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"WHAT ACTUALLY HAPPENS":

I. Representation of Real World Phenomena in Behavioral Science

Peter G. Ossorio
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I. Some Foundations and Technology for Behavioral Science

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Ontology is the discipline that studies Being, and one would suppose that the empirically-oriented scientist must in principle have some interest and something fundamentally at stake in such matters. He does. But the philosopher's interest in Being is not the same as the scientist's interest in what is the case. "Being" is philosophers' jargon, and ontology is a philosopher's game, and neither has been found to be particularly apropos from a scientific point of view. I agree. Accordingly, in delineating what is of interest and what is at stake scientifically, I shall talk not about Being or Existence but about reality, reality concepts, and the real world. It does not come to the same thing.

At the present time it has become essential for behavioral scientists to deal with reality and reality concepts explicitly and systematically rather than by simple intuition or by "letting George do it." Traditionally, George has been the ontologist, the epistemologist, the philosopher of science, the physicist, and a variety of others, and the current state of the art in behavioral science directly reflects that intellectual default. Fortunately, there appears to be no difficulty in principle in regard to this necessary task. And it appears, also, that a full appreciation of the necessity is likely to follow, rather than to precede, a detailed understanding of how the requirement can, in fact, be met, not merely in principle but in practice. The primary purpose of this presentation is to contribute to such understanding by dealing explicitly and systematically with reality and reality concepts in a scientifically viable way.

It is essential to deal with reality explicitly because it has an essential relation to science, and it is essential to deal with it systematically because the relation is neither single nor simple.

As soon as we begin to consider what connections there are between the real world and the social institution of empirical science, at least three fundamental sorts of connection--methodological, substantive, and

historical--come readily to mind. These connections make a difference at all levels from basic methodology to theorizing to experimental procedures, to analysis and interpretation of data. Because of this, it is difficult to imagine how we could have an intellectually responsible behavioral science or a methodologically sound one or a substantively adequate one if we could not deal effectively with these connections within the scope of that science. To be sure, this is an unprecedented requirement to place on a science; but, then, it is hardly a feat of daring today to suggest that obviously a behavioral science would have to take a form which was unprecedented in some major respects if it were to be a science and not merely an agglomeration of behavior-manipulating and explanation-constructing techniques and practices.

The methodological, substantive, and historical connections between science and the real world are characterized briefly as follows:

A. THE METHODOLOGICAL CONNECTION

There is a difference between what is real and what is merely a possibility, and between what is factual and what is merely conjectural. Likewise, there is a difference between facts that could not be otherwise and facts that must be discovered to be the case. These differences correspond to differences in the methodological status of the linguistic expressions wherewith realities, possibilities, facts, and conjectures are expressed. For there is a corresponding difference between a statement that is true and one that is not, between a conclusion which is mere guesswork and one which is supported by the relevant facts, and between a conclusion which is merely consistent with the facts and one which is supported by the facts.

These differences cannot be read off from the statements themselves. Although there are some linguistic conventions for making particular status assignments to statements, no statement can simply confer a particular status on itself. Thus, "It is certain that such and such" and "It has been experimentally demonstrated that such and such"

exemplify conventional ways of assigning particular statuses to the statement that such and such. But on a given occasion, "It is certain that such and such" may be an expression of doubt. And it is up to the listener or reader to decide whether it is a fact or mere conviction that "It has been experimentally demonstrated that such and such" (or, more broadly, whether this apparently sincere claim is not, e. g., a joke or a swindle).

It is because status assignments are in this way independent of the content of the statements which are appraised that we have been able to think of the methodological principles of science as something quite apart from the substantive content of scientific theories. Correspondingly, we have a picture of a "theoretically neutral" scientific method which is "applied to" various subject matters, including behavior, and which provides the criterion for whether the results of that application are (have the status of) science.

In general, to assign a status to a statement or a body of statements is to give it a place within a wider context in which it has some relevance. The point of making a status assignment is that it is an appraisal which carries putative implications in regard to behavioral possibilities, practicalities, or necessities--implications, that is, as to how it would make sense to act on that statement. For example, to treat a conjecture as though it were a fact would be injudicious as a policy and often impossible in point of fact. Equally, it would be rash to take a statistically significant finding as ipso facto an important one or to take an experimental conclusion either as simple truth or as being no different from the result of casual observation.

To say that science is empirical is to make a status assignment, albeit elliptically, of a general sort.

To say that science is empirical is to call attention to the fact that the point of that social enterprise is to deal systematically and effectively with the kind of fact which must be discovered to be the case. (I shall

later want to suggest that "predict and control" is a technician's parochial rendering of "deal effectively with.") Correspondingly, it is to remind us that scientific findings are established by observation and that scientific explanations (given that they qualify as explanations at all) are criticized primarily by reference to such findings, and that is is so just because the scientific enterprise deals essentially with this world, i. e., the real world, rather than with all possible worlds or with merely possible worlds. Scientific accounts have that kind of standing and that kind of putative value.

That science is empirical in this sense has, if anything, been over-emphasized in the traditional and influential accounts of scientific practice. Yet, in spite of this emphasis, these accounts fall short of an adequate explication of the methodological connection between science and the real world, and they fall short in at least two major ways.

(1) Scientific practice does indeed include empirical procedures as indispensable. But its doing so is a non-empirical methodological principle. We do not engage in empirical procedures in order to decide whether empirical procedures are essential to the scientific enterprise. No more do we conduct experiments to establish empirically what the essential characteristics of an experiment are. Empiricism is a procedural principle which can be followed only if it is adopted as (is given the status of) a non-empirical principle (see Section II, below). But no satisfactory presentation of a non-arbitrary pre-empirical basis for empirical procedures is included in traditional accounts of the matter.

(2) Scientific findings are established by observation, and so that relationship is clear. But the relation of scientific theories to observation and to the real world is not at all clear, and it remains that way in spite of determined efforts to the contrary. In what is perhaps the most recent major attempt to deal with the problem, Lakatos (1969) proposes: (a) that it is research programs rather than theories which are confirmed or disconfirmed by empirical findings, (b) that there is a

statable criterion for accepting or rejecting a research program on the basis of evidence, but, (c) it might take as long as a century to generate a decision based on that criterion and the observed facts. But the reference to a century is not really conservative; in point of fact, with that criterion it might take forever to decide. This is because the scientist who is faced with negative findings is put in a position comparable to that of a bettor who, on losing a coin toss on the basis of two out of three, calls for a change to three out of five, and then to four out of seven, etc. Eventually (perhaps in only a century), he pulls ahead and quits a winner or else he runs out of conviction or excuses and quits a loser. What strikes us forcibly here is that a statable criterion need not be one which we would normally call an objective one or a rational one. Moreover, it remains unclear whether the acceptance of a confirmed account is a case of: (a) deciding that that is what the real world is like, (b) deciding that talking that way is all right for scientific purposes, or (c) deciding that it is a good guess (good enough to act on, perhaps) but one which retains the status of a conjecture and not of fact.

In short, "How is science empirical?" is an old question to which we have not had fundamental answers which are satisfactory in principle. We have not dealt effectively with the methodological connection between science and the real world either in our scientific theories or in our "methodological" theories of scientific behavior.

B. THE SUBSTANTIVE CONNECTION

This connection involves the factual content of scientific accounts. The real world is what scientific accounts are accounts of. This holds for both observational accounts and explanatory ones and for true accounts and fallacious ones. On this basis, one might expect that the concept of the real world would be an integral part of the substantive content of observational and explanatory scientific accounts. I need hardly say that on the face of it nothing of the sort occurs.

One explanation for this disparity is that the term "real world" is generally taken to refer to a purely methodological status (of the kind noted above). From this view it follows that "real world" is lacking in any substantive content. Such a conclusion might be argued for on the grounds that any such content could only consist of non-scientific, a priori speculation, since to the extent that the "real world" has any substantive content that is what is provided by the products of scientific effort, forever tentative though they may be. Closely associated with these views is the notion that reference to the conjectural entities ("hypothetical constructs") of explanatory scientific accounts is in principle a legitimate replacement for our "pre-scientific" references to the real world.

Such historical conceits are most easily held if one ignores the historical aspects of science. Conceit or not, it leaves both our observational terminology and our theoretical terminology without any intelligible connection to reality since the former is stipulated to be inadequate (else why would we need any science at all?) and the latter is in principle uncertain (not only because any particular account is open to revision, but because scientific accounts cannot certify their own status). Little wonder, then, that the ascendancy of such traditional views has resulted in a behavioral science which is fragmented, disoriented, and lacking in either foundations or fundamental behavioral concepts.

In considering the "content-free" argument, one might argue that although the concept of "the real world" is indeed lacking in any empirical factual content, since we have to find out about it by observation, it must nevertheless have a considerable amount of conceptual content since without that we would have no basis for saying that any discovery or observation had anything at all to do with the real world. Since statements of fact, whether they be empirical or non-empirical, observational or explanatory, all require conceptual distinctions, one might then all the more expect that the concept of the real world would be an integral

conceptual part of the substantive content of observational and explanatory scientific accounts of the real world and that a suitably articulated delination of the concept of the real world would show where and how this was the case. Conceptual content of this sort would also be a prima facie candidate for providing the pre-empirical basis for the empirical procedures of a scientific enterprise. We will return to these notions in later sections.

C. THE HISTORICAL CONNECTION

The practice of science, including observing, explaining, and summarizing and organizing data and theory, occurs within the real world and is part of the real world. This is the force of saying that empirical science is a social institution (an organized body of social practices). The practice of science, in the way that it is done, is part of what actually happens--it is a historical phenomenon.

The historical aspect of scientific practice has presented certain kinds of problems, particularly in conjunction with the methodological aspect. Two examples will suffice:

(a) I have pointed out at some length elsewhere (1968, 1971) that the only existing theories of behavior which deal with scientific behavior as such are non-scientific, anecdotal theories of limited scope called "philosophy of science " the substantive content of which is incompatible with the content of scientific theories which purport to "apply to" all behavior. Yet these philosophical theories are indispensable to traditional empirical science since they provide the fundamentals of empirical procedures and of the traditional forms of scientific theorizing. After all, neither empirical procedures nor the accepted forms of scientific theorizing are capable of providing their own foundations or rationale. Neither is the philosophy of science. Both theory and practice in current science are therefore necessarily incomplete in a methodological sense and in a fundamental way.

(b) The historical character of scientific practices as a particular institution within our society and similar societies receives some explicit treatment in the recent sociological development of "Ethnomethodology." The result is a legitimization problem which is parallel to the classical "sociology of knowledge" problem, though in a more sophisticated vein. For to suppose that scientific accounts are simply what certain people say in accordance with the standards that govern their practices is to imply that all such accounts, including the very supposition in question (e. g. , ethnomethodology), are ineluctably parochial in their content and outlook and therefore contrast with a simply factual account of what actually happens. But this result violates the methodological character of science, which requires that scientific accounts be factual accounts of what actually happens. In short, under existing treatments of the subject, the condition that scientific accounts be factual accounts of the real world is both a requirement and an impossibility.

On the whole, it appears that there is not now generally available any adequate treatment of reality and reality concepts or their connections to empirical science. From a diagnostic point of view, I should want to suggest that the failure to deal adequately with these topics either singly or jointly accounts in large part for the intellectual shambles in which current behavioral science finds itself, and I shall exhibit some part of the basis for taking this to be the case.

Moreover, it does not appear to be at all difficult to construct respectable historical and social psychological accounts of how the present state of affairs has come about. To take one thread, for example, and briefly: We may distinguish three ranges of facts, namely, (a) the range of facts studied by physicists, (b) the range of facts studied by behavioral scientists, and (c) the range of facts comprising the practice of science

by scientists. We next note that the range of facts (c) falls entirely within the range (b) and falls entirely outside the range (a). Thus, for physical science, the conduct of that science does not fall within the scope of its subject matter and so it is not something that physical theories could or should provide an account of. In contrast, the conduct of behavioral science is straightforwardly part of the subject matter of behavioral science; hence it is something which behavioral theories must give an account of if there is to be any substantively adequate general theory of behavior. Such an account of the facts of scientific behavior would have to be an adequate account of those facts and not merely an account which was not self-contradictory and in some vague sense "applied to" that behavior. Attempts at such accounts are what we call "methodology" or "philosophy of science."

In this light it can be seen that although the separation of methodology from theory was proper and inevitable in the physical sciences, in the behavioral sciences it is preposterous and self-annihilating. Now, since the physical sciences are what influential philosophers of science universally use as their paradigm cases which form the anecdotal basis for their non-scientific theories of scientific behavior, it is entirely understandable that philosophical reconstructions of "the scientific method" should embody the separation of scientific methodology and scientific theory. Such reconstructions have always been used prescriptively by behavioral scientists as a social group, partly because the group is subject to pressure from the wider scientific community upon which it is parasitical and partly because the group, like any group, operates in a variety of ways to keep its members in line, and partly because no full-fledged alternative has been visible. Thus, we have that separation today, and its destructive consequences are pervasive and evident.

However, my primary purpose is constructive rather than critical, just as it is scientific rather than philosophical. The relations between the real world and the institution of science can be dealt with within

behavioral science, in details and coherently, by reference to a specific conceptual organization of four articulated basic concepts: i. e., "reality," "person," "behavior," and "language." In the present paper I shall be primarily concerned with one of these four concepts, namely, "reality" and with the most neglected of the three connections, the substantive one, between science and the real world. In the final section I shall examine some of the ways in which reality concepts have entered into behavioral theories and behavioral theorizing and some additional and alternative ways in which it appears that they might do so in the future. That discussion is, naturally, limited by the fact that the systematic treatment of "person," "behavior," and "language" is accomplished in a subsequent paper and cannot be presupposed here.

I. A PRIMARY SYSTEMATIZATION OF REALITY CONCEPTS

I referred above to a conceptual organization of the articulated concepts of "reality," "person," "behavior," and "language." The organization of these four into a single conceptual system, which is designated as the Behavioral Model, depends on the separate articulation of each. Without that, we could get no further than the commonsense notions that people are a part of the real world, that they behave in various ways, and that verbal behavior is one such way. The technical conceptual synthesis will preserve these notions, of course.

The articulation of the concept of "reality" is accomplished by reference to four basic reality concepts, namely, "object," "process," "event," and "state of affairs," and their further development.

By way of preliminary examination, we may note that these are not invented technical terms. Rather, they are already straightforwardly concepts of reality or the real world. The primary and paradigmatic use of these concepts is as the categories of "what there is." Thus, for example, one of the principal ways of formulating the claim that Z's are real is to say that they are a certain kind of object (e. g., a mental object,

a mathematical object, an invisible physical object) or a certain kind of process (e. g., a mental process, a sub-microscopic process, a learning process), etc.

Also, and by no means unrelated, the four reality concepts are observation concepts--we observe exemplars of each kind. To observe something on a given occasion is (at least) to find out something about it without on that occasion having to find out something else first (observation contrasts with inference). For example, I observe an object when I see an automobile, smell a fish, hear a bell, touch a person, or taste an apple. I observe a process when I hear the automobile coming down the road, feel the water turning warm, hear the music rising to a climactic pitch, or see the infant bouncing in his crib or working himself into a rage. I observe an event when I hear the motor stop, feel the wire snap, or see the flash in the sky. I observe a state of affairs when I hear that the singer is off key, feel that the coat is threadbare, taste the difference between brand X and brand Y, or see that he is overjoyed or that they didn't understand or that the brass instrument is faulty, that the respiration rate has increased, etc.

What we observe is the real world. The fact that some exemplars of each of the four kinds of concept are observable provides one entree to the logical relations among these concepts. For without those relationships our observations would be as unrelated as the number 17, the color orange, and the Day of Judgment; and the very concept of "observation" would be lacking. The fact that our separate observations can be conceived of as observations of a single world, i. e., the real world, requires that there be logical relationships among the concepts in terms of which our observations are made and our world described.

The general idea of there being such logical relationships is not a new one, of course. It was expressed by Kant in his *Categories and Functions*, and it appears in the current philosophical literature under the conventional designation of "our conceptual scheme." What is novel in the present formulation is that the unification of "the real world" is

accomplished explicitly and directly in terms of the reality concepts themselves by formulating them as elements in a calculational system. This contrasts with a unity which is merely implicit in our judgments but which can be argued for philosophically (Kant) or with a unity which is fully exhibited in a single structure (i. e., our conceptual scheme) of relationships.

There is an even more novel and fundamental feature of the present approach which cannot be adequately explicated here, since to do so would require the systematic distinctions and constructions provided by the entire Behavioral Model. Briefly, it is that the procedure of presenting portions of the Behavioral Model is one for which questions of truth cannot arise (logically cannot arise, since concepts cannot be true or false, and neither can behaviors). Rather, questions about the truth of any statement presuppose the Behavioral Model or some equivalent thereof, since it is only within such a model that any such question can be formulated, understood, reacted to, or acted upon. Thus, in the present paper what I am doing is: (a) delineating concepts, i. e., constructing and exhibiting (by means of verbal performances) forms of representation (corresponding to articulated concepts) or else, (b) illustrating the use of these concepts in behavioral science both as pre-empirical foundations and as workaday technology for empirical and explanatory efforts. (Note that doing (a) is a way of doing (b), and frequently doing (b) is a way of doing (a).)

This form of presentation is a technical device (made possible by the Behavioral Model) which illustrates an alternative to the traditional folk wisdom which has it that behavior, especially scientific behavior, proceeds on the basis of assumptions. Heuristically, this device provides a kind of antidote to the myopic preoccupation with truth which is characteristic of philosophers and experimental technicians. Such a preoccupation would be a severe handicap in understanding the Behavioral Model. After all, there is nothing there to believe--or to doubt. More

In APA paper says it is not a model.

No assumption needed - more possible because not a question of truth.

importantly, this preoccupation has limited our scientific understanding of the real world and thereby limited severely the kinds of truths we have thought to inquire about empirically and the ways in which we have gone about the inquiry.

With these preliminaries, let us turn to the reality concepts which form one major portion of the Behavioral Model. These concepts, which comprise a formal system of a certain, distinctive sort, are defined by their relationships to one another and not by any name relation or referring function vis-a-vis something external to the system. They are six in number, not four; for, if "object," "process," "event," and "state of affairs" are our categories for what there is, "relation" and "concept" are our categories for saying how it is, or what sort of thing there is. The question of what there is does not have priority over the question of how it is, and nor can one of these questions be answered without answering the other.

The formal system of reality concepts is presented below in the form of a set of transition rules, or transformations. What remains invariant under these transformations is real world identity. What changes is the form of representation.

 Insert Table 1 about here

The state of affairs system is even neater and simpler than it appears in Table 1, since it could be compressed considerably into fewer and less redundant rules. The point at present, however, is to optimize its intelligibility in order to facilitate its explicit use. In this regard, certain remarks are called for in order that it not be grossly misunderstood. These remarks are directed toward questions concerning (1) the status of the system as a "formal" system, (2) the nature of the products of the system, (3) the absence of any reference to concepts, and (4) the relations of the system as such to the real world as such.

Table 1.

State of Affairs System Transition Rules

1. A state of affairs is a totality of related objects and/or processes and/or events and/or states of affairs. .
2. A process (or object or event or state of affairs) is a state of affairs which is a constituent of some other state of affairs.
3. An object is a state of affairs having other, related, objects as immediate constituents. (An object divides into related smaller objects.)
4. A process is a sequential change from one state of affairs to another.
5. A process is a state of affairs having other, related processes as immediate constituents. (A process divides into related, sequential or parallel, smaller processes.)
6. An event is a direct change from one state of affairs to another.
7. An event is a state of affairs having two states of affairs (i. e., "before" and "after") as constituents.
8. That a given state of affairs has a given relationship (e. g., succession, incompatibility, inclusion, common constituents, etc.) to a second state of affairs is a state of affairs.
8. a. That a given object or process or event has a given relationship to another object or process or event is a state of affairs.
9. That a given object, process, event, or state of affairs is of a given kind is a state of affairs.
10. That an object or process begins is an event and that it ends is a different event.
10. a. That an object or process occurs (begins and ends) is a state of affairs having three states of affairs (before, during, and after) as constituents.

1. In what sense a "formal system"?

From the outset, it is important to avoid confusion and vacuous controversy over what it amounts to to say that the state of affairs system (SA system) is a formal or calculational system. I have in mind here the Element-Operation-Product conception of a formal system. In such a system a finite set of Elements and Operations are introduced explicitly. Operations are, by definition, performed on Elements (with or without restrictions on which is allowable with which), and every combination of Element and Operation has a result which is a Product. Every Product serves as a new Element. Finally, there is a distinctive notation for representing an element as an Element and a distinctive notation for representing an element as a Product (i. e., as an Element-Operation combination). For example, if we think of numbers as the elements in the arithmetic system, then "12" is a representation of a certain number as an Element, whereas " $7 + 5$ " and " $20 - 8$ " and " 4×3 " are ways of representing the same number as a Product. The preservation of numerical identity across changes in form of representation is the essence of arithmetic calculation, and it provides a familiar analogue for the preservation of real world identity across changes in form of representation within the state of affairs system; hence the characterization of the latter as a "calculational system." ?

These several features distinguish the state of affairs system as a formal system, and nothing hinges on whether it is "really" a formal system in any narrower sense. For example, the utility of the formulation does not depend on giving explicit definitions of such expressions as "change," "occurrence," and "sequential." Nevertheless, since the transition rules do not obviously conform to the "Element-Operation-Product" format, some further explanation is called for.

To begin with, let us note that each transition rule consists of a lefthand element and a righthand element connected by the word "is." It is these which correspond to Element, Product, and Operation, respectively.

The transition rules are rules for re-identifying (or re-describing) something that is already identified (or described) as being an object, process, event, or state of affairs. Every re-identification (Product) is an identification of that something as being an object, process, event, or state of affairs. Thus, the convertibility of Products into elements is automatically guaranteed.

