# A SYNTACTICAL AND SEMANTICAL ANALYSIS OF ACCOUNTING EXPLANATION

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# PREFACE

Accounting was, and to large extent is, traditionally viewed in the context of an income measurement model. More recently, emphasis has been placed upon accounting as a decision-facilitating tool. As a result, accounting is viewed increasingly in the context of a decision maker using some (specified) prediction and decision models. This research is a natural extension of this latter approach. Specifically, accounting information is examined as it functions to provide explanation of relevant events such that the decision maker is provided with the knowledge requisite to a rational decision. The essential question is whether accounting should be viewed as, in some sense, unique, or as simply another case of a discipline seeking to provide useful explanation of events in its accepted domain of inquiry. This research takes the latter and broader approach. In large part this study holds as its task the development of a context that is useful for examining the many and varied approaches to accounting "theorizing."

I wish to express my appreciation to my major adviser, Dr. Milton Usry, for his guidance throughout this research. I also wish to thank two other committee members Dr. Elba

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# CHAPTER I

# RESEARCH TOPIC, METHODOLOGY, AND ORGANIZATION

## Introduction

Accounting is recognized as a discipline which derives its justification, in part at least, through the provision of information to decision makers. Stated in another way, the accounting discipline concerns itself with methods that can be employed to make various parties more knowledgeable than they would be without those methods or procedures. Clearly, the characterization of a discipline as being concerned with the provisions of knowledge or information that will allow reasoned actions is equally applicable to all intellectual disciplines, whether it be one of the physical sciences, medicine, sociology, psychology, or economics. In this respect, then, accounting shares with those disciplines an interest in such questions as: "What are the basic features or requirements of adequate knowledge?" and "What are the implications of these requirements for a discipline seeking to gain and transmit such knowledge?"

Since it is generally recognized that science, especially the natural sciences, has built an impressive

edifice of knowledge, the concern with epistemic aspects of accounting leads quite naturally to the query, "Can accounting be a science?" However, that question, as stated, provides no direction to a researcher. Indeed, the awarding or withholding of the distinguished title of "science" is unimportant. However, due to the intellectual maturity of these scientific disciplines and the availability of a clear analysis of the basic features of the knowledge these disciplines provide, the following question can be meaningfully asked: "If accounting is to provide knowledge for reasoned action, what are the necessary, fundamental features of that knowledge?"

## The Research Question and Methodology

In large part, understanding any research question demands understanding the tools used to analyze that question. Furthermore, to make the present question--What are the epistemic requirements of accounting information in its role of aiding reasoned action?--amenable to analysis, it is necessary to specify clearly those aspects of the actor and those functions of the accounting system which are viewed as fundamental. In other words, certain simplifying assumptions are necessary, and reader awareness of these assumptions is essential to an understanding of the research question. At this point, the research question is given very succinct statement, while the remainder of this section provides a closer examination of the research tool and the

simplifying assumptions used in this research.

The research question is as follows: Under the analytical technique of logical empiricists and with accounting viewed as a language, what are the necessary syntactical and semantical features of accounting information in its role of providing information to a rational actor? In other words, the methodology of this research involves the technique of logical empiricism, accounting is viewed as an informative (knowledge providing) language, and the user of that information is characterized as rational. Also, it must be noted that in order to provide a more precise characterization of accounting systems, the paradigm of the 1971 AAA Committee on Theory Construction[1] is accepted and two functions of accounting--planning and control--are recognized. The next task is to clarify, at a preliminary level, each element of the research question.

## Accounting's Informative Function

In order for accounting to be informative, it is necessary that accounting statements provide an explanation of something or provide inputs to an explanatory system. In its informational capacity, accounting must do more than merely describe. In order to inform or explain, accounting data must be consciously selected as input to a system

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[1] "Report of the Committee on Accounting Theory Construction and Verification," The Accounting Review, Supplement to Vol. XLVI (1971), pp. 51-79.

maintaining a connection between that data and some other phenomena. This connectiveness is the basis of explanation; it is the essence of knowledge.

Indeed, it is difficult to imagine accounting as meaningfully informational without such an interpretation. In the words of John Dewey:

> To assume that anything can be known in isolation from its connections with other things is to identify knowing with merely having some object before perception or in feeling, and is thus to lose the key traits that distinguish an object as known. It is futile, even silly, to suppose some quality that is directly present constitutes the whole of the thing presenting the quality. . . . The more connections and interactions we ascertain, the more we know the object in question.[2]

Thus, if accounting purports to provide knowledge or information about some objects, events, or states of affairs, accounting statements must reveal the connections of the reported phenomena with some other phenomena. For economy, it will no longer be stated, but should be understood, that rather than providing the explanation outright, accounting may instead provide inputs to such explanatory systems.

## The Function of Accounting in Decision Processes

This research accepts the paradigm of the 1971 AAA Committee on Theory Construction. That committee has provided the most complete and articulate statement of the

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[2]John Dewey, "The Quest for Certainty," The Age of Analysis, ed. M. G. White (Boston, 1955), pp. 177-178.

function of accounting in the context of those decision processes which facilitate reasoned action. This is the justification for accepting their work as the initial framework for the analysis of accounting explanation.

The committee divides the decision process into three functions--data collection, prediction, and choice--which correspond to the three elements of the process--accounting models, prediction models, and decision models. Accounting systems are viewed as making observations on the empirical world according to the rules of the accounting model. These observations, after being encoded in the form of accounting statements, are the inputs to prediction models. Then, the outputs of prediction models serve as inputs to decision models, where final choice is effected.

At this point only a few points must be made. First, accounting systems are viewed as providing links between observational data and prediction models. Secondly, prediction models provide a means for connecting accounting data to other phenomena; prediction models are explanatory systems. Thirdly, decision models allow the decision maker to choose among alternatives specified by prediction models; decision models represent the system of values held by the decision maker.

## Rational Actions

Accounting is viewed as functioning to facilitate the decision process. Thus, in order to specify clearly the

fundamental function of accounting which is subject to analysis, it is necessary to characterize the decision process. To accomplish the characterization of the decision process, the concept of "rational action" is developed.

Basically, a rational actor is one who chooses among alternative courses of action on the basis of factual connections among phenomena. Thus, the function of accounting, relative to this rational actor, is to provide information which reveals those connections. Thus, accounting statements must provide explanations, as developed earlier, if accounting is to be useful to the rational actor.

The sources for the characterization of rational actions include Talcott Parsons' The Structure of Social Action and Talcott Parsons' and Edward Shils' Toward a General Theory of Action.[3] The reason for choosing this conception of action, which provides a scheme for defining rational actions, is twofold. First, the theory provides a generalized theory of action at a level of abstraction appropriate to this research. Second, the theory apparently represents the theory accepted, implicitly at least, by most social scientists concerned with individual choice. Indeed, in The Structure of Social Actions, Talcott

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[3] Talcott Parsons, The Structure of Social Action (New York, 1937); and Talcott Parsons and Edward Shils, Toward a General Theory of Action (Cambridge, 1951).

Parsons accepts Vilfredo Pareto's analysis of economic rationality. In Parsons' words:

> From this it seems legitimate to conclude, either that the course Pareto took in defining the status of economic theory was wrong and an entirely different basis must be found or that it is necessary to proceed from his position, which involves only one positively defined analytical science of action, to the construction of a coherent system of the analytic sciences of action. . . . [The] economic element of Pareto's treatment has a definite place in the wider scheme of elements of action here developed. . . . This study is naturally definitely committed to Pareto's view of the status of economics.[4]

In short, a specification of the nature of rational actions will allow the characterization of the decision process in a larger context and will make clear the functions and attributes of accounting information that are to be subjected to analysis.

## Types of Explanation in Accounting

This research recognizes accounting as functioning in two ways or as providing two types of explanation, viz., planning and control. Others emphasize these aspects as portions of a cycle under the rubric of feedforward and feedback.[5] In any case, these aspects are ostensibly different in some way.

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[4]Parsons, Structure, p. 766.

[5]Joel Demski, "Decision-Performance Control," The Accounting Review, XLIV (1969), pp. 669-678.

Figure 1 provides a schematic of the conceptual difference between planning and control maintained by this research. Notice the representation of two planes--the structured and the realized. Planning takes place on the structured plane, while actions take place on the realized plane. Accounting feeds communications forward to the realized state ($State_0$) in the form of directives (These may, of course, be self directives.), it monitors the realized plane, and finally, it feeds back communications about the realized state ($State_1$). The feedforward is planning information; feedback is control information.

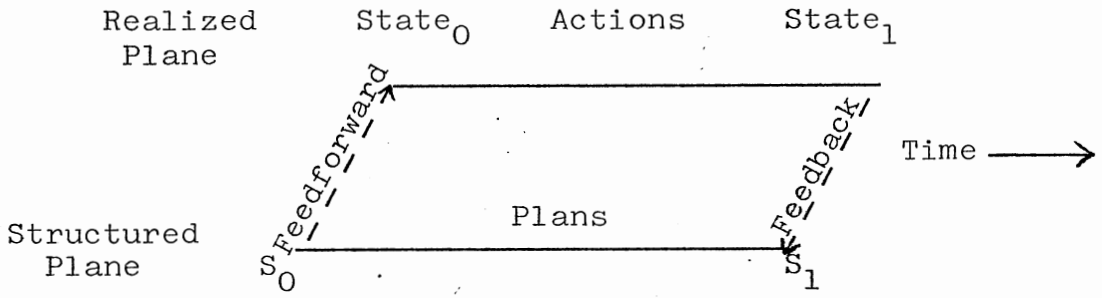



Figure 1. Conceptual Difference Between Planning and Control

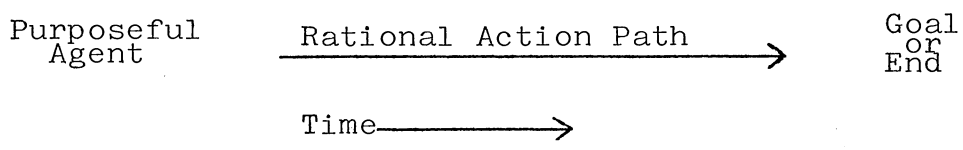
It should be clear that the feedforward cannot take place without some initial informational inputs. Moreover, since the feedback does not represent an end of the process, that feedback must be the initial informational inputs. Thus, separation of accounting explanations into planning

and control must, in a sense, be artificial. Nevertheless, an intelligible discussion must make use of this dichotomizing approach. And this is precisely the approach used here.

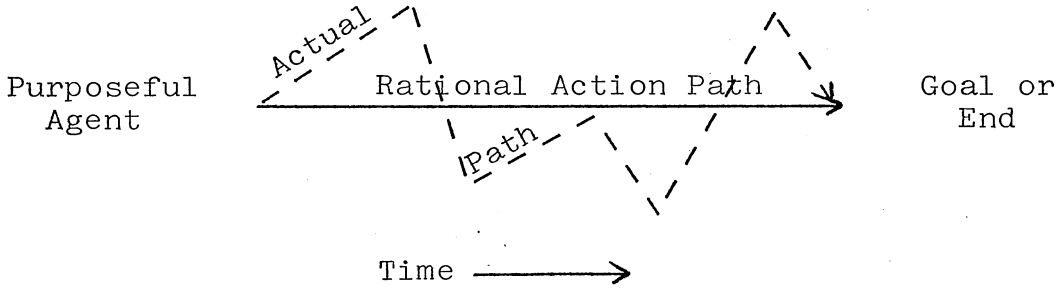
Indeed, this research is sectioned along these lines. It is argued in this study that the planning-control distinction can be supported by reference to the explanatory function of accounting. The argument follows.

On the structured plane, accounting explanations are prediction and decision model-based (directives) and provide partial answers to the question, "How can I achieve my goals?" On the realized plane, accounting explanations, though potentially directive insofar as they provide initial inputs to the structured plane, are in response to the question, "Why did I deviate from my plan of action?" On the structured plane, explanations have a clear future reference, while on the realized plane, explanations have, initially at least, a historical reference.

The schematic given below should make the distinction clear. A rational actor has developed a plan which is labeled in the diagram a "rational action path." These plans of action are the results of explanation on the structured plane. Explanation on this plane is assumed to operate in light of completely specified prediction and decision models.



On the realized plane, however, there will be deviations from the rational action path. This is the justification for control or monitoring systems. The situation is diagrammed below. The actor finds events proceeding along the "actual action path." Before corrections of deviations from the rational action path can be effected, there must be knowledge of why the deviations occurred. There is an initial emphasis on historical analysis or explanation. Corrections of deviations are the results of explanation on the realized plane, which is characterized by incompletely specified prediction and decision models.




This difference between the structured and realized plane--viz., complete specification of prediction and decision models in the first case, incomplete specification in the second--raises the cogent possibility that planning and control explanations may differ. In other words, the planning-control distinction may not be artificial; the distinction may be justified along logical and pragmatic grounds.

## Logical Empiricism

The technique which is used in this research to analyze

the accounting language in its planning and control functions has been developed by those philosophers of science known as "logical empiricists." Their method of analysis involves precisely what this research holds out as its primary task, viz., the explication of the syntactical and semantical features of explanation in an accounting context. The choice of this method of analysis allows one to respond to the vague question, "Can accounting be a science?", after first rephrasing the question as, "Can accounting fit the logical empiricist's paradigm of scientific explanation?" Of course, showing that accounting explanation can fit that paradigm does not show that accounting can be a science; but, it does show that certain necessary conditions of scientific explanation are met, whose absence would prevent such an achievement.

The position of logical empiricism maintains a dichotomy--the purely formal sciences of logic and mathematics on one hand and the factual sciences of nature and society on the other. Its analysis of these factual or empirical sciences, the analysis of interest to this research, involves the explication of the logical structure and empirical confirmation in these sciences. Thus the name, "logical empiricism."

In order to understand the technique of analysis used by logical empiricists, one must first be aware of the distinction between analytic and synthetic sentences and between <u>a priori</u> and <u>a posteriori</u> validity. Analytic

sentences are true by definition, while the truth of synthetic sentences is contingent upon experimential evidence. A priori validity is logically independent of experience, while a posteriori validity is dependent upon experience.

Figure 2 reveals the combinations of sentence types and validity bases which are considered legitimate by logical empiricists. The allowed combinations are as follows:

1. The a priori and analytic. For example, the statement, "All bachelors are males," is known to be valid independent of experience (a priori), since the statement is predicated by a term, the meaning of which is part of the meaning of the subject (analytic).

2. The a posteriori and synthetic. For example, the statement, "All bachelors are eccentrics," has a validity which is dependent upon experience (a posteriori) since the

| Validity Bases \ Sentence Types | Analytic (True by definition) | Synthetic (Factual) |
|---|---|---|
| A priori (independent of experience) | Formal logic, Mathematics | Illegitimate |
| A posteriori (dependent on experience) | Contradictory (logically inconsistent) | Empirical Sciences |

Figure 2. Legitimate Combinations of Sentence Types and Validity Bases

statement is predicated by a term, the meaning of which is not subsumed by the subject (synthetic).

The other two combinations, a priori synthetic and a posteriori analytic, are held to be illegitimate combinations. One cannot have a statement which is factual (synthetic) and yet verified by means logically independent of experience (a priori). Nor can one have a statement, the validity of which is dependent upon experience (a posteriori) and yet is true by definition (analytic).[6]

The above discussion renders clear the following description of the empiricist's method. In the analysis of empirical knowledge, one relies upon a bifurcation analogous to the dichotomy of pure logic and factual sciences. First, the analytic structure and the a priori validity of scientific knowledge can be analyzed. This analysis involves the study of syntax and logical validity. Second, the means by which these structures are connected to synthetic a posteriori statements of the empirical sciences is subject to study. This is the investigation of semantics and empirical confirmation.[7]

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[6]The definitions may be empirically based; but, for one accepting the definitions, the validity of an analytic statement requires no recourse to observation. However, a systematic collection of statements may be analytic and yet be connected to a synthetic a posteriori proposition. This renders the theoretical system meaningful.

[7]The preceding discussion relied heavily upon Herbert Feigel, "Logical Empiricism," Readings in Philosophical Analysis, ed. Herbert Feigel and Wilfrid Sellars (New York, 1949, pp. 3-26; and Rudolf Carnap, "Philosophy and Logical Syntax," The Age of Analysis, ed. M. G. White (Boston, 1955), pp. 203-225.

# Objectives and Organization of the Research

## Objectives

The objectives of this research can be stated in terms of the research question: Under the method of semiotics (the technique of logical empiricists) and with accounting viewed as a language, what are the necessary syntactical and semantical features of an accounting model in its function of facilitating rational actions? Moreover, the planning-control distinction is recognized as a potential source for divergent answers to the research question. Thus, the research is appropriately sectioned along these lines.

## Organization

In Chapter II, this research examines the position of logical empircists. First, an analysis of the technique of semiotics will be provided. Following the description of semiotics, deductive systems will be analyzed using that technique. The purpose of Chapter II is to specify the tool of analysis to be used in this research, as well as elucidate the paradigm of scientific explanation maintained by logical empiricists.

In Chapter III the concept of rational action will be developed. As previously pointed out, the purpose of specifying the decision-maker-type is to reveal clearly

which functions of accounting are to be analyzed by the technique of semiotics. At this point, then, the methodological tool will have been specified, a paradigm of explanation will have been provided, and the precise functions of accounting explanation which are to be analyzed will have been identified.

Chapter IV will present an analysis of accounting explanation in the context of the theory of action with respect to the structured plane. First, the 1971 Committee's view and the concept of rational action will be coordinated. Then an analysis of the logical structure and semantical features of accounting explanation on the structured plane will be provided. In this chapter it is assumed that a fully articulated deductive system is available for the purpose of explanation. Thus, this chapter examines the necessary syntactical and semantical features of accounting explanation assuming that the paradigm of the logical empiricists holds. As a result, a precise characterization of accounting, prediction, and decision models is given. In a certain sense, then, Chapter IV provides a coordination of Chapters II and III.

Chapter V provides a critical examination of the assumption that the traits of adequate explanation maintained by the logical empiricists is necessary to accounting explanation. This critical analysis is effected by examining accounting explanation on the realized plane, i.e., accounting control explanation. It is no longer

assumed that fully articulated deductive systems are available for explanatory purposes. Thus, the question arises--"What paradigm of explanation is necessary relative to a rational actor?"

The approach taken in Chapter V begins with an explication of the logical empiricists' paradigm of historical explanation, since, as previously pointed out, control explanation are intitially in response to a need to analyze the causes of past deviations from planned actions. Then, the suitability of this paradigm with respect to accounting control explanation is examined. Finally, Chapter VI provides a summary of this research.

# CHAPTER II

# DEDUCTIVE SYSTEMS IN EMPIRICAL SCIENCES

## The Method of Analysis--An Investigation of Language

### Introduction

The method of analysis used in this research is termed "semiotics." This is the approach of that group of philosophers known as logical empiricists. Essentially the approach involves an analysis of the logical structure and empirical requirements of scientific knowledge. Inasmuch as it is the purpose of this research to investigate the characteristics of a cognitively oriented accounting language, the reason for the choice of the semiotic method of analysis becomes clear. In order to provide a systematic approach to the investigation of the language of accounting as it operates to facilitate objectively reasoned action, one must adopt an analytical tool that can reveal the logical (reasoned) and empirical (objective) requirements of such a language. The method of semiotics provides such a tool.

The first section of this chapter examines the method of semiotics; the next section examines deductive systems

using that method. The reason for examining deductive systems is simply that accounting systems are initially viewed as structurally consistent with such systems. At a later point this assumption is critically examined.

## Metalanguage and Object Language

Semiotics involves the analysis of language. However, the study of the actual language of science would include the analysis of our natural language, English. Owing to the ambiguity of the English language, semantical and syntactical investigations (two of the three aspects of semiotics; the other is pragmatics) are generally conducted on an artificial language. Languages to be investigated are called "object languages."

In order to speak about the object language, one must use some other language. This "metalanguage" is usually English, while the object language is usually symbolic logic. Symbolic logic is chosen due to its univocality and precision. In other words, operations within symbolic logic are both agreed upon and definite.

For example, consider the connective "or". In English this term is ambiguous--the term can be used in either the exclusive or inclusive sense. In English the sentence "A or B" can be evaluated as (1) "A or B, but not both" or as (2) "A or B or both." The first evaluation is in the exclusive sense; the latter is inclusive. On the other hand, the term "or" in symbolic logic is

usually designated in the inclusive sense. If either both or at least one of the two expressions joined by the connective "or" is true, then the entire disjunction is true; otherwise, the disjunction is false.[1]

The procedure of adopting a precise object language and analyzing the semantical and syntactical aspects of that language through a metalanguage is termed "rational construction" (or "reconstruction" if a portion of some body of scientific knowledge is under investigation). The procedure avoids many of the ambiguities that would be inherent in studying the actual language of science. It allows the demonstration of principles which would otherwise be hidden in a mass of complexity. Logical empiricists have found rational reconstruction an invaluable technique.

## Semiotics

Semiotics is the study of languages. As practiced by logical empiricists it often involves the creation of an artificial language, the object language. Semiotics views language as comprised of three dimensions--syntactics, semantics, and pragmatics.

Syntax is the relation of language signs to language signs. It is the province of formal logic. Semantics is the study of the relation of language signs to the things

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[1]Alfred Tarski, Introduction to Logic and to the Methodology of Deductive Sciences, tr. Olaf Helmer (3rd ed., New York, 1965), pp. 21-23.

designated by those signs. Empirical scientific systems must have a semantical system. Indeed, any communicative effort must involve some semantical system; otherwise, the communication would be meaningless, i.e., without reference. Pragmatics is the study of the relation of signs to users. This research considers pragmatic aspects when the uses and requirements of accounting statements are considered. Syntactical and semantical aspects arise during the analysis of accounting as a language. A discussion of syntax and semantics follows.

Syntactical analysis, the study of relations among language signs, views language as marks on paper.[2] Of course, only certain marks will be allowed in any fully developed language. For example, in our natural language of English the mark "☒" is not recognized.

In addition to rules specifying allowable marks, a rationally constructed language will contain certain rules of formation. These rules specify the ways in which the marks of language are to be placed in combination to form expressions. In English, for example, the following violates accepted rules of formation: "A human? is a dog." While all the marks are acceptable, the placing of the question mark in the middle of the expression is a violation of syntactical rules. Notice that the "sense" of

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[2]Obviously, more than written languages could be considered, e.g., facial expressions. However, only written languages are considered here.

the sentence (i.e., the meaning if the question mark is removed) is not a violation of syntax. The sense of the sentence is a question of semantics.

The other rules of a syntactical system are those of transformation. These rules specify the ways in which sentences of the language can be transformed into other sentences. In a deductive system this transformation process involves what is ordinarily called implication. For example, in traditional logic one can derive from the sentences "All A is B" and "All B is C" the sentence "All A is C."[3]

Another dimension of language which is subject to study is semantics. Semantics involves meaning or the relation of language signs and expressions to things those signs and expressions designate. In a complete semantical system, it is necessary to specify other rules in addition to the appropriate, adopted syntactical rules. These additional rules are rules of designation, truth, and ranges. The method of semantical analysis considered here is due primarily to Rudolph Carnap.[4]

Rules of designation specify what object or event is referred to by the referential expressions of the language

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[3]The above section relied heavily upon Rudolf Carnap, Introduction to Semantics and Formalization of Logic (Cambridge, 1959); and Andreas G. Papandreou, Economics as a Science (New York, 1958).

[4]Rudolf Carnap, Meaning and Necessity, A Study in Semantics and Modal Logic (2nd ed., Chicago, 1956).

under question. For instance, these rules might include "'s' is a symbol for 'Socrates'" and "'H' is a symbol for 'human'." Note for future reference that 's' is an individual constant and 'H' is a predicate of the object language, while "'s'" and "'H'" are symbols of the metalanguage for 's' and 'H', respectively.

Rules of truth specify the necessary and sufficient conditions for the specification of a sentence as true. An example of a rule of truth for atomic sentences follows: The (symbolic) sentence 'Hs' is true if and only if the thing designated by 's' has the property designated by 'H'. Of course, the designates are determined by the semantical system's rules of designation. This is sometimes called the "correspondence theory" of truth.[5]

The other rules of the semantical system are the rules of ranges. These rules, which are extremely important to the understanding of the method of semantical analysis under consideration, determine whether a sentence of a particular semantical system, $S_i$, holds in a given "state description." A state description is formed from the class of all atomic sentences (sentences comprised of a predicate followed by any number of individual constants) of $S_i$. A particular state description is formed as follows: For every atomic

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[5]Alfred Tarski, "The Semantic Conception of Truth and the Foundations of Semantics," Readings in Philosophical Analysis, ed. Herbert Feigel and Wilfrid Sellars (New York, 1949), p. 54.

sentence of $S_i$ either the sentence or the negation of the sentence, but not both, is designated. A particular state description gives one of many complete descriptions of the universe of discourse of $S_i$.

