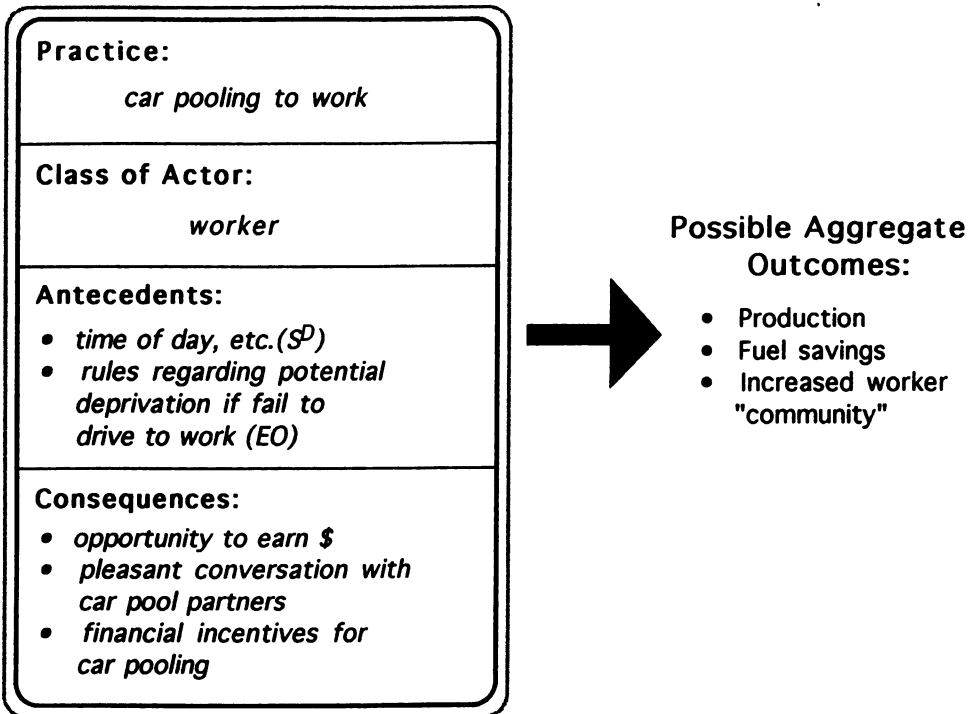


Figure 4. A practice diagram depicting the practice, class of actor participating in it, antecedents, consequences, and possible aggregate outcomes.

may be ineffective, given the multiple active factors involved.

Up to this level of complexity, contingency diagrams are robust, capturing substantial details that can be aggregated and disaggregated for analytic purposes. The situation becomes more challenging when the interlocking acts of multiple persons, or especially multiple classes of actors, are of interest. Up to a point, one can overlay transparencies that depict how the behavior of a member of one class of actors (say peers) may be an important consequence for another (a young person perpetrating an act of violence), and the behavior of yet another person (the youth from outside the neighborhood) may be a necessary antecedent for the attack. The relevant contingencies associated with all three acts can be diagrammed separately, and overlaid on each other with careful planning of graphic layout; as classes of cultural practices and classes of actors accumulate, however, such overlays be-

come increasingly cumbersome, and the purpose of the figures (to clarify complexity) can be lost. Cultural practice diagrams, as presented below, are an approach for organizing such data that may have utility for more complex cultural analysis and design purposes.

Diagramming Cultural Practices

In dealing with cultural practices, scientists are interested in similar contingencies across a class of actors, rather than in the behavior of a single individual. In seeking ways to capture these events graphically, it is essential to maintain that focus. A practice diagram like that shown in Figure 4 is one way to do so. The core element is the practice itself, noted in the top cell. The class of actors who emit the practice is shown next, followed by antecedents and consequences that are involved in contingent relationships with the practice. The central object in Figure 3 is therefore the practice; the ac-

tors who emit them, although important, are analytically secondary. The single practice depicted in Figure 4 alone, of course, does not result in the aggregate outcomes shown. Multiple practices and the interlocking contingencies within which they are embedded are required to do so. The real power of practice diagrams emerges when such interlocking webs are depicted, as in the more complex figures that follow.