The primary cases of the use of the system are those in which the original description is given as a result of observation. However, since we are dealing now with the system as such and not yet with its use, we might explicitly specify four primitive Elements which would introduce our four reality concepts in a purely formal way. These Elements would be "object," "process," "event," and "state of affairs." The corresponding descriptions would be "Here is an object," "Here is a process," etc.

As to Operations, there in fact is one explicitly represented in the transition rules. This Operation, which we may call "Identity-coordination" is represented by the word "is."

It should be clear that the "is" which connects Element and Product is to be understood as "is the same thing as" rather than "has the characteristic of." For example, "a rose" is the same thing as "a kind of flower," and it may have the characteristic of "red," but "a rose" is not the same thing as "red." The locution "the same thing as" is not used in the transition rules because it too readily suggests the traditional semantic distinction between meaning and reference and thereby invites the very question which discredits that distinction as being in any way fundamental, namely, "Well, what thing is it that these things are the same thing as?" Note that we have no tendency whatever to ask "But what number is it that "12," "20 - 8," "4 x 3," "7 + 5," etc., are the same as?" A language with Identity coordination has no deficiencies which need to be made good by a theory of reference, and this will be of some significance later in dealing with the problem of what it is that behavioral science is about.

Given the single Operation of Identity-coordination, the kind of Product that is generated is a function of the kind of Element one begins with. (Compare: given the single operation of Addition, the kind of Sum that is generated is a function of the numbers one begins with.) This much is clearcut.

However, on the face of it there is some ground for uneasiness in the fact that one may begin with the same Element and Operation and generate different Products. For example, "process" is transformed by Rule 4 into "a sequential change in a state of affairs"; but it is also transformed by Rule 5 into "a state of affairs having other, related processes as immediate constituents." However, no contradictions are introduced in this way. What follows is that a sequential change in a state of affairs is the same thing as a state of affairs having related processes as immediate constituents. Both of the transitions given by rules 4 and 5 are essential to the concept of "process," and neither the meaning nor the logical role of that concept is fully given by any single transition rule.

The transition rules provide only the basic articulation of the reality concepts. For this purpose, simple intelligibility is crucial. And it does not appear that any of the transition rules are difficult to understand. On the other hand, since the answer to such a question as "What is a process" is distributed across the various transition rules, that answer is given only implicitly by the transition rules. It is the extended systematization developed in Section II which provides a direct answer: Given the formulation there of "Process Description" or "Process Representation," we may then say "A process is anything that exemplifies a Process Representation." In the Process Representation, the compatibility and complementarity of Rule 4 and Rule 5 is exhibited

*These are (p.1)
primitive
how possible
to define?*

2a. Permissive transitions and elaborations of descriptions

Given the characterization of something as an object or process or event or state of affairs, no redescription at all is required by the

SA system. In this sense, each of the transition rules is entirely permissive rather than obligatory.

Taken collectively, however, the transition rules may be characterized as strongly, but conditionally, obligatory. The condition is that one's observations be intelligible. If no transitions were accomplished, then it would seem at first glance that all descriptions would be bare cases of "Here is a case of X." Under these conditions, it would be impossible to accomplish even the first move that William James attributed to the normal infant, namely, "Thingumbob again," for that would be to say that what I observe now is the same thing as what I observed then. But under these conditions even "Here is an X" would be entirely vacuous, for without being able to re-identify the same X we could have no concepts of particular things that would qualify as an X. In this sense, the transition rules are, collectively, obligatory. This notion is developed further in the discussion of "Chronological Description" in Section II.

There is a second and very different respect in which we may speak of permissive and obligatory in connection with the transition rules. That is in regard to whether a redescription, given in accordance with a transition rule, replaces the original description or, alternatively, enriches or elaborates it.

Either alternative is always possible, so that the rules are permissive rather than obligatory in this sense also. It does appear, however, that in most cases our redescriptions are used to elaborate rather than to replace. Thus, for example, when a nation is said to be an object (Gruner, 1970) which is a state of affairs having as constituents smaller objects (persons) standing in certain (political) relationships, we do not replace the description of something as a nation with a description of something as that state of affairs. Instead, we keep both by saying that that nation is that state of affairs. The state of affairs description elaborates the description of the nation as an object, and does not replace it.

For a simple and familiar example of the enrichment of description by successive elaborations, we may turn once more to the nursery:

This is the house that Jack built.

This is the table that stood in the house that Jack built.

This is the cheese that lay on the table that stood in the house that Jack built.

This is the horse that kicked the dog that chased the cat that ate the rat that nibbled the cheese that lay on the table that stood in the house that Jack built.

And compare:

1. This is the object that's part of the object that's part of the object that Jack observed.
2. This is the object that's part of the state of affairs that's the same as the process that ended in the event that introduced the state of affairs that Jack observed.

The latter descriptive formula should have a familiar ring to it in spite of the prosaic idiom. It resembles in form our "theoretical" scientific "explanations" of observed states of affairs. Indeed, in that particular formula the "object" mentioned would equally well fit a "cognitive structure" in a calculational account of problem solving (the latter being the observed state of affairs) or a "physiological structure" in a physiological account of "the same" observed result. But, then, of course, all of us in the various sciences are, no less than the historians, engaged in the study of "what actually happens."

2b. Descriptions and descriptive formulas.

It should be clear from the foregoing example that the products of the SA system are not particular descriptions of the real world, but rather logical formulas (forms, formats, schemas, paradigms) for such descriptions. Particular descriptions are generated when the objects, processes, events, states of affairs, and relationships which appear in a given reality formula are specified as to kind (see Rule 9).

It should also be clear that the range of reality formulas generated by the SA system is infinite in variety and not merely in number. For example, the difference between the formulas exemplified above by (1) "This is the object" and (2) "This is the object" is quite comparable to the structural difference between

$$(3) \quad X + [y + [Z + Q]] \quad \text{and}$$

$$(4) \quad \sqrt{X/(y + Z)} + Q.$$

Consider now a certain kind of re-identification of an observed state of affairs (as in our "explanation" given by (2), above). Here we will take it that when we observe a state of affairs we can supply the specifications (as to kinds of object, relationship, etc.) necessary to generate a particular description of that state of affairs. The re-identification then consists of a formula which involves objects, processes, etc., which are defined by their relationship to the observed state of affairs (this is the case in (1) and (2), above) and are therefore hypothetical object, processes, etc. The introduction of hypothetical objects, processes, etc., which are defined by their relation to what is observed is in important respects the SA system analogue of an ordinary algebraic equation, e.g.,

$$(2a) \quad 12 = \sqrt{X/(y + Z)} + Q$$

$$(2b) \quad 12 = X + [y + [Z + Q]]$$

$$(2c) \quad 12 = [X/y] \times [Z - Q], \text{ etc.}$$

That is, the observed state of affairs is "pinned down" by our description as to what state of affairs it is, but within the limits defined by the transition rules, we may invent or introduce any collection of objects, processes, events, and states of affairs to represent its hypothetical antecedents, correlates, or consequences, if we introduce them as its antecedents, correlates, or consequences. (Note, too, that it is by using the SA version of Product notation that we introduce these hypotheticals, just as it is by using the algebraic version of Product notation that the variable expressions in (2a), (2b) and (2c) are introduced.)

To put it differently, from each single observation we make we can construct a hypothetical re-identification formula so complex as to represent the past, present, and future history of the universe. Thus, the task of giving an empirical account of the real world (i. e., an account of this world, the world we observe, as contrasted with merely possible worlds represented by our hypotheticals) is the task of inventing world formulas within which we can fit, as constituents, the more limited reality formulas with which we represent what we observed and the fact of our having observed it in the way we did. As I will indicate below, to represent empiricism in this way is to provide the basis for a new view of the task and the character of the various sciences and, in particular, the behavioral sciences.

3. What is the status of concepts?

There is a conspicuous omission in the Transition Rules. Of the six concepts which were identified as the fundamental reality concepts, the Transition Rules mention five. The sixth, namely, "concept," is not mentioned at all. How, then, does "concept" enter the picture at all?

The answer is simple, but only provisionally satisfactory. That is that the entire SA system is a single concept, or conceptual organization, and it involves not object, processes, etc., but rather the concepts "object," "process," "event," "state of affairs," and "relationship." Moreover, the distinguishable kinds of each of these, which must come into the picture in going from descriptive formulas to descriptions, all correspond to different concepts.

The answer is only provisionally satisfactory because it raises a new question about the status of "concept." If the entire SA system is a single concept, then where, in what possible context, is there a place for concepts and what is their place there? Once again, the full answer requires the entire Behavioral Model.

A brief answer here is that "concept" is not to be reified as a distinct something. A concept is not an object or process, etc., so it

is not something we are going to encounter or observe. Rather, "concept" is a logical derivative from the more complex "P uses concept X" or "P acts on concept X." So the answer to "Where do concepts have a place?" is "Concepts have a place in behavior, because the concept 'concept' has a place in the concept 'behavior'". The clarification of what that place is must be given by the detailed articulation of the concept of behavior within the Behavioral Model. A crucial feature of that articulation is to dissolve the apparent paradox of saying that the general category of "concept" has a place in the particular concept of behavior. These considerations have been dealt with at some length elsewhere (Ossorio, 1966, 1969a, 1969b). Suffice it to say that in a reflexive conceptual structure such "paradoxes" are neither unusual nor paradoxical.

4. The state of affairs system and the real world.

The state of affairs system, as a conceptual system, is an articulation of the concept of "reality" as a methodological status concept. (Recall the methodological connection referred to initially between behavioral science and the real world.) The concept of "the real world" is the concept of an historical particular, and it is as an historical particular which exemplifies certain specifiable regularities that the real world is what any given science is about. (Recall the substantive connection between behavioral science and the real world.) The formulation of the state of affairs system permits us to examine the relation between the two.

For this purpose (and for other purposes later on), there are two among the various procedures for generating reality formulas which will be of special interest. These are designated as composition with respect to objects, processes, events, and states of affairs and decomposition with respect to objects, processes, and states of affairs.

Both composition and decomposition involve part-whole relationships and both involve progressive enrichment, or elaboration, from some starting point (generally speaking, starting from what is established by observation). In decomposition, a single something (which may be an

object or process or state of affairs) is redescribed as a set of related constituents of the same sort. That is, objects decompose into other, related objects (Rule 3); processes decompose into other, related processes (Rule 5); and states of affairs decompose into other, related states of affairs (Rule 1). The converse is the case in composition. That is, related sets of objects are redescribed as a state of affairs which is the same as a new single object (Rule 8a, 1); sets of related processes are composed into a new single process (Rule 8a, 1, 5); and sets of related states of affairs are composed into a new single state of affairs (Rule 8, 1). And, since processes can be composed, so can events (Rule 10). Finally, since Rules 1, 3, and 5 are recursive, composition and decomposition can be carried on indefinitely.

It is against the background of the unlimited possibility of composition and decomposition that certain limiting cases take on intelligibility and significance. The following are among the most familiar and important limiting cases:

- LC-I The state of affairs which includes all other states of affairs (i. e., "the real world").
- LC-II A type of object that is not a state of affairs (i. e., it has no constituents, and so is an ultimate object--a "basic building block").
- LC-III A type of process that is not a state of affairs (i. e., it has no constituents, hence no beginning that is distinct from its end, hence is the effective equivalent of an event (perhaps most "literally" it would be a unit class of events)).
- LC-IV A type of process that is a state of affairs but has no process constituents (i. e., is the effective equivalent of an object during a period in which the object undergoes no change--cf. molecular processes at "absolute zero temperature").

The significance of the limiting cases is that they are ways of putting an end to the composition (LC-I) and decomposition (LC-II, III, IV)

of the primitive reality concepts. The result of introducing limiting cases is a type of formula which is suitable for representing a single, boundary-less, historical particular of indefinite extent or a single, unbounded set of historical particulars. In either case, we have a "world formula," which is the kind of thing that "our conceptual scheme" is. There are several significant aspects of this state of affairs.

(a) The "ultimate" objects or processes achieved by LC-II or LC-III cannot be specified merely as ultimate. They must be identified as being of one general sort or another (without this specification we would have only empty formulas, not descriptions). And what distinguishes one sort of object or process from another is the kinds of relationships it can enter into. Thus, the kind of object or process that is specified here will set limits to the kinds of relationships that such objects could enter into. Correspondingly, the states of affairs which could obtain in a world which simply consisted of such objects and their by-definition composites would be limited. So also would the totality of such states of affairs be limited, in range if not in number. In short, the choice of ultimate object or process sets limits to the kind of "world" which corresponds to such representation.

In point of fact, the situation is somewhat more complex. Ultimate objects or processes need not be of just a single kind. They may simply be the various primitive kinds of object or process defined by a conceptual system. Any one of a large variety of conceptual systems can be used thus in selecting ultimate constituents. Each selection determines a kind of "world." Some selections are more familiar than others and some are often taken to be more general, more fundamental, or more real than others. Thus, we speak not only of "the art world," "the world of fashion," "the baseball world," and "the academic world," but also of "the physical world," "the biological world," and "the world of nature."

Not only is any particular limit-setting arbitrary in that its choice is not simply a reflection of how the world is, but also the restriction

of one's choice to a single limit-setting (whether in terms of a single kind of ultimate or a single conceptual system) is a further arbitrary choice, and it is one which can obviously be rejected. There is no reason why different kinds of objects should not be identified as ultimate relative to a certain range of possible facts (states of affairs). Indeed, this is what the hard facts of the matter have always required of us in order to span the entire range of facts with which we are acquainted. In this regard, the traditional scientific ideologies phrased in terms of "determinism" and "reductionism" are not merely non-empirical, but, one might say, actively anti-empirical. To be sure, the commitment to such postures is usually presented with engaging candor as an article of faith, but it is not clear that a scientific respect for fact leaves room for theological practice even in this vestigial form.

The arbitrariness of limit-setting is not restricted to the kind of object or process, etc., which is selected as ultimate. It also appears in the choice of which of the reality concepts is used in specifying the ultimate units and the nature of the totality. The mutual convertibility of the basic reality concepts as forms of representation has the consequence that "the real world" may equally well be conceived as (1) an all-encompassing state of affairs (LC-I), (2) an all-encompassing object, (3) an all-encompassing process, or (4) an all-encompassing succession of events. Historically, each of these conceptions of "what there is" has had its proponents; and it has long been recognized that any of them will do the job, so that "you pays your money and you takes your choice." The formulation of the SA system renders these historical facts entirely intelligible and unsurprising, but it provides neither motivation nor encouragement toward the adoption of any such limited views.

I shall later want to suggest that the only "world" which does not represent an arbitrary, a priori limitation on possible states of affairs and which, therefore, includes all the other "worlds" and qualifies as simply "the real world" (LC-I) is the one that would be most naturally

called "the behavioral world," and that is the one which is codified in the Behavioral Model (hence the name). This notion will, of course, have a bearing on the problem of foundations for behavioral science.

(b) The concept of "reality" corresponds to the SA system as such, hence is more fundamental than the various concepts of "the real world" which are derived from it via the limiting cases and choices of ultimates. Since such limits and choices are entirely arbitrary with respect to the SA system as such, they must be introduced extraneously. And they are--by persons. Every conception, observation, or description of "the real world" or any of its parts or aspects is someone's conception, observation, or description. Hence there is a person with respect to whom it has the methodological status of my conception, observation, or description. That is a conceptual and methodological necessity, not a matter of phenomenology. (Recall that the SA system is a fragment of the more complex logical structure of the Behavioral Model, which includes persons, behavior, and language as well. The "my" here is part of what requires the reflexive structure referred to above in commenting on the place of "concept" within the Behavioral Model.)

*meaning - no
objective reality*

(c) In traditional scientific theorizing, the substantive content of a theory is categorically distinct from the methodological principles by reference to which its standing within the social institution of its particular science is appraised. This gives all such theories a distinctive cast which might be characterized as a "pictorial," or "entity" perspective. That is, the primary concern is with objects (or "structures") and processes ("deterministic" causal processes) via LC-II, III, and IV.

The relation between the separation of methodology and the "pictorial" quality may be clarified by reference to the familiar example of actual pictures. A picture (or description), e. g., of a man and a dog walking in front of a house, can portray certain objects, processes, events, and states of affairs. What it cannot portray is any state of

affairs which constitutes its own methodological status. For example, it cannot portray the fact that it is a picture or the fact that it is a picture of a man and a dog walking in front of a house. Nor can it portray any instructions or prescriptions or standards concerning what one could sensibly do with a picture. Nor can it portray any definition or instruction as to what a picture is and is not. It is only because these fundamentals are already taken care of in other ways than with pictures that there are such things as pictures and that they have the value that they do. Likewise, it is only because considerations of methodological status are already taken care of in other ways than by traditional scientific theories that there are such things as traditional scientific theories and that they have the value and standing that they do in our real world. And methodological principles have the form of fact (state of affairs), not objects or processes.

In contrast to traditional theorizing, the Behavioral Model contains principles of scientific methodology as a substantive special case; and this, too, gives it a distinctive cast which might be characterized as a "methodological," or "factual" perspective. That is, the primary conceptual concern is with facts, or states of affairs, via LC-I. It is because it deals principally and essentially with states of affairs rather than simply with objects or processes that the Behavioral Model has no difficulty in principle with methodological facts or with the fact that they are methodological facts. These are behavioral facts.

It should not be surprising, therefore, that in the Behavioral Model the pre-empirical conceptualization of empiricism should have a distinctive cast also and that it contrasts with the empiricism which reflects the pictorial perspective. This contrast is reflected in the adoption of "reality" and "the real world" as the basic form of empiricism in the two approaches, respectively. //

From the pictorial perspective on empiricism, what distinguishes the real world from merely possible worlds is that certain descriptions ("pictures") are applicable to what we observe, and these descriptions contrast with other descriptions which do not apply to what we observe but which might have applied and would apply in some possible worlds.

From the methodological perspective, what distinguishes reality from mere possibility is that we are (in fact) limited in what we can and can't do in just those ways in which we are (in fact) limited, and not in any of the other ways in which we might possibly have been limited.

As the boundary condition on our possible behaviors, reality in no way resembles the scenes we see as we look around us (nor yet a submicroscopic or cosmic picture thereof). This is because it is categorically different from the latter, hence not comparable in the usual way as to similarity or difference. In a similar and more familiar vein, the English language does not resemble the English sentences that we speak (nor does chess resemble pawn moves or checkmates), because the language and the sentences are categorically different. It would be quite in keeping with our hypothetico-deductive custom to say that the sentences are the observable manifestations of the language (or linguistic competence). But neither the fact (cf. Rule 8a, 10a) that the "sentences" are being "uttered" or that the "sounds" are being "emitted" is in any way more "observable" than the fact that it is "English" that is being "spoken." Our access to the English language is by observation, not inference.

And it may be worth commenting that the methodological formulation cannot be reduced to the previous case (the pictorial formulation) by exhibiting a description of our behavioral capabilities and limitations (which change over time, of course, sometimes in part as a result of just such efforts) and saying that this is just one of the descriptions which is applicable to the real world. (This is, of course, old-fashioned "naturalism" applied to behavior.) The boundary condition would reappear in the form of the limitations on how we were able to act on that description.

Thus, in place of the pictorially motivated traditional question, "Is the description (the predictive one) true (or false) and is the other description (the theoretical one) true (or false)?" we may offer a new formula for scientific empiricism--"Has it been demonstrated that as a matter of fact there is a point in talking that way?" This formula is applicable whether the talk in question is (a) an observation report, (b) a "theoretical" description of what is observed, (c) a classically "methodological" statement to the effect, e. g., that a theoretical description has been "confirmed" or that it has been "operationalized," or (d) a modest statement to the effect that as a matter of fact there is a point in talking a certain way (or in not talking that way).

I have indicated above that our non-scientific theories of scientific behavior are deficient in that they are (in fact) unable to provide an adequate account of the sense in which scientific theories either (a) are empirical or (b) are factual accounts of the real world. From this, one might well conclude that as a matter of fact there is a point in not talking that way. One of the advantages of the behavioral approach is that its empirical formula creates no mysteries and leaves no problems of this sort.

It is not to be supposed that the question "Has it been demonstrated that as a matter of fact there is a point in talking that way" reflects the recently fashionable disparagement of language (as being mere "verbal behavior" in an S-R sense) or any general skepticism regarding it. On the contrary, an adequate formulation of language as a form of behavior is one of the indispensable conceptual units within the Behavioral Model. Thus, the question is asked with the expectation that it could commonly be answered in the affirmative. The phrase "talking that way" directs our attention to the necessity for a technically detailed, systematic representation of what it is that we can say or do say in talking scientifically about the real world. For any given scientific statement,

we should want a systematic representation of what information is carried and what commitment is being made by "talking that way." (This is the part of the scientific study of verbal behavior in general, not a merely ad hoc treatment of scientific verbal behavior.) The extended systematization of reality concepts presented in the following section may be used as a technical resource in this way. As a technical resource, it is independent of the contrast between the pictorial and the factual perspectives on empiricism and can be used in either way.

II. THE REPRESENTATION OF WHAT ACTUALLY HAPPENS

The concepts of "reality" and "the real world" were presented above as being the substantive correlatives of our use of the formal conceptual system delineated by means of the Transition Rules (the SA system) of Table 1. This system defines the concepts of "object," "process," "event," "state of affairs," and "relationship" by reference to one another. It brings together explanatory, methodological, and observational facts and concepts within a single conceptual system, and in this way provides one of the conceptual anchors for a science of behavior.

What the basic Transition Rules do not do explicitly is to provide procedures for distinguishing kinds of object, process, event, and states of affairs or for distinguishing historical particulars of these sorts. For example, since the rules deal with the general concept of a process, they apply to all processes, and so they do not serve to distinguish one process from another. But distinguishing one object, process, etc., from another is essential to the behavior which is our subject matter; and it is no less essential to the behavior of studying that subject matter scientifically. Thus, our reality concepts must be articulated at a new level of detail in order to serve a technical function in our scientific procedures. As we shall see, the resources for doing so are inherent in the Transition Rules.

