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Three Conceptual Units for Behavior

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Three generic units for behavior are examined in terms of their background: an if-then unit for stimulus and response (S-R), a holistic unit for Kantor's behavior segment, and an AB-because-of-C unit for Skinner's three-term contingency. The units are distinguished in terms of their respective historical backgrounds, causal modes, advantages, and disadvantages. The ways in which these units may be compatible are discussed.

Key words: behavior analysis, interbehavioral field, mechanistic explanation, S-R psychology, three-term contingency conceptual units

Three conceptual units for behavior have been prominent in behavior analysis: (1) an if-then unit illustrated by the S-R formulations of the early behaviorists and by Skinner's respondent behavior; (2) a holistic unit illustrated by Kantor's behavior segment or interbehavioral field; and (3) an AB-because-of-C unit illustrated by Skinner's three-term contingency. These units are central to their respective explanatory accounts of behavior and can be used to distinguish conflicting positions in behavior analysis. In order to appreciate fully the significance of the differences among these units, their historical background needs to be examined. The following describes this background in terms of how each unit fits into a distinct explanatory framework and how all three units may be compatible with one another so that a more complete and coherent account of behavior is possible.

THE IF-THEN UNIT

When we want to duplicate a previous achievement, useful guidelines eliminate unnecessary behavior and make duplication easier. Straight lines are convenient guides for shortening distance, time, and effort in reaching goals that others have achieved in a less direct way. In their simplest form, such guides connect two events. To avoid uncertainty over what comes next, the connection is made a necessary one: "If I call, then you must come." A simple two-part guide may be extended in a chain of paired connections, one step after the other, like the directions for a recipe, a line of reasoning, or an ordered scale. Events may also be separated or opposed in an either-or relationship that gives the guide branching connections: "Either that is the case and then you do this, or this is the case and then you do that." Although "branching-tree" and "flow-chart" diagrams can be elaborate, they have an appealing clarity when they are seen as combinations of connections between two events.

Euclidean geometry is a paradigm of if-then constructions that have simple, necessary connections. Etymology of the term geometry (geo + metre) indicates that its origins lie in the surveying practices of the Egyptians, who needed repeated measurements of the land after floodings of the Nile (Crombie, 1953, p. 22). The success of this kind of reasoning in measuring the earth and the heavens was highly promising for further uses, and the geometric tradition dominated accounts of the physical universe (Einstein, 1923/1953; Hempel, 1945/1960).

Geometric reasoning also offers a ready model for mechanistic accounts of simple machines, where part is connected to part in direct physical contact, and the action of one part produces a necessary reaction in the other part. Mechanistic explanations in terms of multiple action-reactions, or interactions, have been used to account for complex events. We may

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conceptualize an interaction, which may be represented by a double-headed arrow, as a doubling of the if-then relationship back upon itself. In this way, multiple action-reactions between pairs of elements enter the explanatory account as interactions. According to Dewey and Bentley (1946), the central concept for classical mechanics was "Inter-Action: where thing is balanced against thing in causal interconnection" (p. 509).

This mode of reasoning was extended to psychology. In addition to deducing a thoroughly mechanistic universe in which all action was by contact, Descartes, the founder of analytical geometry, made a lasting contribution to the necessary connection between stimulus and response (see Skinner 1931/1972). As Pavlov expressed it for the reflex, "A stimulus appears to be connected of necessity with a definite response, as cause with effect" (1927/1960, p. 7). The S-R formulation of Skinner's respondent behavior, like Pavlov's reflex, is also an if-then unit with a mechanistic connection conforming to mechanistic laws (see Ringen, 1976, p. 241). Ample details on the history of the S-R formulation are available from several sources (e.g., Fearing, 1930/1970; Keller, 1973; Kitchener, 1977; Young, 1970; Zuriff, 1985).