Practice diagrams draw heavily on tools and concepts from object-oriented analysis (OOA) (Coad & Yourdon, 1991), incorporating such OOA principles as abstraction, encapsulation, inheritance, and association. As noted by Coad and Yourdon, tools with these functions allow the analyst to “tackle more challenging problem domains . . . , explicitly represent commonality, [and] provide a consistent underlying representation for analysis . . . and design” (pp. 35–36)—all crucial objectives in the analysis and design of cultural practices. Note that “objects” in OOA need not be “things”; they may be events, as in the analyses presented here.

The practice diagram can be viewed as a contingency diagram that has been further collapsed into an iconic representation. It is possible, and often preferable, to code items listed in terms of their function (e.g., positive reinforcer [R+ or SR+], establishing operation [EO]). For practical purposes it is not always necessary to note all the relevant antecedents and consequences that are involved in less central parts of the network; at minimum, the practice and class of actors performing it should consistently be noted. My colleagues and I often begin with contingency diagrams that trace the practices of interest to ensure precision, then collapse those diagrams into practice diagrams to explore the interlocks among practices and their associated contingencies.

Aggregating and disaggregating practices. In some cases, cultural analysts are interested in a relatively ab-

stract, generalized class of practices, for example, acts of street violence. This practice may interlock with certain law enforcement practices, bystander-emitted actions, and so on, and “act of street violence” may be specific enough for some analytic purposes. At other times, however, finer grained analyses may be required, and the generalization-specialization (gen-spec) notation shown in the upper panel of Figure 5 may be useful for that purpose. Such diagrams allow the analyst to identify and work with relatively discrete subclasses when this is useful.

At other times, what object-oriented analysts call whole-part structure may be important to portray. The most obvious example in behavioral work is when a behavior of interest consists of a chain of simple acts; one may not always need this level of detail, but in some cases it may be valuable. A simple example, using the standard OOA notation, is shown in the lower panel of Figure 5.

Portraying contingency interlocks. The central purpose of practice diagrams is to depict the interlocks among multiple practices and the contingent relations within which they are embedded. The sequence of events within a scene is also often important. An example—a sort of behavior-analytic “classic”—is shown in Figure 6, in which escalation of coercive exchanges (as described by Patterson, 1976) occurs between a parent and an aggressive child in one of the simplest of cultures—a family. Although later elements in the sequence may result from naturally occurring consequences that do not require cultural mediation, the initial steps (a coercive demand and noncompliance) are often elements of family cultures that are, indeed, passed on across persons and generations within the family. In fact, the incidence of such behaviors varies dramatically between larger cultural units as well; Biglan (1995) suggests that the core of the analysis of cultural practices is the examination of incidence and preva-