Now, a sentence holds in a state description if that sentence would be true if that state description were true. A rule of range for atomic sentences would, then, be that "an atomic sentence holds in a given state description if and only if the sentence belongs to (is included in) that state description."[6] Rules of ranges for other designators (all expressions to which semantical analysis is applied) can be similarly given. They are, however, not of interest to this research.

Up to this point, then, there are syntactical rules specifying allowable signs, combination of signs (expressions), and transformation of expressions. The semantical system, using an appropriate syntax, determines the designation of expressions, rules of truth, and rules of ranges. At this point the important distinction between analytic and synthetic sentences is drawn.

Utilizing in particular the concepts of rules of designation and rules of ranges, an analytic sentence is defined as one that is "L-true." A sentence is L-true (logically true) in $S_i$ if and only if that sentence holds in every state description. Notice that if a sentence holds in

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[6]Carnap, Meaning and Necessity, p. 9.

every state description, it must hold in the true state description. (Remember that possible state descriptions are limited to the universe of discourse of the particular semantical system, $S_i$, under consideration.)

For example, 'Hs' (i.e., 'Socrates is human') holds in some state descriptions. '~Hs' (i.e., 'Socrates is not human') holds in all others. Thus, 'Hs v ~Hs' (i.e., 'Hs or ~Hs') holds in all state descriptions and thus is L-true or analytic. But the sentence 'Hs' does not hold in all state descriptions, viz., those descriptions including '~Hs'. Thus 'Hs' is synthetic or factual. Only an empirical investigation of, say, records stating that Socrates was human would suffice to determine the truth of 'Hs' in fact.

Another way of viewing analyticity can be given. Analytic sentences can be shown to be true merely on the basis of meaning. If the semantical rules alone suffice to determine the truth of a sentence, that sentence is analytic. However, if one has to make extralinguistic investigations, then the sentence is factual or synthetic. (In other words, the sentence is "F-determinate" or factually true or false.)

Given the concept of logical truth (L-truth), one can examine the concepts of intension and extension. These latter concepts are important later in this research (Chapter IV) when questions about the empirical requirements of accounting language arise. However, it is most convenient to introduce these concepts now.

First, consider the concepts of L-equivalence and F-equivalence (i.e., logical and factual equivalence). Equivalence (symbolically written as '≡') expresses mutual implication. For example, "If X then Y and if Y then X" or, stated another way, "X if and only if Y" or, yet another way, "X ≡ Y" express mutual implication.

Two sentences, '$A_i$' and '$A_j$', are L-equivalent if and only if the sentence '$A_i \equiv A_j$' is L-true. In other words, '$A_i$' is L-equivalent to '$A_j$' if and only if '$A_i$' and '$A_j$' hold in the same state descriptions. F-equivalence is defined as follows: '$A_i$' is F-equivalent to '$A_j$' if and only if '$A_i \equiv A_j$' is F-true (i.e., not L-true, but true in fact).[7] If two sentences are L-equivalent, this can be discovered on the basis of semantical rules alone; if they are F-equivalent, only an empirical investigation will reveal the equivalence.

Notice that there are two types or kinds of equivalence for sentences. It appears, then, that sentences (and, more generally, any expressions) must involve some sort of dual aspects or features. These aspects are labeled "intension" and "extension." Before becoming formal, however the concepts of intension and extension are examined at a preliminary level.

In the case of predicates (e.g., "blue," "hard," "harder than"), extension refers to classes while intension

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[7]Carnap, Meaning and Necessity, p. 11.

refers to properties. For example, the sentence 'Hs' can be translated as "Socrates is a member of the class human" or as "Socrates has the property of being human."

Intension, then, deals with the meaning or sense of an expression, while extension refers to the scope of predication. Intensions are determined by the semantical system. Extensions are in general determined by factual inquiries. This leads to the following formal definitions: "Two designators [predicates, individual constants, sentences] have the same extension (in $S_1$) = df they are equivalent (in $S_1$)," and "Two designators have the same intension (in $S_1$) = df they are L-equivalent (in $S_1$)."[8]

Notice that equivalence can be either F-equivalence or L-equivalence. Two predicates, for example, would have the same extension if they are F-equivalent. Moreover, they have the same intension if and only if they are L-equivalent. The identicality of intensions is a semantical question. In general, then, an identicality of classes due to F-equivalence corresponds to any number of properties or intensions. However, any property uniquely determines some class.

To illustrate the above, consider the predicates "human," "rational animal," and "featherless biped." Now, if the semantical system stipulates that "human" ('H') and "rational animal" ('RA') have the same or identical meaning,

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[8] Ibid., p. 23. The symbols " = df " is read "means by definition that."

then 'H' is L-equivalent to 'RA' and the sentence 'Hs ≡ RAs' (i.e. 'Socrates is human is equivalent to Socrates is a rational animal') is L-true. Also, the class "human" and the class "rational animals" would be identical. Semantical analysis is sufficient to demonstrate the identicality.

But, without specification to the contrary, the sentence 'Hs ≡ (F·B)s' (i.e. 'Socrates is human is equivalent to Socrates is a featherless biped') is F-true. That the class "human" and the class "featherless biped" are identical is a factual question since there is no identity of intension expressed by the semantical system between "human" and "featherless biped."

The purpose of working through this rather technical discussion is now suggested. Full elaboration is reserved for Chapter IV. The question to be reckoned with is what parts of an accounting system correspond to the semantical system which specifies meaning. At this point it is merely noted that the signals from an accounting system must be viewed as encompassing some <u>immediate</u> semantical system; otherwise, the problem of what sense or meaning is to be attached to the signals is left so open that verification of the signals before transmittal is problematic. In other words, if the signals are transmitted to users each of whom (or each class of whom) has different semantical systems, then there is a question as to what the accounting signals refer. This may seem extremely obvious. But those who, for example, advocate general (multi-) purpose statements

seem to be committed to potentially different interpretations of the signals of accounting. How, then, can the signals be considered semantically true prior to transmittal, if that to which signals refer is not even specified? At any rate, all of this is left to a later point. A further elaboration is given in the summary to this chapter.

## An Analysis of Deductive Systems in Empirical Sciences

### Introduction

This section discusses deductive systems in the empirical sciences. It should be noted that the system as characterized does not necessarily have an exact counterpart in the systems used by natural and social scientists in their accounts of natural or social phenomena. Instead, the discussion relies on rational reconstruction, a system wherein all semantical and syntactical aspects of the object language are ruled. Such a procedure recommends itself due to its fruitfulness and avoidance of unnecessary complications.

The discussion of deductive systems uses the method of semotic analysis. Deductive systems are viewed as language systems. As a result there is a parallel between this and the immediately preceding section. The first portion of the following examines the syntactical aspects of deductive systems; the second portion considers semantical aspects.

Syntax--Theoretical Terms and the Calculus

First one must make the distinction between a theory, T, and a metatheory, M. The metatheory has the theory (or deductive system) as its subject matter. This distinction corresponds to the earlier contrast between object language and metalanguage. Within the metatheory one can make the further distinction of the structure of T and the referential function of T. The structure of T is governed by the syntactical rules of M, while the referential function of T is ruled by the semantical rules of M. Most existing deductive systems of science do not specify the syntactical and semantical rules, although such rules do obtain.[9]

Next in order is a discussion of the structural aspects of T. The syntactical rules of T (found in M) would include the three types of rules examined earlier, viz., rules of enumeration and classification of the signs of T, of formation, and of transformation.

The signs of T can be classified as logical or descriptive. These signs can in turn be classified as either constants or variables. Among the logical constants would be such terms as "and", "or", and "implies." In short, the logical signs would be (most of) the symbols

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[9]J. H. Woodger, "The Technique of Theory Construction," Foundations of the Unity of Science: Toward an International Encyclopedia of Unified Science, Vol. II, ed. Otto Neurath, Rudolf Carnap, and Charles Morris (Chicago, 1970), p. 456.

of formal logic.[10]

Among the descriptive constants in the syntactical portion of T are the primitive terms. These primitive terms are undefined in the syntax of T. All other extra-logical (descriptive) terms are derived from the primitive terms. In an axiomatic or deductive system, primitive terms are used to form postulates or axioms or primitive sentences from which all other sentences are derived.[11] (The way in which primitive terms and sentences, and derivative terms and sentences obtain empirical import is a question of semantics. Accordingly, that question is considered in the following section.)

Examples of primitive terms from classical physics would be the terms "force" and "motion;" from economics would be "wants" and "goods." In traditional accounting, primitive terms would not be "assets" or "costs" since "assets" are defined as "unexpired costs." Instead, the primitive term is "value," since costs are defined as "purposeful value releases."[12] Whether or not one agrees

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[10] Woodger, pp. 458-459.

[11] Carl G. Hempel, "The Theoretician's Dilemma: A Study in the Logic of Theory Construction," Minnesota Studies in the Philosophy of Science: Concepts, Theories, and the Mind-Body Problem, Vol. II, ed. Herbert Feigel, Michael Scriven, and Grover Maxwell (Minneapolis, 1959), p. 46.

[12] "Tentative Statement of Cost Concepts Underlying Reports for Managerial Purposes," Accounting Review, XXXI (1956), p. 183.

with the choice of primitive terms, it is clear that to avoid circularity some terms must be left undefined.

Once the signs of the system have been classified and rules of formation have been specified, postulates or axioms can be formed. Then, with the rules of transformation, one can deduce theorems.

An example is given at this point. In Euclidean geometry the primitive terms include "point," "plane" and "line." Axioms or postulates are posited. These satisfy (unspecified) rules of formation. An example of an axiom is "There is at least one line on a plane."[13] Then, to every high school student's distress, from these axioms various theorems can be proven using (not explicitly stated) rules of transformation.

Notice that interpretation has been given to neither the primitive terms nor the system as a whole. So far all one has are signs (logical and extralogical), rules of formation, and rules of transformation. While everyone may imagine "points" as very small dots on a piece of paper, such imagining is unnecessary to the proof of theorems, i.e., to operations within the syntactical structure of the theory.[14]

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[13]Morris R. Cohen and Ernest Nagel, "The Nature of a Logical or Mathematical System," Readings in the Philosophy of Science, ed. Herbert Feigel and May Brodbeck (New York, 1953), p. 133.

[14]Cohen and Nagel, p. 133.

The following summarizes the discussion thus far. The "theoretical" portion of a deductive system can be viewed as a calculus, i.e., as signs and ruled operations on signs. There is no reference to objects of the empirical world. Examples of theoretical terms from economics are "pure competition," "perfect markets," and "utility." Operations within this portion of the deductive system require no recourse to observation; this is clear to anyone who has found generalized equilibrium equations in a Keynesian system. However, if these systems are to have application and testing, there must be some sort of connection to observables. For instance, in Keynes' system one needs to know the coefficient of the propensity to consume if one is to test or apply that system empirically. We now turn to a consideration of these connections and the language of observables.

## Semantics--Observation Terms and Interpretation of the Calculus

If the theoretical, syntactical structure is to have empirical import, then that calculus must be connected to observational terms. Or, as it is sometimes put, the syntactical structure needs an empirical interpretation.

These connections to the observable world are effected by means of a semantical system specified by the metatheory. The semantical system specifies descriptive signs. The descriptive constants are observational terms such as,

for example, "red" and "currency." The descriptive variables are place-holders for such constants.

These observational terms have a more or less direct empirical reference. Under the logical empiricists method, when one speaks of a "blue" object, the quality "blue" is spoken of, not "blue-perception."[15] This is to say that the term "blue" has a direct link to observables. On the other hand, there are concepts such as "temperature" or "harder than." These observational terms specify operations that must be performed to identify the empirical property or relation. For example, in a hardness test, one object is said to be harder than another if a relatively sharp edge of the former will scratch the latter, but not vice-versa. In short, observational terms are those which refer directly to empirical objects or which refer to operations with direct empirical links.[16]

In addition to specifying the descriptive signs, the semantical system must lay down rules of designation, truth, and ranges. Remember that any semantical system must embrace an appropriate syntax. Since semantical systems and their rules have already been discussed, all

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[15]Carl Hempel, "Fundamentals of Concept Formation in the Empirical Sciences," Foundations of the Unity of Science: Toward an International Encyclopedia of Unified Science, Vol. II, ed. Otto Neurath, Rudolf Carnap, and Charles Morris (Chicago, 1970), p. 674.

[16]Herbert Feigel, "Operationism and Scientific Method," Readings in Philosophical Analysis, ed. Herbert Feigel and Wilfrid Sellars (New York, 1949), pp. 448-509.

that is left to consider is the way in which a theoretical syntactical structure, which contains no terms designating real world objects or events, is connected to the semantical system containing observational terms.

In order that this connection between the theoretical and observational can be effected, a special type of semantical rule is necessary. These rules are called, among other names, "rules of correspondence." The exact form of these rules is not clear. Indeed, any precise formulation borders on fiat specification. However, the general nature of these rules can be made clear.

First, not all sentences or descriptive terms of the theoretical, syntactical structure are connected directly to observational sentences or terms. There is no one-to-one correspondence between theoretical and observational expressions.[17] Only certain theoretical concepts are connected to directly observable experessions. Other non-observable, descriptive expressions receive interpretation or meaning in an even more indirect fashion through application of syntactical rules of formation and transformation.

The schematic in Figure 3 should be helpful.[18] The

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[17]Hans Reichenbach, "The Verifiability Theory of Meaning," Readings in the Philosophy of Science, ed. Herbert Feigel and May Brodbeck (New York, 1953), p. 95.

[18]Adapted from Henry Margenau, "What Is a Theory?" The Structure of Economic Science--Essays on Methodology, ed. Sherman Roy Krupp (Englewood Cliffs, 1966), p. 30.

theoretical sentences are related to one another by the rules of transformation. Note that one pair of theoretical sentences has the relation of mutual implication as denoted by the two-directional, dashed arrow. Only two of the theoretical sentences are connected to observational sentences. The other theoretical terms are more indirectly interpreted. One must say "more indirectly" interpreted, since the form of the rules of correspondence is not necessarily one of, say, nominal definition or synonym.

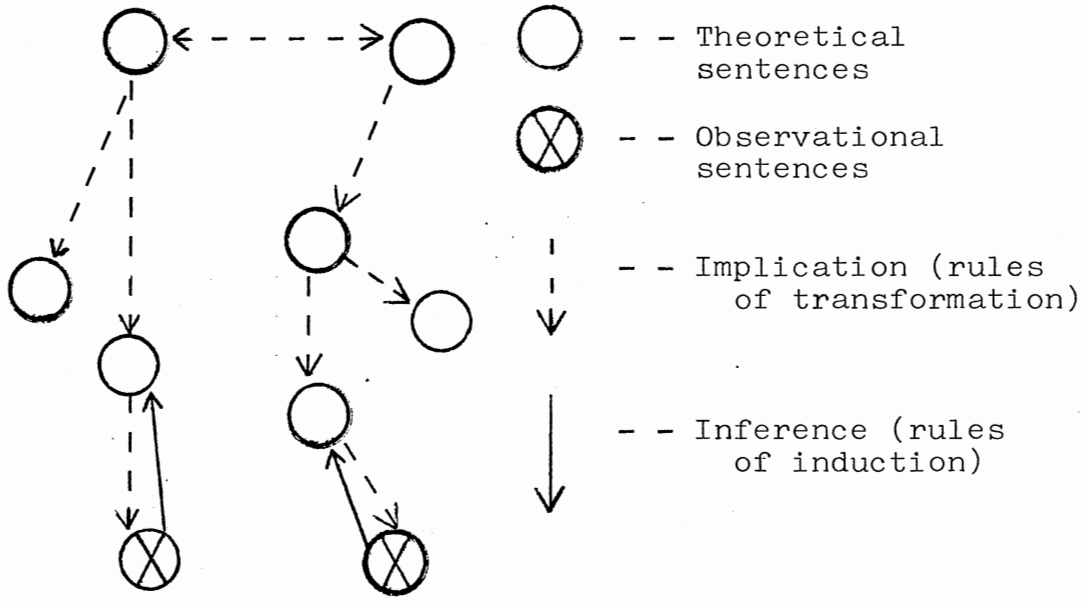


Figure 3. Logical Relationships Among Theoretical and Observational Sentences

One other characteristic of deductive systems becomes apparent. Not only must implication from theoretical to observational sentences hold, but also inference from observational to theoretical sentences.[19] That is, both deduction and induction must be encompassed by the rules of correspondence. This illustrated in the diagram by two sets of arrows from observational to theoretical sentences.

In general, the requirements of deduction are agreed upon. However, induction presents many unsolved problems. Nevertheless, it is generally agreed that the evidence as stated in observational sentences yields only a degree of confirmation on the propositions of theoretical structures. This is a statement of the familiar principle of induction--no future observation need be consistent with all previous observations. One may be highly certain that future observations will follow previously experienced regularity; but, there is no reason to be absolutely sure. There is certainty only in the sense of logical necessity; uncertainty is a characteristic of induction. Thus confirmation of propositions, theoretical or empirical, is only one of degree. No empirical regularity can ever attain the status of certainty; thus, neither can any theoretical formulation, since such formulations rest partially on observational evidence.

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[19]Reichenbach, p. 95.

There is one other requirement which must be met by any deductive system in empirical science--There must be confirmability or disconfirmability in principle, even if this (dis) confirmability is indirect.[20] This condition of confirmability depends upon the nature of the observational propositions of the deductive system, assuming that the rules of correspondence and all syntactical and all other semantical rules are sufficient.

An example of a proposition which is not confirmable in principle is the following: "At nightfall, all things double in size." There is no way imaginable to empirically test this proposition. On the other hand, the following is confirmable in principle: "If all (early) persons were to shut their eyes simultaneously, then the universe would grow dark." Of course, the latter proposition might be practically impossible to (dis) confirm; but, in principle, all one must do is, say, set up appropriate cameras and get everyone to close their eyes simultaneously.

This requirement of confirmability is important for the following reason: If two competing theories are set forth and if more than logical consistency is demanded as a requirement for entry into scientific knowledge, then there must be an empirical basis for choosing between the two

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[20]Herbert Feigel, "The Mind-Body Problem in Development of Logical Empiricism," Readings in the Philosophy of Science, ed. Herbert Feigel and May Brodbeck (New York, 1953), p. 619.

theories. In other words, if the analytic validity of two theories is unquestioned, then the only basis for judging the two theories is that of synthetic confirmation. (See Chapter I for the logical empiricists' allowable combinations of sentence and validity types.) Clearly, then, empirical confirmation in principle is an essential feature of hypotheses in empirical sciences.

## Summary and Purpose

This section summarizes Chapter II and indicates how it relates to subsequent chapters.

First, the analytical method of semiotics, excluding pragmatics, was considered. The method of rational reconstruction was explained. A discussion of the technique of syntactical and semantical analysis followed. Syntax refers to the logical structure of a language. Semantics is the study of the relation of language signs to their designata. In a rational reconstruction, all syntactical and semantical aspects of the object language will be ruled.

In this chapter the particularly important concepts of intension and extension were introduced. Intension deals with the meaning or sense of an expression; extension deals with the scope or denotation of expressions. For example, in the case of predicates (such as "human"), the intension would be the specified property, while extension would be the corresponding class; in the case of sentences, intension would be the proposition expressed, while extension would

be the truth value.

The intension of a sentence is specified by the semantical system. In other words, the proposition expressed by a sentence is determined by the semantical system in operation. For example, the meaning of the sentence (in English), "All crows are black," depends on the designata of the various extralogical terms. Of course, syntactical questions are involved, as they are in any semantical system. In short, the semantical system allows interpretation of the sentence.

The extension or truth value of the above example is a question of fact. However, before an empirical investigation can be made, the sense of the sentence must be clear, i.e., an unambiguous semantical interpretation must be available.

Now, the truth value, "true," is consistent with any number of interpretations of "All crows are black." This consideration led us to the question: Can an accounting system be viewed as divorced from some specified semantical system? The provisional answer was, "no." If accounting statements are to be held out as empirically correct, then that about which correctness is maintained must be specified. And since semantical systems specify the interpretations of sentences or statements, it follows that some semantical system must be maintained. Otherwise, the correctness of accounting statements is held on faith since, as pointed out, multiple semantical systems lead to multiple

interpretations and thus, in general, multiple extensions. In other words, as the number of interpretations increase, the likelihood of any accounting statement being correct is reduced relative to all interpretations. Similarly, as "crows" and "black" receive additional interpretations, the likelihood of the statement "All crows are black" being true is reduced. This topic is dealt with in more detail in Chapter IV and Chapter VI.

Secondly, deductive systems were examined. Using semiotical analysis, excluding pragmatics, the characteristics of the theoretical and observational portion of a deductive system were specified. The theoretical portion is viewed as a calculus--signs and operations on signs. It involves only syntax in any direct way. The observational (or empirical) portion corresponds to a semantical system.

The purpose of this chapter is to provide a partial foundation for the discussion in Chapters IV and V. In this chapter semiotics, the analytical tool used in this research, and deductive systems, the paradigm of scientific explanation maintained by logical empiricists, were examined. In Chapter III, the concept of rational action is developed. Chapter IV and V examine accounting explanations for planning and control, using the tool developed in this chapter.

# CHAPTER III

## A SKETCH OF A THEORY OF ACTION

### Introduction

This chapter provides an analysis of the "theory of action." The primary sources of the analytical scheme are Talcott Parsons' The Structure of Social Action[1] and Parsons' and Edward Shils' Toward a General Theory of Action.[2]

The first purpose of this discussion is to make explicit the paradigm within which this research operates insofar as substantive questions--those about rational actions--are concerned. Chapter II made clear the method according to which this research operates, viz., the procedures of logical empiricists, where questions about languages and empirical assertions are concerned. This chapter provides a statement of the context in which rational actions are viewed. Included in this statement will be an explication of the phrase, "rational actions." This chapter serves to specify precisely with which function of accounting this research is dealing, while the former

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[1]Talcott Parsons, The Structure of Social Action (New York, 1949).

[2]Talcott Parsons and Edward Shils, Toward a General Theory of Action (Cambridge, 1959).

chapter specified the method of analyzing the requirements of that function.

The second purpose, undeniably related to the first, is to move toward a characterization of accounting, prediction, and decision models in their function as guides to rational actions. Only by embracing some conception of action, a conception which includes rational action, can one characterize those models in an explicit fashion.

As a result of specifying the rational-action-facilitating function of accounting, prediction, and decision models, a clearer analysis of the structure and verification of accounting explanations in both the structured and realized plane will be possible. This, of course, is the primary purpose of the entire research.

## The Theory of Action

### Theory or Conceptual Categories?

Before beginning a discussion of the theory of action, it will be helpful to ask whether this research is indeed dealing with a theory in the sense discussed in Chapter II. The view held is that the "theory" of action, as presented here, is not a theory at all. Instead, it is an (exhaustive)[3] set of conceptual categories, i.e., a conception of action. The distinction is as follows. Any theory

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[3]On the exhaustiveness issue see Harold Bershady, Ideology and Social Knowledge (New York, 1973), p. 113.

includes concepts. Concepts are names for things. A theory relates concepts; a theory allows deduction.[4]

All of this is not to say that Parsons' work is not "theoretical" in the sense of being general or abstract. Nothing could be further from correct. Instead, all that is maintained is that the theory of action (This is the commonly used label.) is not a deductive system, but rather an explication of action. It unpacks the idea of action. And this definition of action will be sufficient for the purposes set out at the beginning of this chapter, i.e., it will allow the clarification of the conception of rational action and, with some elaboration, the functioning of accounting explanations in the context of rational actions.

## A Sketch of the Elements of Action

Action is a "process of striving for the attainment of states of gratification or goals within a situation."[5] This process is viewed as involving three elements--a human actor, a situation, and the relationship of the actor to the objects of the situation. The relationship is a perspective of the actor and is labeled the "orientation"

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[4]George Casper Homans argues that Parsons' scheme is not deductive in "Contemporary Theory in Sociology," Handbook of Modern Sociology, ed. Robert E. L. Faris (Chicago, 1964), pp. 951-977.

[5]Parsons and Shils, p. 234.

of the actor toward the objects of the situation.[6] Note that the conception of rational action provided here involves the specification of those modes of orientation that are foremost or of overriding importance in the case of certain aspects of action. In other words, certain forms of relationships between the actor and the objects of the situation will be constitutively defined as the rational aspects of behavior. This will allow a clarification of the conception of rational actions. Each of the elements of action is now taken up in turn.