What is required, then, is a systematic specification of the ways in which one object (or process, etc.) may resemble another or differ from another. Such a specification would amount to a parametric analysis of the reality categories of "object," "process," "event," "state of affairs," and "real world." What is required beyond this is a systematically related set of representational formats within which such specifications can be given.

The result of pursuing these requirements is a set of eight articulated representational formats. Five of these correspond directly to

the five reality categories noted above; the remaining three are important derivative cases. Since these eight formats are systematically related to one another along the lines laid down by the Transition Rules, they are correspondingly recursive and convertible into one another, so that the entire set constitutes a single resource for representing the real world or any part or aspect thereof.

The representational formats provide the public, observable correlatives of the corresponding reality concepts, just as mathematical symbols provide the public, observable correlatives of mathematical concepts. And, as is the case with mathematical notation, these forms of representation may be considered either (1) as a systematic alternative to linguistic representation or (2) as being essentially linguistic, but having certain technical advantages over discursive sorts of presentation. This contrast is considered further below in connection with "State of Affairs description."

Thus, the representational formats are referred to variously as forms of representation, forms of description, or types of (conceptual-factual) analysis. The remainder of this section is devoted to the delineation of (A) Process description, (B) Object description, (C) Configuration description, (D) Chronological description, (E) Means-Ends description, (F) Task analysis, (G) Event description, and (H) State of Affairs description. As it happens, the strategic entree to this range of descriptive formulas is in the middle (in point of complexity), with process and object descriptions. This is because of the strategic character of the composition and decomposition of object and process representations.

A. PROCESS DESCRIPTION

The technical concept of a process description is arrived at by specifying a basic descriptive unit which is recursive (hence can be composed and decomposed) and then specifying how the results of the

recursive use may be tied together in a single logical structure. The primary basis for the technical elaboration is, as might be expected, Rule 4 and Rule 5.

Rule 4. A process is a sequential change in a state of affairs.

Rule 5. A process is a state of affairs which has as immediate constituents other, related processes. (A process divides into smaller, related (sequentially or parallel) processes.)

What is involved in the notion of "sequential" here is that the change in question from some state of affairs, A, to another one, B, consists of at least two successive changes, i. e., A-Q and Q-B. The interposition of Q is what carries the implication that, unlike an event, a process has duration. Then, since A-Q and Q-B are themselves processes, by Rule 5, each has duration and each consists of sequential changes, A-X, X-Q and Q-Y, Y-B. And so on. Since the division may be continued indefinitely and every such division may be divided indefinitely and this progression may be continued indefinitely, the limiting case will be the equivalent of all the non-terminating decimals; hence will correspond to a "continuous" process as that is currently defined mathematically. Thus, in the present formulation the notion of a discrete process given by Rule 4 and Rule 5 is the fundamental process concept and the continuous process formula is a generally dispensable derivative.

The gross structure of a process description, i. e., "Name" and "Description" (see Table 2) reflects the relation of Rule 4 to Rule 5. We report the occurrence of a given process, A-B, by giving as its systematic "Name" an identifying description, usually of the normal discursive sort, e. g., "He shot the bear with a revolver." In representing "Name" as having occurred, we might then appeal immediately to LC-III or LC-IV and deny that any further "Description" applies (at some point we have to do this, except possibly with a continuous process); but normally we are committed to at least one sequential breakdown, A-Q, Q-B, which

was not specified by "Name" per se. For example, "Well, he pointed the gun (A-Q) and pulled the trigger (Q-B). Methodologically, we are back at the starting point; for A-Q has now been identified by a new "Name" as a process which has occurred, and so has Q-B. Either we now appeal to LC-III or LC-IV or we provide a new "Description" for A-Q, and so on. In this way the SA system formulation directly codifies the fact of our being able to give observational reports of just those processes which we are in a position to report, i. e., those which we can establish by observation as having occurred. This contrasts with the physicalistic-inferential view that our observations of processes represent inferences drawn from cues provided by the occurrence of theoretically describable continuous physical processes.

But "Name" and "Description" are merely the gross structural divisions of process descriptions. To reach a technically effective level of detail, the Basic Process Unit (BPU) shown in Table 2 is proposed.

Insert Table 2 about here

In the Basic Process Unit each Option within a given stage is a constituent process with respect to P-Name A. Thus, it is the Stage-Option structure which codified the recursiveness of the transition rules within the BPU. Decomposition can proceed indefinitely by generating a BPU representation of any Option in P-Name A, then doing the same for any Option within that BPU, and so on. Composition is accomplished by identifying P-Name A with some Option within a more extensive process, say, P-Name Q. Then P-Name A is the same process as, say P-Name Q135. And so on.

In contrast, Individuals, Elements, Eligibilities, and Continuities are designed to codify the state of affairs structure of the process P-Name A. By Rule 5, a process is a state of affairs that has related processes as immediate constituents. That state of affairs may also have other constituents. It will have event constituents, if only by virtue of Rule 10; and it will have state of affairs constituents, if only by virtue

eg.?

Table 2.

Basic Process Unit (BPU)

P-Name A: The process "Name" of process A.

P-Description A: The "Description" of A. It specifies:

I. P-Paradigms: The major varieties of P-Name A. This is a technical option. If only one paradigm exists, it will be the same as P-Name A. For each paradigm, the following is specified:

(a) States 1-K: These are "Names" of subprocesses within A. They are systematically specified, e.g., as P-Name A11, P-Name A12, ... P-Name A1K for Paradigm 1. For each stage, specify:

(1) Options 1-N: These are the various exemplars of the process (stage) in question. That is, these are the various ways in which that process could happen. Each Option is systematically indexed as P-Name A111, P-Name A112, ... P-Name A11N. Each of these can now be expanded (decomposed) on the model of P-Name A.

- (b) Individuals
- (c) Elements
- (d) Eligibilities
- (e) Contingencies
- (f) Versions

Rule 10a. The major case of interest will involve object constituents. These must, then, be of certain kinds and stand in certain relations to one another in order that they should be the same thing as that state of affairs, which, after all, is already defined by reference to the process (Rule 1, 8a, 9).

Since the process P-Name A divides without remainder into constituent processes, the object constituents of that state of affairs (which might be systematically designated as PSA-Name A) would, in our ordinary way of talking, be constituents of that process and of some sub-process. "Element" provides a logical category within the concept of "process" which may be filled by an object or structure.

For example, if P-Name A is "He shot the bear with a revolver," a set of sub-processes would be (1) He raised the revolver with his hand; (2) He pointed the revolver at the bear; (3) He pulled the trigger of the revolver; and (4) the bullet shot out, (5) fatally wounding the bear. These would be Stages. Among the object constituents of the process P-Name A would be (a) the man, (b) his hand, (c) the revolver, (d) the trigger, (e) the bullet, and (f) the bear. These would be Elements.

Certain relationships do hold among these Elements. For example, "raised it with his hand" is the relation between the man, the hand, and the revolver in Stage 1 (P-Name A1). But as we have noted, "He raised the revolver with his hand" is also a description of the process P-Name A1. Similarly, it is also the description of the state of affairs PSA-Name A1, which is a constituent of the larger state of affairs PSA-Name A. And there is a parallel treatment of "He pointed the revolver at the bear." We see here how "the same thing" can be described as a process, a relationship, and a state of affairs. We see also some of the ambiguity which is systematically present in most scientific and non-scientific discourse and which calls for systematic answers to the question "What did he say?".

In this example there are some relationships which are not given by process descriptions. For example, the trigger is part of the revolver, and it is a specific part. That relationship has no corresponding process description unless we employ LC-IV, but it is part of that state of affairs (PSA-Name A1). Without that relationship there would be no such thing as shooting the bear with that revolver by pulling that trigger.

In general, then, the process Element provides the way to represent an "ingredient" as such of a process, and it is most pertinent when the ingredient is an object or structure. Ingredients have to be combined in certain ways, and the specification of what those ways are is given by the detailed (as much as needed) articulation of the state of affairs PSA-Name A in terms of constituent states of affairs. What is not yet specified is how many distinct individuals are required for the process and which of these individuals is eligible to participate in the process as which Elements. Thus, we have the additional logical categories of Individual and Eligibility in order to specify the state of affairs structure of a process. Individuals are specified in such a way (e. g., with numbers, names, letters, symbols) that they can be identified as individuals when that is needed.

In football, for example, we might distinguish 37 Elements, of which 22 are individually distinguished as the players of the various "positions." Among the 22 collectively, there are a wide variety of actions and practices which are the process constituents of the behavioral process (the social practice) of playing a football game. At the same time, the logical structure of that process is given in large part by the clearcut constraints as to which of the 22 is eligible to do any particular one of those things, e. g., catch a pass, and under what circumstances. The latter notion brings us to the category of Contingency.

Within a given BPU, Contingencies provide further restrictions (given a specification of Name, Paradigm, Stages, Options, Elements,

Individuals, and Eligibilities) as to what can occur and still be a case of P-Name A. Or else it is a factual constraint which merely summarizes the statistics concerning the likelihood that a given Version (see below) of P-Name A would actually happen. Contingency specifications fall into two general classes, i. e., attribution constraints and co-occurrence constraints. What is contingent is the occurrence of a given component process (Stage-Option), and what it is contingent upon is either or both of (1) given Elements having given characteristics or given relationships to other elements (recall the trigger as part of the revolver) or (2) the occurrence of one or more other designated process components. The contingencies are states of affairs.

Examples of the first sort (attribution constraints) would include such specifications as (a) (in a football game) the quarterback is a human being; the goal posts are not; (b) (in a "double bind" interaction) the Victim must be strongly motivated to understand the Binder; and (c) the fuel for our non-polluting engine must be lacking in lead-compound additives.

viz.) attribute of elements?

With respect to co-occurrence constraints, it should be kept in mind that a component process of P-Name A can be identified and described independently of P-Name A, and the fact that it sometimes occurs as part of an instance of P-Name A does not imply that whenever it occurs it is part of an instance of P-Name A (nor, of course, that it occurs whenever an instance of P-Name A occurs). Thus, for example, if the gross sequential structure of "Dining" (P-Name A) is given by (a) preparation, (b) serving, (c) eating, and (d) cleaning up, then a co-occurrence constraint is given by saying that whatever is prepared is also served and also eaten. That is to say that, for example, although cabbages, apples, and steak are all eligible to be what is prepared or eaten or served, if it is apples that are prepared, then it is apples and not cabbages or steak that are eaten; conversely, if it is steak that is eaten, then it was steak and not cabbages or apples that

was prepared. This contingency statement rules out such sequences as (a) preparing apples, (b) serving steak, and (c) eating cabbage. Note that co-occurrence constraints are not per se temporal constraints --a given occurrence may be expressed as contingent upon a later or concurrent occurrence no less than upon an earlier occurrence. *e.g.?*

Given this development of "contingency," we see that two contingency statements are implicit in the prior development, namely,

? → (1) Eligibilities are attributional constraints and (2) if the requisite Elements are not at hand, the process P-Name A does not take place.

When the BPU is used recursively, more complex formulas are the result. The structure of such formulas is given (a) necessarily, by the pattern of recursion, since every recursive use of the BPU decomposes some particular constituent process, hence has a definite place in the BPU from which the new BPU was generated; (b) generally also by Contingencies, which may connect Elements at any locations in the structure or to states of affairs external to the process in question; and (c) among such Contingencies are those which extend the Eligibilities of particular Individuals across the lines of recursion.

The concept of Version is, one might say, a way of representing the net results of the structural constraints on P-Name A which are provided by Paradigms, Stages, Options, Elements, Individuals, Eligibilities, and Contingencies. The net result of these constraints is to delimit the possible cases of P-Name A. A Version of P-Name A is simply one of the possible cases of P-Name A. Since P-Name A is a process, its exemplars will be occurrences of processes. Thus, a Version of P-Name A is one of the ways that P-Name A could happen on a given occasion; it is one of the courses that P-Name A could take on a given occasion. Conversely, the occurrence of P-Name A on a given occasion is the same thing as the occurrence of some one of its Versions on that occasion. Since different Versions of the same process, P-Name A, need not resemble one another in any way other than their being alternative Versions, the empirical study of processes takes on a certain

kind of complexity. It is significant, for example, that our social practice of studying behavioral processes experimentally involves examining particular Versions of P-Name A and expressing the findings as discoveries about P-Name A per se, and this move is essential to the customary form of that practice. And it raises questions which cannot be dealt with here. The different Versions of P-Name A may be given by a list or by a formula for generating them.

Consider now a simple example of the analysis of a social process by a sociologist (Garfinkel, 19__). The process, or practice, in question is the "degradation ceremony." A classic example of such a ceremony is the case of a non-commissioned officer who has been convicted of a grave breech of military discipline; he is marched out before the assembled company, is "read out," and his stripes are ceremoniously ripped off. The result of the degradation is a change of status for the offender, and the significance of that change is that it constitutes a change in his eligibilities to participate in certain ways (as certain Elements) in the social life of the group. In the military case, the degradation is literally a lowering of his grade or rank. The limiting case of degradation in this sense is total expulsion from the group.

Garfinkel makes the following points about successful degradation ceremonies: (1) There must be a community of individuals who share certain basic values such that adherence to those values is a condition for retaining good standing in the community; i. e., for being "one of us"; (2) three members of the community are involved, namely, a "perpetrator," a "denouncer," and (some number of) "witnesses"; (3) the denouncer and the witness act as members and representatives of the community and not out of merely personal interest; (4) the denouncer describes the perpetrator to the witness as having committed a certain act; (5) the denouncer redescribes the act (if necessary) in such a way that its incompatibility with the community's values follows logically;

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(6) the denouncer presents a case for judging that the perpetrator's engaging in the act (as redescribed) is a genuine expression of his character and is not to be excused or explained away by reference to accident, atypical states, etc. Under these conditions, if the denouncer makes his case successfully, he has thereby shown that the perpetrator isn't now and never really was "one of us," and the degradation ceremony is successful.

why is the "never" really there or necessary?

In a BPU format this account could be represented as in Table 3.

Table 3a.

Degradation Ceremony

P-Name A: Degradation Ceremony

P-Description A:

P-Paradigm S: This is the only one.

- (a) Stages: (1) Description of the Act
(2) Redescription of the Act as reprehensible
(3) Characterization of the Perpetrator by the Act

Options: see Table 3b

(b) Individuals: D, P, A, G, W_1 , $W_2 \dots W_n$

- (c) Elements: (1) Denouncer
(2) Perpetrator
(3) Act
(4) Witness
(5) Group

(d) Eligibilities: D = Denouncer
P = Perpetrator
A = Act
G = Group
W = Witness

In what sense is "Act" an eligibility?

- (e) Contingencies: (1) D, P, W have been bona fide members of G
(2) D, W share basic values of G
(3) D and G represent G, not themselves
(4) Stage 2 only if stage 1
(5) Stage 3 only if stage 2

4

The elaboration of the first stage in terms of Options could be accomplished as in Table 3b.

Table 3b.

Options in Degradation Ceremony

P-Name A1: Description of the Act

P-Description A1: D gives W to understand that P committed A

Option 1. (D tells W)

P-Name A11: D tells W that P committed A

P-Description A11:

Stage 1. D says "P"

Stage 2. D says "committed"

Stage 3. D says "A"

Individuals, Elements, etc., same as in Table 3a BPU

Option 2. (D writes to W)

P-Name A12: D writes to W that P committed A, etc.

*to what
lead?*
?

Note that in the absence of a specification of the Act, the group, and their values, our decomposition quickly comes to an end, not from any formal necessity, but because we have no further information that requires it. From the standpoint of the degradation ceremony as such, we invoke LC-III because all that is required is that the processes we have represented in the BPU format should occur. Since LC-III gives an Event description, we can see why historical events should stand out as being what History is essentially or typically interested in (Gruner, 1970). It is not that those events have some recondite character which makes them peculiarly relevant to historical study (and similarly for behavioral events and behavioral science). Rather, it is that the historian's way (and the behavioral scientist's way) of taking an interest in what actually happens defines as a boundary condition the mere occurrence of what is of interest, and that is given by an Event description (LC-III and Rule 10a).

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On the other hand, if the specifications of Act, group, values, etc., were given, we might well be overwhelmed by the number of Versions it would be possible to distinguish. For example, what is the range of ways in which D could give W to understand that P committed A? Consider, for example, that Mark Antony's funeral oration was a denunciation; yet, it is quite certain that no behavioral scientist who was involved in charting Degradation Ceremony Versions would think of that one even as a possibility until he actually encountered it. Evidently, our descriptions will routinely employ a "wastebasket" category--"The Versions of P-Name A are V_1 , V_2 , ..., V_n , and W," where W = "any other way that P-Name A could happen." This will be the functional equivalent of formulating "precise" and "determinate" generalizations or theories in the pictorial tradition and, in that tradition, leaving the essential qualifications to be stated elsewhere and elsewhen in "methodological" terms--"But, of course, since these general descriptions have an 'open texture,' don't be surprised if they don't quite fit the facts or if they are exemplified in surprising ways."

B. OBJECT DESCRIPTION

Since composition and decomposition of objects and processes involve a part-whole relationship in either case, we may use the analysis of process as a point of reference for generating systematic object descriptions. The directly relevant transition rules here are the following:

1. A state of affairs is a totality of related objects and/or processes and/or events and/or states of affairs.
2. Any process or object or event or state of affairs is a state of affairs which is a constituent of some other state of affairs.
3. An object is a state of affairs having other, related objects as constituents.
- 8a. That a given object or process or event has a given relation to another object or process or event is a state of affairs.

Table 4.

Basic Object Unit (BOU)

O-Name A: A list of names, O-Name 1A, O-Name 2A, ...)-Name NA, each of which is the name of this same object.

O-Description A: The "description" of O-Name A. It specifies:

- (1) O-Paradigms 1, 2, M. These are different alternative breakdowns of O-Name A into a set of immediate constituents. Thus, for each O-Paradigm, specify:
 - (A) Constituents: A list of immediate constituents systematically designated as O-Name 1A1, O-Name 1A2, O-Name 1AK. Each such constituent can be decomposed by being given a BOU representation.
 - (B) Relationships: These are given by a list, each member of which specifies the following:
 - (a) Elements: (As in the BPU) a list of N elements.
 - (b) Individuals: (As in the BPU) each being a constituent
 - (c) Relationship: An N-place attribute with a place for each of the N elements
 - (d) Eligibilities: A specification of which individuals may or must participate as which Elements in the relationship by virtue of their constituency in O-Name 1A. In many cases, this will be equivalent to
 - (e) Attributes of the Relationship: e.g., symmetry, transitivity, reflexivity, etc.
 - (C) Attributes of O-Paradigm 1A
- (2) Attributes of O-Name A
- (3) Configuration membership: (Optimal) This is a list of configurations of which O-Name A may be a constituent.
- (4) Contingencies:
 - (A) Attributes which a given constituent must have
 - (B) Applicability of a given name, e.g., O-Name 2A, as presupposing a given O-Paradigm or a recursive elaboration of one.
 - (C) Applicability of a given name presupposing a given configuration of which O-Name A is a constituent. (Most technical terminology would fall under this heading--recall "the physical world," "the baseball world," etc.)
 - (D) Configuration membership of O-Name A as contingent on the specification of a given O-Paradigm KA or
 - (E) On given attributes of given constituents of O-Name A (e.g., an auto is an internal combustion machine because its motor is one).
- (5) Relationships: As in (1)B, above, but not restricted to immediate constituents.

Missing Page?
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some particular part, any more than it could just be colored without having any particular color. B must correspond to some derivation from some O-paradigm of A, and it is this derivation which determines which part of A, B is, what the other, correlative parts of B are, and what B's relationships to those other parts must or may be. And "B" may be a name which presupposes that B is part of A (e. g., "citizen," "professor"), in which case the statement "B is part of A" is pre-empirical, or it may not (so much for the contrast of "meaning" and "reference"). On the other hand, it is just that incompleteness which gives the part-whole relationship the degree of generality which permits us to formulate so many of the basic transition rules and their technical elaboration in terms of the concept of "constituent."

C. CONFIGURATION DESCRIPTION

A configuration description is one which represents a state of affairs either (a) as being an object (by Rule 3) and having process constituents or (b) as being a process (by Rule 5) and having object constituents.

Almost any object or process which is of any scientific interest and is not an "ultimate" object or process will qualify as a configuration, so that comprehensive scientific explanation will inevitably take on the form of configuration description. We have seen that behavioral processes will involve objects, since at a minimum they will involve the individuals who are behaving. Conversely, a piece of machinery (organic or otherwise) or an organization of behaving individuals will be an object in which some of the relationships for which its constituents are eligible will be process relationships. Thus, although object and process concepts are the necessary ingredients, our major conceptual and experimental interest will be in configurational states of affairs, since that is the form in which we will represent most of what actually happens.

Some of the major characteristics of a configuration will reflect the object-process contrast. If the configuration is an object (with

process constituents) it will have the general character of a "system," whereas, if it is a process (with object constituents) it generally will not. Thus, for example, a stable society or other social organization will be perspicuously represented as a self-maintaining system, whereas one which is progressively deteriorating, explosively expanding, or radically metamorphosing will not.

Perspicuous or not, one may always adopt one or the other form of representation and one may adopt a "theoretical" language that is committed to the chosen form of representation. That will frequently give the impression of having made a factual commitment about the nature of social organization and social change.

D. CHRONOLOGY

Each of the forms of description discussed above (and below) is "repeatable" in the sense that it would be possible to encounter more than one phenomenon which would satisfy a particular description having that form. In contrast, the Chronology is a form of description which corresponds to Limiting Case I, i. e., the real world. As such, it is necessarily non-repeatable. ??