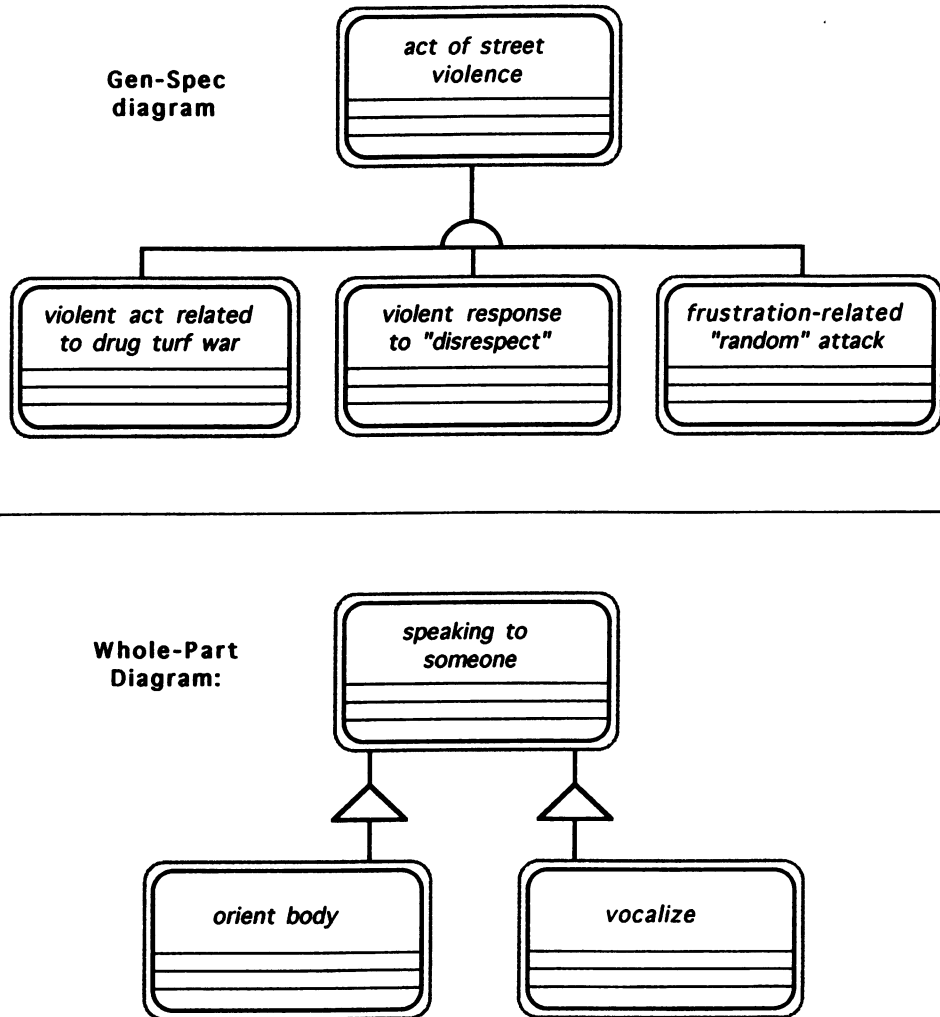


Figure 5. A gen-spec diagram and a whole-part diagram. Note that only the practices are shown here; the class of actor, antecedents, and consequences related to each practice are omitted for simplicity.

lence rates of desirable and undesirable practices within cultural groups. Although I am focusing in this example on practices within the family as a cultural entity, a related analysis could, and probably should, examine this larger picture.

Family therapists (e.g., Friedman, 1991) recognize that such patterns can be passed on from generation to generation, a process that occurs in non-clinical family systems as well (Walsh, 1993). What the science of behavior can bring to bear here is an operation-

alization and demystification that can be important to intervening, to designing new family cultures, which is the core of family intervention. This is another way of understanding what Minuchin (1974; Minuchin & Nichols, 1993) terms *restructuring*—not just a change, but a substantive change that is supported by corresponding changes elsewhere in the system. Practice diagrams can be useful for elaborating and specifying both current contingency interlocks and those that may be more desirable. Patterson and his colleagues