The Actor

Actors can be viewed as either individuals or as collectives and, further, as either the subjects of action or the objects of orientation. The actor is the subject of a system of action if that actor's point of view is adopted when discussing that system. As an individual, the actor is a personality system; as a collective, a social system.[7]

The distinction between personality systems and social systems should be emphasized and clarified. Personality systems are ". . . the area of relations between the

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[6]Talcott Parsons, "An Approach to Psychological Theory in Terms of the Theory of Action," Psychology: A Study of Science; Study I: Conceptual and Systematic; Vol. 3: Formulations of the Person and the Social Context, ed. Sigmund Koch (New York, 1959), p. 613.

[7]Parsons and Shils, p. 56.

organism and objects in the external environment, particularly social and cultural objects."[8] Personality systems involve the orientation of one actor[9] and that actor's motivation and standards. Social systems, on the other hand, involve a number of individual actors and their interaction. It is not, however, simply a plurality of individual actors. It is "a system which is organized around the problems inherent in or arising from social interaction . . . rather than around the problems which arise in connection with the integration of the actions of an individual actor . . . ."[10]

This research deals with personality systems, i.e., it adopts the perspective of an individual actor in an individual's striving for goal attainment. This will minimize complications while allowing the main thrust of this research to remain undiminished. Notice that the object world of the actor can include other persons and social systems. However, the social aspects of the actor and the actor's relationships with others are not explicitly treated, i.e., social systems *per se* are not analyzed. Thus, certain types of problems are avoided--those arising

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[8] Guy Rocher, *Talcott Parsons and American Sociology* (New York, 1975), p. 100.

[9] Generally, the context will make clear which meaning of the term "actor" is intended. If this is not the case, the terms "subject-actor" or "object-actor," as appropriate, will be used.

[10] Ibid.

from social interaction--while those problems arising from an individual actor's attempt to integrate actions are embraced. Avoiding the social aspects of the situation will prevent a dual discussion of each element of the theory of action. For example, when speaking of goals there would arise the necessity of explicating social and private goals, as well as examining any potential conflict between the two. Moreover, as previously mentioned, only rational aspects (to be defined later) of an individual actor's integrative attempts are considered.

## The Situation

The second element of action, the situation, is that part of the world which the actor takes into account. "Specifically, it is the part (of the external world) to which the actor is oriented and in which the actor acts."[11] In other words, the situation is defined as that portion of the environment that stands as action-relevant with respect to some actor. Note that the part of the world which is relevant (and, thus, part of the situation) is determined in part by the aspect of orientation under question. These aspects are considered in due time.

The situation is said to be comprised of objects. These objects may be social or non-social, conditional or instrumental. Non-social objects may be further classified

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[11] Ibid., p. 56.

as either cultural or physical.[12] These different classifications are briefly examined in this section.

Social objects are those which are interactional, i.e., the subject-actor and the object-actor hold reciprocal expectations.[13] Of course, one human being normally considers another human or collective of humans as social objects. Potentially, however, the concept includes more than human actors. In any case, as pointed out earlier, this research is not concerned specifically with problems of interaction or with systems organized around interactional problems, viz., social systems. At the risk of being repetitious, the reader is reminded that it is not assumed that there are no social objects. Indeed, the individual actor will have to solve interactional problems. But, this solution is by a personality system according to the values of that system, not a solution by a collectivity according to the values of its social system.

In contrast to social objects, non-social objects do not have expectations about the subject-actor's behavior. Before the two types of non-social objects are differentiated, a discussion of culture and cultural objects is provided. One type of cultural objects, accounting statements, is very relevant to this research. However,

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[12]Ibid., p. 57.

[13]Rocher, pp. 33, 46.

any in-depth discussion must be delayed until Chapter IV.

In Parsons' words, "Cultural objects are elements of cultural tradition or heritage . . . when these are taken as objects of orientation."[14] Culture itself is constituted by "ways of orienting and acting." Examples of cultural objects are laws and ideas. As objects, cultural elements can be "embodied" in symbols. This embodiment allows ideas, for example, to be transmitted from one actor to another.[15] In this research, one type of cultural symbol system, the "cognitive," is of primary import. However, as mentioned earlier, closer examination is delayed.

Physical objects are now distinguished from cultural ones. Cultural objects are transmittable via symbols from one actor to another. This transmission is a transfer of a manner of orienting. For example, one can transmit knowledge, an element of culture, through symbols. In some cases and with effective communication, a new manner of cognitive orientation (or cognitive relationship between actor and some objects) will have been effected. While physical objects can also be transferred from one actor to another, only a change in possession is effected. Symbols, then, are a special type or aspect of physical objects. However, cultural objects are different than physical

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[14]Parsons and Shils, p. 58.

[15]Ibid., pp. 159-163.

objects--the former are both transmittable and ways of orienting and acting, while the latter are not. The latter are located in time and space, the former, except as "embodied" in symbols, are not.

Cultural and physical objects can be distinguished in yet another way. Only cultural objects are potentially "internalizable" by a personality system by becoming the values or standards of that system. After internalization the actor as a personality system no longer views that element of culture as an object and, thus, no longer is an actor's orientation to that object necessary. Instead, that cultural element is a value standard, an aspect of orientation itself.[16] Orientation is discussed in the next section.

One further subclassification of the situation is possible; this classification cuts across the previous social-nonsocial distinction. A situation can be analyzed into instrumental or conditional objects. Instrumental objects are those things or ideas or states of affairs which the actor uses or controls to bring about desired ends. Conditional objects are those things or ideas or state of affairs which represent constraints or conditions within which the actor operates.[17] For example, the lack of rainfall might be viewed as a condition; and, as a means

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[16]Ibid., pp. 8, 58, 159-163.

[17]Parsons, The Structure of Social Action, p. 44.

of eliminating the dryness of the land, the farmer might resort to irrigation techniques. In short, conditional objects are those aspects of the situation over which the actor exercises no control; instrumental objects are those aspects over which the actor exercises control.

Orientation

The final element of action is the orientation of the actor to the situation. The actor, as a personality system, has a certain set of relations with the object world, i.e., with the elements of the situation. The actor's orientation is the set of "cognitions, cathexes, plans, and relevant standards which relate the actor to the situation."[18] Orientation involves the actor's "relations-to-objects."[19] Cathexis is defined as ". . . the attachment to objects that are gratifying and rejection of those which are noxious."[20]

The actor's orientation to objects involves three elements at two different levels. The levels are "motivational" orientation and "value" orientation. Motivational orientation has cognitive, cathectic, and evaluative aspects or elements. Value orientation has

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[18]Parsons and Shils, p. 56.

[19]Ibid., p. 54.

[20]Ibid., pp. 58-60.

cognitive, cathectic, and moral aspects.[21]

In order words, any action can be viewed as involving knowing (cognitive aspects), wanting (cathectic aspects), and choosing (evaluative aspects). Choice, moreover, can involve choice among knowledge claims, wants, and consequences of choices. The knowing, wanting, and choosing aspects of action are the elements of motivational orientation. Furthermore, choice among knowledge claims, wants, and consequences of choice involves standards of value orientation. Thus, there are two levels of the three orientation elements.

As pointed out, the value orientation of the actor involves standards. Cognitive standards rule choice among knowledge claims. Appreciative standards rule choice among immediate wants. Moral standards rule choice among consequences of choice. It is important to recognize that these standards are not "part of" the actor nor "part of" the object world, but rather manifested as consistent relations between the two. "Once values are treated as relational, . . . then making values the focus of the organization of systems of action becomes immediately feasible."[22]

At this point it will be helpful to show once again how this research makes use of the above conception of

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[21]Ibid., p. 5.

[22]Parsons, Psychology: A Study of Science, pp. 622-23.

systems of action. The perspective involves personality systems--one actor's organization of knowledge, wants, and consequences in the context of a partially controllable object world. Moreover, the organizational aspect emphasized is the cognitive orientation of the actor. Up to this point this has been termed the "rational" element of action. In short, this research examines a single actor's cognitive relations-to-objects, i.e., objects from a perspective of knowledge about those objects. Before becoming more precise, there is a closer examination of the modes of orientation and then the orientation process itself.

Motivational Orientation. The motivational orientation of a personality system is at least partially determined by the actor's need-dispositions, adopted value standards, and the current object situation.[23] There has been a discussion of the object situation, value standards, and the relationship between those categories and motivational orientation. This section will examine motivational and value orientation more thoroughly. First, however, there is a brief discussion of need-dispositions.

Need-dispositions are recognized by an actor's ". . . tendencies to orient and act with respect to objects in a certain manner and to expect certain consequences from these actions."[24] Three points need emphasis. First,

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[23]Parsons and Shils, p. 92.

[24]Ibid., pp. 114-115.

need-dispositions have a future as well as immediate gratificatory reference. Second, need-dispositions are characterized by some end-in-view (need) and manipulation of objects to reach those ends (disposition). Third, orientations are the consequences of the need-dispositions. In other words, orientations (relations-to-objects) are, in principle, empirically observable, while wants per se are postulated as partial determinants of those observed relationships.[25]

Motivational orientation, then, is classified into three aspects or modes which are need-dispositional-necessary. If there are need-dispositions, then there must be knowledge of the object world (the cognitive mode or the manifestation of cognitive processes), a desire for a new or maintained relationship with those objects (the cathectic mode or cathectic process manifestations), and choice among potential means and goals (evaluative mode).

The cognitive mode of orientation is the result of processes which allow the actor to discriminate among objects and to relate those objects to one another and to his needs. The cathectic mode is a result of processes which leaves objects (or, more precisely, certain relationships between actor and objects) either desirable or undesirable from the actor's point of view.

Clearly, those two processes are inextricably bound

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[25]Ibid., pp. 92, 115.

together. If the actor cannot discriminate among objects and if factual relations of objects to objects and objects to needs are unknown, then the actor cannot attach a positive or negative cathexis to those objects. On the other hand, if objects are not cathected, there is little interest in what objects (or groups of objects in some particular relation with one another, i.e. situations) will follow as consequences as the result of some action. Obviously, then, both cognitive and cathetic processes must operate in light of one another if any actor-relevant discriminations among objects are to be effected.[26]

Given an actor's achievement of cathectic-cognitive orientation, there still remains the problem of evaluating various alternatives. In general, there will be competing wants at a point in time and over time. The evaluative mode of orientation is the process of choosing among alternatives. Formally, the evaluative mode involves ". . . the processes by which the actor allocates his energy among the various actions with respect to various cathected objects in an attempt to maximize gratification."[27] The actor organizes the cathectic-cognitive discriminations. This organization is a <u>cognitive</u> act, with cognition serving more than one specific want.[28] The prior cathectic-

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[26]Ibid., pp. 68-69.

[27]Ibid., p. 59.

[28]Ibid., p. 71.

cognitive process has determined the effects of various actions on various objects' relations to the actor's needs; the evaluative process is the more complex procedure of developing an intelligent plan of action which will result in some overall maximization of gratification over time.[29]

In sum, the paradigm of motivational orientation can be viewed as the process of an actor's mapping of available knowledge of factual relationships among objects onto the actor's cathected, personal relations-to-objects. Since the actor is an object, the cathectic-cognitive orientation can be more simply described as the discrimination of actor-relevant, object-to-object relationships. Then, the evaluative mode of orientation becomes operative as choice among competing wants becomes necessary. The evaluative mode is a process of organizing the cathectic-cognitive discriminations. Evaluation is the act of choice among various means and the resulting outcomes (which are spelled out through the earlier cathectic-cognitive process). As a final note, it should be recognized that means and goals are "packaged." In general, different means (instrumental actions) result in different outcomes. Nevertheless, there is a separable cognitive aspect to any choice process.

Value Orientation. The discussion of the act of choosing can be made more complete by considering the standards involved in those choices. The act of choice

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[29]Ibid.

is an aspect of motivational orientation. The standards involved in such acts are aspects of value orientation.

In the discussion of motivational orientation, the sequence of processes that comprise orientation was emphasized. Evaluation was limited to choice among consequences of alternative courses of action. Now, with consideration of the standards involved in the evaluative mode, the sequential features of motivational orientation are blurred. Choice or evaluation can involve choice among competing knowledge claims and competing wants, as well as consequences. There is more to choice than the organization of cathectic-cognitive discriminations. The three value standards, cognitive, appreciative, and moral, are now discussed in turn.

Decisions about the validity of competing factual claims will involve cognitive standards. When one has to choose among competing assertions, there will be some standard-based method for determining the validity of those assertions.[30] Two points must be made. First, one might disagree with the statement that cognitive standards are essential. The argument might be that from among competing assertions an actor will choose that which "best" attains the objective of the actor. Thus, there are no "cognitive" standards, rather only personally best claims. However, this argument is confused. Before

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[30]Ibid., p. 59.

choosing among competing knowledge claims, the actor must know which are factually correct. For example, suppose there are three statements available to an actor: (1) "If A, then X", (2) "If B, then Y", (3) "If C, then Z," where "A," "B," and "C" represent distinct courses of action, and "X," "Y," and "Z" represent distinct outcomes. Before choosing a course of action, the actor must know which of the above statements are factually correct. In other words, only after the factual correctness of claims is determined, can the actor choose among alternative courses of instrumental action such that objectives are achieved. In short, the actor demands knowledge. Choice among competing factual assertions is the determination of valid knowledge claims. Thus, this choice precedes the choice of instrumental actions.

Second, it should be recognized that Chapter II of this study spelled out the method that will be used to examine the assertions of accounting. Thus, given the paradigm of action and with limitation to cognitive (rational) aspects, implications for empirical accounting assertions can be derived. In a sense, cognitive standards are going to be derived.

The second of the value standards, appreciative standards, allows the actor to assess an object's immediate gratificatory significance. Note that there is no assessment of the consequences of acts, but only of the immediate

gratification given outcomes.[31] Actions and results are viewed in isolation from other actions and results.

Moral standards allow the actor to assess the consequences of action. These complement the appreciative mode which, as pointed out earlier, is conjoined with the cognitive mode. The moral standards are concerned with consequences of action on the action system as a whole. They are the most integrative of all standards.[32]

Pattern Variables

Up to this point, a sketch of the theory of action has been provided. The sketch included a discussion of the actor, the situation, and orientation of the actor to the situation. The orientation involves both motivation and standards or values. This section introduces "pattern variables." The pattern variables represent crucial orientation decisions which are made prior to action. The choice in each dilemma faced by the actor allows the actor to come to grips with the situation.[33]

A pattern variable is defined as ". . . a dichotomy, one side of which must be chosen by an actor before the meaning of a situation is determinate for him, and thus

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[31]Ibid., p. 60.

[32]Ibid.

[33]Harold Bershady, p. 109.

before he can act with respect to that situation."[34] There are four basic dilemmas of orientation; thus, there are 16 possible combinations. A rational action is defined as one specific set of those 16 combinations. The specific pattern of four choices which is defined as rational action could be called a "rational pattern" of action. As the reader may suspect, rational patterns are those which emphasize cognitive orientation.

Figure 4 provides a schematic of the dilemmas of orientation classified by (1) modes of orientation and (2) objects of the situation. The reader should refer to this diagram as the discussion of the pattern variables progresses.[35]

The first step in the orientation process does not present any dilemmas; it is essential that the actor know the factual relationships among objects and that the actor has discriminated objects along a cathectic dimension. This is the primary aspect of orientation. Notice that implicit in this cathectic-cognitive discrimination is the assumption that (1) if competing knowledge claims have presented themselves, there has been adjudication through a process based on standards of cognitive validity, and (2) if competing wants have presented themselves for

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[34]Parsons and Shils, p. 77.

[35]This discussion relies on Parsons and Shils, pp. 48, 77-88; and Harold Bershady, pp. 36-40.

immediate gratification, appreciative standards have ruled some wants must be suppressed.

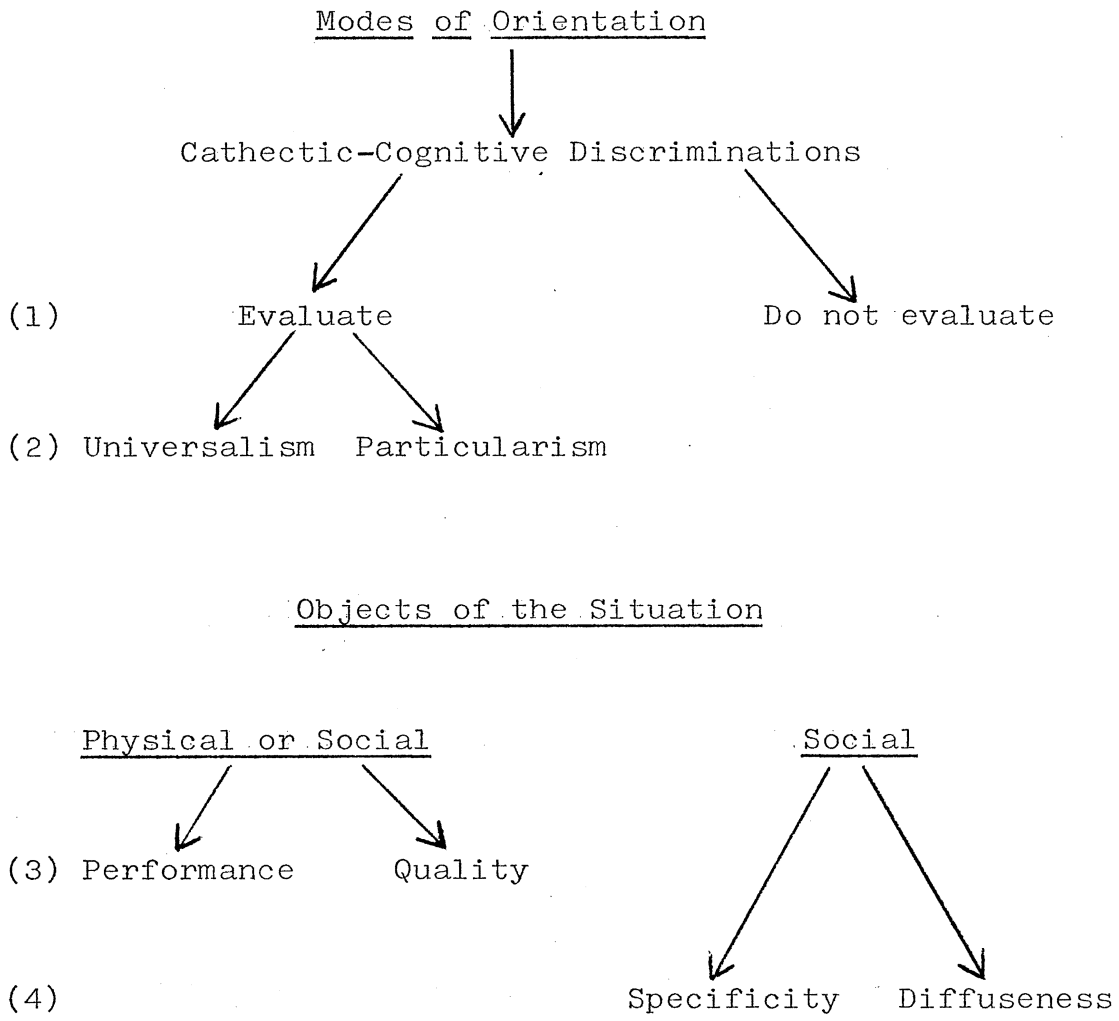


Figure 4. A Schematic of the Dilemmas of Orientation

The first orientation dilemma now presents itself. The actor must decide whether to evaluate. This is the dilemma of affectivity versus affective neutrality. The

actor must either exercise discipline or simply act such that immediate impulses are satisfied. A rational system of action is defined as one which exercises discipline or is affectively neutral.

Inherent in the first dilemma of orientation for a personality system is the nature of the discipline. Given that there is to be evaluation of the consequences of action, i.e., a posture of affective neutrality, then there must have been a decision regarding which interests are to be held out as primary with respect to consequences. A self-orientation emphasizes private interests, while a collective-orientation emphasizes the interests of the group in question. The rational actor may adopt either posture.[36]

The second dilemma is that of universalism versus particularism; the actor may judge an object either on the basis of cognitive or appreciative standards. When appreciative standards are primary, there is a tendency to judge an object with respect to that object's specific, contextual relationship with the actor, while cognitive standards judge objects according to categories which are independent of a particular actor's needs. In Parson's words:

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[36]At one time Parsons included the self- versus collective-orientation as a pattern variable but later dropped this as a basic dilemma. See Guy Rocher, p. 37.

> The (second dilemma) is that between evaluating the object of an action in terms of its relations to a generalized frame of reference, on the one hand, and evaluating it in terms of its relations to the actor and his own specific relations to objects on the other.[37]

It is posited that a rational actor holds appreciative standards as primary with respect to goal objects and cognitive standards as primary with respect to instrumental objects. Indeed, the choice of appreciative or cognitive standards for judging objects (or groups of object, i.e., situations) is equivalent to the specification of objects as goals or instruments.

It might be argued that the choice of means involves appreciative standards. There are two counters. First, there are, nonetheless, cognitive aspects involved in the choice of means; this research is concerned with these. Or, second, a rational actor is postulated as a limiting concept, i.e., at the point where there are no cathectic aspects of instruments. These object instruments are desired only because of what they can, with proper manipulation, bring about; and, the factual validity of these consequences is a cognitive question.

A third dilemma facing the actor is how to view an object or situation. If the actor views an object as a performance complex, then there is concern for that object's consequences as a result of its actions. On the

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[37]Parsons and Shils, p. 48.

other hand, if the actor views objects as quality complexes then there is concern for the object "as it is," independent of the relation between qualities and performances.

Whether the rational actor views objects as performance or quality complexes depends, once again, or whether the objects are viewed as instrumental or goal objects. As an instrument, the performance attributes of the object are relevant. This view of objects, according to the preceding argument, emphasizes cognitive standards. Concerning goal objects, the actor might view those objects as either quality or performance complexes. If the object is an "end in itself" then appreciative standards rule; however, if the object is desired only for its potential to bring forth other objects, then cognitive standards rule. It is a cognitive question whether that object will in fact bring forward those other objects. Of course, in this latter case the goal object would be more properly classified as an instrument.

The last pattern variable, diffuseness or specificity, is the least clear as to which aspect of orientation is involved. If the actor grants the object-actor all requests not interfering with higher obligations, then that actor has a diffuse relationship with the object-actor. On the other hand, a specific relation is clearly defined and limited.

Notice, then, that in the case of diffuse relationships, the "higher obligations" would in the case of

"intellectual" activity be cognitive standard-based. But in the case of "aesthetic" activity, the higher obligations would be appreciative standard-based. On the other hand, a specific relation could be defined on either set of standards. In any event, it does not appear that the specification of the relationship between the actor and object-actor sheds any light on the research problem, since it has already been specified that this research is not concerned with social systems. Thus, the type of interaction, the main characteristic of social systems, is irrelevant to this research.

## Rational Action

At this point rational action in terms of the theory of action can be defined. A rational system of action is one which exhibits patterns of affective-neutrality (evaluation) with universalistic (cognitive) evaluation standards on performance-perceived instrumental objects and with particularistic (appreciative) standards on quality-perceived goal objects. Figure 5 provides a schematic of rational action.[38] The discussion which follows summarizes this chapter.

Notice in Figure 5 that the actor is the subject, a personality system (in this case a rational personality system as previously defined), and an object. The actor as

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[38]This parallels Parsons' "instrumental action." See Parsons and Shils, p. 75.

object is both condition and mean (instrument). The personality system defines relevant modes of orientation along each step of the process of action. As subject, the actor's point of view is adopted; the goals are the actor's, for instance.