In principle, any events related to behavior, including consequences, can be analyzed so as to leave an S-R connection as the fundamental conceptual unit of behavior. For example, Thorndike (1940/1969) explained the causal relationship of consequences in terms of a "confirming reaction," which resolved the apparent conflict between "commonsense teleology, which asserts that we do as we do largely because we thereby get what we want, and mechanistic science, which asserts that the mind is as truly determined by natural forces as is a dynamo or a radio set" (p. 10). Thorndike's "confirming reaction" resolved this conflict by explaining purposes in mechanistic terms and relationships:

> Our purposes, though teleological, are a part of nature; they exist as parts of what I have called the overhead control or ruling set of the mind; they act by the natural force of the confirming reaction; this is as truly a mechanism as the knee-jerk or lid-reflex or strengthening influence of sheer repetition, but it has the special property of working back upon connections to strengthen those which are satisfying to a man's purposes. (p. 10)

In this account, the S-R action is complemented by an if-then reaction working backwards. The *if* in the backward *if-then* relationship begins at a consequence. The *then* ends at the S-R connection. In Thorndike's formulation, the backward reaction does not establish the S-R connection, but it works "back upon" the connection to modify it. The relationship between antecedents, behaviors, and consequences here is not a three-part unit. Instead, this relationship is reduced to a pair of two-part action-reaction formulations.

Some S-R psychologists have included a pervasive network of if-then constructions in their explanations. Building on the formulations of Pavlov and Thorndike, Hull (1943, pp. 2–7) recommended explanations for a science of behavior which were like Euclid's definitions, axioms, and deductions for geometry. Neobehaviorists have even equated explanation with theoretical deduction (Kendler & Spence, 1971, p. 21).

As an approach to scientific investigation, the interweaving of if-then connections throughout explanatory accounts was consistent with widely advocated "logical" perspectives such as logical atomism, logical positivism, and logical empiricism (see Turner, 1967), which provided some of the background for "methodological behaviorism." Data were certified by public agreement—a correspondence criterion for truth. This agreement required physical descriptions of immediate events and definitions of terms according to those descriptions. Abstract theoretical concepts were formally connected to the physicalistic definitions within a hypothetico-deductive framework (see Day, 1980, 1983; Moore, 1975, 1985). An often quoted statement from Wittgenstein's *Tractatus Logico-Philosophicus* (1922) captures the thrust of this methodology: "What can be said at all can be said clearly; and whereof one cannot speak thereof one must be silent" (p. 27). Much of what scientists actually did, however, was outside the prescribed pathways. Darwin's theory of natural selection, for example, would have difficulty with some of the recommended verification criteria (Putnam, 1981, p. 198).

In general, accounts in terms of if-then constructions simplify a complex situation by leaving out unnecessary experiences. Something important, however, may have been overlooked or passed over in silence. No matter how much an if-then account provides clarity, simplicity, efficiency, precision, certainty, and finality, it always remains conditional. Even when sound empirical reasons exist for regarding a behavior as mechanistically determined, we have no guarantee such a determination will be supported in the future. Empirical events, and our explanatory frameworks for them, change.

THE HOLISTIC UNIT

Not long after Pope's "Essay on Man" (1732/1931) proclaimed that everything was in its proper place and all was right with the world, Romantics began looking for everything that was missing. This meant replacing a mechanistic view with an organic one (see Furst, 1976). Although the Romantic vision was reactionary, it provided support for more comprehensive accounts of human experience. Existentialists such as Kierkegaard were interested in examining experience in more personal detail, an interest shared by phenomenologists and humanists (Misiak & Sexton, 1973).

Some looked to concepts like the *field* to organize events more comprehensively. The use of field as a psychological concept was advanced by Gestalt psychology. Kurt Lewin (1951), who was influenced by the Gestalt school while he was in Germany, gave a prominent role to the field as an organizing concept, and the influence of this concept is apparent in the ecological psychology of Roger Barker (1968), Lewin's student and coworker. Barker regarded comprehensive organizations of behavior, like behavior episodes and standing patterns of behavior, as behavioral units.