If A and A' are distinct phenomena identified by the applicability of the single description "Q", e. g., "degradation ceremony," "eclipse," "mitosis," then each of A and A' is a state of affairs. In that case, there is another state of affairs, C, having A and A' as constituents (Rule 1, 2, 8). Moreover, A and A' have some set of relationships, R_1, R_2, \dots, R_K , such that their having those relationships is the state of affairs K (Rule 8); then, either K is a constituent of C or K is identical to C. Thus, repetition of what satisfies a given state of affairs description is necessarily relative to some wider state of affairs context within which the repetition occurs. A phenomenon for which no wider context exists is necessarily non-repeatable, and that condition is satisfied uniquely by LC-I, namely, the state of affairs of which all other states of affairs are constituents. why?

Chronology is therefore a description of historical particulars. The general form of a Chronology is that of a Configuration description. What distinguishes it from Configuration description per se is its non-repeatability by virtue of its unlimited scope.

We do not, of course, have descriptions of the whole world. Rather, we give Chronological descriptions of some parts and aspects of the real world by using more or less incomplete Configuration descriptions. In giving such descriptions, we are committed to their (the configurations being described) being parts of the history of the world. That is to say that we are committed to there being a "world formula," corresponding to the real world, part of which is identical to the Configuration description we have given. Since that part is a particular part of a non-repeatable whole, it is itself non-repeatable.

One sort of description which necessarily carries this commitment is an observation report (this is an instance of Contingency 4C in the BOU). The uniqueness of the real world is a consequence of its non-repeatability; but any of the finite states of affairs which can be represented by a state of affairs description is, as such, repeatable in the sense given above. What gives historical states of affairs their historical uniqueness is their relationship to an object whose historical uniqueness is guaranteed, namely, an observer. For any observer, the real world is necessarily the world which includes him as an observer.

*Redundant;
4 means
Contingency*

It is commonly supposed that historical uniqueness is secured by assigning space-time coordinates or the functional equivalent thereof to the phenomenon in question. But one can do this for a fictional account of a fictional world no less than for a factual account of the real world. My reference to the overthrow of the Chtulu in the year 653 is a fictional reference because I don't take myself to have any position on that calendar or on that geography. In contrast, my reference to the discovery of America in 1492 is a factual reference because I do take myself to have a position (1971) on the same calendar and on the same

geography. Moreover, that calendar and that geography has a place for the fictional reference to the overthrow of the Cthulu.

Thus, "what actually happens" is Chronology. What actually happens is historically unique and that uniqueness depends on the historical uniqueness of observers and their observational and descriptive achievements. (This is a conceptual necessity, not a phenomenological discovery.) What it is that actually happens is, for a given observer, given by what he observes to be the case, augmented by his explanatory or systematic elaborations thereof. The empiricist principle that our knowledge of the real world is ultimately empirical (grounded in observation) is intelligible in this way as a non-empirical principle.

E. MEANS-ENDS DESCRIPTIONS

Means-ends descriptions are incomplete process descriptions, and the sense in which they are incomplete is best exhibited by reference to the notion of "Element" in the Basic Process Unit. We noted that one implicit contingency statement was "if the requisite Elements are not present the process will not take place." Means-ends descriptions are specifications of a set of Elements which is sufficient for some Version of the process in question. The set of Elements would, in general, vary from Version to Version. What is left out of the means-ends description is the process structure, the representation of how and in what order those Elements enter into the process, and what the alternative Versions are.

Since a process representation may be a hierarchical, recursively generated structure of sub-processes, it would be possible to have a complex process representation which contained means-ends descriptions instead of process descriptions at the most detailed level of description.

In general, means-ends descriptions are given in place of behavioral process descriptions when the knowledge and competence of the user of the description can be counted on to fill in or compensate for the descriptive deficit.

F. TASK DESCRIPTIONS, OR ACHIEVEMENT ANALYSES

If a means-ends analysis is a statement of what is sufficient for the accomplishing of a given result, a task analysis is a statement of what is sufficient to qualify as the accomplishment of a given result. The paradigmatic locutions for a task analysis are (1) "To accomplish P, R, and S is to accomplish Q" and (2) "To accomplish P, R, and S is a way to accomplish Q." Formally, the procedure is to begin with a state of affairs description, "Q," and associate with it a set of more limited states of affairs which jointly exemplify Q or are equivalent to Q.

For an example of a task analysis, we need look no further than the original account of degradation ceremonies which was used to exemplify a process representation. The title of the original, "Conditions of Successful Degradation Ceremonies," is ambiguous and could equally well be taken to refer to a means-ends analysis, a task analysis, or a set of contingency statements in a process description. Indeed, there might be some question, even upon reading the entire article, as to whether Garfinkel was offering an empirical generalization (of causal conditions or procedural rules of thumb) or a conceptual analysis. However, if we ask how much and what part of a process representation of degradation ceremonies is provided, it appears clearly that what we are given is a task analysis along the lines of locution (1), i. e., "To accomplish P, R, and S is to accomplish Q." Thus, it is a conceptual analysis, not an empirical generalization.

As we look back at the process representation given above for the degradation ceremony, we can see that, although the order there is intuitively reasonable, in fact no order is prescribed. The stages could be interchanged. For example, D might first make the case that if P were to engage in A that would be an expression of his character, then typify the act as contrary to group values, and conclude with a dramatic "And he did do A!" Or again, all three might be accomplished more or

less simultaneously. For example, in the military situation, the single reading, "Carlyle, you vile, treacherous coward who left your comrades to die, you're a disgrace to the Queen's uniform," accompanied by the ripping off of Carlyle's stripes, might do the job. In a process representation, these possibilities would most likely be represented as different Versions and perhaps would be derived from different Paradigms.

The relationships among task analyses, means-ends descriptions, and process representations are conducive to certain systematic ambiguities. For example, in a behavioral context a task analysis will automatically qualify as a means-ends description in the ordinary manner of speaking. For, if to accomplish P, R, and S is to accomplish Q or is a way of accomplishing Q, then accomplishing P, R, and S is a means to accomplishing Q, and it is a procedure for accomplishing Q. Also, if "accomplishing P" is taken as the name of a process which results in P, it may also be taken as the name of an event, namely, the accomplishment of P, and as the name of a different event, namely, the occurrence of the process which resulted in P. It is by virtue of this ambiguity that one can say simply that historical events are the subject matter of History, that behavioral events are the subject matter of Behavioral Science, etc.

which ones?

The same relationships which generate the ambiguities are also a positive representational resource. Among other things, task analysis appear to be indispensable in representing certain kinds of social practice which are "free," "flexible," or "open-ended" in certain respects. Consider, for example, a type of meeting which we may call a "Leader-Agenda Group." This is a task-oriented group, presided over by a leader, which takes up one topic (task) after another. An examination of a transcript of such a meeting showed no obvious sequential structure or contingencies, and it was clear that there was no way of specifying for the general case any particular number, order, or set of topics discussed. Very little sequential structure was obvious within any given topic discussion, either.

The practice was analyzed by reference to a repeating unit consisting of dealing with a single agenda item, or Topic. A task analysis of the Topic was made in terms of four lists of elements, namely, (1) general context of the topic (why are we doing this), (2) decisions to be made or alternatives to be selected among, (3) generally relevant considerations, and (4) those considerations favoring one choice over another. The Elements for the process consisted of L (the leader) and M_1, M_2, \dots, M_K (members). Constituent subprocesses (recursive) consisted of Presentation-Response units where the Presentation consisted initially of introducing an item on one of the four lists and the Response involved the Options of (1) doing nothing, (2) adding to the Presentation, (3) elaborating on the presentation, (4) challenging, and (5) questioning. The recursive structure here consisted in the Contingency that any Response could be treated as a Presentation, thereby generating a new Response, etc. (Had the presentations of items on the four lists been represented as Elements, e. g., Acts 1 ... N, then the same result would be given by saying that any individual that was a Response Act was eligible to be a Presentation Act also.)

A discursive rendering of the process analysis (of the Leader-Agenda Group meeting) which employed the Task Analysis as an essential component would go roughly as follows: The Leader was eligible to introduce Topics and make Presentations which were not Responses. Members were eligible to make Responses to Presentations, and everyone was eligible to treat a Response as a Presentation and respond to it (i. e., every item on one of the lists could itself become a miniature Topic, and the sequential structure was of a last in-first out variety). Everyone was eligible to make a special Presentation Option initiating a decision (i. e., call for a vote). Members were eligible to present Topics after the Leader's agenda was completed.

In this way it was possible to do substantial descriptive justice both to the lack of antecedently specifiable content, sequence, or number

of stages and to the kind of structure which makes the operation of such a group the familiar and usually orderly process it is. In general, it appears that a certain kind of open-endedness is defined by an optional recursiveness contingent on the behavioral Option selection by Elements.

G. EVENT DESCRIPTION

The descriptive format for representing events is formally one of the simplest of those considered here. The primarily relevant Transition Rules are the following:

6. An event is a direct change from one state of affairs to another.
7. An event is a state of affairs having two states of affairs (i. e., "before" and "after") as constituents.
10. That an object or process begins is an event and that it ends is a different event.

If we keep to the "Name" and "Description" format, then Rule 7 directly provides the form of the "Description." That is, we specify the two states of affairs, SA1 and SA2, and this, together with a Name which identifies the event (SA3) will provide the representation of that event.

The simplicity is only a formal one, however, for there are de facto ambiguities and complexities to be dealt with.

One such consideration is that most frequently our discursive references to events involves a confounding of "Name" and an incomplete Description, namely, SA2. "The light bulb exploded," "He won the race," "It occurred to him that" are examples of specifying SA2, i. e., what the change was a change to.

A second consideration is that the event, and the representation of it, may indeed be extremely complex. All that is required is that either SA1 or SA2 be complex states of affairs, and then the change from one to another will be complex. One common kind of complexity stems from the fact that SA1 or SA2 may have to be specified by configuration descriptions. For example, "The automobile backfired," or "The battle took place" or "The anemia improved."

Is this an example of an ambiguity?

But don't these also specify SA1?

Or again, the specification of an event may be accomplished discursively by giving a categorization of SA3 (SA3 includes SA1 and SA2), i. e., by saying not what changed into what, but rather what kind of change it was. "The anemia improved" is an example here. In this case it is Rule 9 that is involved. And in this case it is frequently possible to reconstruct a relation between SA1 and SA2. For example, "The anemia improved" suggests strongly that SA2 involves a greater number of red blood cells than does SA1. And finally, such reconstruction is possible normally by virtue of such contingencies as 4B, C, D, and E in the BOU. That is, terms such as "red blood cell" are O-Names which identify an object as a particular constituent of a particular other kind of object (here, a certain class of organisms) and as derived from the latter via a particular O-Paradigm. (The O-Paradigm required by "red blood cell" was, for example, unknown to the Greeks and Romans, although some of the O-Names, e. g., "human bodies," were quite well known then.)

Still, the formal simplicity of Event description is a genuine one. The complexities here arise from the convertibility of Event representations to Object, Process, and State of Affairs representations. Event representation shares the possible complexities of these latter but adds little of its own.

H. STATE OF AFFAIRS DESCRIPTION

State of affairs description is of particular interest for two reasons. First, if any of the reality concepts could be said to have priority over the others, it is the concept of "state of affairs." Object, Process, and Event descriptions may be converted into one another, but only by being converted into SA descriptions first. Moreover, it is only those Transition Rules which concern states of affairs which also involve relations and properties (being of a certain kind - Rule 9). Finally, as we shall see later, other kinds of concepts are essential only insofar as they are required to distinguish one state of affairs concept from another. It is

from these various considerations that the reality system given by the Transition Rules was designated as the SA System.

The second reason for the particular interest is that State of Affairs description is what is accomplished directly in the asserting or statement-making use of either ordinary language or technical language. Observation reports, theoretical statements, "law-like generalizations, and explanations of any scientific kind will all have the status of State of Affairs descriptions. To relate this notion to some historical distinctions, the concept of a state of affairs is the same thing as the classical "proposition," and descriptive language is essentially propositional and distinguished by its eligibility for truth and falsehood.

On the other hand, a proposition is not exclusively or primarily associated with a description and truth-eligibility, since it can also figure in a question, a supposition, a conjecture, a wish, a command, etc. As I indicated earlier, the declarative sentences in the present paper should not be understood as statements, but rather as instructions or exhortations modeled on the lines of "Notice this, i. e. (sentence), aspect of the conceptual structure I am presenting herewith." It is because language is indispensable in giving us access to the state of affairs concepts which are indispensable in our behavior (and that is their only reality status), including our descriptive scientific behavior, that the articulation of "reality" requires the concepts of person, behavior, and language for its completion.

The most directly relevant Transition Rules for State of Affairs description are as follows:

1. A state of affairs is a totality of related objects and/or processes and/or events and/or states of affairs.
2. That a given object, process, event, state of affairs, or relationship is of a given kind is a state of affairs.
8. That a given state of affairs has a given relation (e. g., succession, incompatibility, difference, inclusion, common constituency) to a second state of affairs is a state of affairs.

3. An object is a state of affairs having other, related objects as immediate constituents.
5. A process is a state of affairs having other, related processes as immediate constituents.
6. An event is a direct change from one state of affairs to another.

With regard to an explicit representational format for state of affairs description, we may keep the standard "Name" and "Description" form and use the precedents provided by the BPU and BOU. Table 5 shows the State of Affairs Unit (SAU), which is modeled primarily on Rule 1. As in the other cases, the simple SAU is a recursive unit, and the full SAU shown in Table 5 involves one recursion in order that certain Contingencies may be simply stated.

 Insert Table 5 about here

Because of the equivalence of state of affairs representation with the descriptive use of natural language, including technical or theoretical language, the major discussion of the significance of SA representation must wait on the systematic development of the concept of language in a subsequent paper. In the present context, certain comments are apropos.

(A) First, we may note from the Transition Rules that among the six basic reality concepts, it is only the concept of "state of affairs" which directly connects with all the other concepts simultaneously, and it is by virtue of this that the others are connected to one another. Because of this formal ubiquity, there is no part or aspect of any possible world to which state of affairs representation would not provide direct descriptive access. However, since composition and decomposition of objects and processes cannot both be exhausted in principle (only by fiat, for a given individual) state of affairs representation cannot provide exhaustive descriptive access to any part of any real world. Nor can any other form of representation.

Certain contrasts and similarities are of some interest here. For example, a pictorial representation provides direct access to some

Table 5.

State of Affairs Unit (SAU)

SA-Name A: The "Name" of state of affairs A. This may be given by any identifying reference, such as, a sentence ("The man shot the bear"), a sentential clause ("the shooting of the bear"), a simpler locution ("the shooting"), or a conventional symbol (SA-Name A).

SA-Description A: The "Description" of SA-Name A. It specifies:

- (I) Relationship: An explicit identification of an N-place relationship, or attribute. (A property is a 1-place attribute.)
- (II) Elements: A list of the N elements, or logical roles in the Relationship. These are distinguished as 1st, 2nd, ... Nth elements.
- (IIa) Eligibilities: Each of the N elements is characterized as being either necessarily or optionally an object, process, event, state of affairs, attribute, or concept.
- (III) Individuals: A list of N individuals identified as individuals by a name, number, symbol, etc. (Note that "individual" is not the same as "object.")
- (IIIa) Classification: Each of the N individuals is identified as an object, process, event, state of affairs, attribute, or concept.
- (IV) Assignments: The N Individuals are placed in one-to-one relation with the N Elements, with each Individual being identified as the exemplar of the corresponding Element in the state of affairs SA-Name A.
- (V) Expansions: An expansion consists of the recursive use of the SAU (as developed to this point) in one of the following ways:
 - (1) Elaborating the Classification of a given Individual as an object, process, event, or state of affairs by giving

Table 5 (continued)

a SAU description of it, (via Rule 1, 3, 5, or 6). This will amount to using BPU, BOU, Event, or SAU formats.

- (2) Elaborating the Classification of a given Individual as an Attribute by giving a SAU description in which the Attribute is the Relationship.

(VI) Contingencies:

- (1) Since contingency statements are possible within BPU and BOU representations and the latter may occur as expansions, such contingency statements will qualify as contingencies within the full SAU also.
- (2) Co-occurrence constraints such that the use of a particular "Name" (in general, referring terminology, either technical or non-technical) for any Element within the full SAU is contingent on the use of particular other "Names" for other Elements.
- (3) Co-occurrence constraints such that the use of a particular Element is contingent on its being that element (or an Element) of the SAU within which it is an Element. (Note that stages, options, and paradigms within a BPU or BOU will qualify as Elements here.)

objects, processes, events, and states of affairs, but it is incomplete even with respect to these. Normal discursive description, whether technical or vernacular and whether observational or explanatory, is also both direct and incomplete. It is because of this similarity that traditional scientific theories, though discursive, exhibit the "pictorial perspective" referred to in Section I. In contrast, the SA system, as a calculational system, provides exhaustive access in principle, but it is indirect. The SA system is not itself a form of representation, but rather a codification of the capability of generating such forms. However, it is not exhaustive in practice, since we cannot in fact give a final and definitive specification of all the kinds of objects, processes, events, relations, and concepts which could be used in representing the real world.

(B) Second, the incompleteness of discursive representations of states of affairs is both an indispensable analytic resource and a source of considerable ambiguity and misunderstanding.

To see in what way it is analytically indispensable, let us first imagine a tremendously complex portion of the real world, such that a SAU representation would involve a network of objects, processes, events, and states of affairs, all decomposed recursively through some number of repetitions, and with contingencies crossing the lines of recursion. We may then say simply that it is a state of affairs representation, and only that, which enables us to connect any element (object, process, etc.) to any one or more others directly and without reference to the remainder of the complex. It is in this way that state of affairs representation gives us direct access to any part and any aspect of a real world. (Compare: "The world is everything that is the case. The world divides into facts, not things.")

Thus, the state of affairs system has, in this sense, an unlimited plasticity as a representational system (I have sometimes suggested that it can be understood as the real world analogue of the notion of

"coordinate system" in the worlds of mathematics and physics). That is, it has an unlimited capacity for absorbing or codifying observational "facts" and unlimited richness for supplementing observation with explanatory accounts of "what actually happens." Doubtless, this is what has rendered the system as such invisible to the naked eye, as it were, and tempted our theological disposed "toughminded empiricists" (Smart, Skinner, etal.) to suppose that there is a "natural order" of things "out there" as though it were not a distinctively human invention whose place in the natural order of things is as an Element in some distinctively human social practices. (Recall the strain between the methodological and historical connections between science (or logic) and the real world.)

However, it is partly because a discursive state of affairs description may connect any set of elements within a much more extensive and complex SA structure that most such descriptions carry a heavy burden of presupposition or ambiguity. The second reason for the ambiguity is that discursive state of affairs representation is in effect (and almost literally so) a concatenation of "Names" as contrasted with "Descriptions" of the elements it brings together in a single state of affairs. This is a particularly outstanding feature of explanatory scientific accounts of unobservable entities. To put the ambiguity of discursive description in these terms is to show the advantage of the requirement, for scientific practice, of an alternative, systematic representation of what is observedly, reportedly, and purportedly "what actually happens." In the final section, this advantage will be illustrated in connection with certain problems concerning scientific explanation and description.

III. "WHAT ACTUALLY HAPPENS" IN SOME SCIENCE-RELATED AREAS

In the preceding section forms of representation of what "happens" or "is the case" were presented. The representational formats are conceptually derived technical devices which provide the public, observable, manipulable correlatives of the corresponding reality concepts. As is the case with concepts, forms of representation are ineligible for truth values, assumptions, implications, belief, doubt, or evidence. The use of conceptual distinctions is presupposed by any of these latter.

Thus, although concepts are pre-empirical, the employment of a new form of representation may, nevertheless, enable us to command a clearer view of those matters which we find both problematical and engaging. It may also enable us to find problematical or simply false or patently ridiculous, certain "obvious truths." In either case, it may suggest new questions, new answers, and new things to do. I have indicated some of these innovations elsewhere (Ossorio, 1969b).

The range of relevance of the Behavioral Model and of the SA system portion of it extends beyond behavioral science or even science per se, and I think that in the interest of presenting these concepts there is a point in illustrating that kind of application without going too far afield from behavioral science. Thus, in the present section we will consider briefly a formulation in History and a problem in Semantics. These topics are taken from the current literature and appear to reflect an upsurge of interest in reality concepts. Indeed, it was the fact of encountering a number of such discussions, particularly Gruner's (see below), within a few days time that prompted the present partial exposition of the Behavioral Model; for the original formulation of the SA system was made at a time when there was little interest in "ontology," so that that formulation was subsequently presented only in relatively technical contexts (Ossorio, 1966; 1969b; 1971; an example of the historical connection between science and the real world).

A. HISTORICAL EXPLANATION AND SUBJECT MATTER

In an effort to explicate the nature of the phenomena which are the subject matter of historical explanations, Gruner (1969) provides a systematic look at the concepts of "object," "event," and "state of affairs." That the nature of historical explanation is, in turn, of potentially central importance for behavioral science is illustrated by the continuing repercussions of Dray's (1957) challenge to the causal model of explanation which has dominated the history of behavioral science. Because of Dray's influence, the central issue raised by reference to historical explanation is generally taken to be the issue of action rationale (norm-governed; rule-following) explanations versus predictive regularity (lawlike; nomothetic) explanations. And it is hardly accidental that the question of reference is raised by Cohen (see below) in connection with the description of actions.

But one can think of additional reasons why it is History rather than, say, Economics or Political Science, which has been the touchstone of controversy. Whether historians fully approve or not, it is a truism that History is the study of what actually happened. It is this notion which leads Gruner, as a historian, to make systematic reference to objects, events, and states of affairs.