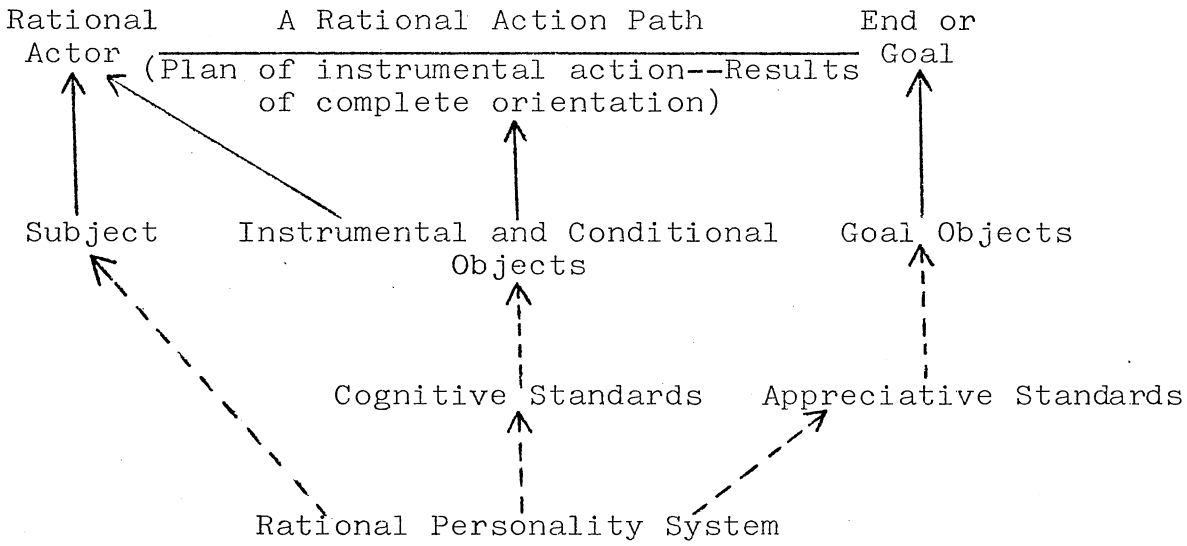


Figure 5. Rational Action

The first task of the actor is to achieve cathectic-cognitive discrimination. This is the process of mapping factual relations among instrumental objects given conditional objects onto desired situations (certain relationships among objects, including the actor).

However, in general, not all goals will be available, i.e., some will be mutually exclusive. Moreover, certain means may exclude certain other means, thus eliminating

the possibility of attaining the different goals implied by those means. As a result, the actor must evaluate alternative courses of action. This choice among goals, then, relies on moral standards, while the spelling out of alternatives requires cognitive and appreciative standards. Moreover, the instrumental portion of action relies solely on cognitive standards when it is necessary to choose among alternative statements about the factual relations among instrumental and goal objects.

This, then, is the conception of rational action maintained throughout this study. The remainder of this research is concerned with statements about the relations among instrumental and goal objects. To ease discussion, it will be assumed that the goals, whatever their specific content, are given. This approach will bring cognitive aspects of decision making to full light.

# CHAPTER IV

# THE STRUCTURED PLANE

## Introduction

The task of this research is to examine the accounting implications of the rational aspects of the decision process. The discussion relies on three fundamental conceptions. First, it is maintained that a rational actor's language can be analyzed into syntactic, semantic, and pragmatic aspects. Secondly, actions are viewed as involving three analytically distinct dimensions--the cognitive, cathectic, and evaluative. Thirdly, two accounting functions, planning and control, are recognized.

This chapter deals with the planning function of accounting insofar as cognitive aspects of action are concerned. Viewing accounting as a language allows the analysis of accounting statements into their syntactic and semantic aspects. The next chapter will adopt the same method of analysis on the control aspects of accounting explanation.

Since the above-mentioned fundamental conceptions permeate the remainder of this research, a brief review and coordination of these notions will follow. This will allow a characterization and analysis of the decision

process and generation of certain accounting implications from that analysis.

## Structured and Realized Planes

Accounting is typically analyzed into planning and control functions. It is maintained in this research that planning operates on the "structured plane," while control operates on the "realized plane." A schematic of the conceptual difference between planning and control is given in Figure 6.

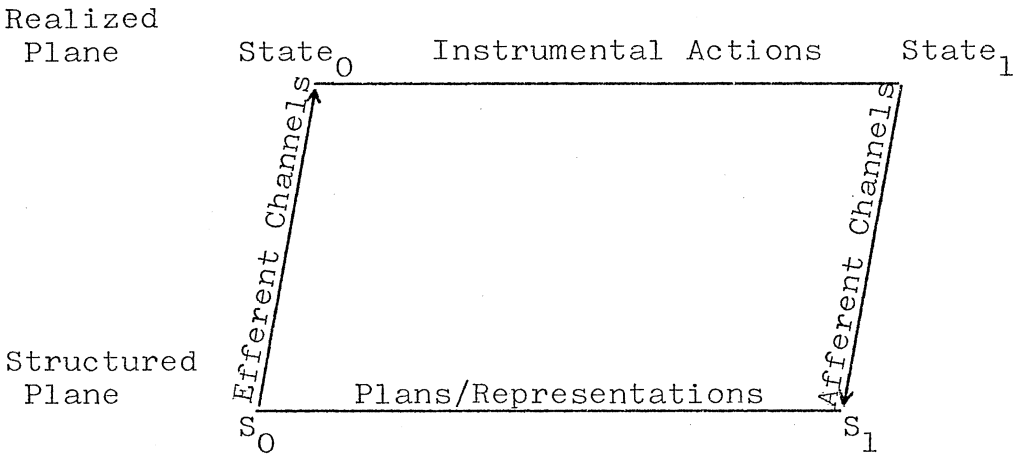


Figure 6. Conceptual Difference Between Planning and Control

The structured plane involves representations or plans of instrumental action, while the realized plane involves the implementation and results of planned actions. Plans

effect instrumental actions through efferent channels, while afferent channels feed back information about state outcomes. In the words of Herbert Simon, "Afferent channels give (an actor) information about the state of the environment; efferent channels cause action on the environment."[1] It is clear that for the efferent channels to be effective, afferent channels are necessary. Nevertheless, as in the discussion of any process, one must enter the cycle somewhere. Thus, this chapter discusses the structured plane in isolation from the problems presented by the accounting function of control.

## Rational Actions

The issues addressed in this chapter are concerned with efferent channels, those which effect action. Clearly, there are a great number of ways to bring about some instrumental action. For instance, one can order another, plead with another, or deceive another. But, regardless of the method one uses, there is the requirement that the action *will* in fact bring about the desired state of affairs. (Whether in fact the instrumental action *did* bring about the desired state of affairs involves the control aspects of accounting. Discussion of this topic

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[1]Herbert A. Simon, "The Logic of Heuristic Decision Making," *The Logic of Decision and Action*, ed. Nicholas Rescher, (Pittsburgh, 1966), p. 9.

is provided in Chapter V.) In this chapter the analysis is not concerned with the nature of the operational method by which instrumental actions are effected, but rather with the cognitive requirements of the efferent channels.

For example, suppose an actor desires to bring about some end result, X, and that the mutually exclusive means, A, B, or C, are available. Moreover, means A involves an instrumental object-actor. The cognitive aspects of this situation include whether in fact means A, B, and C will bring about X and, if there are alternative ways (pleading, ordering) of bringing about the object-actor's actions, whether these ways will in fact be effective. In short, then, this chapter deals with the cognitive aspects of the action-effecting dimension of accounting in the context of a specified paradigm of action. Moreover, the discussion is temporarily freed from the problems of the afferent channels and, thus, the control process of accounting.

## The Paradigm of Action

The paradigm of action embraced here involves an actor, a situation, and an actor's orientation to the situation. The actor is the subject of action, an object of the situation, and a personality system. The aspect of accounting which is presently of concern is brought out most clearly by defining a rational system or, more precisely, a rational actor as a personality system.

The rational actor as a personality system is defined,

in part, as one who views instrumental objects in the context of performance attributes. The relevant properties of instrumental objects are those that are indicative of what an object (social, physical, or cultural) can effect. Goal objects, on the other hand, are evaluated according to their qualities independent of their performance attributes.

The rational actor's orientation to objects will vary as the object is an instrumental or a goal object. The rational actor maintains an affectively-neutral attitude toward performance-perceived instrumental objects. As a result, cognitive standards rule in the evaluation of these objects; and, the evaluation concerns whether the objects, under certain manipulations, will bring about certain desired situations (groups of objects in a specified relationship with one another and the actor). On the other hand, goal objects are quality-perceived with appreciative standards guiding evaluation of these objects.

## Accounting Reports

It is convenient at this point to discuss accounting reports. In terms of the theory of action and in the context of rational actions, accounting symbols are the "embodiment" of cognitive, cultural objects. Moreover, the actor views the symbols of accounting as intrumental, not goal, objects. Thus, the relevant properties of the cognitive symbols are those that indicate what those symbols, or objects represented by those symbols, can

effect; and, the symbols are evaluated according to cognitive standards.

Notice that the accounting symbols can be evaluated along one or both of two dimensions. First, they may be evaluated as to whether they will produce from an object-actor a specified response. Most accountants would label this the behavioral aspect of accounting reports. Second, the accounting signals can be evaluated as to whether they are valid in the sense that (1) they are "true to the facts" or (2) they are indeed consistent with deductive systems which allow the actor to predict outcomes from instrumental actions and to choose among alternative courses of action.

The concept of validity as "true to facts" is vague and receives elaboration near the end of this chapter when the semantical aspects of accounting statements are discussed. As an example of this vagueness, note that some accountants appear to use "true to the facts" in some near metaphysical sense, advocating true income approaches to accounting. Reaction to their proposals appears to take the form of rejecting the concept of truth. One accomplishment of this chapter is to place the controversy in a new perspective. For now, let it suffice to note that the second concept of validity can encompass the first, allowing elimination of vagueness.

In any event, the question remains, "With which of the two primary dimensions is this research concerned?" The

answer is a qualified "both." An explanation follows. If one views the behavioral aspects of accounting signals as the response to those signals by an object-actor in an affective manner, and, thus, with respect to appreciative standards, then our research is not concerned with this dimension of accounting signals, per se. In such a case accounting objects are, relative to a rational personality (as defined here), goal objects. On the other hand, if the behavioral aspects of accounting signals involve the response by an object-actor in an affectively-neutral manner and, thus, with respect to cognitive standards, then our research is concerned with the behavioral dimension. But in this latter case and with treatment of the actor as subject, the response will be based on what the accounting signals can produce as a result of the response of some object-actor(s). (The object-actor's response may be affective or affectively-neutral; it does not matter to this research.) The response of the object-actor is a factual question, while the action of the subject-actor--whether to emit a certain accounting signal--depends on the answer to that factual question and the goals of the subject-actor. Thus, the behavioral aspects of accounting signals, as treated in this research, involve the question, "Are the signals consistent with deductive systems which allow the actor to predict outcomes from instrumental actions?" Notice, however, that this is a description of the second dimension of accounting signals. This is why

it was stated, with qualification, that both behavioral and non-behavioral features of accounting symbols are considered; viz., the two features can be characterized as involving the "consistency" dimension of accounting signals relative to a rational personality system which views those signals as instrumental objects.

## Analysis of Language

The analysis of accounting as a language follows the method of semiotics. Language is comprised of syntactic, semantic, and pragmatic features. Pragmatics is avoided in this research insofar as the analysis of language is concerned but not insofar as the relationship of accounting to actors is concerned. This research embraces pragmatic aspects at those points where the cognitive functions of accounting is delineated, since that delineation involves a description of the relationship of accounting statements to the users of those statements and also implies certain necessary logical characteristics of accounting statements. Presumably, accountants attempt to provide accounting statements that adequately serve those cognitive functions by issuing statements that meet the implied logical characteristics. Thus, description of the functions of accounting statements and the logical requirements necessitated by those functions leads to a specification of the requisite relationship of accountants to accounting statements. In this sense, Chapter III can be viewed as primarily pragmatic

analysis, viz., a determination of the function of accounting statements. Moreover, this chapter is interpretable as pragmatic analysis at those points where logical characteristics of accounting statements are specified, since it is implied that accountants will attempt to issue statements that meet these requirements. A relationship between accountants and accounting statements is implied.

Syntax examines language as marks on paper. It involves the study of operations on these marks to form expressions (including sentences) and operations on sentences to derive new sentences. While syntax examines the form of statements without regard to content, semantics involves the study of the meaning of syntactically sound statements. This involves the coordination of descriptive expressions and empirical objects or operations.

In a deductive system there will be some extralogical, descriptive terms which receive direct coordination with observables by means of rules of designation (as discussed in Chapter II), while others will not. For example, the expression, "cost," is in certain cases identified as the empirical object, "increase in dollar expenditure as a result of a specified act." In other cases the expression is treated as "theoretical." For example, in elementary economic analysis, an actor's avoidance of a particular act would be explained by stating that the utility foregone ("cost") would have exceeded the utility gained. Clearly, "cost" is not directly coordinated to any empirical

referent; it is a primitive or theoretical concept.

Analogous to the treatment of a certain expression as empirical in one deductive system and theoretical in another is the treatment of all expressions of a certain deductive system as theoretical in one case and then treating some of the same expressions as empirical even though they retain the same position in the same deductive system. For example, Euclidean geometry has been fully formalized--the logical structure of this system can be examined, independent of any empirical interpretation. However, if one wishes to apply this deductive system, then some expressions (e.g., "line," straight," "point"), must be coordinated to empirical objects or operations. In short, semantical questions become relevant.

The approach used in this chapter mirrors the above approach. First, the syntactical aspects of the deductive systems served by accounting statements are explored. Then, semantical questions are addressed. Of course, all of this is done within the context of the theory of rational action.

This completes the summary and initial coordination of the first three chapters. Next, an analysis of the decision process is provided by adopting the paradigm of the 1971 Committee Report on Accounting Theory Construction and Verification and placing that paradigm in the larger context of the theory of action. The analysis is restricted to a rational personality system and efferent information channels. Then, this chapter examines the syntactical and

semantical features of accounting statements as instrumental objects of the efferent channels from the point of view of a rational actor's decision process.

## Decision Processes and the Structured Plane

### The 1971 Committee's View

Figure 7 reproduces the schematic representation provided by the Committee with only slight modification.[2] All inputs to the accounting system are held to be empirical or "real world phenomena," while the output may be either analytic or empirical. For example, the inputs might be the dollar outlay for some kind of machinery, the useful life of that equipment, and the salvage value of the equipment. The output might be the calculated depreciation, which, as interpreted by accountants, is not an observable.

The outputs of the accounting system serve as inputs to prediction models, while the outputs of the prediction models enter a decision model. For example, the accounting system might provide as an input the dollar amount of cash of some entity at two points in time. This information, along with certain other inputs, may, in turn, allow the prediction of future interest rates charged to the firm.

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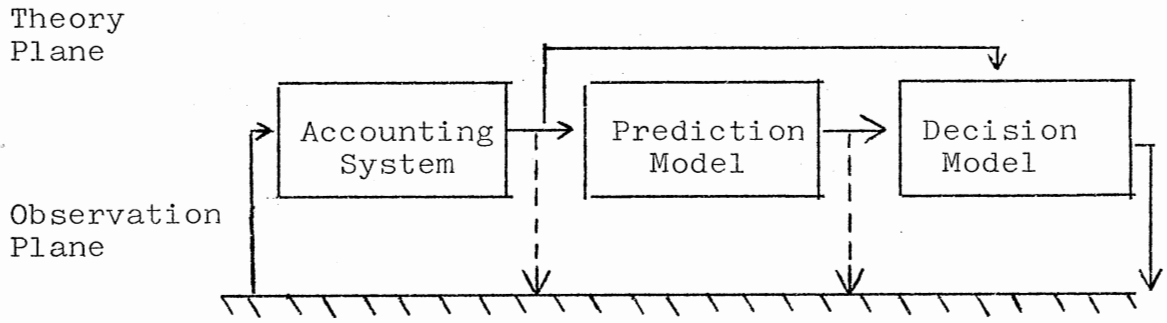
[2] "Report of the Committee on Accounting Theory Construction and Verification," Accounting Review, Supplement to Vol. XLVI (1971), pp. 50-79.

Finally, the predicted future interest rates might be treated as inputs to a capital budgeting model, which, in certain cases, constitutes a decision model and thus provides choice among alternative capital expenditures.




Key: _____ Direct flows of symbolic representation.

– – – – Verification links (to the extent they exist).

Figure 7. Accounting as a Measurement-Communication Function

## Decision Process in Context of the Theory of Action

This research explicitly adopts the point of view of an actor as a personality system. The actor attempts to maximize gratification in a situation comprised of conditional and instrumental objects. The actor desires to attain certain relationships among objects. The actor must identify goal objects and constraints or conditions and must

map instrumental objects onto goal objects under given conditions.

The actor's initial problem is displayed schematically in Figure 8. For each goal relationship, $G_i$, and each set of conditions, $C_j$, the actor must determine the means $M_{ij}$, of obtaining that relationship. For example, Figure 8 shows that under condtions $C_3$, the actor can obtain goal relationship $G_2$ through the implementation of instrumental action $M_{23}$. Once the actor has achieved this cathectic-cognitive discrimination, the actor can evaluate, using some appreciative standards, various alternative actions. Finally, some plan of action is chosen.

| | | Alternative Conditions | | | | |
|---|---|---|---|---|---|---|
| | | $C_1$ | $C_2$ | $C_3$ | . . . | $C_n$ |
| Potential Goals | $G_1$ | $M_{11}$ | $M_{12}$ | $M_{13}$ | . . . | $M_{1n}$ |
| | $G_2$ | $M_{21}$ | $M_{22}$ | $M_{23}$ | . . . | $M_{2n}$ |
| | . | . | . | . | . . . | . |
| | . | . | . | . | . . . | . |
| | . | . | . | . | . . . | . |
| | $G_m$ | $M_{m1}$ | $M_{m2}$ | $M_{m3}$ | . . . | $M_{mn}$ |

Figure 8. Mapping of Means on Goals Under Given Conditions

## Coordination of Committee's Paradigm and the Theory of Action

This section coordinates the committee's view and the paradigm of rational action. Prediction models are methods for determining the results of various instrumental actions under given conditions. Prediction models are themselves means of mapping instrumental means onto outcomes.

Of course, not all prediction models will be used; only those tailored to the actor's goals will be considered. In other words, only certain cognitive discriminations are relevant to the actor in any situation. This leads to a complication, viz., the problem of choice among prediction models. Under the current paradigm, the actor cannot evaluate alternatives until a cognitive discrimination among instrumental objects has been attained. Prediction models are instrumental objects and are also means of cognitive discrimination. Thus, there must be some cognitively discriminating device allowing choice of prediction models. Clearly, one is trapped in an infinite regress. One possible solution is to posit that cognitive standards are the first cognitively discriminating devices and that these standards rank prediction models according to these standards. Then, the actor would choose among these models according to his appreciative standards. In any event, the situation is problematic. Indeed, the next chapter shall attempt to come to grips with this question.

The second complication involves the interpretation of Figure 8. In general, as initial conditions change, different means must be chosen to effect any particular outcome.[3] Moreover, a change in initial conditions may come about in one of two ways--the actor may bring about new conditions through appropriate instrumental actions, or new conditions might follow from present conditions regardless of actor's actions. Thus, as represented in Figure 8, one must view the condtions as more or less complex--more complex when a condition implies some future condition, less complex when an actor controls future relevant outcomes. In the more complex case, one condition stands for a chain of successive atomic conditions. In the less complex case, an outcome given conditions must be mapped back as a new condition.

With prediction models allowing an actor to achieve cognitive discrimination, decision models must be the method of evaluation of or choice among various goals. This implies that a decision model functions to weight appreciative standards in a fashion determined by moral

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[3] One exception to this is the case where the outcomes are not subject to the control of the actor. For example, assume that when conditions $C_4$ and $C_5$ are present, the actor must accept outcomes $O_4$ and $O_5$, respectively. In that case, a change from $C_4$ to $C_5$ would not demand the choice of different means quite simply because there are no effective means available under those conditions. This might be termed "destiny." In any event, prediction of future outcomes is essential if instrumental action is to be effective.

standards, which, as discussed in Chapter III, serve to assess consequences on the action system as a whole. In other words, initially the actor cathects certain objects due to individual appreciative standards. Then the means, if any, of achieving those outcomes are determined through the operation of prediction models. Finally, choices among alternative courses of action are made according to decision models which weight the appreciative-standard-based, individually desirable outcomes in a manner which reflect moral standards. The distinction between prediction and decision models is important and inescapable if one accepts the concept of rational action and the committee's paradigm.

A summary of the coordination of the two paradigms follows. Under the theory of rational action, it is necessary that the actor as a personality system define all goals, i.e., desired relationships among objects, where the actor is one such object. Then, the actor must achieve a cognitive discrimination among objects. This involves prediction of outcomes from various instrumental actions given conditions, i.e., the actor must know current conditions and results from actions under various conditions. As pointed out there may be a chain of conditions and coordinated instrumental actions.[4] So far, then, the

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[4]Such chains, i.e., action over time, allows correction of deviations from "rational action paths." This is one control aspect of the cognitive accounting function and is discussed in Chapter V.

actor has achieved cathectic-cognitive discrimination. Finally, the actor evaluates the available, alternative action-complexes. Thus, there are cathectic, cognitive, and evaluative dimensions of the process of action.

The committee's view coordinates as follows. (The reader should return to Figure 7.) First, selections are made from the observation plane. These observables are represented and processed such that they are consistent with prediction models. The inputs to prediction models are the current existing conditions and various available instrumental acts. The models will predict (1) future conditions given present conditions regardless of actor's actions, (2) future conditions given instrumental actions and current conditions, and (3) goal outcomes from various instrumental acts given current conditions. Of course, outputs from prediction models of type (1) and (2) will be inputs to model type (3). The outputs from model type (3) are inputs to decision models--a method of evaluation of alternative, mean-goal package complexes.

Before beginning the syntactical and semantical analysis, two observations are made. Both revolve around the committee's failure to distinguish between prediction and decision models. First, return to Figure 7. Notice the arrow that starts from outputs of the accounting system, bypasses prediction models, and enters decision models directly. The question arises, "What sort of decision model would demand an input which is not a prediction of some

future outcome?" The answer is that it must be a model which attaches to the object(s) represented by the accounting output or which attaches to the accounting output itself in an affective, as opposed to affectively-neutral manner. This is true since decision models are evaluative mechanisms based on weighted appreciative standards. But the rational actor is concerned with future outcomes and the evaluation among these goal relationships. In other words, only future outcomes are relevant as inputs to decision models as characterized here.

It might be argued that some accounting outputs are predictions. In this case it would be wise to disentangle two concepts, representations of objects (including measurement, of course) and predictions from these observations. It may be that accounting systems encompass prediction models. In this case the schematic in Figure 7 is poorly conceived. As viewed here, however, accounting systems make observations consistent with various prediction models. There cannot be a bypassing of prediction models, whether implicit or explicit, when rational actions as defined here are under consideration.

The second observation mirrors the first. This research accepts the committee's distinction between prediction and decision models. Moreover, within the context of the theory of action, decision models are the method of evaluation of potential goal relationships. Consider the example of a decision model given in the committee report:

> If someone wants to know whether one body will float on another, then they can apply this model. The model precisely specifies what properties are to be measured and how they are to be manipulated. Weight and volume are to be measured and a host of other properties are not to be measured (Emphasis added).[5]

The model referred to is one which compares the specific gravity of a solid body and a liquid; the body will float on the liquid if the body has the lower specific gravity. Notice, however, that the committee's example is not a decision model but rather a prediction model. First, there is emphasis on cognition and the future, i.e., someone wishes to know if a body will float. Second, there is emphasis on instrumentality, i.e., there is specification of what properties to manipulate. This process of achieving knowledge about what to do to achieve some outcome has been termed cathectic-cognitive discrimination. What remains of the decision process is, for example, evaluation of various floatation alternatives. That is, does the actor desire to float, for example, a red or a green piece of wood? This choice is evaluated through appreciative standards. Under the broadest formulation, the evaluation process involves the actor's choosing according to the color he likes best.

In short, the committee failed to adhere to a distinction between prediction and decision models. One may argue that they distinguish, but in a fashion differently

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[5]"Committee Report," p. 61.

from this research. That is very close to the point; the point is that the committee has failed to distinguish clearly. This may be the result of not operating within a larger context. This research supplies that context.

## Accounting Explanation in the Structured Plane--A Syntactical and Semantical Analysis

This section turns to the primary task of this chapter, viz., analyzing from the viewpoint of logical empiricists the characteristics of accounting explanations in the structured plane. With the committee's paradigm placed within the context of the theory of action, an examination of the linguistic aspects of the efferent channels of accounting systems as they function to facilitate rational action is possible.

### Accounting Explanation

First, allow an explication of the phrase "accounting explanation." Begin with "explanation." Returning to Figure 7, one finds that accounting systems or models are guided by prediction models selected by some actor as relevant. Remember that due to inconsistency with the analytic distinction between prediction and decision models within the context of rational actions, the direct flow of information from accounting models to decision models has been eliminated. Explanation, then, is defined as the

process of prediction of future outcomes. This encompasses selection of events or objects from the observation plane, symbolic representation of selected events and objects, processing and inputing the representations into prediction models, generating predictions, and representing prediction model outputs in decision model-relevant form.