The concept of a *system* has also been used as a holistic unit. A system is comprised of all its elements and their interrelationships. Different levels of systems may be organized into subsystems and suprasystems for an extended account in terms of systems as holistic units (see Miller, 1978). A critical feature of a system is its irreducibility, an essential characteristic for any holistic explanation (Peacocke, 1979). Irreducibility can be illustrated by identifying relevant novel features that "emerge" at a more inclusive perspective and that could not be foreseen at a simpler level of analysis. Weiss (1967, p. 803) provides an example from photographs taken by the first weather satellite: "Note the cyclonic cloud pattern. But what are clouds in analytic view? Droplets of water. Now, could knowing all there is to be known about H_2O ever add up to a picture of this configuration?"

Kantor has made frequent use of both *field* and *system* in his interbehavioral psychology, and some clarification of his particular use of these terms may be helpful. All uses of a field concept are not necessarily analyzed as the integrated organization of an irreducible whole. A field can also be analyzed mechanistically as an aggregate of elementary parts in causal interconnection within a spatio-temporal framework (Pepper, 1942/1970). To prevent such a reductive interpretation, Kantor is careful to characterize his interbehavioral field with its focus on R-S interaction as an integrated one. In addition, systems approaches are commonly teleological, giving a prominent role to consequences in the form of feedback (see Ackoff & Emery, 1972). If Kantor's work is regarded as a systems approach, it is a systems approach without teleology.

The term *organismic* has also been influential as a holistic concept. In accounting for holistic events, early organicism relied on a concept of interaction in which the products of lower-level interactions participate in higher-level interactions in a continuous ongoing development toward higher and higher organization. If, as in the Hegelian dialectic, the interaction between opposed elements is regarded as the cause for a subsequent outcome, we have the formulation for thesis-antithesis-synthesis. The interaction of opposed if-then elements (thesis-antithesis) causes the effect (synthesis): if thesis-antithesis, then synthesis. This formulation has been used to explain how global events like organisms and societies have developed in a series of thesis-antithesis-synthesis progressions (Pepper, 1942/1970; Phillips, 1976).

In his early work, Kantor called his approach organismic. The two-part interaction unit, R-S, which is central to his interbehavioral field, is used for interactions that produce subsequent products in the manner of the early organismic explanations: "The basic assumption of the interbehavioral approach is that all scientific and philosophical work consists of interbehavior of individuals with (1) things and events, and (2) the products of such interbehavior" (Kantor, 1981, p. 83). Kantor (1959) has also organized scientific enterprises according to a developmental series of interactions in which "the levels are continuous as well as hierarchical" (p. 255). However, in contrast to organismic accounts that are strongly teleological (e.g., Werner & Kaplan, 1963, p. 5), Kantor has avoided explanations in terms of consequences. Accordingly, Kantor's later orientation has been considered more contextualistic than organismic (Morris, 1982, pp. 192–193). Although the contextualists identified in Pepper's (1942) account include pragmatists like Peirce, James, and Dewey who give a prominent role to consequences, it could be argued that Kantor offers a purer contextualism, one without any special status for antecedents or consequences.

A contextual orientation, as well as an emphasis on integration and an absence of teleology, is apparent in Kantor's holistic conceptual unit for behavior, the behavior segment. The following is one of Kantor's definitions for that unit:

> The behavior segment construct is the descriptive unit of psychological events and refers to many factors. The elements are (1) the response function, (2) the stimulus function, and (3) the interbehavioral medium. More peripheral are (4) the interbehavioral settings, and the interbehavioral history, which comprises (5) the reactional biography, and (6) the stimulus function evolution.
>
> Important too are the specifications covering the subunits called reaction-systems which are abstracted out of the organism's action described on the basis of the total interbehavioral field. (1959, p. 92)

Although this definition has many factors, they are all systematically organized and inseparable from the total interbehavioral field. For this reason, "interbehavioral field" may be more clarifying than "behavior segment" in referring to Kantor's conceptual unit (see Morris, 1982). "Field" is a bit more translucent than "segment" as a holistic concept, although "segment" does suggest we are dealing with a series of interbehavioral fields.