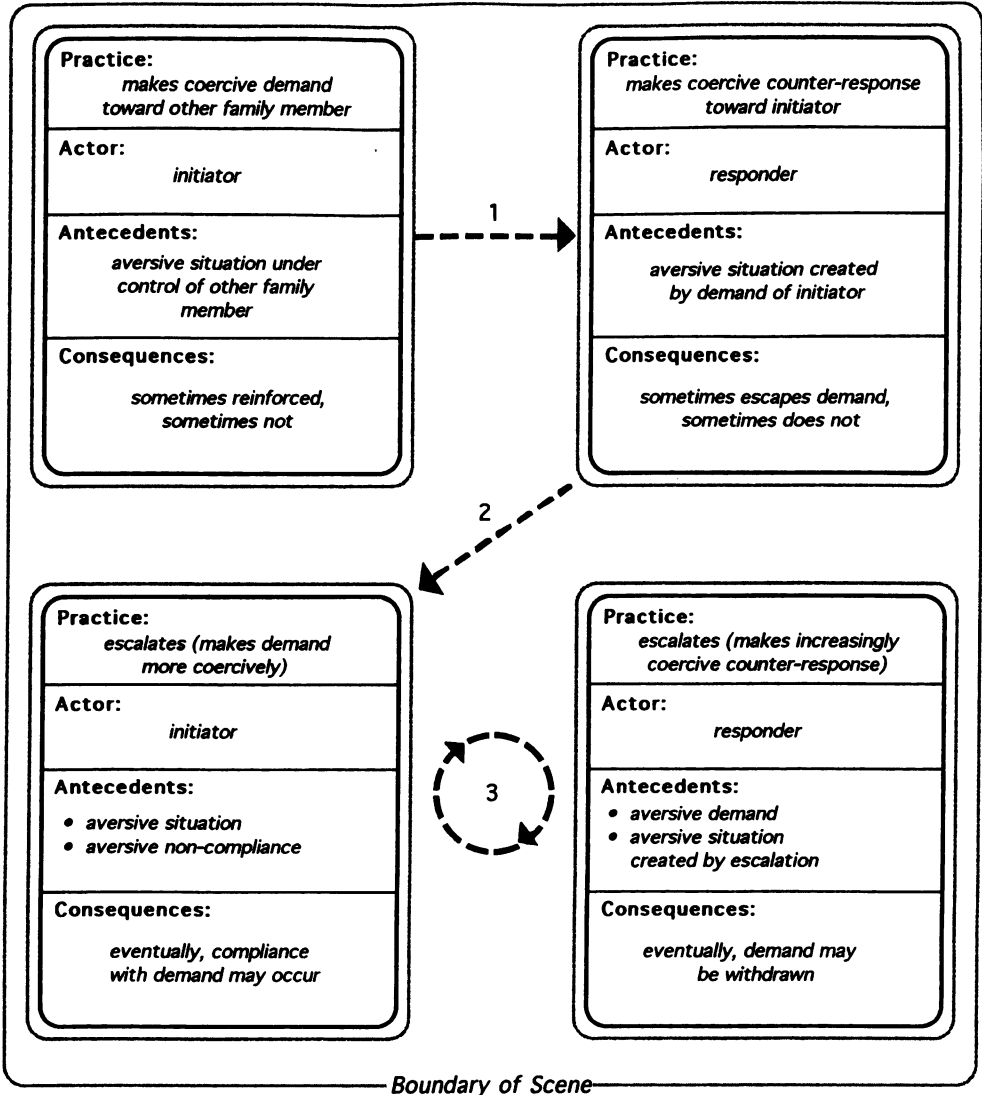


Figure 6. The development of Patterson's (1976) coercive spiral within a family with an aggressive child.

found that in families with aggressive children, coercive exchanges were frequent (and might be initiated by either the child or the parent; it is precisely because the roles in the scene may be taken by any of a class of family members that this is a cultural practice). A coercive behavior was usually followed by a coercive counterresponse, and the aversiveness of the exchanges tended to escalate until one party broke it off. More severe aggression, there-

fore, is shaped by negative reinforcement (and perhaps sometimes by positive reinforcement as well) on an intermittent schedule for each party.

Designing a new family culture, a new set of interlocking practices and contingencies, is crucial in such families, because there is no way out of this pattern, once it is established, within the existing family culture. Although such ineffective patterns of family exchanges were clearly described over

two decades ago by Patterson (1976) and others (e.g., Sloane, 1988), conceptualizing the issues this way has not yet become mainstream. Effective behavior-analytic intervention involves not just teaching individuals new behaviors but embedding new sets of practices within the family system. A good example is presented by Serna, Schumaker, Sherman, and Sheldon (1991), in which they taught very disturbed families to participate in family conferences in the home. These conferences involved sets of practices in which roles were interchangeable among members and interlocking networks of social reinforcement were established; ideally, these practices would be passed along to younger members of the family as they grow up. Practice diagrams could be useful for clarifying the specifics that need to be addressed in helping families (or organizations, or other cultural entities) change in these ways.

Beyond the Boundaries of the Scene

Not all of the relevant contingencies involved in many cultural practices occur within the boundaries of the immediate scene. There are several ways in which conditions and events that are not present at the moment may affect behavior. For example, the history of delivery of consequences under similar stimulus conditions is of course crucial, because this is how, ultimately, behavior has been selected. Particular behaviors are also often segments of behavior chains; one performs an extensive series of behaviors in commuting, for example, that eventually result in access to the reinforcers available at home. Perhaps even more important for our purposes, the occurrence of many, perhaps most, cultural practices is heavily rule governed (see Malott, 1988, and Malott & Garcia, 1991, for further discussion). Many cultural practices involve verbal mediation and rule governance through which temporally distant antecedents and consequences come to affect behavior.