Next, consider the modifier "accounting" in the phrase "accounting explanation." It is a truism that accounting explanations are those concerned with "accounting" information. However, it is not at all clear how accounting information differs from, say, economic, behavioral, or sociological data. For example, disclosures relative to "loss contingencies" are, in some cases, predictions--presumably accounting predictions and, thus, accounting explanation. However, the input to such predictions could conceivably be data that would not generally be specified as "accounting" data. For example, in the case of a loss contingency from an unasserted claim by a third party, such information as outcomes in similar cases, length of time since third party injury, and governmental inquiry findings are possible inputs to the prediction of the likelihood of an unfavorable settlement. On the other hand, what is perceived as accounting data may be the input to a model for prediction of (classification of) each firm of a group of firms as economic failures or non-failures. In this case the output is not recognized as accounting

information, per se. In short, one can identify cases where accounting information is generated from non-accounting data and non-accounting information is generated by accounting data. What, then, are the characteristics unique to accounting information? In light of the above discussion, the best approach appears to be to leave the question unanswered, particularly since an answer would seem to provide no advantage to this research.

## An Analysis of Logical Structure

Generalized Model. In the structured plane, an accounting explanation will be in response to the question, "What will result if action M is taken?" or "How can I achieve goal relationship G?" It is assumed that goals have been specified. Some of these goals may not be attainable; that determination is, of course, part of the task of explanation. Also, it is assumed that prediction models have been chosen. This latter assumption is relaxed in Chapter V when control aspects of accounting explanations are discussed, since planning and control can be distinguished in a meaningful cognitive sense only if this distinction obtains.

The answer to either of the above questions demands a mapping of instrumental actions onto goals. Such a mapping incorporates knowledge of current existing conditions, available instrumental actions, and models which predict the results from available actions under current conditions

The logical structure of such a mapping is presented in Figure 9.

Prediction Models:

If $C_i$ and $M_j$, then $C_k$
If $C_m$ and $M_n$, then $G_p$

Existing Initial Conditions:

$C_1, C_2, \ldots, C_x$

Available Means:

$M_1, M_2, \ldots, M_z$

Mapping of Means on Goals Given Conditions:

| Potentially Attainable Goals | $C_1'$ | $C_2'$ | $C_3'$ | . . . | $C_x'$ |
|---|---|---|---|---|---|
| $G_1$ | $M_{11}$ | $M_{12}$ | $M_{13}$ | . . . | $M_{1x}$ |
| $G_2$ | $M_{21}$ | $M_{22}$ | $M_{23}$ | . . . | $M_{2x}$ |
| $G_3$ | $M_{31}$ | $M_{32}$ | $M_{33}$ | . . . | $M_{3x}$ |
| . | . | . | . | . . . | . |
| . | . | . | . | . . . | . |
| . | . | . | . | . . . | . |
| $G_y$ | $M_{y1}$ | $M_{y2}$ | $M_{y3}$ | . . . | $M_{yx}$ |

Key:

C = Conditions
M = Means
G = Goals

Figure 9. General Structure of Explanation

In the preceding schema there are two types of prediction models. The first delineates ways that means and conditions combine to form new conditions, i.e., "If $C_i$ and $M_j$, then $C_k$." These type of prediction models may be used in a chain, with the output of one model being the input to another. Ultimately, the output of this model type will be the input to a model of the second type. These latter models indicate the goal outcomes from various means and conditions in combination. Clearly, the distinction maintained is actor specific, since different actors will perceive different outcomes as goal versus conditional. If such a distinction is maintained, then the mapping of means onto goals under given conditions involves, as mentioned in the last section, a complexity, viz., the specification $C_k'$ involves a more or less long chain of atomic conditions and the specification $M_{ij}$ involves a more or less long chain of coordinated atomic means. For example, one might have the following chain:

$$\begin{array}{l} C_1 \cdot C_5 \cdot C_3 \equiv C_1' \\ M_2 \cdot \emptyset \cdot M_6 \equiv M_{11} \end{array} \longrightarrow G_1$$

In this case, $C_1$ and $M_2$ yields $C_5$ which leads to $C_3$ with inaction ($\emptyset$). Then $C_3$ and $M_6$ lead to $G_1$, the ultimate goal. Returning to Figure 9, one finds that $C_1'$ and $M_{11}$ yields $G_1$. Of course, the outcomes from $C_1$ and $M_2$ and from $C_5$ and $\emptyset$ and from $C_3$ and $M_6$ would be determined from prediction models, knowledge of existing initial conditions, and knowledge of available means.

Given prediction models and goals, one cognitive function of accounting, then, is to provide knowledge of existing initial conditions and available means. (This emphasizes the necessity of the balance sheet as popularly conceived.) Obviously, only relevant initial conditions and means are candidates for representation by the accounting system. And, relevant conditions and means are determined by reference to prediction models that are in fact being used. Remember there is no concern with choice among or alteration of prediction models. Such choices are an aspect of the operation of accounting systems on the realized plane; discussion is therefore delayed until Chapter V.

An Example. This section presents an example that is consistent with the generalized schema of explanation. This provides a manageable analysis of logical structure and will allow elucidation of some issues that were not explicitly addressed in the previous general model. Additional concreteness is attained without appreciable loss of generalizability. The assumptions of the example follow:

1. There are three distinct goals--$G_1$, $G_2$, $G_3$.
2. There are only two known instrumental ways to reach each goal. A single "instrumental way" is a combination of atomic mean, $M_i$, and atomic condition, $C_j$.
3. The relevant aspects of the situation are described by two atomic, initial conditions, $C_1$ and $C_2$, and by four atomic means, $M_1$, $M_2$, $M_3$, and $M_4$.

4. Neither $C_1$ nor $C_2$ is equivalent to $G_1$ or $G_2$ or $G_3$ or any combination of these.

5. $C_1$ is not the negation of $C_2$ in part or otherwise. $C_1$ and $C_2$ represent different dimensions or properties of the current existing situation.

Tables I through IV present a schema of the logical form of an explanation which, under the foregoing assumptions, is necessary to allow a cognitively unhindered operation of the actor's decision model. Remember that decision models are characterized as methods of evaluating alternative goal-mean package complexes. The actor applies personal standards in the evaluation and arrives at a final plan of action.

The schema of explanation presented in the following tables is deductive in character. Essentially, with goals and prediction models specified and given available means, one can deduce alternative plans of action. An examination of Table I reveals that three distinct goals--$G_1$, $G_2$, and $G_3$--have been specified by the actor. The known, relevant prediction models reveal that each goal can be individually attained in one of two ways and that inactin (Ø) will result in an unchanged state of affairs. Notice also that both conditions $C_1$ and $C_2$ currently exist. Table II reveals the means individually and combinationally available. Given all of the above, one can then deduce Table III and Table IV.

One should begin with the deduction of Table III. For the moment accept Table II--"Means Available"--as given.

TABLE I

LOGICAL STRUCTURE OF EXPLANATION

| Goals | Prediction Models | Existing Initial Conditions |
|---|---|---|
| $G_1$ | If $C_1$ and $M_1$, then $G_1$ | $C_1$ |
| $G_2$ | If $C_2$ and $M_3$, then $G_1$ | $C_2$ |
| $G_3$ | If $C_1$ and $M_2$, then $G_2$ | |
| | If $C_2$ and $M_4$, then $G_2$ | |
| | If $C_1$ and $M_4$, then $G_3$ | |
| | If $C_2$ and $M_3$, then $G_3$ | |
| | If $C_1$ and $\emptyset$ , then $C_1$ | |
| | If $C_2$ and $\emptyset$ , then $C_2$ | |

TABLE II

MEANS AVAILABLE

| Means - Combinations* | Conditions | | |
|---|---|---|---|
| | $C_1$ | $C_2$ | $C_1 \cdot C_2$ |
| $\emptyset$ | yes | yes | yes |
| $M_1$ | yes | yes | yes |
| $M_2$ | yes | yes | yes |
| $M_3$ | yes | yes | yes |
| $M_4$ | yes | no | no |
| $M_1 \cdot M_2$ | no | yes | no |
| $M_1 \cdot M_3$ | yes | yes | yes |
| $M_2 \cdot M_3$ | yes | yes | yes |
| $(M_1 \cdot M_2) \cdot M_3$ | no | yes v no | no |
| $M' \cdot M_4$ | yes v no | no | no |

*$M'$ denotes any logically possible means-combination, except those including $M_4$.

TABLE III

MAPPING OF INDIVIDUALLY AVAILABLE MEANS ON OUTCOMES UNDER GIVEN CONDITIONS

| Potential Outcomes | Existing Initial Conditions | |
|---|---|---|
| | $C_1$ | $C_2$ |
| $G_1$ | $M_1$ | $M_3$ |
| $G_2$ | $M_2$ | -- |
| $G_3$ | $M_4$ | $M_3$ |
| $C_1$ | $\emptyset$ | -- |
| $C_2$ | -- | $\emptyset$ |

TABLE IV

FACTUALLY AVAILABLE INSTRUMENTAL ACTIONS

| Plans (Alternative Courses of Action) | Known, Relevant Outcomes |
|---|---|
| $M_1$ | $G_1$ |
| $M_2$ | $G_2$ |
| $M_3$ | $G_1 \cdot G_3$ |
| $M_1 \cdot M_3$ | $G_1 \cdot G_3$ |
| $M_2 \cdot M_3$ | $G_1 \cdot G_2 \cdot G_3$ |
| $\emptyset$ | $C_1 \cdot C_2$ |

Notice from Table II that means $M_1$, $M_2$, and $M_3$ are individually available under either condition $C_1$ or $C_2$, while $M_4$ is available (is not prevented) under $C_1$ but is not available (is prevented) under condtion $C_2$. Inaction, $\emptyset$, is also available under either $C_1$ or $C_2$.

Thus far there is knowledge of (1) ways to bring about each goal, (2) existing condtions, and (3) means available under either condition. From this knowledge one can deduce Table III. A generalized form of the deduction is as follows:

If C, then M
C
$\therefore$ M
If C and M, then O
$\therefore$ O

Where $M \equiv (\emptyset, M_1, M_2, M_3, \sim M_4)$

$O \equiv (C_1, C_2, G_1, G_2, G_3)$

The symbol "$\equiv$" is followed by a specification of all possible and relevant substitution instances.

In words, the first statement says that if condition C obtains then means M is not prevented. The fourth statement says that if C exists and M is not prevented, then O is not prevented. By invoking the entire argument for each individually available mean ($\emptyset$, $M_1$, $M_2$, $M_3$) and each prediction model, one can derive Table III, insofar as those cells containing a substitution instance of M are concerned. For example, since $C_1$ exists and $M_1$ is available if $C_1$ exists, $M_1$ is available. Table 1 reveals that $C_1$ exists. Table II reveals that $M_1$ is available if $C_1$ exists. Moreover, the first prediction models states that if $C_1$ exists and $M_1$ is

available, then $G_1$ is available. Thus, Table III shows $G_1$ as a potential outcome insofar as $C_1$ and $M_1$ are concerned.

However, there are also cells in Table III without entries, viz., those with a dash (--). No entry occurs in a cell in the event that a means is prevented (is not available) under a given condition. In that case, no necessary conclusion is possible. This results in a dash (--) in Table III in the appropriate cell. A discussion of this situation follows.

In this example the following series of statements is available:

If $C_2$, then $\sim M_4$
$C_2$
$\therefore \sim M_4$
If $C_2$ and $M_4$, then $G_2$
$C_2$
$\sim M_4$

No necessary conclusion is possible. As a result, a dash is placed in cell ($G_2$, $C_2$) of Table III. Furthermore, by assumption (2) of this example, the lack of explicit mention of any other prediction models implies there are no other known ways to bring about the goals desired. In short, prediction models state all known, relevant ways to reach given goals. (A relevant prediction model is one relating goals and existing conditions.) Thus, a dash is also entered in cells ($C_1$, $C_2$) and ($C_2$, $C_1$) of Table III. The dash signifies that there is no known way to achieve the stated outcome under the given condition, either because a means is prevented by a condition or no prediction model

is available relating a mean with some outcome under the given condition.

Next consider the derivation of Table IV, which lists alternative plans of action and corresponding outcomes. Given that $C_1$ and $C_2$ exist, the alternative courses of action that are available for implementation are those marked by a "yes" in the column marked "$C_1 \cdot C_2$" in Table II. (For the moment take the entries in that column as given.) Thus, the alternative plans of action that are entered in the first column of Table IV are $M_1$; $M_2$; $M_3$; $M_1$ and $M_3$; $M_2$ and $M_3$; and $\emptyset$.

Finally, one can use Table III along with the list of available plans given $C_1$ and $C_2$ to derive the second ("Outcomes") column of Table IV. Mechanically, one scans each individual column of Table III for each atomic means available and finds that $M_1$ yields $G_1$, $M_2$ yields $G_2$ that $M_3$ yields both $G_1$ and $G_3$, and that inaction yields $C_1$ and $C_2$. These outcomes are entered in Table IV. While $M_4$ will yield $G_3$ under $C_1$, $M_4$ is not in fact available due to existence of $C_2$. (See Table III.)

To derive the remaining two outcomes, "$G_1$ and $G_3$" and "$G_1$ and $G_2$ and $G_3$", one first searches for $M_1$ and $M_3$ where $M_1$ is in one column of Table III and $M_3$ is in another. This reveals that $G_1$ and $G_3$ will result from action $M_1$ and $M_3$. Secondly, one searches similarly for $M_2$ and $M_3$ and finds that $G_1$ and $G_2$ and $G_3$ are the corresponding outcomes.

Turn now to a more formal analysis of the deduction of

Table IV. Since Table III is a restatement of knowledge given by prediction models, existing initial conditions, and individually available means under each condition, one can construct from that table the following positive statements:

If $C_1$ and $M_1$, then $G_1$

If $C_2$ and $M_3$, then $G_1$

If $C_1$ and $M_2$, then $G_2$

If $C_1$ and $M_4$, then $G_3$

If $C_2$ and $M_3$, then $G_3$

If $C_1$ and $\emptyset$, then $C_1$

If $C_2$ and $\emptyset$, then $C_2$

From Table II, the following assertions are available:

If $C_1$ and $C_2$, then $\emptyset$

If $C_1$ and $C_2$, then $M_1$

If $C_1$ and $C_2$, then $M_2$

. then $M_3$

. then $\sim M_4$

. then $\{\sim(M_1 \cdot M_2) \cdot (M_1 \vee M_2)\}$

. then $\{M_1 \cdot M_3\}$

. then $\{M_2 \cdot M_3\}$

. then $\{\sim[(M_1 \cdot M_2) \cdot M_3] \cdot [(M_1 \cdot M_2) \vee M_3]\}$

If $C_1$ and $C_2$, then $\{\sim(M'' \cdot M_4) \cdot (M'' \vee M_4)\}$

Where $M''$ denotes any means or combination that is factually available given $C_1$ and $C_2$.

What is available thus far are (1) assertions stating

what will result under a given condition and an available action, and (2) assertions stating which actions are prevented and which are not prevented given the simultaneously existing conditions. A general form of the deduction of Table IV is as follows:

1. Derivation of "Plans" column:

   If $C_1$ and $C_2$, then M

   $C_1$ and $C_2$

   $\therefore$ M

   Where $M \equiv (\emptyset; M_1; M_2; M_3; M_1 \cdot M_3; M_2 \cdot M_3)$

2. Derivation of "Outcomes" column:

   a. Single mean, M (includes $\emptyset$):

      If $C_i$ and M, then O

      $C_i$

      M

      $\therefore$ O

      Where $C_i \equiv (C_1; C_2)$

      $M \equiv (\emptyset; M_1; M_2; M_3)$

      $O \equiv (G_1; G_2; G_3; C_1; C_2)$

   b. Multiple means, $M_j$ and $M_3$ (exclude $\emptyset$):

      If $C_1$ and $M_j$, then O

      If $C_2$ and $M_3$, then $O'$

      $C_1$ and $C_2$

      $M_j$ and $M_3$

      $\therefore$ O and $O'$

      Where $M_j \equiv (M_1; M_2)$

      $O \equiv (G_1; G_2)$

      $O' \equiv (G_1; G_3)$

After the derivation of actions and resulting outcomes, the actor will apply his decision model in arriving

at a final plan of action. Of course, the actor may reject all alternatives or may be dissatisfied with the range of alternatives. In that event, the entire process would be repeated with a new set of goals specified.

Thus far, there has been no mention of the logical structure of the process involved in the determination of means available. Table II reveals that $M_1$, $M_2$, and $M_3$ are, individually, not prevented by either condition $C_1$ or $C_2$. $M_4$, however, is available under $C_1$ but is not available under $C_2$. In other words, $C_2$ prevents $M_4$. Moreover, since both $C_1$ and $C_2$ currently exist, the statements in Table II imply more than the results of a simple empirical investigation that revealed the availability of $M_i$. The only statements that one could make as the result of such an investigation would be as follows:

$M_1$ is available

$M_2$ is available

$M_3$ is available

$M_4$ is not available

But Table II includes the following ten (10) non-temporal statements:

If $C_1$, then $\emptyset$

If $C_1$, then $M_1$

If $C_1$, then $M_2$

.
.
.

If $C_2$, then $M_3$

$$\text{If } C_2, \text{ then } \sim M_4$$

where $M_i$ is interpreted as "$M_i$ is not prevented" and $\sim M_i$ is interpreted as "$M_i$ is prevented." In other words, there is an analytical separation of $C_1$ and $C_2$. Similarly, Table II includes the following six (6) statements about available means-combinations:

$$\text{If } C_1, \text{ then } \sim(M_1 \cdot M_2)$$
$$\text{If } C_1, \text{ then } (M_1 \cdot M_3)$$
$$\text{If } C_1, \text{ then } (M_2 \cdot M_3)$$
$$\text{If } C_2, \text{ then } (M_1 \cdot M_2)$$
$$\text{If } C_2, \text{ then } (M_1 \cdot M_3)$$
$$\text{If } C_2, \text{ then } (M_2 \cdot M_3)$$

From these 16 statements and given that $C_1$ and $C_2$ exist, one can derive the remaining statements of Table II. The logical form of that derivation is as follows:

1. The derivation of the two negative entries in the columns "$C_1$" and "$C_2$":

$$\text{If } C_j, \text{ then } \{\sim(M_i \cdot M'') \cdot (M_i \vee M'')\}$$
$$\text{If } C_j, \text{ then } \sim M_i$$
$$C_j$$
$$\therefore \sim M_i \cdot \{\sim M_i \cdot M'') \cdot (M_i \vee M'')\}$$

Where $M'' \equiv$ [any combination of means except those including $M_4$ or $(M_1 \cdot M_2)$]

$$M_i \equiv [a_1 ; a_2] = [M_4; (M_1 \cdot M_2)]$$
$$C_j \equiv (C_1 ; C_2)$$
$$i \neq j$$

In words, if a means is not available under a given condition, then any means-combination which includes the

unavailable means is unavailable under that condition. This is the case of $M_4$ under $C_2$ and $M_1 \cdot M_2$ under $C_1$.

2. The derivation of the entries in column "$C_1 \cdot C_2$":

a. Response is "Yes" in column "$C_1 \cdot C_2$":

(If $C_1$, then M*) and (If $C_2$, then M*)

$C_1 \vee C_2$

$\therefore$ M* v M*

$\therefore$ M*

Where M* $\equiv$ (All factually possible means combinations)

b. Response is "No" in column "$C_1 \cdot C_2$":

(If $C_i$, then $\hat{M} \vee \sim\hat{M}$) and (If $C_j$, then $\sim\hat{M}$)

$C_i$

$C_j$

$\therefore$ $(\hat{M} \vee \sim\hat{M})$ and $\sim\hat{M}$

Where $\hat{M} \equiv$ (All logically possible means combinations)

$C_i \equiv (C_1; C_2)$

$i \neq j$

In words (2-a) states that if a means-combination is available (not prevented) under either condition alone, it is not prevented under both conditions together. Remember that each $C_i$ represents a different dimension of the situation. If $C_i$ and $C_j$ combine to form a new relevant dimension of the situation that prevents M*, even though $C_i$ or $C_j$ alone does not, then a new dimension $C_n$ is formed and would be included in the "single conditions" column of Table II. In the present example, there would have been a column labeled "$C_3$", if $C_1$ and $C_2$ combined to prevent M*

while M* was not prevented by $C_1$ or $C_2$ alone.

On the other hand, (2-b) states that if a means-combination is prevented by one condition but allowed or prevented by another, then that means is prevented under both conditions in conjunction. In the event that, e.g., $\hat{M}$ is prevented by $C_1$ alone, allowed by $C_2$ alone, but allowed by $C_1$ and $C_2$ in combination, then the statement "If $C_1$, then $\hat{M}$" is simply incomplete. In the context of Table I, there would have to be a third column, "$C_3$", with the entry "No" in the row containing $\hat{M}$. The column labeled "$C_1$" would receive no entry (-), signifying that no relevant statement is possible or that $C_1$ does not represent the determinant level of dimension complexity.

A point that becomes clear as a result of this syntactical analysis is that, in general, the relevant conditions for means determination may not be the same as those relevant for outcome determination given means. Similarly, the means representations necessary for outcome determination through prediction models, may not be the representation necessary for means-outcome evaluation by the actor's decision model. These considerations are examined more closely in the section dealing with semantical analysis.

Summary and "Practical" Examples. Thus far, the following cognitive functions have been determined as necessary to explanations on the structured plane:

1. Determination of existing initial conditions from investigation.

2. Determination of means individually and combinationally available. This results from use of nontemporal models, simple empirical investigation, or both.

3. Mapping of individually available means on outcomes under existing initial conditions. This results from operation of prediction models given knowledge of initial conditions and individually available means.

4. Listing of factually available instrumental actions (plans). This results from (3) and knowledge of available means-combinations.

Of primary interest to this research are the junctures at which explanation and actor evaluation involve reference to real world objects and the semantical problems involved, especially as they concern the accounting system on the structured plane. The crucial elements of decision processes as formulated here are shown in Table V. The table places the cognitive functions of explanation (as set forth in the preceding section) within the paradigm of the 1971 Committee report as interpreted within the theory of rational action.

Table V is discussed within the context of two examples. Suppose the decision to be made is what depreciation method to use for certain property for income tax purposes. In this instance, the means available are the alternative methods of depreciation calculation. The determination of means available (not prevented) will entail both temporal and nontemporal "prediction" models. The tax law does specify the conditions that must be met

for a particular depreciation method to be available to the taxpayer (actor). For example, the property must, obviously, be depreciable; the tax law specifies the traits of depreciable property. Moreover, certain classes of property are depreciable by methods not allowed for other classes. For example, "new" tangible property (excluding buildings) can be depreciated at higher rates than can "used" tangible property. And in some cases the method allowed is dependent on the useful life of property.[6] Clearly, the determination of useful life involves prediction models. Then, a list of available alternatives and the corresponding outcomes can be constructed. In this example, future tax rates will partially determine the outcomes. Thus, prediction models are again involved. Finally, some alternative is chosen.

Return to Table V. In the present example, the tax law provides "If, then" propositions which allow the determination of available means. The form of these propositions is, "If property X has traits Y, then methods Z are available." In this case, it is necessary to know the existing initial conditions of the relevant aspects (traits) of the situation (depreciable objects). Of course, the determination of traits (e.g., useful life) may involve prediction models. And prediction models will

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[6]Ray M. Somerfield, Federal Taxes and Management Decisions (Homewood, Illinois, 1978), p. 190.

be necessary in the determination of future outcomes. In these latter two cases, it is also necessary to know the existing initial conditions of the relevant aspects of the situation. This determination of existing initial conditions is shown as the first function of the accounting system in Table V.

TABLE V

COGNITIVE FUNCTIONS SERVED BY THE ELEMENTS OF THE PROCESS OF DECISION

| Elements of Process of Decision | Cognitive Functions Served |
|---|---|
| Accounting / Information System | Determination of relevant initial existing conditions |
| | Determination of means available |
| Temporal and Nontemporal "Prediction" Models ("If, then" propositions) | Determination of means available |
| | Determination of possible outcomes |
| Accounting / Information System | Mapping of individually available means on outcomes |
| | Listing of alternatives available |
| Decision Models | Choice or evaluation |

After determination of means available and corresponding outcomes, there is necessary a listing of these alternatives. This may appear to be a simple processing of information. But what is brought out clearly is that the information provided for prediction and "means-availability" models is not necessarily the same as that provided for decision models through the listing of alternative means and corresponding outcomes. Even though the "same" objects are involved, the dimensions which are relevant differ depending on whether one is involved with determination of means and outcomes or evaluation of those alternative means-outcome packages. In other words, even though some object representation (data) may allow accurate prediction, it does not follow that that represenation is the relevant dimension for evaluation of that object.