For Kantor, the interbehavioral field is fundamentally an irreducible whole. It cannot be broken up into separate events, and no one factor has any inherent claim to being more necessary or more important than another. All factors participate equally in the event:

> An event is regarded as a field of factors all of which are equally necessary, or, more properly speaking, equal participants in the event. In fact, events are scientifically described by analyzing these participating factors and finding how they are related. (Kantor, 1959, p. 90)

There is no justification here for reducing the description to a simpler level.

One of the interesting features of Kantor's behavioral unit is its implication for causality:

> Cause and causal relation, therefore, may simply be regarded as the interrelations of field components. . . . Causal changes or fields are functions of mutual and reciprocal change in every aspect of a factorial system. Causal changes in any field constitute a rearrangement in the simultaneous coexistence of factors in a unique pattern . . . . All things existing as parts or features of a certain pattern of happenings may be said to participate as factors in that particular causal field. (Kantor, 1950, pp. 156–157)

As long as we assume the irreducible wholeness of the causal field, an element within it may be singled out: "In some cases it may be legitimate to describe one factor as agentive, causal, or key, since it may be the factor required to complete the combination" (Kantor, 1950, p. 163). This justification for singling out a causal element within the field, however, does not extend to a justification for singling out a causal element outside of or antecedent to the field:

> We exclude here all forms of causal antecedents. No object, or action of an object may be regarded as a causal factor prior to its presence or occurrence in a specified field. These antecedent potencies are rejected when they are presumed to have inhered in any copresent object, as in the single causal antecedent. (Kantor, 1950, p. 157)

Likewise, no justification exists for singling out a consequent that is outside of the field.

In general, holistic units such as Kantor's serve as a placeholder for all the events and interrelationships of the whole. They may also provide organizational details for the participating events. In doing so, holistic units increase our sensitivity to a variety of considerations that may be relevant to the whole. We have more responses to what might otherwise be passed over in silence. Kantor's interbehavioral field exemplifies these features while including organizational details like R-S interaction which are not common to holistic units in general. Holistic units with a comprehensive interdependent view of causality, however, have practical limitations (see Bunge, 1979, p. 97). If we pursue the identification of all the interdependent factors that participate in the interbehavioral field, moving beyond a preliminary stage of investigation and into interventions for change is difficult.

THE AB-BECAUSE-OF-C UNIT

Some teleological explanations, or explanations in terms of consequences, are quite different from others. Aristotle used the concept of final cause to refer to what something is for, like the purpose of an activity or the use of an instrument. For example, "On account of what does he walk? We answer 'To keep fit' and think that, in saying that, we have given the cause" (Aristotle, 1970, p. 29). Offering a consequent event as an explanation for a prior event in this manner is common in ordinary discourse. Aristotle also used formal cause as an explanation in terms of a consequence: "A thing's form or what it is, for that is its end and what it is for" (1970, p. 38). Aristotle seems to imply that the ultimate shape of a flower would be the cause of the flower. This kind of explanation is likely to be the one referred to when teleological explanations are categorically rejected.

In addition, Aristotle gave an explanation in terms of consequences which seems to anticipate accounts of biological evolution:

> Zeus does not send the rain in order to make the corn grow: it comes of necessity. The stuff which has been drawn up is bound to cool, and having cooled, turn to water and come down. It is merely concurrent that, this having happened, the corn grows .... What, then, is to stop parts in nature from being like this—the front teeth of necessity growing sharp and suitable for biting, and the back teeth broad and serviceable for chewing the food, not coming to be for this, but by coincidence? And similarly with the other parts in which the 'for something' seems to be present. So when all turned out just as if they had come to be for something, the things, suitably constituted, as an automatic outcome, survived; when not, they died, and die, as Empedocles says of the man-headed calves. (1970, p. 39)

Interestingly enough, although Aristotle suggested this account might give us pause, he rejected it as impossible.