The particular power of visual tools becomes most evident in analyses of practices that are supported by multiple interlocking contingencies both within and outside the scene, many of which may involve verbal mediation. In this section, two examples of relatively complex interlocking practices and the extended webs of contingencies within which they are embedded will be briefly elaborated. Similar analyses using practice diagrams can be conducted for any practice or set of practices of sociocultural importance, from encouraging condom use to demonstrating respect and appreciation for cultural diversity.

As one example, Jesse Jackson and his Rainbow Coalition have targeted the reduction of violence as a core priority (Citizen Education Fund, no date). Rather than simply exhorting young people not to be violent, however, Jackson has targeted success in school as a key variable (this is consistent with the analysis of our group; refer to Mattaini et al., 1996). As a part of this strategy, he has asked churches to ask parents and children to make an annual pledge to take specific actions. These actions include parents taking children to school, meeting with teachers, and turning off the television for three hours each evening while children do homework; and youth attending school, not carrying weapons, and doing homework instead of watching television. A partial depiction of this strategy, including several probably necessary but in some cases unspecified contingencies (identified by question marks), is shown in Figure 7. Only the parent and child may be present during the actual occurrence of the scene of interest, but many extrascene practices interlock with their behaviors. Not all of the relevant contingencies are noted on the diagram; readers can identify additional practices and resources that may be necessary or helpful at various points in the interlocking cultural system. Identifying such missing elements is important to effective introduction and stabilization

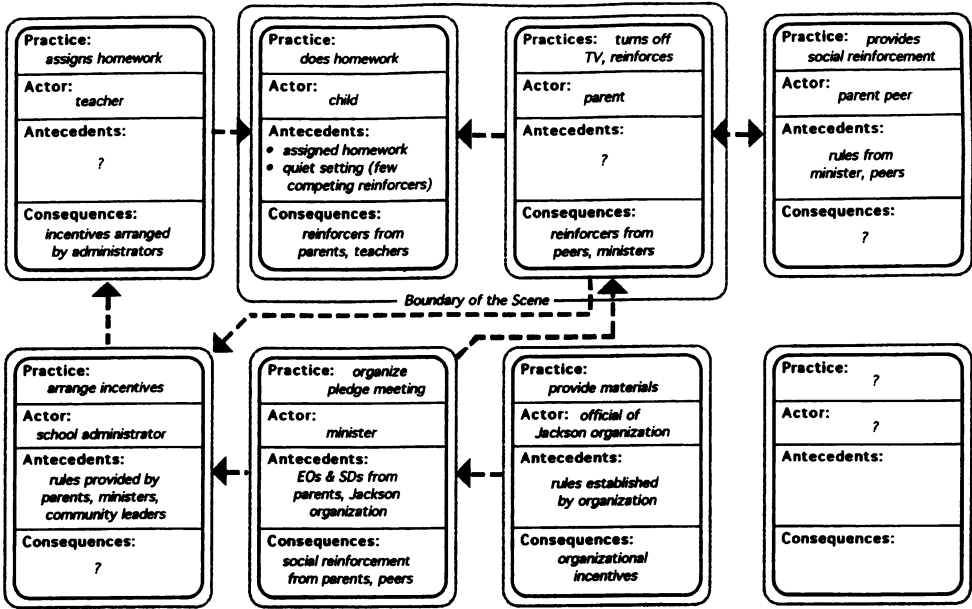


Figure 7. Practices and interlocks involved in Jesse Jackson's "Back to School" pledge campaign.

of new cultural practices, and the diagram makes it easy to do so, prompting the analyst to consider potential ways to fill in the gaps.

In another example, voting by members of traditionally disempowered groups is a potentially significant practice. Voting in this country is actually a two-step process: registration and voting itself. Current data suggest that persons who are registered usually vote in national elections, including those who register to vote in social agencies (Fawcett, Seekins, & Silber, 1988). This process is depicted in the whole-part practice diagram in Figure 8. The first step in the process (registration) is highlighted in the diagram; note, however, that a similar analysis may be important in developing strategies to support the second step (voting) as well. With the recent passage of the national Motor Voter Bill, the availability of voter registration is mandated in certain governmental offices, including motor vehicle and welfare departments. The bill also encourages nonprofit social agencies to make registration available on-site, and a major goal of Human Serve (a nonprofit organi-

zation dedicated to universal voter registration) is to embed this practice, which would substantially reduce the response cost for clients, in the routine organizational cultures of a wide variety of agencies.