Consider another example. Suppose the goal of an actor is increased productivity; this may be necessitated, from the point of view of the actor, due to declining availability of input in the face of constant or increasing demand for output. Suppose, furthermore that there are three means available as follows:

1. Managerial employees training program.
2. Production employees bonus program.
3. Merger with input supplier.

Notice that implicit in the above list are statements of the following form:

If $C_i$, then $M_j$

In other words, even if the determination of means available is the result of "pure" empirical observation or investigation, there is, after and before investigation, an implicit statement that if such and such conditions exist then such and such means are available. Indeed, the form may be "If $M_i$, then $M_i$." The reason for adopting choice among tax methods as the first example was simply that a more or less clearly stated set of initial condition sufficient to allow certain means is given through the tax law.

Continuing the present example, the next step is to generate outcomes from various alternative actions. Again it should be noted that the situation representation (data) necessary to allow determination of means and outcomes possible may be vastly different from the representation necessary to allow evaluation of those outcomes. For example, the relevant condtions for determining the availability of merger as a means might include recent governmental rulings about similar mergers in the industry and the desires of voting stockholders of companies involved. The outcomes possible under merger might be contingent on competitive conditions, general economic environment, and rate of technological change. Finally, the way these outcomes are represented depends on the decision model of the actor.

Semantic Analysis

The summary of the results thus far and the provision of examples allow a transition to the semantic aspects of the process of explanation and evaluation. The question remains, "What are the necessary semantic characteristics of accounting statements?"

Returning to Table V one finds that the primary functions of explanation are (1) determination of existing initial conditions, (2) determination of means available, (3) determination of possible outcomes, and (4) listing of alternative mean-outcome packages. In the simplest form, a sketch of explanation is as follows:

1. $C_i$
2. If $C_i$, then $M_j$
3. If $C_i$ and $M_j$, the $O_k$
4. $M_1$ $O_1$
   $M_2$ $O_2$
   . .
   . .
   . .
   $M_n$ $O_n$

One may notice the absence of statements signifying the determination of available means through investigation. However, as mentioned in the previous example, the logical form of such statements is equivalent to the logical form of prediction. Finally, remember that knowledge of conditional statements, like (2) and (3) above, is assumed.

Thus, the accounting statements can be divided into two classes--(1) those that allow prediction of relevant means and outcomes, and (2) those that allow evaluation of predicted[7] future outcomes resulting from various means. The necessary semantic characteristics of each of these classes is considered in turn.

Accounting for Predictions. As prediction model[8] relevant, the accounting statements must represent existing initial conditions. Moreover, to be useful to a rational actor, the statements must be true in a semantic sense. Examination of this contention is delayed until completion of a review of the semantic conception of truth with respect to sentences or statements.

Semantics, it will be remembered, deals with coordination of empirical objects with extralogical, descriptive terms. And, as pointed out in Chapter II, sentences have two semantical dimensions--intension and extension. Intension refers to the proposition expressed, while extension refers to truth value or empirical correspondence. Moreover, empirical correspondence is, in general, consistent with any number of intensions. For example, consider the

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[7]Evaluation of actual outcomes is addressed in Chapter V.

[8]One may object to the use of the terminology "prediction model" when referring to statements specifying the condition under which a means is available now. However, the distinction is merely pragmatic; as shown, the logical form is the same for either temporal or nontemporal conditional statements.

sentence, $A_1$--"Firm X has cash of $50,000 on May 31, 1977." Also, consider the three semantical systems, $S_1$, $S_2$, and $S_3$ which provide the rules of designation given in Table VI.

TABLE VI

PARTIAL RULES OF DESIGNATION FOR THREE SEMANTICAL SYSTEMS

| Semantical System | Symbol | Designatum |
|---|---|---|
| $S_1$ | "Firm X" | "XYZ Corporation" |
| | "Cash" | "Bank deposit balances + money orders" |
| $S_2$ | "Firm X" | "XYZ Corporation" |
| | "Cash" | "Bank deposit balances + money orders + coin and currency on hand" |
| $S_3$ | "Firm X" | "XYZ Corporation" |
| | "Cash" | "Bank deposit balances + money orders + coin and currency on hand + travelers' checks" |

Clearly, if the XYZ Corporation has bank deposits of $47,000, money orders of $3,000, coin and currency on hand of $0, and travelers' checks of $1,000, then the sentence $A_1$ is true under either semantical system $S_1$ or $S_2$ but is false with respect to $S_3$. In other words, the extension and, thus empirical correspondence, of a sentence is determined by the semantical system in operation. In the

above example, the term "cash" extends over a varying number of objects. Thus, the proposition expressed by sentence $A_1$ varies. In short, then, the empirical correspondence of the sentence may vary as the objects referred to vary.

Return now to the contention that with respect to a rational actor's cognitive orientation process in the structured plane, the accounting system must produce semantically true statements. The reader is reminded that the rational actor by definition adopts an affectively neutral orientation toward accounting statements and that accounting statements, by the present interpretation of the analytical distinction between accounting, prediction, and decision models, must represent existing initial conditions to fulfill the requirements of prediction models. Thus, to add the restriction that the representations must be semantically true with respect to prediction models simply implies that the semantical system implicit in the construction of the prediction model must be referred to when making observations on the "real world." Otherwise, the predictions generated will be semantically true only by coincidence.

For example, consider the following "prediction" model:

> "If Firm X has bank deposits + money orders equal to Y, then Firm X has cash of Y."

Furthermore, imagine that Firm X has bank deposits of

$47,000, money orders of $3000, and coin and currency on hand of $0 and that by summing these amounts one "predicts" cash of $50,000. Relative to the aforementioned prediction model, this statement is semantically true; but, only by coincidence, it appears.[9]

It may be argued that the example is "unrepresentative" especially since no prediction model is involved. But, as noted in footnote 8, the distinction between prediction and cross-sectional models is pragmatic. The logical form and issues are the same. For example, consider the prediction model:

$$"R_{t+1} = a + b \cdot M_t$$

where "a" and "b" are some constants and "$M_t$" is some observable.

$M_t$ is an existing initial condition. $R_{t+1}$ is to be predicted. The model may be restated as follows:

"If $a + b \cdot M_t$ equals X, then $R_{t+1}$ equals X"

The analogy to the previous case should be clear--"$a + b \cdot M_t$" is analogous to "bank deposits + money orders." Once again it should be noted that whether $R_{t+1}$ is in fact obtained is a question for the next chapter, when the realized plane is discussed.

Accounting for Evaluation. Turn now to the semantic

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[9] It may as a matter of fact be the case the firms avoid cash on hand. In that case the prediction model is merely succint or frugal in expression. This, however, draws in pragmatic issues which cloud logical exposition.

aspects of those accounting statements which serve to allow evaluation of predicted future outcomes. It is assumed that the actor has been provided with a list of relevant mean-outcome combinations. The relevant dimensions of the alternatives may or may not be the dimensions that were used as inputs to or generated as outputs of prediction models. This "dual purposiveness" of accounting statements in the structured plane, viz., as prediction and decision model relevant, is discussed more fully in the final chapter of this research.

In the context of evaluation the distinction between means and goals (or relevant outcomes) must be eliminated. When discussing the determination of available alternatives, it is helpful to maintain a distinction between means and outcomes. However, once a list of available mean-outcome packages has been provided, then the packages themselves are the evaluated unit. The desirability of any action relative to any other action is the relative desirability of the two means-outcome packages. While one may be inclined to view this situation in the context of "minuses" and "pluses" (i.e., sacrificing means and obtaining consequences), such a distinction is confused. While the evaluation is an evaluation of future plans which themselves are means and outcomes combinations, the evaluation may be along dimensions cutting across the prior means-outcome distinction. The distinction is useful only for discussion of cathectic-cognitive discrimination

of the actor. Moreover, the elimination of the distinction at this point does not militate against the use of the concept of "outcomes" or "goals" in the context of the first stage of the actor's orientation, since at that stage the actor has no knowledge of how, if at all, those outcomes can be brought about. In short, there is no necessary weighing of "cost" of means against "benefits" of outcomes once potential plans have been established. While there are certainly costs and benefits and while the plan chosen will, by definition, have the greatest net benefit, there is no necessary attaching of costs to means and benefits to outcomes. That is to say, the means-outcomes distinction is eliminated.

As decision model relevant, accounting statements must allow choice or evaluation of alternative courses of action. If the accounting statements are to be useful, the representations must be consistent with the dimensions along which the actor evaluates available alternatives. As with prediction models, the representations must be semantically true. An example of evaluation will support and clarify these contentions.

Suppose that a decision-model-relevant aspect of the situation is straight-line depreciation, D, calculated as "D = (C - V ) ÷ L", where "C", "V", and "L" represent historical dollar outlay, future dollar salvage value, and expected service life, respectively. The accounting statement S, then, is "D is x dollars." As an input to a scheme for evaluating various alternative actions, S

must be consistent with the actor's decision model which, as discussed in Chapter III, is a means of weighting various standards or values of the actor in a manner which reflects moral values. In other words, the impact of alternative actions on certain standards is revealed directly or indirectly, fully or partially, by the magnitude of D. And if the actor's relative weighting of each standard against all other standards is to be interpretable by the actor, the statement, S, and all other accounting statements used evaluatively, must have the relationship to values that the actor holds according to some system or must allow the actor to adjust to such a relationship.

This idea of relationship to values is made less vague through continuation and simplification of the present example. Suppose, then, that the actor has three standards for evaluative purposes and that available as aids in the evaluation of two alternatives are the accounting statements, $S_1$ and $S_2$--viz., "$D_1$ is $X_1$" and "$D_2$is $X_2$"--corresponding to alternatives $A_1$ and $A_2$, respectively. $S_i$ represent some dimension of $A_1$ and $A_2$, which impacts on the values of the actor. The incorporation of these statements into the evaluation is in effect a quantification of a value. The quantification as a result of any statement may be adjusted across values. The extent of such adjustment is one function of a decision model.

For simplicity, assume D represents the only relevant dimension of $A_1$ and $A_2$. A schematic of a decision model in

context of this example is given in Table VII. Notice that each value weights a given dimension differently. In other words, the values rank a given dimension. Moreover, all other dimensions would be ranked by each value and, thus, be ranked relative to all other dimensions along all values.

TABLE VII

SCHEMATIC OF A SIMPLIFIED DECISION MODEL

| Value | Quantified Dimension D | | |
|---|---|---|---|
| | Weight | Alternative $A_1$ | Alternative $A_2$ |
| L | a | $X_1$ | $X_2$ |
| M | b | $X_1$ | $X_2$ |
| N | c | $X_1$ | $X_2$ |

More generally, then, there will be numerous dimensions represented from various data sources. In order for the actor to choose among alternatives with respect to some value and dimension, there must be comparability across alternatives. To allow this comparison, any represented dimension or aspect of two situations must be the "same" dimensions. The "sameness", if one is to avoid metaphysics,

must be grounded in observable, verifiable, evidential matter. It is necessary to have a grounding in observables. In other words, one semantical system must operate across alternatives--presumably the system of the actor or a system transformable to the actor's. In short, truth in the semantical sense as explained earlier (See pages 110-113.) is necessary.

Notice that D does not have to represent any empirical object "directly." For example, straight-line depreciation has no "direct" empirical referrent. One cannot in any sense observe depreciation, any more than one can observe specific gravity. Rather, both are mathematical calculations, the values of the variables being based on measures of empirical objects.

Also, it is necessary that the actor be able to compare dimensions. This function of decision models is accomplished through differential weighting of different dimensions on any value, while maintaining proper weighting across values. Clearly, such weighting is subjective. But, as pointed out, comparisons within dimensions across alternatives demands empirically sound representations of dimensions.

## Summary

This chapter has been limited to actor types who view accounting statements as instrumental objects. Two functions of those objects were examined, the predictive

and evaluative. Accounting itself operates according to a model which is distinct from prediction and decision models.

Goals of the actor are taken as given. The predictive function of accounting provides the actor with cognitive discrimination among instrumental objects, i.e., different ways of achieving certain goal relationships are specified. This specification involves prediction models. And, since prediction models are themselves instrumental objects, it is assumed that prediction models are specified. This assumption avoids infinite regress.

Prediction models provide knowledge of how certain outcomes can be brought about given certain means and conditions. Thus, there must be knowledge of existing initial conditions and available means. The determination of available means involves models which have a logical form that is the same as that of prediction models. In short, the process of cognitive discrimination involves determination of the intersection of available instrumental actions (including inaction) and the actor's desired future relationships with goal objects.

Decision models specify actor-relevant dimensions along which competing plans of actions can be evaluated. This evaluation is the final step in the decision process. The distinction between prediction and decision models allows for the possibility that the dimensions of instrumental actions and outcomes that are necessary for and

a consequence of prediction models may be different from the dimensions relevant for evaluation of that same means-outcome package. Nevertheless, implicit in any choice is prediction of alternatives and evaluation of alternatives.

In short, the cognitive function of the planning function of accounting is to support the cognitive requirements of prediction and decision models. In the case of prediction models, it has been shown, the accounting model operates by making selections from the observation plane and representing those observations in a manner consistent with prediction models. The consistency requirement demands that the accounting model embrace rules of designation relating descriptive accounting terms and empirical objects. And these rules must be identical to the rules upon which the prediction models are based or must be capable of transformation into those rules.

In the case of decision models, which can in a sense be interpreted as including prediction models, accounting statements must represent action-complexes along dimensions consistent with the dimensions specified by the actor's decision model. This choice involves comparison of action-complexes. The comparability demands an accounting representation that is verifiable independent of the actor value(s) which requires evaluation along those dimensions. Otherwise, one has the untenable case that an evaluation proceeds along dimensions which are themselves value

determined, i.e., one evaluates, according to some values, dimensions which are determined by those values. Verifiable independence is achieved by rules of designation which are consistent with rules of designation implicit in the decision models. In order to allow choice, the rules will necessarily be consistent across alternatives with respect to any dimension or will be transformable to common rules of designation.

In sum, this chapter has viewed accounting models as a fundamental element of explanatory systems. Within this context and with accounting statements viewed as instrumental, cultural objects, this research has specified the necessary logical characteristics of accounting statements. It is not maintained that, nor examined whether, accounting statements do in fact possess these characteristics. Instead, this chapter identified those syntactical and semantical characteristics that accounting statements must possess in order for accounting to fulfill its cognitive function on the structured plane. Essentially, accounting as a language must have a clearly specified syntax and one or more explicit or implicit semantical systems. Without a ruled syntax and referential base, accounting as a cognitive tool fails.

# CHAPTER V

# THE REALIZED PLANE

## Introduction

The purpose of this chapter is to expand the analysis of the cognitive functions of accounting to include what has been termed the "realized plane." The fundamental issue is whether the logical empiricists' requirements of historical explanation are necessary for adequate accounting explanations in the realized plane. It should be noted that accounting is still viewed relative to a rational actor, as previously defined. However, this chapter does relax one assumption of the previous chapter; specifically, it is no longer assumed that prediction models are given. This relaxation brings issues of historical analysis to full light.

## The Realized Plane

### Summary of Structured Plane

It will help to review briefly the nature of the actor's decision process and the related cognitive function of the accounting model, insofar as the structured plane is concerned. In its predictive function, the accounting

system makes selections from the observation plane in a manner consistent with prediction models. In other words, the accounting model must operate with reference to a semantical system that is consistent with the semantical system implicit in prediction models.

The predictive function of accounting, then, is to provide inputs to prediction models such that a set of available, instrumental actions and related outcomes can be generated. But, in order for the actor to evaluate these alternatives, the plans must be represented along decision-model-relevant dimensions. Effecting this representation involves the evaluative function of accounting. Notice that in fulfilling this function the accounting model must represent <u>future</u> states of affairs. Obviously, this can be accomplished only if there are <u>predictions</u> of relevant dimensions of future situations. Thus, decision models and the related evaluative function of accounting can be viewed as encompassing prediction models and the predictive function of accounting. While it proved useful to maintain an analytical distinction between prediction and decision models in the previous chapter, this chapter can safely eliminate the distinction. This simplification will result in no loss of generalizability. In the present chapter the phrase "decision model" will be used with the understanding that a broader meaning is intended than in the previous chapter, viz., the phrase encompasses the meanings previously attached

attached to "prediction" and "decision" models.

The final step in the decision process is the choice of a plan of action. As the above discussion and the previous chapter indicate, the choice of alternative plans of action is completely determinable in the case of a fully specified (and more broadly interpreted) decision model. The function of the accounting model, as an instrumental object of the actor, is to make decision-model-relevant selections from the observation plane in a manner consistent with the semantical system of the decision model.

## Basic Character of the Realized Plane

Returning to Figure 6 of Chapter IV, one finds that the realized plane encompasses the outcomes of implemented instrumental actions and that accounting operates on the realized plane through afferent information channels. This information is used by the actor to formulate new plans or revise old ones.

There are three basic characteristics of afferent channels that are of primary importance: (1) incompletely specified decision models, (2) the function of control, and (3) the necessity of historical analysis in the first instance. Each of these characteristics is discussed in turn.

First and foremost, the afferent channels are characterized by a less than fully specified (i.e., incomplete)

decision model. It is no longer assumed that the accounting model is completely guided by the semantical system of the actor's decision model, since it is no longer assumed that the actor's decision model is actor-complete. An actor-complete decision model or process is a state of affairs wherein all currently existing conditions are either included in one or more true and relevant prediction models or are ruled irrelevant. Relevant prediction models are those describing the instrumental actions necessary to bring about all possible outcomes which are individually cathected by the actor. Moreover, the actor must be sufficiently value-oriented, i.e., the actor must have stated values and choose accordingly. An actor-complete decision model was illustrated in the previous chapter. Now an incomplete process is assumed. The aspect of incompleteness which is under analysis in this chapter is revealed shortly. In any event, the actor is unable, due to the incompleteness, to specify an accounting-model-relevant semantical system. Notice that an actor-complete decision process is not necessarily a state of complete certainty, since a prediction model may specify an instrumental action that will possibly bring about two or more individually cathected outcomes with equal or unequal probabilities.

The second characteristic of the afferent channels is the accounting function of control of the decision process itself. Due to the actor-incomplete decision model,

the actor is faced with indecision as to future courses of action. This indecision can arise from two sources. First, there can be indecision as a result of conflicting values of the actor. In terms of the previous chapter, such indecision can be described as an actor's inability to specify the relative weights that should be assigned to the actor-specific values. Secondly, there can be indecision because the consequences of action cannot be determined. In terms of the previous chapter, such indecision can be described as the lack of actor-relevant prediction models. The accounting function of control is examined in light of this second source of indecision.

The lack of a completely specified decision model also implies the third basic characteristic of the accounting process--the necessity of an historical analysis in the first instance. Without instruments of cognitive discrimination, the actor cannot act rationally. In other words, the situation lacks structuring. The purpose of control is to eliminate this predictive incompleteness. In order to effect this purpose, there must be an investigation of the past, i.e., an historical analysis. Support for and clarification of this contention is provided in the following section.

## Rational Action Paths, Deviations, and Event Selection

In sum, the cognitive function of the accounting model

with respect to the realized plane is to provide an historical analysis that will allow control over the decision process.[1] Stated in another way, the efferent-channel function of accounting is to select and represent events such that deviations from the "rational action path" are corrected. A discussion in terms of the concept of "rational action path" will place the issues of this chapter in clear relief.

The schematic representation of the concept of rational action path is given in Figure 10. The schematic represents the results of the structured plane operation of the actor's decision model and the related accounting model. Assuming a fully specified decision process, the accounting model's function is to make observations according to the semantical system of that decision process. The final result of the decision and accounting model operation is the selection of a plan of instrumental action. In other words, a rational action path (RAP) is determined.

The accounting function of control implies deviations from this rational action path. The first question that arises is whether a deviation has obtained. The second question is how to correct any deviations. The two are closely related and the solution to both of these queries

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[1] It should be noted that control over the decision process implies control over that which the decision process itself controls, such as the performance of sub-ordinates (object-actors).

is a function of the accounting (control) model.

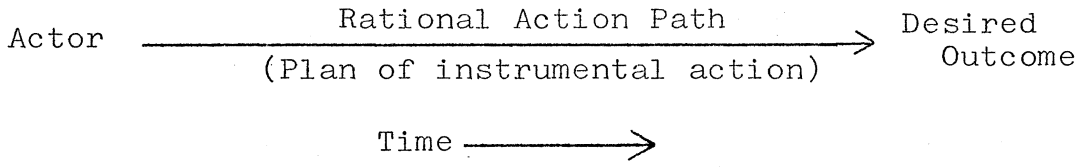


Figure 10. Rational Action Path

Before proceeding with this discussion, one simplifying assumption is made. It is assumed that the actor's values and the relative weighting of those values remain unchanged. In other words, the deviation from the rational action path is not a result of the actor's desiring a new goal relationship, all other things the same. Indeed, as the only source of deviation, the change in an actor's valuation system could be examined within the context of the previous chapter. Thus, the assumption that such value changes do not take place does not result in loss of substantive content.

Return now to a consideration of the two "control queries." First, it is shown that an historical analysis is necessary to the solution of these queries. Then, this research turns to the main question of this chapter, viz., What are the necessary cognitive characteristics of the accounting model in light of the requirement of historical

analysis as fundamental to the control function?

A schematic representation of the control problem is given in Figure 11. Actual actions have deviated from the rational action path. Discovery of this deviation, solution of the first control query, must be the result of comparison of actual instrumental actions relative to the original rational action path. This comparison is illustrated in Figure 11 by the points "a" and "a′". Notice that there is comparison to the original rational action path. However, the solution to the second control query, how to correct the deviation, may require more knowledge than that provided by observation of the actual instrumental actions and the original RAP. The reason of the original RAP will not serve as a device for correction of some deviations is simple--the RAP will change any time there is a deviation not encompassed in the original plans. This type of deviation implies a prediction model error of some sort, since it is assumed that the valuation system of the actor is unchanged. The predictive error may have arisen from (1) a prediction model which is insufficient relative to the observed deviation, or (2) an input represented in a manner inconsistent with the semantical system of the prediction model. For simplicity it is assumed that there is no error of the second type. Thus, the predictive error is a result of insufficient prediction models, including therein the associated semantical system. Therefore, since RAP's are the result of prediction models

(holding actor values constant), it follows that the control process, in certain deviation correction situations, must correct prediction models. Otherwise, there is no justification for realized plane control models.

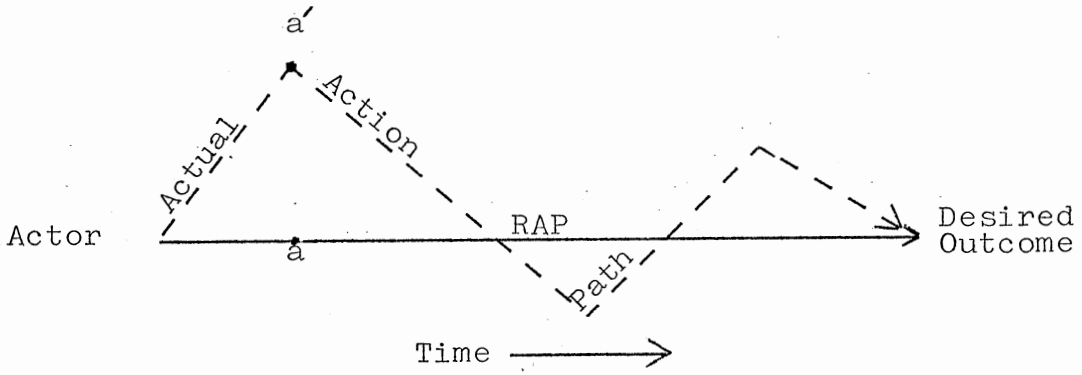


Figure 11. Deviations from the Rational Action Path

In order to clarify the foregoing discussion, consider the argument that the prediction model is correct and that the deviation correction process is a matter of adjusting parts into a coordinated whole. Such an argument seems particularly forceful if one has in mind the control of some mechanical process or a process wherein persons are viewed as mechanical parts of that process. But this still leaves open the following question--"According to what model are the adjustments made?" If such a model is known, then that model, by definition, is part of the original rational action path. In other words, one has the same

scenario as in the discussion of the structured plane. Thus, what is admitted in the discussion of the realized plane is the possibility of deviations which cannot be corrected relative to the original RAP. This, then, implies discovery of a new RAP, i.e., adjustment or correction of prediction models themselves.