Centuries later, Darwin (1859/1959) offered a similar role for consequences in terms of a natural selection that operated gradually over a long period of time: "A natural selection acts solely by accumulating slight, successive, favorable variations, it can produce no great or sudden modification; it can act only by very short and slow steps" (p. 735). In addition to "variations" and "selection," another key concept for Darwin was "the conditions of life." Natural selection "implies only the preservation of such variations as arise and are beneficial to the being under its conditions of life" (p. 165). Darwin, however, did not use a three-term formulation of *conditions, variations,* and *selection* as an explicit conceptual unit.

Darwin (1872/1965, 1877) extended his views to human behavior. His account for inherited behavior is similar to his account for inherited structures: "Reflex actions are in all probability liable to slight variations, as are all corporeal structures and instincts; and any variations which were beneficial and of sufficient importance, would tend to be preserved and inherited" (1872/1965, p. 41). Today, basic features of Darwin's approach to the study of behavior can be found in ethology. According to Blurton-Jones (1972), ethological theory is distinguished by

> (1) emphasis on the use of a large variety of simple observable features or behaviour as the raw data; (2) emphasis on description and a hypothesis-generating, natural history phase as the starting point of a study; (3) a distrust of major categories of behaviour whose meaning and reality have not been made clear; (4) belief in the usefulness of an evolutionary framework for determining which kinds of questions need to be asked about behaviour. (pp. 4–5)

Charles Peirce (1902/1931–63) extended Darwin's account by comparing the "experimental" development of human conceptions and inventions with natural selection and the adaptation of animals and plants to their environment. Peirce proposed an explicit three-part formulation applicable to natural selection, in contrast to two-part formulations for "purely mechanical actions [taking] place between pairs of particles":

> Just as a real pairedness consists in a fact being true of A which would be nonsense if B were not there, so we now meet with a Rational Threeness which consists in A and B being really paired by virtue of a third object, C. (2.86)

The relationship between A and B is because of C. Applied to natural selection, the relationship between the environment (A) and the behavior (B) of the animals adapted to it exists because of consequences (C) that occurred for previous AB (environment and animal) relationships. Consequences as a class of events have a causal, mediating role here.

This causal relationship is different from Thorndike's if-then treatment of consequences. It is also different from thesis-antithesis-synthesis formulations in which the consequent event (synthesis) has no mediating or causal role for the prior events (thesis-antithesis). The thesis-antithesis relationship exists without the synthesis. By contrast, in Peirce's formulation, the AB relationship is dependent upon C and would not exist without it. C establishes the AB relationship and makes it what it is.

The causality expressed in Peirce's formula applies to Skinner's concept of the operant three-term contingency. This can be shown by matching Peirce's terms in brackets alongside Skinner's (1969): "We construct an operant by making a reinforcer [C] contingent on a response [B]. . . . Any stimulus [A] present when an operant is reinforced acquires control in the sense that the rate of responding will be higher when it is present" (p. 7). The relationship between the discriminative stimulus [A] and the response [B] has been established by the reinforcer [C]. The AB relationship is because of C. Skinner goes on to rephrase this conceptual unit in a more general way:

> An adequate formulation of the interaction between an organism and its environment must always specify three things: (1) the occasion upon which a response occurs, (2) the response itself, and (3) the reinforcing consequences. The interrelationships among them are the "contingencies of reinforcement." (p. 7)

The causal role of consequences in this formulation has been advanced by Skinner (1981) as a pervasive principle. He has pointed out how, in living things, selection by consequences replaces explanations based on the causal modes of classical mechanics. In particular, he has noted the role of consequences in natural selection, the shaping and maintenance of the behavior of the individual, the evolution of cultures, and in machines made by living things. In accounts of "machines made by living things," the terms *input, output,* and *feedback* occur in an AB-because-of-C relationship (see Bunge, 1979, p. 154). Feedback plays the key role here in establishing and adjusting the input-output relationship.