A background for Gruner's reference to these reality concepts is provided by the fact that a central part of the cultural inheritance of both modern History and behavioral science is the notion of the physical world as the Given and as the wider stage within which behavioral-social phenomena take place. Thus, when referring expressions such as "event," "object," or "state of affairs" are used descriptively, e. g., in reporting an observation, it is commonly supposed that these terms function as does the pronoun "it" or the demonstrative "this," i. e., that they serve to pick out the thing that is referred to but in no way characterize it. The "thing" they pick out is, on this view, antecedently given as a physical object, event, etc. It is not surprising, therefore, that little attention

has been paid to the possibility that "event," "object," etc., have logical relations to one another and to other concepts, since it is more or less taken for granted that, outside of mathematical and other formal systems, logical relations are a feature of the meaning of a term, and since purely referring expressions have no meaning they ought not to have any logical relations either.

But Gruner points out that "As with many other words, the usefulness of 'event' depends on a contrast or comparison with other things, and only if there are historical phenomena which cannot rightly be called events has the term any significance." His analysis is that when an event occurs something changes, and that something is a state, condition, or state of affairs. (Recall Rule 6.) But states or conditions must be conditions of something, and so a state requires a thing or object as its subject: "An object R is in a state S_1 ; an event E happens; and R's state S_1 is replaced by another state, S_2 ." For Gruner, this single statement captures the basic interrelations among "object," "event," and "state." His further, informal elaboration includes the following:

(1) Events do not change, hence cannot have duration. Since achievements (or more generally, results) cannot be conceived of as having duration, achievement words are the only words that always refer to events.

(2) A battle, which is time-extended, may be thought of as changing a state, e.g., the political or military state of a country. Hence we may allow time-extended events by recognizing that something is an event only relative to something else.

(3) If we allow time-extended events, it will be a matter of choice whether one wishes to speak of a single event or a number of events. A battle, for example, consists of many separate episodes (sub-events), each of which possesses its own sub-events.

(4) The relation between an extended event and its sub-events is neither causal nor analytic.

(5) What is from one point of view an event may, from another point of view, be an object and from still another, a state. For example, a battle can be thought of as an object whose states are being changed. And, for example, if the battle "becomes a scramble for plunder," then it is a kind of state.

(6) This relativity can be extended to historical ideas, not to mention social and other institutions. ("The idea of 'progress' is not in the same healthy state today as it was in the nineteenth century.")

(7) To locate the event character in the eye of the describer is not to deny reality in any meaningful sense of this word to any individual historical phenomena. ("There still was, or occurred, a French Revolution, whether the item that goes by this name is conceived as an event, or as a state, or as an object.")

(8) But there are limits. In History, at least, it is impossible to conceive of physical objects, including (sic) human individuals, as anything but objects, as things which are in states.

(9) "One may conceive of an historical process as continuous and even flow, but when it is a matter of putting things down on paper and of writing history, one cannot do without events."

To these considerations, Walsh (1969) adds:

(8a) Once it is granted that nations, institutions, and perhaps even processes, could all be regarded as objects, there should be no difficulty in thinking of a person, such as Napoleon, as an event. "We do that, indeed, when we speak of him as a 'phenomenon.'" (Recall Rule 10, 10a.)

(10) Although nations are not separately identified entities over and above their members, it is nations and institutions and other social groupings which are more centrally the subject of History than individual persons.

In summary, Gruner succeeds in making a case for logical relations among "event," "state," and "object" such that these apply as descriptions only relative to one another. He indicates further that

contextual possibilities are always such that what is describable in any of these ways is describable in each of these ways, with a corresponding change in the reference of the other two associated terms. An exception to this interchangeability (but not to the relativity) is made with respect to those objects which he regards as the fundamental subject matter of History, i. e., persons (the "ultimate object" for Historical facts) and "other (sic) physical objects." Walsh notes that this exception is formally arbitrary, questions the notion that individual persons are the central subject matter of History, and raises the issue of reductionism in thinking of nations and institutions as "mere 'logical constructions' out of individual persons."

It seems clear that both in general tenor and specific detail Gruner's discussion represents a partial formulation of the SA system presented above in Table 1. The substantial deficits in Gruner's formulation leave little doubt that the rationale for historical subject matter and explanation cannot be given by the partial formulation. For example:

(1) It is one thing to remind us of logical connections among the three concepts and another to make these connections coherent and intelligible. The formulation of the SA system as a formal system accomplishes the latter.

(2) The equivocation or ambiguity of "event" as being either extended or not extended is certainly undesirable. This is too basic a difference, pace Ryle, to be left unsystematized. The missing ingredient here is obviously the concept of "process" which both Gruner and Walsh mention but do not exploit. A plausible reason for their failure to do so is contained in Gruner's reference to process as a "continuous flow." Such a process is indeed not what the historian needs, and so the common notion that a process is really a continuous process would rule out "process" as a basic concept for historians. In the SA formulation it is the concept of a discrete process which is fundamental.

(3) The relativity and interchangeability of "event," "object," and "state" appear to threaten a thoroughgoing fragmentation of the subject matter; hence also its explanatory reconstruction, since there does not seem to be any way of relating descriptions which overlap in their reference but are given from different viewpoints (e. g., the battle as a state vs. the battle as an object vs. the battle as a single event vs. the battle as an extended event).

An important special case of this difficulty is this. If a nation can sensibly be conceived as an object and each of its citizens can be conceived as an object, surely we would require, at least as an option, that it be possible to speak of both nation and citizens as objects simultaneously. (Note that the logic here is the same as between an automobile and its carburetor or between a person and his liver.) Gruner's relativity formulation appears to rule out such an option. One consequence is the disagreement with Walsh as to which of these two kinds of object is the basic subject matter of History. Either way, the answer would be subject to Cohen's critique (below) of "the description" (of the basic object of historical study).

The SA system offers no such problems. The issue was discussed in Section II as the issue of enrichment versus replacement of descriptions. Gruner's relativity formulation appears to require replacement whereas Identity Coordination in the SA system permits both. And it is enrichment which permits the building up of "world formulas" which integrate, rather than fragment, a subject matter. For nations and citizens, Rule 3 is directly applicable.

(4) "There still was or occurred a French Revolution, whether the item which goes by this name is conceived as an event or a state or as an object." This formulation is directly vulnerable to Cohen's critique, below, i. e., "Just what 'item' is that?" A system with identity coordination does not encounter the pragmatic paradoxes of the theory of reference.

(5) The (informal) definition of History in terms of either "basic object" of study (i. e. , persons or nations and institutions) does not distinguish History from other behavioral sciences and disciplines. In this regard, the extended systematization of the reality concepts appears to provide the needed resource in the form of the "Chronological description." Traditionally, a contrast has been drawn between a historical account and a mere chronology. A chronology is simply a sequential account, in observable, concrete detail of what happens. A history, in contrast, is an abstract account which reflects the historian's selection of significant detail.

Then does the historian not, after all, deal with what actually happens, and if he does is it only because history is merely "applied sociology?" The very compellingness of the history-chronology contrast appears to have left the historians with fundamental uncertainty in regard to whether there is any distinct subject matter for History and whether there is any distinctive "historical method" and whether History is distinct from social psychology or sociology, and whether there is any "objective" way of distinguishing historically significant detail from mere chronological detail.

The SA system does not provide answers to such questions, but it does suggest that there is a point in talking about these matters in certain ways. To begin with, the SA formulation reminds us that the difference between history and chronology is not the difference between atomic facts and generalizations or "abstractions" therefrom. Since there is no description which could not be considered incomplete in regard to detail, a chronology, in the traditional definition, is not per se the distinctively historical formulation from which systematic historical accounts derive their distinctively historical character (in this sense, any empirical data is given first by a chronology). The distinctive character of History, therefore, is not to be sought for in data but rather in the type of explanatory formula which provides the paradigm

cases of historical accounts (what constitutes "the historical world"). Such a formula may be found in the Chronological description of Section II. There we saw that what distinguishes Chronological description from, e.g., State of Affairs description or Configuration description is not either a distinctive set of happenings or a distinctive form of representation in any usual sense (historical descriptions would in general take the form of Configuration or SA descriptions), but rather the representation of a phenomenon as a portion of a non-repeatable "world formula" which makes historical particulars both unique and uniquely cases of "what actually happens." Thus, both the distinctness from the other behavioral sciences and disciplines and the close relationship to at least some number of them is accounted for. History is no more "applied sociology" or "applied economics" than Astronomy or Cosmology are "applied physics."

B. THE PROBLEM OF REFERENCE AND DESCRIPTIONS OF "THE SAME THING."

As part of the background for Gruner's discussion of objects, events, and states, I indicated that the behavioral sciences and disciplines have inherited a heavy burden of philosophical theorizing about what there is and how we talk about it. Among the major burdens of this sort is the semantic "theory of reference" and a variety of "logical" or "methodological" formulations which incorporate such thinking. Historically, the notion that there is a something, a "referent," which any of our descriptions is merely in fact about has evolved as the notion that that something is physical and that physical objects, processes, etc., are what behavioral science descriptions, whether observational or explanatory, are in fact necessarily about. We find just such a notion expressed more or less explicitly by both Gruner and Walsh in their discussion of historical phenomena. It is hardly surprising, therefore, that the behavioral sciences have systematically excluded fundamental behavioral concepts and remained parasitical on the methodologically incomplete

"natural" sciences. The notion that psychological, sociological and other behavioral descriptions are just different ways of talking about the same, i. e., really physical, things has provided the major lines along which this parastical dependency has been acted out, i. e., the "hypothesis" of "the unity of the sciences." The theory of reference itself, however, is being subjected to increasingly pointed criticism.

Cohen (1970) examines "the assumption by some recent philosophers that we can attach a clear sense to the claim that one and the same action can be described in many different ways." Consider the following sets of descriptions.

- (a) Brutus killed Caesar with a knife.
- (b) Brutus killed Caesar.
- (c) Brutus killed Caesar in the Forum with a knife.
- (d) He shot the bear with a revolver.
- (e) He pointed the gun at the bear and pulled the trigger.
- (f) The sheriff arranged for the official execution of a man he knew to be innocent.
- (g) The sheriff arranged for the official execution of a man he knew to be innocent in order to save the lives of five other innocent men.
- (h) The sheriff committed judicial murder.

Normally, we would say that if (a) Brutus killed Caesar with a knife, it follows straightforwardly that (b) Brutus killed Caesar. Yet there is no way in current logical theory to show this result. (In a similar case, Gruner points out that the relation between an extended event and a sub-event is neither causal nor analytic; likewise, the occurrence of P Name-A (= Dining) neither causes nor implies the occurrence of particular Versions, e. g., preparing steak.) Cohen points out that Donaldson's (19) technique of "quantifying over events" as a way of getting at the event which, e. g., (a), (b), and (c) are all

descriptions of will indeed work for examples such as (a) and (b), but when applied to cases such as (d) and (e) it leads to such absurdities as "He pulled the trigger with a revolver."

That the question of the description of the behavior (what the behavior really was) is not merely an academic matter is illustrated by cases such as (f), (g), and (h). In connection with such cases, Cody (19) points out that

"Under one description a man is guilty of a crime or a sin. That, however, is just one of the many true descriptions of his action. Under still another, no legal or moral questions can be raised. Can there be justice in our praise or blame when everything depends on which description we select to judge a man's action under? It seems there cannot if many different descriptions are applicable and if all applicable descriptions are, though different, true."

Thus, there are two main questions here. The first is, what is it for there to be different descriptions of the same action (or the same anything)? Here, Cohen suggests that there is no answer, because "...that makes no sense unless you have a way of showing what action it is that they are both descriptions of; and I reject the view that some bodily movement is what provides the identity." He has also rejected other proposed ways of making the identification independently of any description.

The second question is, given that there are several descriptions of the same action, which is the description. Cohen's answer here is, of course, negative. It also appears to be closely related to Gruner's "point of view" formulation: "...we might say that either description might count as the description of his action--provided we understand that this is not like saying 'the same action can be described in either way' as if it were a matter of a borderline case. It is just to say: you can regard this as the action, in which case the other is a description of its consequences; or you can regard the other as the action, in which case this is a description of how he did it."

Cohen's critique appears to be well taken. Certainly, the standard theory of reference has been presented as though we could and do first pick out a bare particular and then sometimes go on to describe it. He rightly objects that in that case, unless we have a way of showing what actions two descriptions are descriptions of, it is ridiculous to go through the ceremony of saying that they are descriptions of the same action. (Compare: "I'm thinking a thought. Now I'm thinking the same thought again. Of course, I have no idea what thought it is.")

But, although Cohen shows what is unsatisfactory about simply saying, in the customary way, that (b) "Brutus killed Caesar" describes the same action as (a) "Brutus killed Caesar with a knife," it is equally unsatisfactory to have to conclude that it is nonsense to suppose that they do describe the same action. In the behavioral sciences we appear to have accepted both unsatisfactory consequences simultaneously. Because everybody knows that "every description is theory-laden" we regard all "data" with suspicion so long as it retains any distinctively behavioral flavor and is not merely a matter of assigning numbers to something or other which we describe in conjectural, "theoretical" terms. Correspondingly, behavioral concepts such as "behavior," "motivation," "learning," "personality," "cognition," and so on become expressions which can be defined only within a given theory (see, e.g., Hall & Lindzey, 1971, p. 9). And intellectual anarchy is the predictable result, for there is no longer anything which might be called "personality" (etc.) which could serve as "the same thing" which various personality (etc.) theories provide different descriptions of. In effect, we accept Cohen's critique.

On the other hand, there is an equally general acceptance of an equally obvious truth, namely, that there is indeed a real description of what it is that behavioral theories are theories about; but it lies outside of behavioral science, in biology, and ultimately in physics; for everybody knows that persons are really organisms, and organisms are really et ceteras. If that real description is theory-laden, too, somehow

it does not seem to matter there, perhaps because, after all, that is real science. In effect, we have never heard of Cohen's critique.

The SA system formulation, involving the less simplistic referential characteristic of Identity-coordination, does not create the problem of achieving a purely referential identification and thus offers a way to avoid the second of these embarrassing postures both in regard to actions and in regard to behavioral science. It also offers a way out of the first embarrassment because it provides a clear sense for the notion of there being different descriptions of the same thing.

With respect to actions, the indicated resolution hinges on (1) the part-whole relationships codified by the Transition rules, (2) the notion of an incomplete description, and (3) the forms of representation which exhibit part-whole relationships and the constructive procedures of "composition" and "decomposition."

Cohen rightly rejects an informal, linguistic version of this resolution: "One might try to get around this by saying that 'Brutus killed Caesar' is really an ellipsis for 'Brutus killed Caesar with something.' But as Kenny has pointed out, it just isn't clear how long the unelliptical form of the sentence is; once one puts a restriction on the number of places available, one puts a restriction on the number of details which might be added to a description of Brutus' killing of Caesar, and it seems unlikely here that there be such a limit."

Note that this objection involves two points which were developed explicitly in Sections I and II. The first is the contrast between a description and a descriptive formula. The second is the reality constraint that no explicit representation of any part of a real world is also an exhaustive representation, since it always leaves room for further composition or decomposition. The solution which Cohen rejects would involve a descriptive formula which (a) was only partially filled in with descriptive constants, hence was an incomplete description, and (b) was, except for the missing constants, an exhaustive representation of the

behavioral episode in question. But we have seen that a descriptive formula cannot fulfill condition (b), and so this is not a possible solution.

But such a formula is not needed, and a purely linguistic formulation will not be adequate: The episode in question is a state of affairs, given by a Chronological description having the form of a Configuration description. Let this state of affairs be SAR and its description be DR. And let D1 and D2 be two descriptions of "the same behavior" which we identify by means of DR, and let SA1 and SA2 be the states of affairs for which D1 and D2, respectively, provide a representation. Now, let D3 be an actual description and SA3 its corresponding state of affairs, such that SA3 has both SA2 and SA1 as constituents and is itself a constituent of SAR. Since D3 is a description that can actually be given, e. g., "Brutus killed Caesar in the Forum with a knife," D3 serves independently of D1 and D2 to identify the action of which D1 and D2 are both (incomplete) descriptions.

This resolution requires neither a fixed, finite format for giving a "complete" description of SAR nor a reference to SAR which is secured independently of description. There is no need here to "be clear how long the unelliptical form of the sentence is . . ." because "Brutus killed Caesar" is not an elliptical way of saying something else. Rather, it is an incomplete representation of something for which a different and a more complete representation could be given.

Two points of interest remain here. First, it sometimes happens that SA1 is a constituent of SA2. In that case, SA2 will do the job of SA3. Thus, "Brutus killed Caesar" is an incomplete version of "Brutus killed Caesar with a knife," and so no third description is needed. In contrast, "He shot the bear with a revolver" has no such relationship to "He pointed the gun and pulled the trigger." In this case, the relationship between SA1 and SA2 must be represented within a further state of affairs, SA3. It is when that relationship is not taken into account that we generate such cases as "He pulled the trigger with a revolver." Configuration description

and the other representational formats are ways of giving such relationships an explicit representation; "quantification over events" is not.

Second, it may not be obvious that in general the applicability of a factual Chronological description is presupposed when we say that D1 and D2 are descriptions of the same thing. But consider the case where "Brutus killed Caesar" and "Brutus killed Caesar with a knife" are given not as references to a single historical particular, but rather merely as "repeatable" Configuration descriptions. If we allow multiple instances of each description, then the resolution above is not available, for it will not in general be the case then that "Brutus killed Caesar" describes the same episode as "Brutus killed Caesar with a knife." If another Brutus killed another Caesar in the Forum by poisoning him, and we say of that event that "Brutus killed Caesar," this will not be an incomplete version of "Brutus killed Caesar with a knife" nor will it be a description of the same episode. The conceptual distinctions, structures, and procedures associated with the SA system provide a technical implementation of the logic of part-whole relationships; the propositional calculus and the theory of reference do not.

IV. BEYOND TECHNOLOGY AND SUPERSTITION

In the preceding section we dealt with some current problems which have more than a passing relevance for scientific thought and practice, though neither the problems nor the disciplines involved would ordinarily be thought of as "scientific." In this final section it will be appropriate to give some further illustrations of the contributions which can be provided by the systematic formulation of the real world and its representation, this time dealing with issues directly concerning behavioral science and scientists.

More specifically, I shall undertake three tasks here. The first is to use the State of Affairs system as a perspective from which to examine critically the place of reductionist policies and the ideology of determinism in the behavioral sciences. The second is to provide some substantive backing for the claim that in fact there is a point in not keeping the methodological, substantive, and historical aspects of behavioral science in the traditional logic-tight compartments. Primarily this is done by illustrating a "substantive" way of dealing with a supposedly "methodological" issue (determinism again) and a "methodological" way of dealing with a supposedly "substantive" issue (the self-concept). More accurately, what is illustrated is a reality-oriented behavioral approach in which both "substantive" and "methodological" resources are freely available in descriptive and explanatory constructions.

The third task is to give some explicit delineation of the form which a behavioral science might take, considering that "the real world" is, substantively, what that behavioral science is about. Since the social institution of science is one in which the relationships among linguistic behavior, non-linguistic behavior, and the real world are crucial, it is inevitable that the delineation of this possibility on the basis of only the

the "real world" portion of the Behavioral Model will be appreciably incomplete. However, even this much of a suggestion is non-trivial in that acting on it would involve doing some things differently in the practice of behavioral science. Moreover, given the technical resources presented in Section I and II, it is something that could actually happen, now. So there is a point in talking that way.

A. HOW NOT TO REIFY BIOLOGICAL AND PHYSICAL CONCEPTS

It has long seemed obvious, in our pictorially oriented empiricism, that nations are "nothing over and above" their citizens, that each citizen is "nothing over and above" his physiological structures, that those physiological structures are nothing over and above et ceteras, and in the end, there is nothing over and above the hypothetical ultimate particles which the physicists talk about. Historically, the reductionist "nothing but" approach has predominated in the customary verbal and nonverbal practices of behavioral science. One expression of this predominance is the widespread denial that any behavioral description could be a fundamental description, for all behavioral attributions, it is said, are really inferences based on something more fundamental than behavior, e.g., movements, "perceptual cues," or statistical covariation data.

Reductionism has predominated not in the form of a substantive thesis which would be empirically vulnerable, but rather as a pre-empirical policy, which is perhaps only politically vulnerable. As an established policy it has a normative force and not merely a numerical predominance; reductive and atomistic approaches are generally accepted as paradigms of scientific rigor. The question "Where in the causal sequence is there a place for volition to enter in and influence the course of physiological events?" provides a succinct expression of the methodological priority given to physiological facts as against behavioral facts in our substantive "explanations" of behavior.

Correspondingly, the holist, however partially successful his defense of a holistic approach has been, has always been on the defensive. But consider the following dialogue:

Wil: Oh, I admit that people, tables, mountains, and all those parochially middle-sized things you laymen and behavioral scientists like to talk about are real. But they're real only because they're made up of little things, Zilch particles, and those little things are what are really real.

Gil: Rubbish! You've got it exactly backwards. Those hypothetical little things you talk about--if you insist on conjuring

up such things and calling them real, I won't say they aren't, but if they are, it's only because they're parts of a big thing, the real world, and that's what's really real.

The State of Affairs system formulation shows the detailed basis for the symmetry in this exchange. The basis lies in (a) configurational composition and decomposition and (b) LC-I and LC-II. Specifically, Wil chooses to define his ultimates by recourse to LC-II and views other objects as compositions; Gil chooses LC-I as the ultimate and views other objects as decompositions. With respect to world-formulas generated by the Transition Rules and limiting cases, either choice is formally available. However, since Gil's ultimate has the advantage of being observable and guaranteed real (recall the relation of observation and reality to the Chronological description) as contrasted with the unobservable and hypothetical particles of Wil, one might wonder why the holistic approach has not been predominant.

Part of the reason appears to be that a simple, straightforward statement such as that presented by Gil has not been generally available. We noted in Section III that Gruner's formulation, being merely relativistic and not calculational, makes it necessary to replace one description with another rather than using one description to enrich another. In turn, that makes it impossible to say, for example, that both the nation and its citizens are objects; and so it seems that one has to make a choice--is it the nation or the citizen that is the real object here.