In sum, the discovery of deviations is a relatively simple process. Observations are made on actual actions (or intermediate outcomes) in a manner consistent with the original semantical system. However, deviations not encompassed by models which are a part of the original RAP will demand an historical analysis. In contrast to the structured plane, there must be discovery of (potential) RAP's. This is the fundamental distinction between planning and control. The structured plane is characterized by complete decision processes, while the realized plane is characterized by incomplete processes. Planning assumes completeness, while control demands discovery of causes of deviations from plans in order to eliminate incompleteness.

Return to Figure 11. Suppose an actor is discovered at point "a′ " when the proper position is point "a" according to the original RAP. The first question that must be asked is whether point "a′ " is encompassed by the original RAP. If answered in the affirmative, then a "new" RAP would emerge in light of "a′ ". On the other hand, "a′ " may not be encompassed by the original RAP. In that event,

a new RAP must be discovered. This discovery may be thought of as the selection of prediction models from an inventory of such models. However, in order to choose some model(s), there must be an analysis of the reasons "a′ " came about instead of "a". Discovering such reasons characterizes historical analysis and will presumably provide a basis for choosing relevant prediction models. In other words, discovering why "a′ " obtained is actor-relevant only if the reasons allow choice among prediction models that will provide the actor with a new cognitive orientation (as discussed in Chapter IV), allowing the formulation of new plans.

## Cognitive Requirements of Historical Analysis

In summary, the accounting process of control involves correcting or adjusting the decision process through an historical analysis directed toward the discovery or selection of relevant prediction models. The questions addressed in the remainder of this research revolve around the cognitive requirements of accounting-control explanations. Because of the similarity between this question and the questions of the cognitive requirements of historical analysis in general, this research begins by examining the requirements of historical analysis as set forth by logical empiricists. The interest of these philosophers of science in the area of historical analysis

parallels the concern of this research. For example, consider the following quotation from Ernest Nagel:

> It is often maintained that the natural sciences are nomothetic, whereas history (in the sense of an account of events) is idiographic; and it is claimed in consequence that the logic and conceptual structure of historical explanations are fundamentally different from those of the natural sciences. It is my aim here to examine this and related issues in the logic of historical analysis.[2]

Also, consider this statement by Nicholas Rescher:

> The claim is frequently made that the mode of explanation to be found in history differs radically and fundamentally from the types of explanation found in the natural or social sciences. This difference is said to lie in the fact that history, unlike science, must always deal with 'the description of a situation or state of affairs which is unique.' It is argued that the exclusive objects of historical understanding are unique, particular, concrete events: the historian, it is contended, is primarily concerned with describing and analyzing the unique features of his data, unlike the scientist who looks to the generic.
>
> It is the thesis . . . that such a claim regarding history (which, properly understood, contains a large measure of truth) cannot, without severe qualifications, survive objections which can be brought against it.[3]

Essentially, the question posed in the last part of this research is whether accounting must be viewed as patently non-scientific in its role of providing an account-of-events. Notice that the previous chapter constructed a paradigm of accounting explanation that was consistent with

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[2]Ernest Nagel, "The Logic of Historical Analysis," Readings in the Philosophy of Science, ed. Herbert Feigel and May Brodbeck (New York, 1953), p. 688. (Emphasis added.)

[3]Nicholas Rescher, Essays in Philosophical Analysis (Pittsburgh, 1969), p. 193.

the logical empiricists' paradigm of scientific explanation. In the present chapter, however, this research examines the plausible alternative that, due to accounting's critical function of control and the resulting necessity of historical explanations, accounting-control explanations are fundamentally unlike scientific explanations.

This research proceeds by first examining the logical empiricists' paradigm of historical explanation, a paradigm which is consistent in all fundamental aspects with scientific explanation. Then, counter-arguments to that paradigm are examined. Finally, the requirements of accounting-control explanations in the realized plane are set forth.

## The Paradigm of Explanation

### General Laws in Historical Explanation

The paradigm of explanation held by logical empiricists finds its most lucid exposition in the locus classicus, "The Function of General Laws in History" by Carl Hempel. It is maintained that in order to explain some event (or, more precisely, a statement about some attribute(s) of some event), one must identify the causes, $C_i$, of that event, E. In the words of Hempel:

> Now the assertion that a set of events--say of the kinds $C_1$, $C_2$,..., $C_n$--have caused the event to be explained, amounts to the statment that according to certain general laws, a set of events of the kinds mentioned is regularly

> accompanied by an event of kind E. . . . In history as anywhere else in empirical science, the explanation of a phenomenon consists in subsuming it under general empirical laws; and the criterion of its soundness is . . . whether it rests on empirically well confirmed assumptions concerning intitial conditions and general laws.[4]

In other words, an explanation is constituted by a logically valid, empirically sound argument. A schematic of the basic form of explanation is given in Figure 12.[5]

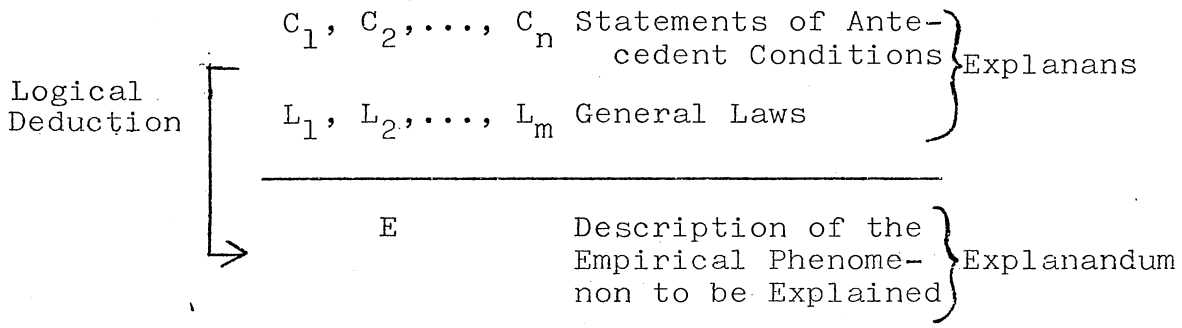


Figure 12. Logical Form of Explanation

In the context of this research, the empirical phenomenon to be explained is some deviation, E, from original plans which is correctible only upon discovery of the causes of the deviation, C.

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[4]Carl Hempel, "The Function of General Laws in History", Theories of History, ed. Patrick Gardiner (Glencoe, Illinois, 1959), pp. 345 and 353.

[5]From Carl Hempel and Paul Oppenheim, "The Logic of Explanation," Readings in the Philosophy of Science, ed. Herbert Feigel and May Brodbeck (New York, 1953), p. 322.

The general laws are interpreted as models which state that conditions $C_i$ are regularly accompanied by deviations E. It is assumed that in the structured plane all relevant prediction models are specified; but, in the realized plane such "structuring" is necessary, i.e., prediction models must be discovered.

Before moving on to the next topic, it should be emphasized that the form of explanation maintained by the logical empiricists is identical to that put forth by this research in the discussion of the structured plane. In that earlier discussion it was assumed that a fully specified deductive system was available. At that point, the nonlogical terms were "means", "conditions", and "outcomes." Now, the terms "means" and "conditions" are replaced by "causes" or antecedent conditions, while plan-deviating outcomes are the events to be explained. This correspondence between the logical form of prediction in the structured plane and explanation in the realized plane is not surprising when one recognizes that

> . . . the same formal analysis . . . applies to scientific prediction as well as to explanation. The difference between the two is pragmatic. If E is given, i.e., if we know that the phenomenon described by E has occurred, and a suitable set of statements $C_1, C_2, \ldots, C_k, L_1, L_2, \ldots, L_n$ is provided afterwards, we speak of explanation of the phenomenon in question. If the latter statements are given and E is derived prior to the occurence of the phenomenon it describes, we speak of a prediction. It may be said therefore, that an explanation is not fully adequate unless its explanans, if taken account of in time, could have served as a basis for predicting the

phenomenon under consideration.[6]

This last quotation brings to light the final question addressed in this research--Are accounting explanations in the structured plane and the realized plane logically identical and distinguishable only along some pragmatic dimension? Or, is there some logical difference between the two? The question is especially interesting if one recognizes that the discussion of the structured plane simply assumed the logical form now under question. Thus, the final part of this research can be seen as a critical examination of that assumption. Earlier in this chapter, it was argued that the planning-control bifurcation is, in a logical sense, untenable unless it is assumed that relevant prediction models (general laws) are pre-specified in the structured but not in the realized plane. The question which arises is whether these models are necessary to the control function of accounting. If answered in the affirmative, then there is no logical difference between adequate planning and control explanations. If answered in the negative, then this research offers a possible logical difference between planning and control explanations, since such an answer affirms a logical distinction maintained by some historians between "scientific" (planning) and "historical" (control) explanations. In any event, the potential difference between planning and control

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[6]Hempel and Oppenheim, "Logic", pp. 322-323.

explanation--knowledge of general laws in one case, the need for discovery in the other--gives credibility to the assertion that planning and control explanations are pragmatically different and that the distinction is not arbitrary.

## Rational Reconstruction, Explanation Sketches, and Principles of Adequate Explanation

In sum, then, the logical empiricists hold that explanation, historical or otherwise, involves reference to empirically valid general laws and the deductive form of argument. However, this paradigm is not held to be an exact duplication of the explanations provided by historians, or physical scientists for that matter. Instead, these philosophers are reconstructing in full the logical structure of the explanations actually provided by historians, social scientists, and others. For example, one might explain the collapse of a city street by stating that the sewers were very old and had collapsed some time ago; and that as a result the underlying road bed had been washed away by recent heavy rains. Clearly, the argument as stated does not logically entail the collapse of the city street. There may well be other streets that have not collapsed that are subject to the conditions mentioned. Hempel describes this sort of "explanation" as follows:

> What the explanatory analyses of historical events offer is, then, in most cases not an

> explanation . . ., but something that might be called an explanation sketch. Such a sketch consists of a more or less vague indication of the laws and intitial conditions considered as relevant, and it needs "filling out" in order to turn into a full-fledged explanation.[7]

Nonetheless, the relevant intital condtions or causes that are indicated by the "sketch" must be empirical in nature. For example, to explain that the previously mentioned street collapsed because of the "destiny of roads" or the "hand of historical justice" would be a psuedo-explanation, not an explanation (sketch). The psuedo-explanation provides no direction to a "data-collector" or empirical investigator.[8]

The principles of adequate explanation that can be distilled from the last two sections are as follows:

1. The explanans must allow deduction of the explanandum.
2. There must be general laws and these laws must be required for the derivation of the explanandum.
3. The explanans must have empirical content; this condition must hold if some empirical phenomenon is being explained. This is the condition of "verifiability in principle" that was discussed in Chapter II.
4. The explanans must be true.[9]

An example which meets these requirements of explanation follows. Suppose it is observed that a business

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[7]Hempel, "General Laws," p. 351.

[8]Ibid.

[9]Hempel and Oppenheim, "Logic," pp. 321-322.

firm's actual direct labor efficiency ratio (units produced ÷ hours of direct labor) is 4 to 1 while the standard or planned ratio is 5 to 1. Leaving aside the question of the desirability, from some actor's point of view, of expending the effort to determine the cause of this deviation from standard (which raises similar issues but in a different context), one might provide the following explanation of this deviation:

1. Explanans:

   a. Initial or antecedent conditions:
      Industry A has suffered a series of localized strikes in a disperse area. This firm has not been the object of such a strike and is in industry A.

   b. General law:
      If an industry is subjected to localized strikes, any firm which is not itself subject to such a strike will nonetheless experience a decline in productivity if the firm is in the industry subject to those strikes.

2. Explanandum: This firm has experienced declining productivity.

If one returns to the four conditions of adequate explanation given earlier, it can be seen that the above explanation is adequate, assuming that the general law and antecedent conditions are true. The critical question to be dealt with is whether general laws are indeed necessary to historical explanations.

Before beginning the examination of this critical issue, one overriding distinction between the scientist and the historian can be made. The scientist has as his object the formulation of general laws. The historian, on the

other hand, uses general laws (or, generalizations) as the means for explaining the "facts."[10] The accountant appears to hold a position similar to that of the historian. Returning to the example of the declining labor productivity, one can view the general law as a means, not an end, of the accountant. The social scientist would, however, quite probably consider it his task to formulate such laws. Notice that this distinction does not argue against generalizations in historical accounts; indeed, it assumes such generalizations.

## Event Selection and Explanation

The arguments for and against general laws in history revolve around one pervasive question--What is the historian's principle of event selection? In other words, what attributes of events does a historian admit as relevant and why? Clearly, not all attributes can be recorded and laid down in an historical account. In the words of John Dewey:

> All historical analysis is necessarily selective. Since the past cannot be reproduced in toto and lived over again this principle might seem too obvious to mention. But it is of importance because its acknowledgment compels attention to the fact that everything in the writing of history depends upon the principle used to control selection.[11]

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[10] Nicholas Rescher, pp. 196-197.

[11] John Dewey, "Historical Judgments," The Philosophy of History in Our Time, ed. Hans Meyerhoff (Garden City, New York, 1959), p. 167.

The analogy to accounting is clear--What is and is not relevant to control-explanations? What shall be accounted for and what shall be left unrecorded? Logical empiricists maintain that four principles of event selection are necessary to provide sound explanations--truth, empirical content, non-superfluous general laws, and inference of explanandum from explanans. This has already been reviewed. This section, then, examines some arguments that general laws are unnecessary to adequate explanation and, thus, as event-selection devices. It should be noted that the requirements of truth, inference, and empirical content are generally accepted.

The most lucid and cogent argument that general laws are unnecessary to historical explanation is provided by Michael Scriven.[12] Scriven distinguishes three elements of explanation--(1) accuracy, (2) relevancy, and (3) adequacy. Each of these is examined in turn in order to clarify Scriven's argument against the necessity of general laws in history.

The accuracy of an explanation deals with the truth of and the corresonding evidence for the assertions made through the explanans and explanadum. In the context of the preceding example, the truth of the assertion of declining productivity would be involved. Notice that

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[12]Michael Scriven, "Truisms as the Grounds for Historical Explanations," Theories of History, ed. Patrick Gardiner (Glencoe, Illinois, 1959), pp. 443-475.

(accounting) explanations can be more or less accurate and yet be true in all cases. For example, the statements that productivity is declining and that productivity is declining at the rate of X% can both be true. In any instance, the degree of accuracy is a choice problem analyzable according to the method set forth in this research. Accuracy, while important, is not the fundamental issue here.

The relevance of an explanation involves the kind of explanation offered. This is a context-bound concept. Accountants are familiar with this aspect of explanation through the near-maxim of "different cost for different purposes." As another example, suppose that the proferred explanation for the declining productivity was that the direct laborers had experienced a declining motoneuron response time which, according to some general law, is concomitant with declining productivity. This explanation might well be irrelevant to the solution of the problem at hand, even though it is true or accurate.

The final element of explanation specified by Scriven is the adequacy of the explanation in its role of explanation. It is disagreement about the required grounds of adequate explanation, Scriven maintains, that separates "covering-law" theorists (those advocating general laws as necessary to explanation) and those disputing those theorists. All reflective persons will, presumably, agree that the grounds for accuracy and relevancy of an explanation lie

in evidential matter and fitness-for-purpose, respectively. But cannot the grounds for an adequate explanation and the adequate explanation itself be examined separately in a manner similar to a separation of an assertion and the evidence for that assertion? For example, suppose that as an explanation of declining productivity one stated the following: The declining productivity is due to the localized strikes throughout the industry even though none of this firm's plants have experienced strikes. Assuming relevancy and accuracy, the question is whether the explanation is adequate. This leads to the fundamental question: Are general laws necessary for justification? In this example it may appear obvious that to defend the above assertion as adequate one would offer the general law connecting widely disperse, localized strikes and worker's declining productivity; the question is whether some other grounds in certain instances might be sufficient to justify an explanation. In Scriven's words: "Once we remove from an explanation's back the burden of its own proof we are in a better position to see the criteria for judging both."[13]

The question raised here is important and, fortunately, resolvable, at least in the context of this research. Suppose the following explanation form:

If C, then E

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[13]Scriven, "Truisms," p. 451.

C
∴ E

In words, there is general law stating that C regularly accompanies E and there is a statement that C has obtained. It can thus be concluded that E obtained.

But according to Scriven, the explanation could be stated as:

C
∴ E

And if someone asked why C explains E, the response would be as follows:

Because, if C, then E.

This leads to the position that explanation is trivial to obtain, since if one wishes to explain any event, E, then one could proceed as follows:

If ∼(∼E) then E
∼(∼E)
∴ E

In other words, double negation would provide adquate explanation. Clearly, this does provide a logically correct (or, deductively valid) explanation. But what purpose does it serve?

One can, and Scriven does, produce explanations in history that are similarly "trivial", i.e., that approach a statement of a single instance in a general form. For example, consider the following explanation of why Cortes sent out a third expedition to Baja California after two failures:

1. General Law:
   "All confident people with Cortes' background of experience, seeking very great wealth, undertake any venture involving the hazards of this one, which offers very great wealth.
2. Initial Conditions:
   "The third voyage envisioned by Cortes involved the hazards that it involved and offered very great wealth."

   "Cortes was confident and had Cortes' background of experience and was seeking very great wealth."[14]

Scriven's argument, then, is that if one demands a deductive model explanation but no general laws are known, then one is forced to provide trivial explanations. However, the argument confounds two concepts--justification of an explanation and the justification of deduction.

One can deduce from the statements, "For all X, if X is A then X is B" and "This X is A", the statement "This X is B." This involves operations on statements; and one would presumably invoke the rule of inference, modus ponens, if one were required to justify the inference.[15] The question that arises is whether it is consistent in the use of language, i.e., unconfused, to say that an explanation that has the deductive form is justified since it has that form. The answer is negative. Instead one could say the inference is valid since the form of the argument is the same as that required by the rule of modus

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[14] Ibid., p. 454.

[15] This and other rules of inference are derived in most texts on symbolic logic. For example, see Irving M. Copi, Symbolic Logic, 4th ed. (New York, 1973), p. 32.

ponens. The question as to whether the explanation, in contradistinction to its form, is justified seems to carry no meaning unless one has relevancy (which can be interpreted to encompass the "empirical content" requirement of logical empiricists), accuracy (truth), or the supporting general law in mind.[16]

Thus if general laws are known, they appear to be necessary to justify explanation. Yet, what about those cases where no relevant (fit-for-purpose) general laws are known, but an explanation is nonetheless required? A second argument against general laws in explanation employs the assumption that no relevant general laws are available and that the purpose of explanation is something such as "getting on with the story." For example, suppose someone is asked to explain why he is limping. And the explanation given is that the injured party was leaving from his home when he tripped at the top of the stairs because he was unaccustomed to his new shoes. This resulted in injury to his right kneecap and the limp.

Suppose the above explanation is satisfactory to the questioner. Certainly there are no general laws. And it appears that any "filling out" of this "explanation sketch" would indeed move toward the trivial in the sense

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[16]Adapted from May Brodbeck, "Explanation, Prediction, and 'Imperfect' Knowledge," Readings in the Philosophy of the Social Sciences, ed. May Brodbeck (London, 1968), pp. 383-385.

illustrated earlier. In other words, it is not generally the case that persons with new shoes trip and injure themselves such that they limp afterwards. An explanation in terms of general laws would probably involve reference to physical laws and be irrelevant to the questioner, while any deductive form explanation that was relevant would probably become trivial.

It is clear that the above explanation of the limp is adequate but without general laws. It quite simply serves its purpose. Such explanations are encountered daily. They are common-sense explanations. There are no relevant general laws--none are desired, none are sought.[17]

But what can be said about control explanations for the rational actor? In this case the purpose of the explanation is not simply to provide a description of what happened, but rather to provide an explanation which will allow correction of some undesirable situation. There must be a setting forth of corrections between various (corrective) actions and outcomes. In other words, prediction is necessary. And prediction involves general statements (or laws) connecting various events, actions, and states of affairs.

Of course, generality is a matter of degree. And, as previously pointed out, general laws are, to accountants,

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[17]For a more detailed treatment of common sense in history see J. H. Hexter, The History Primer (New York, 1971).

means of explanation not ends in themselves. What remains to be shown is that such laws are necessary as event selection devices. The argument is that some event selection devices are necessary, that to provide predictive explanations one must show connection among events, actions, and state of affairs, and, finally, that general laws serve these purposes.

First, examine the case where no principle of event selection is maintained. Such a proposal has been put forth under the rubric of "events approach." Essentially, the proponents of this approach to accounting argue that accountants should <u>avoid</u> the selection problem by recording events without "aggregation." The logical extreme of this approach reveals its hopelessness. Suppose some event is to be recorded. The question is which attributes are to be noted and which are to be omitted. Any event can be described without limit unless some selection criterion is imposed. In schematic form, one would encounter the following data set for n events at time t where x attributes are identifiable:

$$\begin{array}{ccccccc} E_{11} & E_{12} & E_{13} & \cdot & \cdot & \cdot & E_{ix} \\ E_{21} & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ E_{n1} & \cdot & \cdot & \cdot & \cdot & \cdot & E_{nx} \end{array}$$

Of course, there is no logical reason for limiting attributes. And, over time, a time subscript must be added

since a similar event may take place at different points in time. For example, one dollar spent on commodity X at time t might be encoded as "$1$_t$\rightarrow X$_t$", while one dollar spent on a similar commodity X at time t + 1 might be encoded at "$1$_{t+1}$\rightarrow X$_{t+1}$", and so on. Moreover, since time is infinitely divisible, the events-approach implies an infinite data set.

Thus, it is not a question of whether selectivity is necessary but what selection criterion is necessary. And, as pointed out earlier, the question is answerable only if some purpose is assumed. The purpose of explanation in the context of this research is prediction. Prediction involves generalization of some degree <u>if</u> one is to avoid the problem of the events approach, i.e., an infinite data set. In other words, certain attributes of events are ruled irrelevant while others are ruled relevant in the sense of showing connection among events. Of course, not all connections are relevant to control in a purposive-action sense. Returning to the paradigm of rational action brings out these points clearly.

The rational actor is faced with a deviation from the RAP. This deviation is deemed serious enough to demand investigation of its cause with the general goal of correction or adaptation. The situation wherein prediction models (general laws) which allow correction of the situation are available has been fully discussed under the heading of the structured plane. Now, however, the situation posited

is that no such models are known. Thus, an historical analysis is needed which results in an explanation that provides a cognitive orientation for the actor. Corrective actions and results are displayed allowing choice according to some decision model. Notice that this characterization of cognitive orientation is a description of general laws, or statements that ". . . a set of events of the kinds mentioned is regularly accompanied by an event of kind E."[18] And the explanation cannot be merely trivial statements of the initial conditions and the consequent in general form since the generalization also operates as an event selection device.

But, the question remains--How do these unknown laws operate as event selection devices? The situation faced in the realized plane demands selection of a prediction model (or general law) that will in turn direct the accountant to relevant events for purposes of deviation correction. Generalizations are needed to allow selection of relevant events, but these general laws are unknown. Thus, in order to avoid the infinite data set problem of the event approach, there must be some model or procedure for choosing among prediction models. It is assumed that there exists an inventory of prediction models from which one chooses a model relevant to the problem at hand on the basis of evidence as to the sources or causes of the deviation.

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[18]Hempel, "General Laws," p. 345.

The "inventory assumption" accords with the view of prediction models as instruments of the accountant, not goals toward which an accountant strives.

At this point the fundamental distinction between the accounting model's function of planning and control can be drawn. In its planning function, the accounting model simply selects and represents those events specified by the semantical system of the actor's decision model. However, in its control function, the accounting model has the broader and more complex task of specifying procedures for selecting prediction models. The nature of such procedures is problematic, involving issues of induction, and is beyond the scope of this research. However, there is the requirement that the completed control explanation allow prediction, or specification of courses of action, which allow correction of observed deviations. Thus, the thesis put forth here is that planning and control explanations are identical in final form. The difference between the two is one of degree of knowledge or cognitive orientation prior to data collection efforts of the accountant. The planning-control distinction attains force only with respect to the amount of direction provided by relevant semantical systems.

## Summary

The question addressed in this chapter was whether accounting-control explanations must exhibit those

characteristics maintained by logical empiricists as necessary to adequate explanation of empirical phenomenon. According to these philosophers, explanation must (1) conform to some logically valid argument form which allows deduction of the phenomenon to be explained, (2) include nonsuperfluous general laws in the explanans, (3) have empirical content, and (4) be true.