One final example completes our review of alternative expressions for an AB-because-of-C relationship. Using E-B-G notation, which is common in philosophy, for *Environment, Behavior,* and

Goal, Zuriff (1985) points out how this notation can be adapted to an explanation of reinforcement:

> 1. In E, B tends to bring about G.
> 2. B occurs in E because it tends to bring about G.
>
> In this formulation, the critical feature of teleological explanation is its reference to the consequences of B while nonteleological explanations mention only antecedents of B.
> . . . the formulation can be emended:
> 1. In E, B *has brought about* G in S's past.
> 2. B occurs in E because *it has brought about* G in S's past.
>
> This revised formulation is equivalent to reinforcement explanation where G is the reinforcement, B is the reinforced response, and E is the discriminative stimulus. (p. 125)

In addition to illustrating another way of expressing an AB-because-of-C relationship, this passage is of interest for its identification of consequences as the critical feature in a teleological explanation.

One curious detail that Skinner includes in his use of the three-term contingency is that of temporal contiguity between a response and its reinforcer. Although Skinner (1953, pp. 76–77, 95–96) has indicated delayed consequences can be effective before a more refined control is provided by immediate conditioned reinforcers, he has subsequently required temporal contiguity without qualification: "Reinforcement must overlap behavior" (1973/1978, p. 20) and "Behavior must be in progress if it is to be changed by a consequence" (1984a, p. 220). This is not a requirement of AB-because-of-C formulations used elsewhere. It is not a requirement, for example, of Darwin's theory of natural selection which arose from naturalistic field studies. Although contiguity has often been demanded for the necessary relationships in mechanistic connections, the relationship between behavior and its consequences in Skinner's three-term contingency is one of probability rather than necessity (see Scharff, 1982).

As a mechanistic feature, temporal contiguity is more consistent with Skinner's laboratory methodology and his early deterministic-mechanistic position (Moxley, 1984). In the de-contextualized environment of the laboratory, the requirement of temporal contiguity may be consistent with empirical observations as well as with a pervasive use of mechanistic methodological principles. It is a big jump, however, to assume a laboratory principle can be generalized without modification to a naturalistic setting or to assume that principles of behavior only emanate from the laboratory. Any supposition that behavioral principles for natural settings cannot be derived directly from those settings, but must be derived indirectly from the laboratory, introduces some degree of disengagement between research and its subject matter. Epling and Pierce (1986) have called such a supposition the "abstract research model" in contrast to an "analytical pragmatism." In the abstract research model, experimental variables are commonly construed as discrete events in an independent-dependent (if-then) relationship in isolation from the surrounding context. In conforming to this model, the experimental analysis of behavior has been seen to advance a methodological behaviorism consistent with S-R psychology, mechanistic explanation, internal validity, and logico-empirical verification (cf. Day, 1983; Epling & Pierce, 1986; Hake, 1982; Leigland, 1984; Reese, 1986; Shimp, 1984; Turner, 1967).

At times, Skinner (1986) appears to favor the abstract research model:

> The experimental analysis of behavior can best proceed as it started, until the control of the behavior of an organism in an experimental space is very nearly total. A science of behavior will then . . . lead most rapidly to an effective technology of behavior in the world at large. (p. 235)

It may not be surprising then that Rorty (1979), who favors explanations in terms of consequences, should refer to "Skinnerian methodological behaviorism" (p. 213) even though Skinner (1974) has distinguished his radical behaviorism from at least one form of methodological behaviorism. At other times, Skinner's radical behaviorism seems more than a simple extension of the experimental analysis of behavior. Instead of confining himself to laboratory findings, Skinner has often pursued a pragmatic analysis in terms of consequences and contexts independent of any particular experimental methodology (see Day, 1980, pp. 234–241; Reese, 1986, p. 85). Skinner, for example, did not use experimental data in *Verbal Behavior* (1957), which he has proposed as his most important work.

In general, AB-because-of-C units have facilitated an understanding of change as well as control over it. One problem with this kind of account for behavior is that it does not seem to be easily communicated. It is often inadequately differentiated from S-R psychology and presented with misleading details like temporal contiguity and with misleading graphics (Moxley, 1984).