A similar difficulty has been at work, historically, in regard to LC-I and smaller objects. It has appeared to philosophers that if the real world is conceived as an object via appeal to LC-I then that requires that individual persons (and a fortiori, Zilch particles) be thought of as states of that object. Thus, one finds a quite recent Aristotelian Society comment to the effect that of course one could refer to the existence of Jane Parker by saying that the universe took on a Jane Parker-ish tinge for a while, but really that would be rather too barbaric. And so it would, and it would be incorrect as well.

The State of Affairs formulation does not, of course, require any such barbarism or involve any such error. Just as it permits us to say that the nation is an object and a citizen is another object, so we may say that the real world is an object or state of affairs of which Jane Parker is this smaller, constituent object. There is no need to talk about tinges, and we may be as precise and as detailed about it as we please. Thus, the SA system formulation clears away some merely apparent difficulties connected with a holistic approach to real world phenomenon and gives Gil at least an even break with Wil in principle.

In-principle adequacy, however is not yet practicability, and mere practicability is something less than established and coherent practice. In practice, it is the Basic Process Unit which provides the most immediately practicable implementation of a holistic approach.

With the BPU format in mind, let us consider the statement that P-Name A1 took place here this morning. Let this statement be abbreviated as "S," and let the "Name" which is referentially interchangeable with "P-Name A1" be, say, "degradation ceremony." Thus, "S" = "A degradation ceremony took place here this morning." Ordinarily, in the reductive approach, we would take S on the semantic model of "name and object," i. e., as referring to an already independently existing historical particular. The latter would be a particular process, and one composed no doubt, of smaller particular processes P-Name A11, P-Name A12, ... P-Name A1K and their corresponding Elements (objects). On this view, we should have to say that S was a crude and possibly misleading way of talking about those smaller particulars which, if we consider both the sub-processes and their individual Elements, are what was really going on (and so on down the decompositional ladder to Zilch particles and their goings on).

In the holistic approach, however, we do not take S as the use of the name of that thing (P-Name A1). Rather, we take S as providing information about the world, and specifically, about some part and some aspect of it (S is a Chronological description). S is a piece of information

about the world because it is a partial specification of a more extensive process (P-Name A) of which P-Name A₁ is either a Stage-Option or a Version (to designate it as P-Name A₁ is to indicate the former). To say that P-Name A₁ occurred is to provide the information that P-Name A occurred in this one of the ways (Versions) in which it could have occurred. But, of course, that information is, in turn, simply the information that an even more extensive process occurred in this one (P-Name A) of the ways in which it could have occurred (and so on up the compositional ladder to LC-I). To be sure, S may be a poor, or even misleading, way of conveying that information, since S does not say that P-Name A occurred. But if we cannot give or imply a particular more extensive process, LC-I is always available and we can give a Chronological description or simply note that our description is incomplete. In effect, then, either a statement, S, or an observation, S, functions not as a name but as a constraint (a reality constraint) on acceptable world formulas and descriptions. S partitions logical space into those world descriptions which are compatible with it and those which are not. Given S, we restrict our world descriptions to the former and reject the latter. This feature is retained as we come down the decompositional ladder from LC-I to S to talking about Zilch particles. The latter are not ultimate building blocks but rather "the last decimal place" in the detail with which we specify LC-I. Thus, to say that a degradation ceremony took place here this morning is to say that the history of the group and the history of the world took a particular course here this morning. In this way, none of our "referents" is reified.

Note that neither Wil's reductionism nor Gil's holism tells him what the real world is like. Both must make the necessary observations, and the problem of relating S "upward" to P-Name A and "downward" to P-Name A₁ is present in both cases. Let us survey a particular example briefly.

The reference to volition, above, was not invented. More than fifteen years after both "The Concept of Mind" and "Philosophical Investigations" (for example) it is possible to find in the psychological journals such a question as "At what point in the causal sequence of physiological events does volition enter in to affect behavior?" along with the suggestion that since experimental psychologists have largely neglected the problem it most likely is at least partly a merely verbal one.

Gil's short and polemic answer to this question is "Nonsense! In 'the world of physiology' there are no such possible facts involving volition--by definition." It is not literally a definition that is involved here but rather a case of Contingency 4C in the Basic Object Unit, i. e., a commitment to use certain terminology in certain places only if certain other terminology is used in certain other places. This is, in short, a commitment to use a certain vocabulary, and perhaps a certain conceptual system, in giving descriptions over the range of phenomena to which it is applicable.

Consider some of the possibilities which are codified by Contingency 4C. Suppose, for example, that there were in current use a portion of our behavioral vocabulary which had a term-for-term correspondence to our physiological (and biochemical, etc.) vocabularies in regard to meaning, observational basis, and use, but with the contingency that the applicability of this terminology presupposed that the referents were constituents of larger, human objects. Our understanding of human behavior, i. e., Configurations involving human objects as constituents, would include what we now refer to as "physiology," "genetics," etc. And then we might well ask, "At what point in the behavioral structure of events do physiological processes enter in to affect behavior? Aren't they really epiphenomenal, when you come right down to it?" And so they would be--given that behavioral choice of descriptive commitment.

To the unwilling ear, this example will quite possibly sound far-fetched. But one could argue that we already have such a vocabulary, i. e., the one we call "physiological." And one could argue along two complementary lines here.

(a) Nobody supposes that the action of muscles, bones, and nerves "influences" human behavior unless these various objects are parts of a living, behaving human being. That is to say, that part-whole relationship is presupposed when "physiological" states of affairs are used to "explain" human behavior. But since human behavior is a process, a human body and its constituents are Elements in such processes and the processes involving those constituents will be constituent processes in the more extensive behavioral processes. Pace Gruner, the relation between a process and its sub-processes is neither causal nor deductive; it is, rather, the part-whole relationship which is codified by the Transition Rules and the concepts of composition and decomposition. When we describe human objects or human behavior in the degree of three-dimensional topographic detail which involves reference to such body units as muscles, bones, and nerves, we introduce, via decomposition, a new set of Stage-Options and Elements, together with the formal possibility of new Contingency specifications which elaborate our descriptions of behavioral possibilities.

To be sure, physiological characterization is only a way of talking about human beings, since it represents only a particular (predictive-manipulatively oriented) sort of O-Paradigm, or immediate constituent analysis, of human bodies; but it is a way of talking about human beings, even though that fact is not within the scope of the science of physiology.

(b) When a systematic technical vocabulary is used, we cannot tell from that fact alone what commitments are carried therewith (just as from the occurrence of the degradation ceremony alone we could not tell what more extensive process it was a Version of, and just as from an inspection of "It is certain that P" we could not tell what the methodological status of this declaration was). In point of fact, it appears that the use of physiological and other technical vocabularies is highly equivocal in this regard. When physiological terminology is used to "explain" something about human behavior, the commitment is that the reference

is to constituents of living, behaving human objects. (This is the case (a), above.) On the other hand, when the same vocabulary is used in the course of the professional physiological practice of description, theorizing, or experimentation, the commitment is to the exclusive use of that technical vocabulary over its range of application. And since "human behavior" does not fall within that range, because it has no conceptual locus and therefore no factual locus within "the world of physiology," no putative explanations of human behavior can be given when the vocabulary is used as a technical physiological vocabulary.

The distinction between the two commitments is generally not made, even though the two are incompatible in that they could not be fulfilled simultaneously. The confusion between the two is comparable to supposing that if I buy a chess set or make one out of ivory then my behavior is explained by the rules of chess which define "the world of chess" or that if I count my change at the grocery store my behavior is explained by a set of rules for the axiomatization of arithmetic. (There is, in fact, a sense in which one could speak of an "explanation" here, and that sense is systematically derivable as an "Achievement Description" within the behavior-descriptive portion (Ossorio, 1969a) of the Behavioral Model.) In short, the error underlying the equivocation is to suppose that the fact that we use a term of art such as "neurone," "reinforcement," "pawn," or "square root" to identify or designate some object, process, event, or state of affairs or attribute commits us to the ideology of the professional practices within which the term first evolved.

Since commitments regarding the use of a given vocabulary or conceptual system have nothing per se to do with truth or falsity, there does not appear to be any generally non-trivial question of the form "Is it true that human beings are physiological objects?" or "Is human behavior really a physiological process?" A fortiori, there is no empirical question of this sort, nor is it the case that scientists have

discovered that human beings are physiological objects. (That the human beings we are familiar with have hearts, basal ganglia, and carbohydrate metabolism was an empirical discovery, but had those findings been different, that would still be physiology.)

But, if the traditional empiricism formally fails us here, the new empiricism does not. This is the very kind of situation in which it is clear that the question to ask is not "Is it true?" but rather "Is there a point in talking that way?". Since Wil and Gil provide us with paradigms, the answer is "yes" for both ways of talking. We move then to the next elaboration, i. e., "When is there a point in talking that way, and what is the point then?".

In this connection we may return briefly to the historical, methodological, and substantive aspects of science. Since behavioral scientists as a matter of historical fact frequently and routinely talk about behavior in physiological terms or give physiological concepts theoretical or methodological priority over behavioral concepts, there is that point in talking that way, i. e., one is following the current custom of the profession. In this sense, the science of behavior is whatever behavioral scientists say it is and whatever they do in their role as behavioral scientists. The latter tack is the one generally taken by philosophers of science with respect to the "natural" sciences.

For the present, we may pass such considerations by as belonging to the politics of science rather than the practice of science per se, noting only that there is such a point and that the scientific behavior of scientists may be highly predictable from a knowledge of such facts. If we ask "When is there a point in using the physiological vocabulary to formulate behavioral facts if one's purpose is to maximize our understanding of behavior?" We can give the partial answer stemming from (a) above: There is a point in going to that level of detail when it permits us to formulate behaviorally significant Contingencies (states of affairs) in our (Configuration description) representations of behavior.

In this way the new empiricism provides a guideline for how to have a behavioral science which (a) has a place, substantively and methodologically, for all behaviorally relevant facts, including findings generated by "outsiders" such as laymen, theologians, physiologists, and biochemists, (b) without reifying non-behavioral concepts as "the real thing" and so forfeiting, in any but a political sense, its character as behavioral science and as behavioral science.

So far we have considered cases in which it is presupposed that Wil's Zilch particles (or processes, etc.), be they physiological, physical, or whatnot, are constituents of the human objects and behaviors which they are purported to cause. It should be clear that the restriction to human objects and behaviors is in no way essential except when that is what is to be "explained." Thus, Wil does not have a counter-argument to the effect that Zilch particles follow laws of their own whether they are parts of human objects or not. For wherever a Zilch particle may be found (or better, supposed) to be following its laws, it will be part of some larger object and state of affairs. So the lawfulness of Zilch particles cannot be divorced from their constituency in the very objects and states of affairs which they are commonly and zealously purported to explain.

Given the symmetry shown above as between the holistic and reductive approaches, I suggested that part of the explanation for the predominance of a reductive policy is that a simple and explicit statement of the symmetry has not been generally available. However, apparently promising approaches are not generally neglected just because they cannot be shown to be sound in advance. Other historical deterrents to holism have been present. Chief among those has been what can best be described as "the prevailing scientific ideology," though that will strike many as a unduly polemic characterization and diagnosis. Two major elements of this ideology are determinism and the unity of the sciences. The first of these is dealt with below; a brief examination of the "unity" notion will be apropos here.

It has always been clear, in modern times at least, that the real world is all of one piece. In contrast, the scientific study of the world is divided into a small, but various, set of distinct sciences, or scientific enterprises. Though they all appeal to a common set of "methodological principles," they in fact produce a variety of distinct theories and explanations. It has been an article of scientific faith that "ultimately" these various accounts will be assimilated into one scientific account of one real world. Since the "ultimate" phenomena of the various sciences correspond to their basic explanatory concepts, and since the explanatory concepts in the various sciences do not form any single conceptual system, the possibilities for unification are limited.

If the ultimate phenomena of the various sciences were to remain as conceptual ingredients in the "unified" account, then clearly that account could not be provided by any of the existing sciences or by any new science modeled thereon, for no such science could encompass the concepts of any other science. But in that case, our faith in unification would be mistaken; for in that case it would follow that no single scientific account of the real world was possible, though an integration of scientific accounts might still be accomplished, say, by philosophers, theologians, or historians.

The alternative is to adopt one of the sciences as the touchstone, as the fundamental science, and show that the concepts and explanatory accounts given by other sciences could in some sense be reduced to or derived from the fundamental science. It is this alternative which provides the motivation for Wil's statement that those big things are "nothing but" those little things and for the experimental psychologist's bland assertion that references to "volition" are merely expressions of the layman's ignorance of neurophysiology.

One of the more recent and "enlightened" versions of the unity theme is stated in terms of "levels of organization." It is enlightened in that in this version it is denied that phenomena (e.g., nations) are simply nothing but smaller phenomena (e.g., citizens). The unity is

provided by the fact that the phenomena of the various sciences involve the same material objects; the difference lies in that the objects of one sort are organizations of objects of a different sort. Thus, we have an arrangement that is formally equivalent to a crude version of the composition and decomposition of objects in the BOU format.

But this "enlightened" version of the Unity viewpoint eschews a crude reduction of large objects to smaller ones only to replace it with an equally crude reduction of large processes to smaller ones. The crucial slogan which is common to all the well-known versions of the "levels of organization" view is that "Lawfulness at a given level of organization depends on lawfulness at the next lower level." Thus, behavioral lawfulness presupposes physiological lawfulness; the latter presupposes genetic lawfulness;; and in the end, it is the lawfulness of Zilch particles which, like Atlas, carries the burden of the whole world. The underlying picture is, of course, the picture of Zilch particles as the ultimate stuff of which everything else must be composed or arranged; and the underlying principle is that if something is so that is because something else (ultimately Zilch-particulate dynamics) makes it so. The notion that Zilch particles are what there really is is easily convertible into the alternate form, i. e., that Zilch processes are what really happen.

But since the real world, as LC-I, does not unroll through time and since it could not possibly require anything to bring it or any of its parts into existence, Gil's direct response to the "enlightened" view would again be "Rubbish!"

More specifically, and with the Basic Process Unit in mind, it may be recalled that the occurrence of a process having multiple Versions neither implies nor presupposes the occurrence of any particular one of those Versions. The occurrence of P-Name A neither implies nor presupposes the occurrence of Stage-Option P-Name A13 if there are other options P-Name A11, P-Name A 12, . . . et cetera. This is so both for a

single occurrence of P-Name A or for the regular occurrence of P-Name A within some larger process (with the regularity being represented by a Contingency specification within a Configuration description of that larger process).

Thus, it follows that lawfulness at a given "level of organization" in no way depends on any independent lawfulness at any "lower" level, nor could any "lower level" lawfulness in any way guarantee any "higher level" lawfulness. If a given process, P-Name A, occurs at all, it occurs in one of the ways in which it can occur, and no account whatever of regularities or irregularities at lower levels of organization will have any bearing on the matter. To put it in a familiar context, if a given physiological theory, no matter how rigorously backed up by experimental data, were to imply that the behavior which we observe could not occur, that physiological theory would be ipso facto false (of course physiological theories are not vulnerable to this kind of evidence because they have no such implications). Conversely, if physiologists had discovered only a chaotic and irregularly distributed set of structures and processes in people's heads, we should not on that account conclude that people didn't really feel and think or that the behavioral regularities which we see around us were an illusion.

If there are any simple connections between "levels" such that, for example, P-Name A could only occur in one of two Versions, P-Name A11 or P-Name A12, then to that degree the occurrence of P-Name A forces regularity on the lower level; for then it determines that either P-Name A11 or P-Name A12 occurred, and not the other way around (recall that the occurrence of a process does not imply the occurrence of any given one of the more extensive processes of which it could be a constituent). Correspondingly, if P-Name A were prevented from occurring, so would either of its Versions be prevented from occurring, so that once more it is the higher level happening which takes precedence.

In short, though enlightenment comes in various Versions, the "levels of organization" version of Unity is not one of them.

Even more recently than the "levels of organization" view, the reductionistic policy in behavioral explanation is exemplified by a variety of "Identity Hypotheses." A hypothesis of this sort asserts that as a matter of fact mental processes are identical with brain processes. Thus, for example, experiencing the redness of an after-image is a process which, though it is a mental process by definition, is a physiological process as a matter of fact; so also is thinking of eating pickles, or feeling sorry for the losing team.

The principal basis for the plausibility of such assertions is the suggestion that the mentalistic description is a non-committal, or indefinite, description which only identifies its referent in a more or less vague fashion but gives no information as to the nature and characteristics of that referent. Thus, "the thought of eating pickles" is uninformative in the way that "What's going on in the next room" and "Jack's misfortune" are uninformative. That is, just as the one tells us nothing about what it is that Jack's misfortune is, and the other tells us nothing about what it is that is going on in the next room, the first tells us nothing about what it is that is going on in the brain of the person doing the thinking.

Since the Transition Rules of Section I are rules for preserving real world identity across different forms of representation, the concepts introduced in Sections I and II should have some relevance to these Identity Hypotheses. Indeed, the issues here bear a strong resemblance to those involved in the problem of descriptions of the same action, though they are not the same. Consider the following statements.

S1 Brutus killed Caesar.

S2 Brutus killed Caesar with a knife.

S3 I'm thinking of eating pickles.

S4 I'm having a discharge through neural circuit X-301.

Note that although it has been suggested that S1 is an elliptical form of S2, no such suggestion is possible with respect to S3 and S4,

for S3 and S4 do not overlap at all in what they say. Thus, the only possible correspondence between S3 and S4 that would be of any interest is that with S3 and S4 we are talking about the same thing, even though we are not saying the same thing about it. The double standard embodied in the reductionist policy in behavioral explanation is shown in the fact that, instead of saying that S3 and S4 have the same referent, the Identity thesis is that the brain process mentioned in S4 is the referent. (So that Gil could say to Wil for openers, "Nonsense! Talking about that live circuit is simply a technician's superstitious way of talking about the thought of eating pickles.")

We may use the BPU notation to represent some possible states of affairs in a neutral way. Specifically, we shall want three "levels" of process representation:

P-Name A "Ordering lunch. "

P-Name A1 "Thinking of eating pickles. "

P-Name A11, P-Name A12, ... P-Name A1K

P-Name A1K

Thus, P-Name A is some process which, for purposes of our example, is the behavioral process of ordering lunch. P-Name A1 is one of the stages in that process, and in our example it is the "mental process" of thinking about eating pickles. The third line represents a sequence of sub-processes which make up one Version of P-Name A1. For convenience, this sequence is abbreviated as P-Name A1K.

Given this notation, we may now raise some questions about the three processes and their relationships and about which process a given description is a description of and which process a given description can be used to talk about or give information about.

Our first question will be: Suppose that we introduce "Activation of brain circuit X-301" as the Name of a process and let the Description of that process be given as a sequence of stages with no options (i. e., we are dealing with only one Version here) and as a sequence in which all the Individuals and Elements are specified in "physiological" terminology.

This process is now a candidate for the status of the process designated as P-Name AlK, above. Thus, if the mention of P-Name Al is a way of referring to P-Name AlK and "I'm thinking of eating pickles" is that mention, then we have apparently shown how the reference to a mental process can be a case of referring to a process which is the same process as a physiological process.

Note, however, that Gil might object to such a move and appeal to LC-III. For he might claim that the examples of "Jack's misfortune" and "something going on in the next room," though they serve to clarify the nature of the Identity thesis, also show what is wrong with it. Misfortunes and going on in the next room cannot just happen that way--if they happen at all they happen as financial losses, physical injuries, et. al., and as card parties, Sunday dinners, family arguments, et. al. In contrast, thinking about eating pickles is not obviously something that couldn't just happen that way. It is not obvious that if it happens at all it must happen in a more particular way. And if, on examination, it appeared that it did, then the particulars would be of an equally mental sort, e.g., imagining a pickle, imagining biting into it, thinking how good it tasted, etc. Thus, we would in this way generate another candidate for the status of the process designated as P-Name AlK, above, and this candidate would be a mental process.

But now, by a symmetrical move upward, it is clear that we could give a process description having the form of P-Name Al but one in which once more the Elements and Individuals could be specified in physiological terms. Evidently the only case of interest here is the first one, where we consider P-Name Al as a mental process and P-Name AlK if not literally as a physiological process, at least susceptible of a specification in physiological language. The reason for this is that where we suppose the same process formula in both physiological and mentalistic terms (a) it will simply be the case discussed previously, where one may choose language which carries different commitments; (b) there will be no question of one of the descriptions being technically deficient, yet the

current Identity theses stress the asymmetry in the technical adequacy of the mentalistic and physiological descriptions; and (c) some existing counterarguments would then apply, i. e., arguments to the effect that identity would be indistinguishable from co-occurrence and the so-called Identity thesis would be only a verbal imposture covering the traditional views of psychophysical parallelism or "double language" views.

The remaining case, where P-Name A1 is the mental process and P-Name A1K is the physiological process, has some additional interest because it would seem that mental processes cannot be decomposed indefinitely (unless we appeal to LC-IV and talk about a continuous process in which nothing changes), whereas bodies, whether human or physiological can, at least practically speaking. So our remaining case is one which would arise when we have decomposed the mental process into some ultimate constituents. As it happens, we have a familiar example of this kind of relationship in the case of a computer "doing arithmetic." Elementary arithmetic operations set a lower bound to the fineness with which we can represent its "mental process" of "doing arithmetic"; and, although over some range there will be parallel electronic and arithmetic descriptions of what the computer is doing, there will also be a range where only electronic process descriptions can be given; for a complex series of such processes may correspond to the elementary arithmetic operation of "adding one."