As can be seen in Figure 8, the key scene involves an agency staff member providing the voter registration form, the potential voter completing the form, and the staff member putting the form in the outgoing mail. Although this appears to be a fairly straightforward process, it is not easy to institutionalize in practice (Conley & Freedman, 1995). Some of the problems relate to misunderstandings on the part of clients, but the major issue appears to be the contingencies involved in the behavior of agency staff members. Given many competing demands, these often overworked individuals commonly fail to take the desired steps; agency administrators, in turn, fail to consistently take steps that encourage staff to do so.

The practice diagram in Figure 8 makes clear where the gaps are. Although many national organizations have taken strong positions in favor of

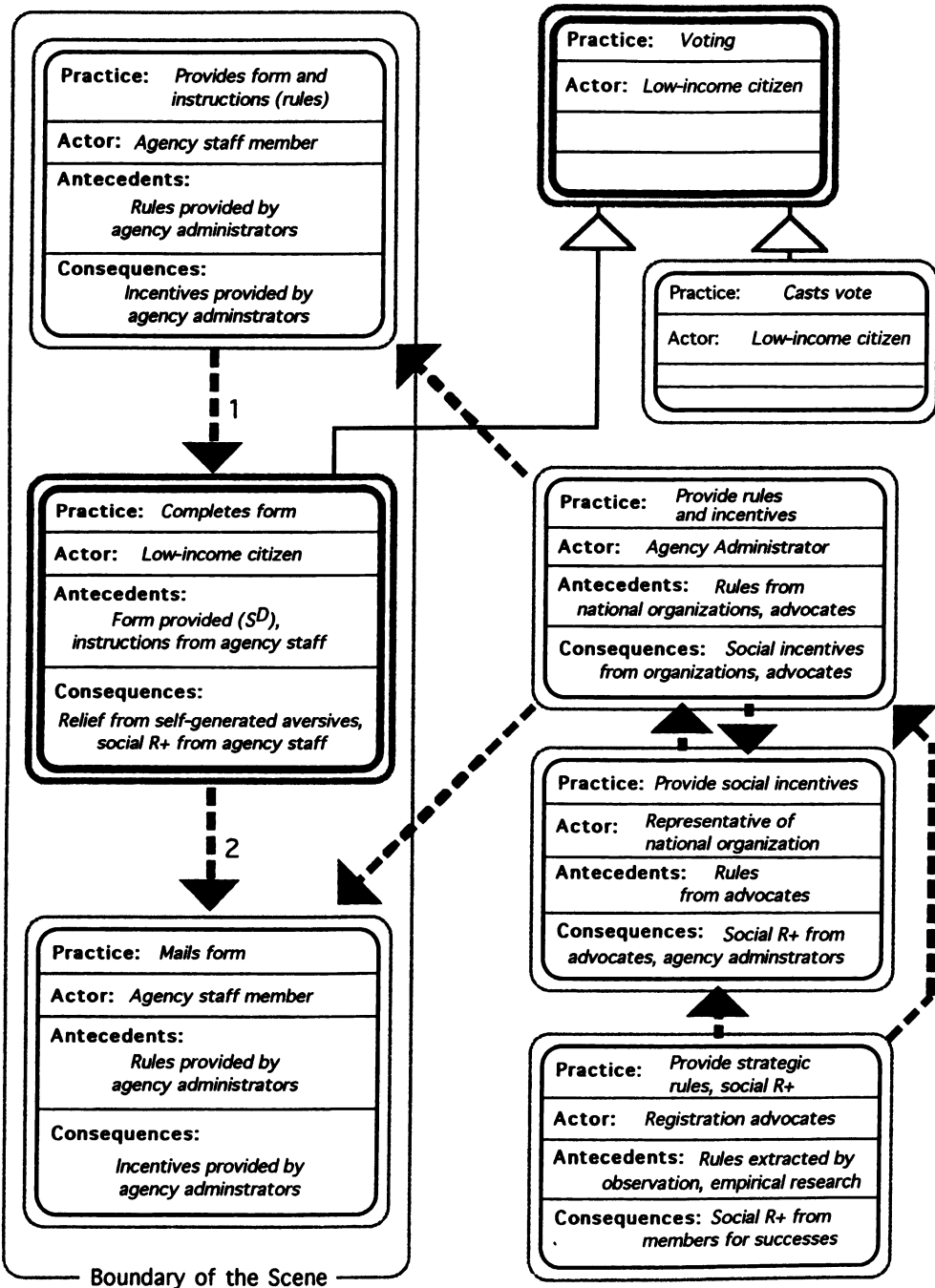


Figure 8. Interlocking practices involved in facilitating voter registration in social agencies.