DISCUSSION

As may already be evident, the same physical events can be described by each of the above units. For example, all the events of respondent and operant behavior might be described in terms of if-then units; or they might all be described in terms of AB-because-of-C units (cf. Schoenfeld, 1976). The choice of a unit, however, does make a difference in our interpretation and responsiveness to those events.

If we consider causality as an account for how events are the way they are, each of these conceptual units has its own distinctive portrayal of causal relationships. With if-then units, the emphasis is on a specific antecedent event for necessary causality. This is the traditional account of cause and effect. It is the unit of choice for clarity and precision when there are sound empirical reasons for regarding events as finally determined. This unit is convenient in mathematics and in laboratory settings where statements of some finality can be made that may be externally relevant to a natural setting. With holistic units, the causality depends on all the participating elements and interrelationships. In contrast to the emphasis on past events in antecedent causality, holistic causality emphasizes present events. It is the unit of choice for an initial investigation where it is important to be complete, even if sometimes ambiguous. This unit is convenient for describing complex personal experiences and social interactions and for indicating areas, such as setting events, for further investigation. With AB-because-of-C units, the causal role is one of selection by consequences with an emphasis on events in a future relationship. It is the unit of choice for an account of change and control of that change. This unit has been convenient in qualitative evolutionary studies as well as in quantitative cybernetic control. It functions at a vast intermediate level of analysis between the all-inclusive context of holistic explanations and the precise determination of mechanistic reductions.

To a large extent, these units are specialized for the different tactics at the begining, middle, and end stages of an investigation. We might begin with a holistic examination, move on to selection by consequences, and end with if-then conclusions. When the end product of an investigation has been successfully determined through a functional analysis of AB-because-of-C relationships, the result may be more economically described (and replaced) by an if-then account. As Skinner (1984b) has put it,

> Once a given structure has been selected by natural selection and once a bit of behavior has been shaped by operant reinforcement, selection as a causal mode has done its work and a mechanical model may suffice. . . . Only if these structures are still changing will selection need to be considered as a causal mode. So far as they are the products of selection, a "mechanical" causality suffices. (p. 503)

This mechanistic account may then appear similar to one that had been reached through a pervasive mechanistic approach from the beginning. Even though the end products seem the same, however, they would have been arrived at from dramatically different approaches, much as similar behavior may be contingency-shaped or rule-governed. Furthermore, in being aware of how the three units function at different levels of analysis, we are less likely to be locked into one perspective. If we encounter a problem, we can recycle our inquiry through these levels to reach a more satisfactory resolution, much as behavior is shaped through cycles of AB-because-of-C units.

At first glance, it may seem feasible to integrate the three conceptual units by synthesizing the work of Kantor and Skinner. Kantor's work has a holistic unit and holistic explanations lacking in Skinner's work. Skinner's work has an AB-because-of-C unit and a selection by consequences explanation lacking in Kantor's work. Both use if-then units for behavior, but in different configurations: S-R for Skinner's respondent behavior and R-S for Kantor's response-object interaction. But how can their work be put together? Kantor's interbehavioral field unit, for example, has a detailed specification that centers on a two-part R-S interaction. Where does that leave a three-part AB-because-of-C unit?

Alternatively, a systems approach might be pursued which includes AB-because-of-C units within a comprehensive network of contexts (Brethower, 1980). In addition, the term *setting* might be used as a holistic reference similar to Kantor's interbehavioral field unit, but with AB-because-of-C instead of R-S components. Fairly comprehensive usages of setting already occur in Kantor's interbehavioral psychology and Barker's (1968) ecological psychology where "a behavior setting" embraces behavior as well as its conditions. If we regard the setting as including consequences as well, events within the setting can be organized in large or small classes of AB-because-of-C units by adjusting the class size of the terms to the level of analysis we are interested in (see Meadowcroft & Moxley, 1980; Moxley, 1982, 1986). When we consider that the terms of the traditional three-term contingency are class concepts to begin with and that the corresponding terms in natural selection often refer to rather large classes, it should be apparent that a wide range of class sizes can be accommodated within an AB-because-of-C conceptual unit.

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