Given this paradigm setting for a possible Identity thesis, we may find the logical basis for such a thesis in the relation between a process and one of its Versions. In the presentation of the Basic Process Unit, I said that the occurrence of a process on a given occasion is the occurrence of one of its Versions on that occasion, and this does sound like an Identity thesis of some kind. Note, however, that this condition is compatible with any of the following states of affairs.

- SA1. Although P-Name A1 occurs frequently, no Version of P-Name A1 occurs more than once, and no Version of P-Name A1 resembles any other Version in any respect other than in being a Version of P-Name A1.
- SA2. There is no way of distinguishing one particular Version from another.
- SA3. There is an infinite set of possible Versions and no way of setting a limit to the kind or number of them that could actually happen.
- SA4. There are N versions, N being a small, finite number, and the occurrences of the different Versions on different occasions have a more or less regular distribution across the N possibilities, but the distribution varies from person to person, from population to population, and for the same person over long intervals of time.
- SA5. There is no Version which could not possibly be deliberately brought about by the person whose behavior or mental process is P-Name A1.
- SA6. There are N versions of P-Name A1, and the distribution of occurrences of Versions across the N possibilities is stable over persons, populations, and time.
- SA7. There is only one Version of P-Name A1, namely, P-Name A1K, but the latter may occur without the occurrence of P-Name A1.
- SA8. There is only one Version of P-Name A1, namely, P-Name A1K, and one occurs if and only if the other does.

Among these possibilities, we shall see that only SA8 leaves room for an Identity thesis. We may eliminate SA6 on the grounds that we would then be committed to saying that P-Name A1 was identical to several things which were not identical to one another; and, if we went to this length to protect an Identity thesis, we should lose not only the Identity thesis, but also the concepts of identity and thesis themselves. The same consideration holds for SA1 to SA5, all of which allow for various Versions actually

occurring; moreover, under any of the conditions SA1 - SA5 it would seem that any assertion of identity between P-Name A1 and any Version would be empty and misleading rhetoric.

We may eliminate SA7 on the same grounds as SA6. For SA7 may be paraphrased as saying that P-Name A1K is sometimes identical to P-Name A1 and sometimes identical to Non-P-Name A1. This is a technical deficit which can be remedied, however. For in the case of SA7 we should have to suppose that there is some set of conditions, X, such that P-Name A1 was identical to P-Name A1K if and only if X. But that would be to say that P-Name A1 was identical to P-Name A1K plus X. That, however, is just a variant of SA8.

SA8, moreover, has the virtue of being logically possible without being logically necessary. However, it is not the kind of statement which could be refuted or demonstrated by any set of observational results, and in this respect it resembles a scientific theory, not a hypothesis. For no matter what we observed, if we found a common element that finding might not hold up and if we did not find a common element, well, who knows but what someday, with more powerful experimental or verbal technology, we might. Evidently, the Identity thesis is not an empirical guess about how the world is, but rather a pre-empirical policy: "Treat behavior and mental processes as though they were nothing but some physiological process and see how long and how well you can get away with it."

What would we be pretending was the case here? Does it make any sense to say, when P-Name A1 occurs in Version P-Name A1K, that P-Name A1 is identical to a state of affairs, PSA-Name A1, which has the processes P-Name A1K as its constituents. Note that there is a straightforward identity between P-Name A1 and PSA-Name A1 (by Rule 5) but not between either of them and the processes P-Name A1K.

Now, if the processes P-Name A1K were related to one another in the requisite way, then not the processes per se, but their being so related would be a state of affairs identical to PSA-Name A1 (by Rule).

But that would be a conceptual truth, not a mere matter of fact. What would be a mere matter of fact would be (a) that processes P-Name AlK occurred and (b) that their occurrences were properly related to one another. Here we may refer back to the "technical deficit" in SA7. The processes P-Name AlK could occur without the occurrences of P-Name Al, because unless they occurred in the proper relationship P-Name Al would not occur. Thus, the additional condition, X, such that X plus P-Name AlK is identical to P-Name Al (via the identity to PSA-Name Al) is simply (b), above, i. e., that these processes occur in the requisite relation to one another.

So we reach much the same conclusion as in the case of "Brutus killed Caesar." Insofar as S3 and S4 may be said to be different descriptions of the same process, S3 is not a defective description of a process of which S4 is a non-defective description. And nor is there any transcendental description or observational perspective or experimental device which could somehow give us direct access to the process of which S3 and S4 are descriptions.

Recall that in the case of "Brutus killed Caesar" we got around this impossibility by introducing a third description which was a more complete description of "the same event" in the sense that it identified a state of affairs which had as constituents the two states of affairs corresponding to S1 and S2. We noted there that the third description is essential in formulating the general case because it is indispensable in the case where one of the two descriptions is not simply a less complete version of the other.

In the present case we arrive at a similar result, but one which points up an ambiguity in the reference above to a "more complete" description. For, if there is to be a description of a process such that S3 and S4 are both descriptions of that process, that process will be P-Name A (another point for Gil). The descriptions of P-Name Al and of P-Name AlK are both ways of (partly) specifying which Version of

P-Name A took place on that occasion. So P-Name A is what both S3 and S4 can be used to say something about. And P-Name A is "more complete" in that it refers to the entire process of which P-Name A1 and P-Name A1K refer to only one stage. (Note that we could generate the previous case of "more complete" by incorporating both S3 and S4 in our description of P-Name A and adding the mention of P-Name A2, P-Name A3, etc. The latter are the analogues of adding "with a knife on the Ides of March" to "Brutus killed Caesar.")

Since it does not appear to be possible to state a coherent Identity thesis, we may ask, in the empirical tradition, what does the identity theorist expect to observe? If we do this, we are back to SA8. He expects to observe that whenever anyone thinks of eating pickles circuit X-301 is active and there is no other circuit that stands in this relation to thinking of pickles. But this is exactly what the proponents of psychophysical parallelism and epiphenomenalism would expect to find. Well, certainly the identity theorist takes himself to be making a different, and more daring, postulate than the parallelism theorist. He doesn't mean merely parallelism. And thinking that there is an identity is not the same mental process as thinking that there is a correspondence. But thinking so doesn't make it so, and so we might do some justice to the facts here by introducing a second-order identity thesis. That is, the current versions of the Identity Thesis are, as a matter of fact, identical to a non-Identity thesis.

We have, of course, in no way exhausted the difficulties which could be raised in connection with reductionism and Identity theses. But, also, in considering reductionism on its own merits we have failed to do it justice; for it does not stand on its own merits but rather gains the force that it has only in connection with the remainder of the traditional scientific ideology and, particularly, with the "deterministic" aspect of that ideology. If it were merely a question of greater or lesser detail in description or of choice of conceptual systems or choice of commitments, it seems likely that even a reductionistic bias would hardly lead

behavioral scientists to adopt as a first principle the impossibility and non-intelligibility of a behavioral science. I do not think this is too strong a characterization. If behavior is really something else and depends completely or fundamentally on non-behavioral principles, then any so-called science of behavior could only consist in showing that behavior is epiphenomenal and that behavioral regularities are simply derivative consequences of non-behavioral regularities. If we are tempted to call that a science of behavior, we have only to look across the aisle to physics and ask ourselves whether we would call physics a science if that were the tack taken there.

The motivation for this self-destructive behavior is provided by the view that certain descriptions (of a Zilch-particulate sort) give us a privileged access to the mechanical principles upon which the world, being a gigantic machine, really operates. For, if the fate of every Zilch particle is fore-ordained, then everything that happens happens by virtue of its Zilch constituents, hence in principle the study of Zilch particles is the key to everything that happens, including behavior, and correspondingly every other topic of study is in principle futile; for we can there study at most the consequences of Zilch processes under a variety of more or less naive and misleading descriptions. Here is motivation sufficient and to spare, and so we shall not avoid an examination of that topic in the next section.

At this point, a reminder may be in order. What I have done in the examination of reductionism and identity, and what I shall be doing, is to illustrate how, though the State of Affairs formulation does not assert anything, it does provide a range of conceptual and notational resources which can be used in a variety of ways, including both the critical examination of some fundamental issues concerning behavioral science and the creative and empirically oriented formulation of behavioral phenomena. Another person using the same concepts and dealing with the same topics would doubtless proceed differently. I have

not (nor shall I) take a "scholarly" approach here. That is, I have not cited particular proponents and varieties of reductionism and Identity; I have not dealt with these topics in the depth or scope that is entirely feasible in principle; and I have not attempted to marshal a conclusive set of reasons for drawing particular conclusions. This is not just a matter of making do. On the contrary, it may be suggested that although a scholarly treatment has some practical value as a compendium of what people say it is in principle inadequate.

Just as we have long seen what is naive about seeking "crucial experiments" to decide among theories which are inherently immune to falsification and can always be protected by their adherents against embarrassing facts, so we might view the notion of a single, decisive argument with respect to reductionism, determinism, and other perennial academic indoor sports. There is no limit to the variations, ad hoc qualifications, studied ignorance, and other maneuvers of which an ingenious person might avail himself by way of saving a given verbal formula, and there is no point in trying to anticipate them all. One can only be illustrative here. If there is a moral to the foregoing, it is that the kind of symmetry there is between holistic and reductive possibilities of commitment is clearly shown by the State of Affairs formulation, though it is not asserted there in any particular form. A behavioral scientist who sees that symmetry clearly will have that much more freedom to pursue the study of behavior in ways which are intellectually responsive to real world observation and conceptual coherence rather than emotionally steered by a received ideology, and he will not be easily imposed upon by a range of superstitions such as reductionism and determinism which have been pronounced, and until recently generally accepted, as the methodological requirements of scientific rigor in the study of behavior.

So far, it is the symmetry of composition and decomposition of objects and processes which has been emphasized. The force of the

preceding illustrations is that a reductive or atomistic approach does not carry with it inherent advantages of precision, differentiation, operationalizability, quantifiability, empirical openness, or any other advantage whatever. However, I do not mean to suggest that the choice of one or the other is of no consequence. On the contrary, the final presentation in this section deals with a decisive asymmetry in the composition and decomposition of states of affairs which requires an autonomous, holistic behavioral science for its conceptual and empirical elucidation.

B. CAUSE AND EFFECT WITHOUT THEOLOGY AND EGOCENTRICITY

As we noted in Section I, the State of Affairs system generates descriptive formulas ranging in complexity from world history to "Here is X." In general, the simpler the formula we use, the more we have confidence, prior to any observation, that we will be able to give a description that fits that formula under any circumstances whatever. "here is a case of X" is a formula which has a cast-iron, money-back guarantee in this respect, since there is no situation in which a description having that form will not be available. The temporal succession formula "B, thereafter A" and the cause-effect formula "C, consequently E" are just noticeably less simple than "Here is a case of X," and these too have a guarantee of applicability. Note that here "applicable" amounts to "unintelligible" rather than "correct," which is to say that one can always give a description of this sort without being nonsensical, and that reflects the nature of these formulas and of the concept of a "world formula." Correctness and incorrectness of descriptions, on the other hand, presupposes human standards and human practices, for only by reference to these in addition could a description be designated as true or false, correct or incorrect.

Of course, what we substitute for "C" and "E" here may be of any degree of complexity. What is simple is the formula, not necessarily the actual description or the state of affairs which is referred to. For example, in the case of "The depression of the early 30's caused the landslide vote for Franklin Roosevelt in 1936" both the formula and the description are simple, whereas the state of affairs is so complex that it has never been adequately delineated. In terms of the representational resources developed in Section II, the description is a State of Affairs description; and it represents a state of affairs having as constituents two states of affairs, SA1 and SA2, in a temporal relation. The two constituent states of affairs are each identified by a Name without any accompanying

Description (this permits a simple verbal reference to a complex state of affairs), though each Name carries some information which would be relevant to a Description. Finally, of the two constituent states of affairs, SA1 is designated as "C" and SA2 is designated as "E" in the cause-effect formula.

Of course, the real world does not per se correspond to a C-E formula any more than the English language corresponds to any particular type of sentence. On the contrary, the closest heuristic approximation to LC-I is the atemporal, aspatial four-dimensional space-time matrix of the physicist. (That world does not change through time, nor does it exist in space.) If we expand the s-t matrix by an indefinitely large number of additional dimensions which represent relationships other than spatio-temporal ones, that will be a pictorial approximation of LC-I.

Thus, the C-E formula does not have any special validity in regard to the representation of the real world. Pictorially speaking, we do not have to read LC-I from left to right in C-E form, though we can choose to do it that way. We can also read it from left to right in B-A form. And we can read it from right to left in teleological form or in A-B form, or from top to bottom or by alternate segments or Chinese box patterns or in cumulative increments from inside out in degree-of-completion form (recall Whorf's celebrated analysis of Navaho) or in any way whatever. All of these would have equal validity in regard to providing representation of the real world, and all of them would be equally deficient, since none of these formulas is a possible "world formula" or even comes close.

The nature of the deficit is perhaps best portrayed by referring to the contrast between representational ingredients and representational products and using some familiar examples. It is a well-known fact, embodied originally in the pointilliste school of art and more recently in the technology of newspaper photography and television, that one can produce a representation (on a canvas, newsprint or cathode ray tube) of,

say, a horse jumping over a fence, using only a finite set of dots varying only in their placement and in either their darkness or their area or both. We may contrast the product, i. e., the actual representation of the horse jumping over the fence, with the ingredients, i. e., the dots, which were used in that product. In such an example we can see clearly the abysmal gap between (a) the fact that a person can use the dots to produce a representation of a horse jumping over a fence and (b) the claim that dots are a representation of a horse jumping over a fence or the claim that since (a), then the phenomenon of a horse jumping over a fence is essentially dot-like.

The formula "use dots" in constructing representations is the analogue of using the descriptive formula "here is an X." The analogue of "C-E" would be something like "Every dot must have an adjacent dot" or "After every dot, make another." Such a formula can indeed be used by a person in constructing a representation of a horse jumping over a fence. But the formula as such not only is not itself a representation of a horse jumping over a fence, but it is not even a formula for constructing such a representation. That is, it is not a recipe which, if only one follows it, will enable one to produce a representation of a horse jumping over a fence. This is easily seen from the fact that the formula is content-free. It does not change, no matter whether we are constructing a representation of a horse jumping over a fence, a pig flying over the moon, the moving finger writing on the wall, or a conversation between Wil and Gil. Likewise, the cause-effect formula does not change, no matter whether we describe a depression causing a landslide vote or a buzzing sound causing a rat to jump out of a black compartment and into a white one.

Considering the overwhelming priority given to custom and precedent in the social practices of scientists, it perhaps needs to be emphasized that although we have a tradition of giving cause-effect descriptions, cause-effect is not per se a fact, but simply a formula

which can be applied, if we insist, whenever we have temporal succession. Since we can, there is no point in insisting, and in fact we do not. However, if the formula is used subject to some rational (i. e., intelligible) rule, for example, if it is used only in the case where what we call "C" is always observed to be followed by what we designate as "E," then there may be a point in talking that way. If there is, then a description (e. g., "the depression caused the landslide vote") which exemplifies the C-E formula will have a particular status. Just as "It is certain that P" exemplifies a linguistic convention for assigning a particular status to the statement that P, "C caused E" exemplifies a linguistic convention for assigning a particular status to the statement that C was followed by E.

What the particular status is will differ, depending on which convention (rule) is involved and what one's approach to the matter is. Under Hempel's "covering law" formulation of causal accounts, to say that C caused E is to say that it was certain that C would be followed by E because it always happens that way. Under the Hart and Honoré formulation it is to say that on that occasion C's being followed by E was both (a) intelligible and (b) not a matter of luck, chance, accident, or coincidence (in this regard it resembles Dray's "rationale").

Thus, although the C-E formula has no particular validity in regard to representing the real world, it does have some distinctive features and a particular status which reflects those features. Let us survey these features briefly.

First, since the C-E formula is a temporal succession formula it provides a way of mapping both the sequential structure of the stages in a process and the order in which we establish states of affairs. Hence it lends itself to predictive use and to the representation of before-after contingencies within some process structures.

Second, the C-E formula is a special case of the Means-Ends description presented in Section II. For, if C causes E, then bringing

about the occurrence of C is a way of bringing about the occurrence of E, and so C is a means to E. Because of this, the C-E formula provides a way of codifying our human capabilities and potentials for bringing about particular states of affairs. As against the Means-End form, the C-E formula has the advantage of conforming to the classical impersonal idiom which is part of our verbal scientific practice and which is frequently confused with objectivity.

Upon this fact rests the premier place of The Experiment in traditional scientific practice and the ready equation of "empirical" with "experimental." It is by no means accidental that the acid test, scientifically, of whether B causes A is whether and experimenter, G, can cause A by causing B. In a Means-Ends formulation we would preserve all of these relationships, i. e., "G brings about B, consequently A." In the traditional practices the G-B link (the experimenter and the "independent variables") is embodied in a "methodological" account. The B-A link (the independent and dependent variables) is formulated as a before-after phenomenon in the description of the results and as a cause-effect phenomenon in the "theoretical" formulation and the Iron Curtain between methodological and theoretical accounts is maintained. There seems to be no public argument about the fact that experimental manipulation is taken as the criterion for causation not because experimental manipulation is taken to be a special kind of causation, but rather because it is the kind which defines our scientific interest. That is, our traditional scientific interest in the real world is not in the real world as such, but rather in the real world insofar as it is actually or potentially manipulable in a unilateral (G-B) way.

Third, the C-E formula is also a special case of a Task Analysis. We noted in Section II the ambiguity in normal discourse in connection with Means-Ends description and Task Analysis. Thus, if we have the task of accomplishing an E which we do not have the ability to accomplish directly, one way to formulate the task is as the task of finding a middle

term (state of affairs) which stands as a C with respect to that E and also stands as an E with respect to some of our possible behaviors. If we succeed in this, we will be in a position to bring about C, consequently E.

To summarize our survey, the Cause-Effect formula has the scientific utility that it has because it can be used by human beings in a variety of ways which are intelligible and effective independently of the C-E formula itself and certainly independently of any supposedly necessary or universal connection between C and E.

Historically, the C-E formula has served to provide the logical form (and the practical ideal) of our technology (i. e., of the confident achievement of known ends by the legitimately confident recourse to known and teachable means). As I have indicated, this feature reflects the (non-empirical) fact that the C-E formula is a truncated version of a Means-Ends formulation, and the latter is the overt and criterial form of a technology. Earlier in the discussion we saw that the C-E formula is defective as a representation of the real world. Subsequently we saw that though it is defective from the standpoint of representation of the real world, the C-E formula does codify our traditional scientific interest in the real world, i. e., an interest in it insofar as it is actually or potentially manipulable in a unilateral way. To see the world as being really a gigantic machine is to see it as a set of actual or potential opportunities for exploitation. To see it that way is to reify our manipulative interest in it, and that is to see it in a way which is perhaps not so much anthropomorphic as merely egocentric.

I mention this not to suggest that there is something in principle improper about human beings pursuing human ends and doing so in a persistent and systematic way, but because seeing the extreme limitations of the C-E formula as a form of representation and seeing the egocentricity inherent in the reification and overwhelming priority given to that formula casts a certain light on two of the most honored superstitions

in the history of science. The first is that a causal account within a general causal framework (traditional "naturalism") is the epitome of hardheaded, realistic, objective representation of the real world. The second is that the manipulative successes in both "experimental" and "applied" settings which are associated with causal scientific accounts constitute compelling evidence for the adequacy of those accounts as representations of the real world and that in the face of this success only a wishful thinker would think of rejecting the in-principle adequacy of such accounts (see, e. g., Minsky's comments, below). But we have seen what that way of thinking amounts to in considering the successful use of dots. That example, incidentally, serves to portray the general problem of the sense in which scientific theories are empirical. We use both those dots and those scientific theories successfully in certain ways--are they then not true? Since that success depends at least as much on the using as on the ingredients (and perhaps depends wholly on the using, in the sense that any ingredients would do, and since neither those dots nor those theories encompass the facts of their own use, the answer is "no." As I indicated earlier, the sense in which scientific theories are empirical has never been adequately explicated either by philosophical theorists or by those scientists who profess to provide us with "empirically based" theories.

The notion that a causal account within a general causal framework is the epitome of realism and objectivity has not evolved and survived in isolation. It is buttressed by the doctrine of "determinism," which functions as a theory of causality when a "covering law" interpretation of the C-E formula is adopted. Thus, briefly, under the covering law formulation, this B caused this A not necessarily because B's always cause A's but because this B is an X and this A is a Y, and X's always cause Y's. That is, the position of an X in regard to a Y is that of C to E. The "determinist" adds to this, "And there is nothing that doesn't happen that way: every phenomenon is an A in this sense, and so

everything that happens had to happen and nothing that happens could have been otherwise."

An explanatory account given in the vocabulary of a deterministic theory has, therefore, many points in common with the Chronological description presented in Section II. Indeed, it may be regarded as a special case. Recall that a Chronological description is characterized not by any distinctive form or content but rather by the commitment to its being part of a world formula which encompasses the history of the real world. Likewise, a deterministic theoretical account is distinguished not by any distinctive form or content or other visible mark, but rather by the commitment to its being part of a world formula which encompasses the history of the real world and is of a particular sort, namely, one which consists of C-E links and only those.

The effect of this move is to create verbally the a priori guarantee that the real world has at least this much unity and at least this kind of order and intelligibility. (Note that LC-I carries no such guarantee.) Since the scientific enterprise is traditionally described as a search for the orderliness of Nature, it is commonly supposed that the acceptance of determinism as an article of scientific faith is essential in order that the scientist's search for that orderliness be a rational behavior. Of course no such faith is necessary and no such guarantee is either necessary or possible. There can be a point in looking for orderliness so long as it is not certain that it will not be found, and it will never be certain that it will not be found.