agency-based registration, few of their local affiliates have yet taken consistent action. What is required is providing the necessary antecedents, and especially incentives, for line staff. There

may be many creative ways to do this; some agencies are discussing experimenting with charting progress, contests, routine inclusion of these behaviors in staff evaluations, and so forth.

Maintaining these contingencies, however, requires continuing action on the part of administrators. (There may, of course, be multiple administrative levels present; they are collapsed into one for simplicity here, but in a particular setting may need to be carefully elaborated.)

Although there are likely to be long-term advantages for agency staff from registration, including shifting power to their clients and eliciting funding support, these small, cumulative advantages are unlikely to be effective reinforcers for staff behavior. What may be required is to identify ways that national organizations could provide more immediate and certain reinforcers to agency administrators, perhaps by publicizing rates of registration among constituent agencies, instituting contests, or experimenting with other creative alternatives. Agency administrators might then, in turn, provide required incentives for staff.

CONCLUSION

The analysis and design of cultural practices and the interlocking contingencies that support them are "new frontiers" for applied work in behavior analysis (Biglan, 1995; Mattaini, 1996)—in some ways a new subdiscipline that one reviewer described as "applied behaviorocultural analysis." Diagrams like those presented here may be useful for this challenging work in several ways. The complexities involved in understanding the problems of the American educational system, for example, are immense. But they can be studied; it is possible to identify current practices, and to suggest and iteratively test variations in antecedents and consequences that may be associated with more effective alternatives (Greer, 1996). As data are collected, they can be slotted into practice diagrams until the overall configuration of the system begins to emerge. When the issues are contextualized in this fashion, scientists or policy makers may be less likely to rely on an inter-

vention (say, sending teachers to a one-day training workshop) that targets a single practice rather than the overall contingency network. The relationships among multiple variables emerge clearly in the diagrams, which thereby preclude oversimplification.

As the phenomena being analyzed become more complicated, so do the practice diagrams depicting them. The utility of the diagrams is likely to be highest when the situation being explored is complex. The diagram representing it may then require significant effort—and even training—to comprehend. Note, however, that this is also true in other fields, including medical imaging, computer systems analysis, and meteorology, but those who become skilled in the technology come to read the images rapidly and efficiently. Achieving the pragmatically most functional balance between simplicity and detail will require experimentation, and no single answer may be right for all circumstances.

Moving toward the design of desirable cultural practices, in some cases the analyst may want to work from diagrams of the existing situation, identifying currently active antecedents and consequences that might be transferred to the new practice. In other cases, one may need to work outward from the desired practice, identifying necessary contingencies to establish and maintain it, then identifying those practices elsewhere in the network that are required to establish and maintain those contingencies, continuing outward until a stable interlocking behavioral system emerges.

The physical preparation of diagrams like those illustrated here need not be a complicated process. The current versions of standard word processors (e.g., WordPerfect® or Microsoft Word®) include simple graphic tools for drawing rounded rectangles, lines, and arrows and for embedding text within the figures, and these are the only elements required to construct practice diagrams. Drawing and saving a blank template can save time later.

When more than one person is working with the diagram, we have sometimes found it useful to print the basic template on transparencies, so the image can be projected on the wall and gradually and iteratively refined in the course of discussions. Related information can be found in Mattaini (1995a, 1995b).

As is true for contingency diagrams, practice diagrams can be valuable teaching tools, in addition to their utility for analysis and cultural design. In the author's community practice course, students develop and annotate detailed contingency diagrams and practice diagrams. They report that these tools enhance both their understanding of the cultural phenomena with which they are dealing, as well as their appreciation for the broad applicability to important human questions of analyses rooted in the science of behavior (Mattaini, 1995b). Such applications may be the principal professional and sociocultural challenge facing behavior analysts in the 21st century.

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