A second effect of the deterministic move is to create a special vocabulary and a special set of entities (which I have given the abstract designation of "Zilch particles" in the earlier discussion). For the causal regularities hold only among the theoretical and hypothetical X's and Y's, not among the (usually) observable and real A's and B's. The rat's jumping into the white box when the buzzer sounds is (one would have to suppose) mysterious, but when we see the buzzer as "stimulus" and

and jumping as "response" it becomes intelligible, because the stimulus causes the response. The final step here is predictable. If the unity and orderliness of nature is a matter of the unity and orderliness of X's and Y's as contrasted with the A's and B's, then nothing in nature can be allowed to depend (really depend) on the A's and B's as such. Since human beings are among the A's and B's, problems arise when we try to formulate a behavioral science within a clockwork model of the real world. The primary problem is that of determinism and freedom, but in its most pertinent form it may be expressed as the problem of responsibility and truth (or knowledge).

It is frequently supposed that the problem of determinism and freedom arises from the nature of scientific explanation and the technological success of modern science (see Minsky's comment below, for example). On the contrary, of course, determinism is a theological doctrine and the problem is a behavioral problem, and both of these antedate modern science and its explanations and its technological successes: If God created the world and saw to it all, right down to the fall of every Zilch particle, then the real world and all its goings on are simply a technological exercise reflecting his competence (omnipotence), but in that case how can we, who are merely Elements in that exercise have any real authorship, responsibility, or freedom in connection with it, since everything that happens happens as a matter of necessity and could not be otherwise?

Just as the C-E formula is a truncated version of a Means-Ends representation, the secular doctrine of "determinism" is the correspondingly truncated version of the theological doctrine. Just as we have the experimenter manipulating the independent variables, from which the rest follows, so we have God manipulating the independent variables from which the history of the world follows. And just as we may refuse to recognize the experimenter in giving our theoretical accounts of his works,

so, in our secular doctrine, we may refuse to give any cognizance to God in giving our ideological account of all that clockwork. Historically, the truncation was symbolized by the celebrated comment that "We have no need for that hypothesis" (the hypothesis of God as the author). Instead of explaining the non-accidental character of what actually happens by saying, as a matter of ideological principle, that it was seen to, we say that that long sequence of C's and E's (the causal version of the Event version of LC-I) just happens to be necessary.

The advantages of the move from the theological doctrine to its secular version appear to be entirely emotional and political rather than more generally intellectual or scientific, since the behavioral problem remains the same. (Actually, it is worse in the secular version, for the theological version allowed a solution of sorts.) Briefly, the behavioral problem is that all our behavior has the status of E in the C-E formula and we become redundant "middle terms" in a causal chain. If X causes B and B causes Y, then X causes Y and B drops out of the formula as redundant. As members of a causal chain we neither have any choice about what behavior we engage in nor, correspondingly, any responsibility for our behavior or its consequences. This conclusion violates what we take to be essential features of our behavior generally and it denies those features which we are at least as legitimately certain about as we can be about any scientific account, hence it raises questions about the substantive adequacy of scientific accounts of behavior. Among the behavioral characteristics which are denied are characteristics which are presupposed by any scientific behavior, hence the doctrine raises questions about the methodological adequacy of scientific accounts of behavior.

The difficulties posed by "determinism" may be seen as a limiting case of the "sociology of knowledge" dilemma created by the joint consideration, in the traditional manner, of the historical and methodological connections between behavioral science and the real world. For if the accounts we give scientifically are merely the (causal) product of our

personal-social histories, then they are at least parochial if not completely off the mark; but then how could such accounts rise to the level of generality and objectivity required of scientific accounts? Yet the substantive burden of our scientific accounts of behavior is that all our behavior, including our scientific behavior, is just such a causal product. Indeed, our ideologically committed theorists have, as a group, not hesitated to use historical accounts as flanking attacks on the methodological or substantive opposition. Thus, for example, Minsky (1965) comments as follows:

"If one thoroughly understands a machine or a program one finds no urge to attribute volition to it. [There is, however, a tendency to resist the reduction of volition to mechanistic principles that] has its genesis in a strong defense mechanism. Briefly, in childhood we learn to recognize various forms of aggression and compulsion, and to dislike them, whether we submit or resist. Older, when told that our behavior is controlled by such and such set of laws we resist this compulsion as we would any other. Although resistance is logically futile the resentment persists and is rationalized by defective explanations, since the alternative is emotionally unacceptable."

That such a treatment of volition and mechanism could appear in a scientific journal some fifteen years after the major works of Ryle, Austin, Wisdom, and Wittgenstein and be cited with evident approval five years later in a "theoretical" psychological journal hardly need commentary. So long as the historical aspects of science are isolated from its methodological and substantive aspects in the way they have been, causal-historical appeals will continue to provide disguised and hominem arguments in the service of deterministic scientific ideologies. But appeals to history in this way undermine all scientific theorizing and methodology, and it is characteristic of such rhetoric as Minsky's that there is always a counter-rhetoric. Thus, for example, Gil might comment to Wil as follows:

"If one thoroughly understands a human being one finds no urge to consider his behavior as simply the operation of machinery. There is, however, a tendency to insist on the reduction of behavior to mechanistic principles that has its genesis in a strong defense mechanism. Briefly, in childhood we learn the reality principle that we cannot have everything we want, but we dislike and resent it. Older, we are told that our rational behavior is limited not merely by what we are capable of doing in a brute way, but also by our limited outlook, by the rights of others, by the choices which are actually open to us, and by our accountability to ourselves and others for those choices. But we resent and resist these limitations as we did the others. Although resistance is logically futile, since we cannot voluntarily abrogate our responsibility for our behavior, the resentment persists and is rationalized by defective explanations portraying a non-rational world from which every possible infantile satisfaction might be extorted, since the alternative is emotionally unacceptable."

As we saw initially, the historical aspect of science can easily be developed in such a way that it seems to follow that all our knowledge is idiosyncratic and parochial (because it is merely a causal product of local and temporary socio-cultural processes). From such conclusions it would follow that our behavior is poorly informed and our knowledge of behavior is seriously defective, hence we can do little better than to blunder about and muddle along, though of course it doesn't ordinarily seem that way to us. With such limited knowledge, competence, and opportunities, our behavioral choices and the responsibility for making them are correspondingly limited. Determinism provides a limiting case here because any of its non-trivial variants involve the denial of any genuine choice or responsibility (in the sense both of authorship of actions and of accountability for them). That denial, however, is enough to make determinism incompatible with our having any knowledge at all, including the knowledge or belief that determinism is the case. (See, e.g., Wick, 1964, for a

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discussion of the tie between freedom and truth.) Since no set of possible observations would amount to having discovered that "determinism" is really the case, i. e., since "determinism" is not empirical, though it is presented as a "thesis," we may suspect that the hold it has exercised on our scientific imagination after working hours reflects a confusion between substantive notions and status notions or between facts and doctrines. Let us use a behavioral example in order to gain some further light on the matter.

Consider a game of chess as a paradigm case of human behavior, embodying as it does the notions of freedom, choice of behaviors, and responsibility for those choices, both in terms of authorship and in terms of answerability. Let us suppose two observers, Wil and Gil, who provide contrasting accounts of that behavior. And let us suppose that Gil, at least, is himself a chessplayer, so that he understands the options that are involved and the nature of the choices that were made.

Gil, on observing Black's tenth move, might say "Yes, he would have to do that" and assemble the relevant considerations (including Black's level of competence) into a compelling case. Wil, who cared only that the move could have been predicted with a scientifically respectable likelihood of success from this set of considerations (or, indeed, any set) might conclude that he had found the decisive constraints, the causal determinants, the controlling variables as it were, of the making of that move, and he would give a C-E account of Black's move.

We, along with Gil, would find Wil's description substantively defective (not false) as an account of that chess move. His choosing, from the descriptive options left open by the observable facts, to give that description would tell us more about his motives or cognitive limitations than about what went on in the chess game. Of course, Wil might have a reason for pretending to know or care only about the predictive relation, and if we knew that his choosing to act on that reason from among the reasons open to him in those circumstances would tell us primarily about

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his character or about the nature of the social practice he was engaging in (after all, he might be a psychologist). If he were charged with this by Gil, he might agree but then claim that his character was in turn determined by his history so that, true to his lights, he had no choice of behaviors. Whereupon Gil would reply that since the historical facts do not force him to give that account of his character, his choosing to to give that account tells us more about his motives and character than about the effects of his history. And so on.

Note that this is not a symmetrical argument. On the surface, it appears that Wil and Gil are involved in a chicken-and-egg type of situation where every thesis meets its counter-thesis and there is no resolution but only an infinite progress. This appearance stems from the fact that Wil has presented himself as being a piece of machinery something like a phonograph record whose sound emissions are merely symptoms of some determining prior events, and, like a phonograph record, this is what he keeps repeating.

In a recent attempt to present determinism as an intelligible thesis, Honderich (1970) agrees that determinism is incompatible with personal responsibility. He then considers the question of whether the belief that our behavior and beliefs are physically determined would properly lead us to a general skepticism about the truth of our beliefs. He rejects this conclusion, saying that we would still have exactly the basis that we do now have for appraising the truth of our beliefs and that it would be unreasonable to expect determinism to guarantee the truth of our beliefs. He concludes that doubts about our knowledge are not a consequence of determinism and will not provide an argument against determinism.

It does not require exceptional diagnostic acumen to see here a glossing over of the distinction between substantive notions and status notions. On Honderich's defense of determinism, the substance of the beliefs we hold to be true would be no different from what it would be anyhow because, on the determinist view, our procedures for deciding

what the facts are would be no different (after all, determinism is not an empirical doctrine). But the determinist thesis, if it has any intelligible content at all, would connect both our beliefs and our checking procedures necessarily to causal antecedents (note that this is at the formula level, not at the level of actual descriptions of causal antecedents). In contrast, it would leave entirely open the connection between our beliefs and our checking procedures and the facts which we take to be the case. But beliefs and checking procedures which had only an unknown relation to the facts could not possibly have the status of true beliefs or valid checking procedures. No checking procedure of the sort envisioned by the determinist could confer the status of "true, " "correct, " "verified, " "confirmed, " "probable, " or any other status on a statement or belief. We might, then, as well adopt a simple coin toss as the basis for adopting, checking, or justifying our beliefs.

So Honderich is quite right in saying that doubts about our knowledge will not provide an argument against determinism. Likewise, doubts about the validity of the beliefs of phonograph records are not grounds for arguing about the existence of phonograph records. This is not, as Honderich appears to suggest, because the existence of phonograph records is compatible with their having true beliefs, but rather because no question about the beliefs of phonograph records can be coherently stated, and so there is nothing of that sort to be doubted, either.

The incoherence of Wil's and Honderich's deterministic stance shows up in the following paradox. Wil has only attempted to present himself as a kind of phonograph record, but he has not succeeded, and this is not just because Gil always has a counter-argument. If Wil did succeed in his purported presentation and Gill accepted Wil at face value as a kind of phonograph record, Gil would, of course, be immediately inclined to put it in a museum or take it into the laboratory and study it, or perhaps destroy it out of hand as a patent public danger (an "attractive nuisance" --a phonograph record that could easily be mistaken for a human being,

with potentially tragic consequences). But the inclination to do any such thing would be only temporary. For if Gil did allow himself to be persuaded by Wil he would have granted that Wil had proclaimed a thesis and successfully presented himself as a kind of phonograph record. But then Gil would have granted Wil a status that no phonograph record of any sort could have or even aspire to. A phonograph record is not eligible to present theses or engage in self-presentation. It is no more eligible to do these things or even to try to do them than it is eligible to have beliefs or knowledge. At this point the inclination to lack it up would have disappeared and Gil would give Wil an irritated look and continue the conversation if he were so inclined. Thus, Wil could appear to succeed only if he in fact failed to substantiate his deterministic thesis, whereas if he failed it would be an honest failure (phonograph records are not eligible to fail in substantiating these, either).

In summary, then, the lure of determinism lies in the combination of several things. It promises a guarantee of a certain kind of order in the world, just as the corresponding theological doctrine promised a certain kind of order in the world. It provides a rationalization for an entrenched mode of scientific theorizing. And it provides a liberal supply of polemic material against one's opponents. I have tried to make it easier to see (a) that no such guarantee is possible or required, (b) that cause-effect formulations need no such rationale, and that behavioral science is impossible if restricted to causal accounts, and (c) that "determinism" even when professed only as a matter of scientific faith and not of fact could only be a hairy-chested social posturing and not a possible intellectual position. In short, as with other theological doctrines, so with determinism --in science we have no need for that hypothesis.

C. "DETERMINISM" FROM A SUBSTANTIVE BEHAVIORAL STANDPOINT

What we have just completed is an exercise in keeping track of historical, substantive, and methodological aspects of scientific statements in order to stay clear of certain temptations and dilemmas. In the introductory section I suggested that to suppose that in behavioral science methodology and theory can be kept in separate domains is, on the face of it, extraordinary. The problem of "determinism" gives a particular point to that remark.

Nevertheless, the preceding presentation was primarily in the methodological style that is a familiar feature of our customary ways of dealing with those problems which we customarily identify as "methodological." As such it is not very different from a common piece of philosophical writing and has many of the same drawbacks. In this section I propose to deal with the problem of determinism by making explicit use of some behavioral science concepts in a substantive way. The point of the exercise is, first, to show that it can be done at all and, second, to show a gain in perspicuity, economy, and definitiveness when the problem is approached in this way.

The substantive frame work for this exercise is provided by Garfinkel's analysis of the successful status degradation ceremony, which was presented in discursive and systematic forms in Section II. To review the necessary conditions:

- (1) There is a community of individuals who share certain basic values such that adherence to those values is a condition for retaining good standing in the community, i. e., for being fully and simply "one of us."
- (2) In principle, three members of the community are involved, i. e., a Perpetrator, a Denouncer, and some number of Witnesses.
- (3) The Denouncer and Witness act as members of the community and as representatives of the community. That is, their

behavior reflects their good standing in the community, and they act in the interest of the community rather than out of merely personal interest.

- (4) The Denouncer describes the Perpetrator as having committed a certain Act.
- (5) The Denouncer redescribes the Act (if necessary) in such a way that its incompatibility with the community's values follows logically.
- (6) The Denouncer presents (implicitly or explicitly) a successful case for judging that the Perpetrator's engaging in the Act as redescribed is a genuine expression of his character and is not to be explained away by reference to chance, accident, coincidence, atypical states, etc.

Under these conditions the ceremony is successful, for the Denouncer has shown that the Perpetrator isn't now, and never really was "one of us." ("What he is now is what, 'after all,' he was all along.") The significance of the degradation is that it constitutes a change of status for the Perpetrator, and the significance of that change is that it constitutes a restriction in his eligibilities to participate in certain ways (as certain Elements) in the social life of the group. The limiting case is a total restriction, hence expulsion from the group.

Let us now consider the presentation of a deterministic thesis as an attempted degradation ceremony, in order to ask then whether such an attempt could be successful. First, we shall want to ask, within what value community is such a thesis presented. Since the thesis is presented as one which is true (or at least, as one which ought to be believed), and as a truth which it is important to know, the answer would be, a community of individuals who are characterized as follows.

- (a) They are capable of distinguishing between truth and untruth.
- (b) They value truth over untruth.
- (c) They are capable of choosing to act on beliefs legitimately regarded as true and refusing to act on beliefs contrary to these.

- (d) They value acting on true beliefs over acting on false beliefs.
- (e) They hold each other accountable for so acting.

It would appear that all of the political communities of which we have a historical record have subscribed to these values. However, these values are not as salient a feature of political ideology generally as they are in the ideology of "the academic world," and currently it is primarily within this context that deterministic theses are presented.

Next, we may ask, who are the Elements in this attempted degradation ceremony? Clearly, the determinist is the denouncer and all of us are Witnesses. But now an element of strangeness creeps in, for all of us are Perpetrators also. This follows from the nature of the denunciation.

What the determinist tells us is that every one of our behaviors individually and all of them collectively qualify as the Act. "Take any of your day-to-day behaviors," he says. "You took it that you chose that behavior on the basis of at least some valid reasons and true beliefs about yourself and the world and that you were responsible for that behavior. But in fact your choice was an illusion because all of your behavior is antecedently determined by unknown causes. Since it is, and you make no choices, you are not responsible for it, either. And since your beliefs are also antecedently determined, your belief that you can distinguish what is so from what isn't so is also an illusion. And, of course, all of this applies to all of us, including me, and all the time, including now."

In short, the determinist tells us that all our behaviors violate conditions (a) and (c), above, and consequently violate (b), (d), and (e) also. Further, he assures us that this violation is not to be excused or explained away at all, but is, rather, a necessary and essential feature of us and our behavior.

Thus, we have achieved here the spectacle of an individual who acts as a member of a responsible, truth-knowledgeable, behavior-choosing community, addresses himself to other such members, and says that no one qualifies as a member of such a community. When you come right down to it, says the determinist, none of us is really one of us!

Or ever really was at all. I take it that this formulation shows in the clearest possible way what is wrong with determinism in any of its methodologically significant forms. What is wrong is not that it is false, nor yet that it is true. It could not be either of these, for it does not get beyond simply being ridiculous.

Note that although the deterministic "thesis" is the fraternal twin of the religious "We are all of us sinners! Repent and bear witness!", the latter does not fail in the same way. A sinner does lose some status, but he is eligible to repent and bear witness. In contrast, a mechanism neither has nor could have any rights, obligations, or human eligibilities. It is not eligible to bear witness to its being a mechanism, or to regret it, or to discuss the possible truth of the statement that it is a mechanism, or to advise other mechanisms that they are mechanisms, or to explain that it didn't really mean literally mechanisms, et cetera. This is why the conversation between Gil and Wil could only be a conversation so long as Wil failed to carry his "point."

I commented in the earlier, "methodological" formulation that the critical move was to identify the change-of-status significance of the deterministic thesis and not to confuse it with a substantive, or merely factual significance which could always be hypothesized away by the thesis. I dealt there with the truth status of our beliefs and with the change in that status which the thesis implied. The contribution of the degradation ceremony analysis in this respect is twofold. First, it deals explicitly, but in a formal (content-free) way with a kind of change-of-status situation, hence it brings the critical feature of the situation out into the open. One might say, following Wittgenstein, that it transforms latent nonsense into patent nonsense. Secondly, it is able to do this because it provides a moderately rich representation of a set of related statuses (Denouncer, Perpetrator, etc.). Because of these relationships and the unity of the of the larger structure (given by a Configuration description of the

degradation ceremony) in which each status has a place, these status concepts are substantially complex and capable of embodying some relatively refined and precisely delineated distinctions. (Compare "True" and "Denouncer" in regard to complexity and conceptual content.) The construction of such representations of complex behavioral processes is part of the substantive work of behavioral science. That such behavioral concepts provide a more sophisticated and economical analysis of a methodological issue than an overtly methodological approach in this case is neither exceptional nor accidental; for, as indicated earlier, methodological facts are behavioral facts, and a scientific codification of behavioral facts ought to be helpful in keeping those facts straight without indulging in paradox.

No doubt the unfamiliarity of the degradation ceremony as an explicitly codified social process has made the latter approach to determinism appear to be more complex and effortful than is actually necessary. Likewise, the unfamiliarity of the general procedure of dealing with methodological issues in a substantively behavioral way contributes to the same result. However, this lack of familiarity is a historical accident and the present difficulty of such an approach is a reality constraint which could be expected to diminish over time. One can readily imagine a state of affairs in which behavioral scientists would routinely master a variety of paradigmatic social process representations in much the same way that a logician or mathematician now routinely masters a variety of argument forms. Currently, a logician, on encountering a particular argument for the first time may readily shrug it off with the comment "fallacy of affirming the consequent." His mastery of this (behavioral) pattern of argumentation gives him the conceptual and technical resources for doing this legitimately. Similarly, our imaginary scientist, on being faced with "determinism" for the first time would have the conceptual and technical resources to shrug it off with the comment, "unsuccessful degradation ceremony."

A final comment is in order here before we proceed to the problems of self and self concept. With determinism, as with reductionism and atomism, no single, definitive argument is to be expected. In general, argumentation generates opposition or reflects pre-existing opposition and so agreement is not often or easily arrived at. One can always introduce a new variation or demand to be shown, ad infinitum, how it could apply to other particulars. One can always strike a lofty pose and complain languidly that really, it just wasn't made clear enough to pass one's critical standards. And one can always engage in some variant of Minsky's degradation formula as an excuse for not dealing with the argument at all, e. g., "That's just one man's opinion--where does he get off talking as though he had a pipeline to the Truth?" (The latter is a common sort of reaction to presentations of portions of the Behavioral Model in spite of explicit and repeated reminders that the presentation and the model are not eligible for truth values at all.)

Thus, another reminder: The point of the foregoing presentation is not to provide a definitive argument to the effect that "determinism" is, scientifically, neither necessary nor desirable, possible, or intelligible. Rather, it is an illustration of how the substantive representation of the real world or portions thereof (in this case, a human social process) can be used economically and effectively in dealing with a methodological issue. For this purpose the illustrative presentation needs only to provide a non-trivial degree of economy and effectiveness, though to be sure, the more the better.

As in the case of the symmetries between the atomistic and holistic formulations, the behavioral "None of us is really one of us!" formulation shows what is wrong with determinism as a purported thesis without asserting that it is defective in this or that particular way. Anyone who understands that formulation in its behavioral context will have got the point of keeping track of substantive and methodological status aspects of statements so as to identify cases where issues of status (e. g., being "one of us") are passed off as merely factual issues. And so he will not

be easily imposed upon by any amount of ingenuity exercised along the lines of "But may it not be the case that, no matter what we think, actually,?" We have already had it told centuries ago that the ways of God are mysterious to man, and we have lived through the charm of Descartes' demon who systematically deceives us, and there is no return to theological innocence. Actually, as I have indicated, the rhetoric is more often along the lines of "But must it not be the case that, no matter how it seems to us, actually,, because modern science requires it, and after all, it works, doesn't it?" Innocence comes in many forms. It is not always an asset in behavioral science.