In Chapter IV it was assumed that general laws (prediction models) were available. Also, due to the acceptance of the 1971 AAA Committee's distinction among accounting, prediction, and decision models, accounting statements are accepted as observation on empirical objects. Moreover, it was shown that, in order to allow a cognitively unhindered operation of a rational actor's decision process, accounting statements must be semantically true. Thus, in Chapter IV requirement (2) from above was assumed, requirement (3) was accepted as necessary for accounting to operate in its domain, and requirement (4) was found to be a necessary feature of accounting statements with respect to a rational actor. Finally, the requirement of logical validity merely emphasizes the necessity of clearly defined rules for operation on statements such that prediction models and accounting statements can be restated in a form useful for the rational actor, viz., in the form of available alternatives and concomitant outcomes.

In Chapter V, it was no longer assumed that relevant

prediction models, devices directing the accountant to relevant aspects of the empirical domain, are available. Actions have deviated from the "rational action path" and, relative to the state of affairs as a result of this deviation, there is a void of instruments (prediction models) necessary to an actor's achievement of cognitive discrimination. Thus, the question arises--Are general laws necessary to explanation in the realized plane?

It was found that the completed explanation of the accountant must involve generalized prediction models if (1) the rational actor's need for cognitive discrimination is to be served, i.e., the accounting statements are to be useful to a rational actor, and (2) the infinite data set problem is to be avoided. In other words, the alternative to accepting general laws is to provide the user an infinite data set; and, if usefulness to a rational actor is accepted as a criterion for accounting statements, then general laws must have predictive force (provide cognitive orientation).

In sum, then, the minimal requirements which necessitate the referencing of non-trivial prediction models when providing explanations in the realized plane have been identified. Moreover, since only one assumption from Chapter IV was relaxed and that assumption is now accepted in this chapter, it follows that all requirements found to be necessary to accounting explanation in the structured plane are also necessary in the realized plane. In short,

all the requirements of the logical empiricists are necessary in either case.

# CHAPTER VI

# SUMMARY, IMPLICATIONS, AVENUES FOR FURTHER RESEARCH

## Introduction

This chapter begins by stating the research question and summarizing the fundamental research assumptions. Then, the method of analysis is reviewed, followed by a summary of the analysis and a statement of conclusions. Finally, certain implications and avenues for further research are examined.

## Research Question

This research poses the following question: What are the necessary and fundamental features of the knowledge that accounting provides in its role of aiding reasoned action?

## Fundamental Assumptions

The following fundamental assumptions permeate this research:

1. Accounting serves an informative function. This assumption is inherent in the research question. While accounting may serve any number of purposes, such as "socially optimal" resource

allocation, it is the informative function of accounting in serving those purposes that interests this research.

2. Accounting is the tool of rational actors. This assumption is also inherent in the research question, since accounting is viewed as aiding reasoned action. Indeed, in order to clearly explicate the meaning of "reasoned action" and "informative functions," it is necessary to define a rational actor. Essentially, a rational actor bases decisions on factual connections between actions and outcomes. For example, if a rational actor desired to encourage "socially optimal" resource allocation through the selective choice of accounting system requirements, the choice would be based on factual connections between accounting statements resulting from such systems, the actions of users of those statements, and the resource allocations resulting from those actions. Of course, the informative function of accounting might be more direct. For example, accounting data might provide certain input necessary to the actor's decision regarding choice of accounting systems for purposes of "socially optimal" resource allocation.

3. Accounting, prediction, and decision models are analytically distinct elements of decision processes. This assumption results from acceptance of the paradigm of the 1971 AAA Committee on Theory Construction. The precise nature of these three models becomes clear upon coordination of the committee's paradigm with the features of rational decision processes as set forth in the theory of action.

4. Accounting models function in both planning and control. The planning function of accounting involves efferent information channels, those which cause action on the environment; the control function of accounting involves afferent information channels, those which provide information about the environment.

5. Efferent channels operate in light of actor-complete decision processes; afferent channels operate in light of actor-incomplete decision processes. An actor-complete decision process is a situation wherein all currently existing conditions are either included in one or more true and relevant prediction models or are ruled irrelevant. Relevant prediction models

> specify the actions necessary to bring about the outcomes cathected by the actor. Moreover, the actor must choose according to his values. It is assumed that prediction-model insufficiency is the source of afferent-channel incompleteness. The accounting function of control is to operate with afferent channels in order to eliminate this incompleteness.

## Method of Analysis

Semiotics is the method of analysis used in this research. This technique involves the analysis of syntactic, semantic, and pragmatic aspects of knowledge or information. Syntax involves relations among language signs; semantics involves the relation of language expressions to the empirical objects or operations designated by those expressions; pragmatics involves the relation of language expressions to users.

Syntactical analysis is the study of formal logic, i.e., operations on marks to form expressions and operations on expressions to form new expressions. Examples of expressions are sentences in English and algebraic equations in mathematics. In a "rationally constructed" language, one which has stated rules for all syntactical and semantical operations, the following syntactical rules will obtain: (1) rules specifying allowable marks, (2) rules of formation, specifying allowable combinations of marks in the formation of expressions, and (3) rules of transformation, specifying ways that expressions can be transformed into other expressions.

Semantical analysis is the study of the meaning of language expressions. In a rationally constructed language the following semantical rules will obtain: (1) rules of designation, specifying what empirical objects or operations are referred to by expressions, (2) rules of truth, specifying the conditions under which a sentence may be held out as true, and (3) rules of ranges, specifying when a sentence may be held out as holding in a particular "state description."

Two important semantical concepts, intension and extension, must be understood, since a conclusion of this research rests on those concepts. Moreover, to understand those concepts, one must understand the distinction between analytic and synthetic sentences. These concepts are reviewed here.

If syntactical and semantical rules alone are sufficient to demonstrate that a sentence is true, then that sentence is analytic; however, if extralinguistic investigations are required to demonstrate this truth, then that sentence is synthetic. Avoiding technical complications, the distinction is as follows: A sentence will be known to be true without empirical investigation only if that sentence holds in all state descriptions, since one of the state descriptions must be true. Such a sentence is analytic--true on the basis of accepted semantical and syntactical rules. All other sentences are synthetic, i.e., have a truth dependent upon correspondence with the facts

which can be discovered only through empirical investigation. Moreover, two sentences are logically equivalent only if their mutual implication is analytic; two sentences are factually equivalent if their mutual implication can be discovered only through empirical investigation.

Next consider the concepts of intension and extension. Intension involves the meaning of sentences; extension refers to the scope of predication and the related correspondence with empirical facts (truth). Two sentences have the same intension if they are logically equivalent; two sentences have the same extension if they are equivalent. (Notice that, without modification, "equivalence" can refer to either logical or factual equivalence.) It follows that logically equivalent sentences are always factually equivalent. But, factually equivalent sentences are not necessarily logically equivalent. In other words, two sentences with the same intensions have the same extension, i.e., the sentences refer to identical classes and have the same truth value. On the other hand, two sentences with the same extension do not necessarily have the same intension or meaning.

In short, factually equivalent sentences may or may not have the same meaning. This leads one to the proposition that the truth of any sentence can only be known if a semantical system is referenced when making such a determination. The truth of a statement is necessarily conditional upon a particular semantical system's specified

intensions. Thus for one to legitimately specify a statement as empirically correct, it is necessary for that individual to specify the semantical system which is referenced. This conclusion is used later when the requirements of an accounting system are developed.

## Summary of Analysis

### Coordination of the Concept of Rational Actions and 1971 Committee's Paradigm

The purpose of explicating the concept of rational action and coordinating this with the committee's paradigm is to distinguish clearly among accounting, prediction, and decision models and to specify clearly the accounting function which interests this research. Since accounting functions to aid decisions by a rational actor, the necessity of explicating the concept of rational action and distinguishing among accounting, prediction, and decision models is patent.

Action, the attempt to attain goals within a situation, involves three elements--the actor, the situation, and the orientation of the actor to the situation. Actors can be viewed as personality systems or social systems and as either the subject or object of action. This research deals with the subject-actor as a personality system.

The situation, that part of the world which the actor takes into account, is comprised of objects. These objects

may be social or nonsocial, instrumental or conditional. Nonsocial objects may be further classified as either physical or cultural.

Both physical and cultural objects can be transmitted from one actor to another. Transmitting physical objects results in change of possession. Transmitting cultural objects, or symbols, results in change of possession and also a way of acting, since culture is a way of orienting or acting.

Instrumental objects are those which the actor controls or uses in bringing about desired ends; conditional objects are those which provide constraints within which the actor operates. Accounting statements are viewed as cultural, instrumental objects which transmit knowledge to actors. In other words, accounting is analyzed in its function of providing actors with new cognitive orientations towards objects.

Orientation, the actor's relations-to-objects, has three elements--cognition or knowing, cathexis or wanting, and evaluation or choosing. Any action involves these three elements. In other words, an actor's orientation to the object world requires cognitive processes, which yield knowledge of the object world; cathectic processes, which yield a desire for a new or maintained relationship with those objects; and evaluative processes, which yield choice among potential means and goals. Notice that under this paradigm of choice there is initially a mapping of available

knowledge about relationships among objects onto the actor's cathected, personal relations-to-objects. This is labeled cathectic-cognitive orientation. Then, there is choice among the cathectic-cognitive discriminations. This is labeled evaluation; it involves choice among various means and resulting outcomes.

Implicit in the above discussion of the actor's process of orientation to the object world is (1) choice among competing knowledge claims if competing claims have presented themselves, (2) assessment of an action's gratificatory significance, viewed in isolation from other actions, and (3) assessment of the importance of various plans (action-combinations) from the point of view of the system as a whole. The standards or values involved in each of these three choices are cognitive, appreciative, and moral, respectively. These standards manifest themselves as consistent patterns of relationship between the actor and the object world. The rational actor is posited as one who holds cognitive standards as primary with respect to performance-perceived instrumental objects and holds appreciative standards as primary with respect to quality-perceived goal objects.

At this point the 1971 Committee's paradigm of the decision process is briefly reviewed. Then, that paradigm is coordinated with the concept of rational action. The committee identified three elements of decision processes--accounting, prediction, and decision models. Accounting

models interpret observations on the empirical world and input this data to prediction models. The output of prediction models is input to a decision model, resulting in the choice of a plan of action.

Coordination of the committee's paradigm and the concept of rational action follows. Prediction models are viewed as means of mapping instrumental objects onto goal objects. Prediction models allow the actor to achieve the cognitive aspect of cathectic-cognitive discrimination. It is assumed that goals are specified, i.e., that cathectic discrimination is achieved prior to operation of prediction models. (More precisely, it must be stated that only cognitive aspects of cathectic-cognitive discrimination are examined, since the two aspects are interdependent. See Chapter III, pp. 53-54 for a fuller discussion.)

Decision models are means of evaluation of alternative courses of action that are determined through the operation of prediction models. Prediction models specify various mean-goal packages (actions) available to the actor. The decision model is a model of choice among alternative course of action.

Accounting models provide empirical observations as input to prediction models. Thus, accounting models can be viewed as the semantical system of prediction models or, more precisely, as making representations of empirical observations in a manner consistent with the semantical system of prediction models.

## Semiotic Analysis of Accounting Explanation

The accounting model functions to aid rational (reasoned) action by providing input to prediction models which in turn provide input to decision models. This section reviews the syntactical and semantical analysis of accounting explanation, a concept that includes selection of prediction-model-relevant empirical events or objects, symbolic representation (classification and measurement) of selected events and objects, and generation of predictions in decision-model-relevant form.

Accounting explanation is viewed as deductive in logical form. A completely specified deductive system of explanation will have the following syntactical rules:

1. Rules of enumeration and classification--These rules specify allowable signs of the language and classify those signs as logical or descriptive.

2. Rules of formation--These rules specify the ways signs of the language can be combined to form sentences.

3. Rules of transformation--These rules specify allowable (logical) transformations of sentences into other sentences.

In addition to the above syntactical rules, there must be a semantical system in order for the deductive system to receive interpretation. The necessary rules are as follows: (1) rules of designation, (2) rules of truth, rules of ranges, and (4) rules of correspondence. Rules of designation specify what is referred to by descriptive signs. Rules of truth and ranges operate to specify which

sentences are analytic and which are synthetic. These rules have been reviewed in this summary.

Rules of correspondence connect descriptive sentences of the deductive system with empirical (observational or operational) sentences. These rules of correspondence have the characteristic of allowing both implication from the deductive system to observational sentences and also inference from observational sentences to descriptive sentences of the deductive system.

The coordination of the concept of rational action and the committee's concept of accounting, prediction, and decision models leads to the previously described concept of accounting explanation. Using the semiotic method of analysis, (deductive) accounting explanation, in its simplest form, has the function and related logical form, as displayed in Table VIII.

In other words, the accounting model generates two classes of statements in the process of accounting explanation. The first type, the description of existing initial conditions, allows prediction of relevant means and outcomes. The second type, the representation of alternative mean-goal packages, allows the actor to evaluate those mean-goal alternatives. Prediction models are crucial links between these two types of statements.

An important semantical requirement is that accounting statements provide semantically true representations. The dimensions represented, whether for the

purpose of prediction or decision model input, must be consistent with, or transformable to, the dimensions specified by the related semantical system. Basically, the reasoning for this conclusion is as follows. An individual cannot specify a statement as empirically true unless some meaning or intension is specified; otherwise, multiple intensions will generally lead to multiple extension. (See pp. 160-161 of this chapter for elaboration.) Semantical systems specify those intensions and link these meanings to observables (i.e., objective, evidential matter). Thus, accounting statements can be held out as correct only if some semantical system is specified.

TABLE VIII

THE LOGICAL FORM AND COGNITIVE FUNCTION OF ACCOUNTING EXPLANATION

| Element of Accounting Explanation | Cognitive Function Served | Logical Form (or Symbolic Representation) |
|---|---|---|
| Accounting Model | Determination of existing initial conditions | $C_i$ |
| Prediction Model | Determination of means available | If $C_i$, then $M_j$ |
| Prediction Model | Determination of possible outcomes | If $C_i$ and $M_j$, then $O_k$ |
| Accounting Model | Representation of alternative mean-outcome packages in decision-model relevant form | $M_1$ $O_1$<br>$M_2$ $O_2$<br>⋮ ⋮<br>$M_n$ $O_n$ |

## The Control Function of Accounting

When discussing the control function of accounting, it is convenient to eliminate the analytical distinction between prediction and decision models. Henceforth, the term "decision model" is used to include the concepts of prediction and decision models as used previously. (See Chapter V, pp. 123-124 for a fuller discussion.) Nonetheless, accounting models provide a link between deductive models (decision models in this context) and empirical observations.

Previously, it has been assumed that decision models were completely specified, i.e., that decision and accounting models were sufficient for a cognitively unhindered choice of actions. This sort of complete decision process allows each existing initial condition to be ruled as either relevant or irrelevant. The control function of accounting is characterized as operating under the constraint of an incomplete decision process. Specifically, it is assumed that the predictive function of the decision process is cognitively insufficient relative to observed deviations from the "rational action path," the course of action decided upon during the planning stage. Of course, it could be argued that there is never a complete (cognitively unhindered) decision process. Under this clearly acceptable view, this section of the research is seen as a critical examination of a crucial assumption of the

foregoing analysis.

Under a complete decision process, adequate explanation must adhere to the following principles:

1. The explanans (the statements of initial conditions and general laws) must allow deduction of the explanandum (the predicted outcomes desired by the actor, or subsequent deviations from the rational action path).

2. There must be general laws and these must be required for derivation of the explanandum. In the context of this research, general laws are decision models, broadly interpreted.

3. The explanans must have empirical content. This condition is required if some empirical phenomenon is being explained.

4. The explanans, both the general laws and the inputs from the accounting system, must be true.

Condition (1) simply requires logical validity. It emphasizes the necessity of specified syntactical rules. Condition (3) requires "verifiability in principle." The necessity of objective, verifiable evidence is emphasized. (See Chapter II, pp. 37-38 for elaboration.) This condition is accepted insofar as accounting models are concerned with verifiable, empirical statements. Condition (4) requires that general laws and observational statements be empirically verified. This condition emphasizes the necessity of specified semantical rules. The requirement of semantical truth has been shown to be necessary for accounting statements. Moreover, the predictive function of decision processes require verified prediction models. In other words, accounting statements must be consistent with verified prediction models in order

for the actor to make cognitively unhindered evaluations of alternative actions. Thus, conditions (1), (3), and (4) are necessary for adequate accounting explanation.

The absence of condition (2), however, is precisely the feature of decision processes that makes control explanations necessary. (See Chapter V, pp. 124-132 for an extended discussion.) If relevant general laws are known, then one can plan adequately and completely. (The syntactical and semantical requirements of accounting explanation under these circumstances have been reviewed in the immediately preceeding section.) But, for a situation to be "out of control" implies that either the predictive or evaluative aspect of the decision process is incomplete. It is assumed that evaluative aspects are sufficient; thus, predictive models are insufficient. In other words, certain relevant general laws are unspecified and control explanations are necessary.

A fundamental question, then, is how unknown general laws can obtain and thus make control explanations adequate. Or, are such laws unnecessary? The answers to these questions are reasoned as follows. Any explanation must be a generalization to some degree. The alternative to "shearing off" certain features of the situation is to provide the decision maker with an infinite data set. The latter alternative is clearly not feasible. Thus, selectivity is necessary; certain aspects of an event or state of affairs must be reported and all others must be left unreported.

This cannot be avoided.

The question that arises is what tool is to be used to make that selection. That question can be answered only with respect to completed explanation as follows. The rational actor requires predictions. As a result, the completed explanation, i.e., the basis for the reported information, must be general laws of predictive force. This requirement provides the accountant with a tool of selection that avoids an infinite data set and provides useful information to the decision maker. The only feasible alternative is an arbitrarily limited data set.

But this conclusion points to a fundamental, unanswered question--How are these general laws discovered? In turn, this question brings to light the singular feature of accounting models, viz., the characterization of accounting models as functioning in a capacity that is larger and more complex than merely operating according to some decision-model-specified semantical system. Instead an accounting model must embrace rules that allow inference from observation to general laws. The nature of this model is problematic.

## Summary of Analysis and Results

### Analysis

This research held out as its first task the explication of the concepts of accounting, prediction, and

decision models and the definition of accounting's informative function. In other words an analytical distinction was drawn among accounting, prediction, and decision models. This, in turn, allowed precise definition of accounting explanation which is requisite to accounting's informative function.

This first task was accomplished by coordinating the paradigm of the 1971 AAA Committee on Accounting Theory Construction with the concept of rational action. The Committee's paradigm specified the cognitive function of accounting, prediction, and decision models, while the theory of action provided a basis for defining rational action and thereby specifying the cognitive requirements of rational action. A coordination of the two paradigms allowed explication of the informative function of each of the three models.

The second task was to identify the necessary requirements of accounting explanation. This task was accomplished by examining the cognitive function of each of the three elements of the decision process in the context of adequation explanation. The analysis adopted certain techniques of semiotic analysis. Specifically, the syntactical and semantical requirements of adequate explanation were identified, leading to an identification of the requirements of accounting explanation. In short, the logical form, function, and requirements of each of the three elements of the decision process were identified and

the function and requirements of accounting models, the means of linking explanatory systems to observables, were identified.

The third task was to extend the analysis to the control, as opposed to the planning, function of accounting explanation. This was accomplished by first distinguishing planning and control. This last analysis gives insight to the problematic nature of accounting models.

## Results

The first primary result of this research resulted from the first two tasks of this study. First, the 1971 Committee's paradigm of accounting, prediction and decision models and the concept of rational action were coordinated, leading to an explication of those three elements of the decision process and to a specification of each element's cognitive function. Also, the meaning of accounting explanation was made clear. Then, adopting the logical empiricists' model of deductive explanation, the logical form and requirements of each element of accounting explanation was specified. Finally, given the analytical distinction of accounting, prediction, and decision models, accounting models were interpreted as necessarily semantical-system-consistent. Accounting models are the means of linking explanatory systems to observables. The requirements of such a model implicitly encompass all requirements of the explanatory system as a whole.

Of course, it can be argued that the distinction drawn among accounting, prediction, and decision models does not in fact hold. Nonetheless, the analytical distinction holds and provides useful insight. In sum, accounting explanation encompasses all cognitive aspects of the decision process up to final choice by the actor. The logical form, function, and requirement of the elements of that explanation have been identified. In particular, accounting models were seen as directly involving semantical systems that are implicit in objective, verifiable explanatory systems.

The foregoing results are conclusions drawn from an analysis of accounting explanation in the context of fully articulated deductive systems. A "complete" decision process, as defined earlier, was examined. In other words, the first section of this research examines accounting models in the context of planning. But, the second section examines accounting models in the context of control. However, before this can be accomplished, the distinction between planning and control must be drawn. In particular, the characterization of planning as operating in light of a complete decision process must be defended. The clear distinction drawn between planning and control, and the effect of this distinction on the nature of accounting models constitute the other primary results of this research.

Planning involves providing explanations that effect

action. Control involves feedback of results of action for purposes of replanning. The need for feedback information can result from actions that deviated from the plan or original plans that are wrong. If actions deviate from a correct plan, correction of actions is simply required. If the means of correcting the action is known then there is no replanning--the original plan will suffice. But if the original plan is wrong, or if the means of correcting actions are unknown, then replanning is necessary.

The question can be raised--What is a correct plan? A correct plan appears impossible to define. But a complete system of explanation can be defined as a state of affairs wherein all currently existing conditions are either included in one or more true and relevant prediction models or are ruled irrelevant. Action, the result of planning, assumes such a complete system. If the impact of some current condition is not known to be relevant or irrelevant, the actor must act as if it is irrelevant. But control implies a deviation that requires replanning, i.e., some irrelevant factor is found to be, in fact, relevant for some reason. The purpose of control is to discover the reason, to replan. If the reader will now read the preceeding paragraph by replacing the word "right" with "complete" and the word "wrong" with "incomplete," the argument for the planning and control distinction will be complete.

The distinction between planning and control leads to

a final and fundamental result of this research. Control requires discovery of causes of deviations from planned outcomes such that corrections are possible. Corrections are possible only if prediction models can be discovered. Thus, accounting models must allow inference from observations to prediction models (general laws). In sum, accounting models are much more complex than is implied by those who maintain that accounting could solve its data selection problem if the prediction models used by decision makers were known. Even if that were known, there is the strong possibility of incomplete decision processes which require accounting to fulfill a control function. Clearly, research into the nature of this control model would provide fundamental insight into the problems of accounting. This presents an avenue for further research, while the present study provides a tool or method useful in such research.

## Extensions

The final section of this study provides a number of extensions, all of which have been mentioned in passing at convenient points. Most, if not all, of these comments stem from the view of accounting as an inherent part of explanatory systems. This view quite naturally recognizes accounting systems as subject to all requirements of an objective, verifiable explanatory system.

In Chapter II, it was pointed out that the concept of

multiple-purpose accounting statements is potentially inconsistent with the goal of empirically correct accounting statements, unless accounting systems are viewed as involving some immediate semantical system. The reasoning is as follows. Semantical systems specify meaning or intension. And as the number of interpretations of any statement increases, so do the extensions. As a result, the likelihood of any statement being true relative to all interpretations diminishes as the number of semantical systems increase. Moreover, the concept of general purpose financial statements implies multiple semantical systems, one for each class of user. Thus, if accounting statements are to be held out as empirically true propositions prior to transmittal, it is necessary to specify the related semantical system prior to transmittal. Finally, it can be noted that the present approach to "standard setting" in financial accounting appears to be an attempt to specify a single semantical system. While the approach receives various criticisms, it is not entirely clear what viable alternatives are available. If information were generated through a "free" market system with participants who demanded verified information, the problem of semantical system specification remains. In short, "standard setting" would presumably be present, whether imposed by formally established, quasi-governmental bodies or by "consumers." In either event, costs of standard setting are imposed, and the relative efficiency of the two means of setting

standards seems to be an open question.

Two additional points deserve elaboration. The first concerns the question of "truth in accounting," while the second involves the "dual purposiveness" of accounting. As will be shown, the two questions are closely intertwined.

The question of truth in accounting has generated a good deal of argument among accountants. The controversy revolves around whether accounting statements must be "true." While the precise meaning of truth appears to be unspecified, those supporting "truth in accounting" tend to support proposals that result in measurement of "true income," a concept of well-offness of the measure entity. If that entity begins and ends some period of time at the same level of well-offness, then no income was generated; and, so forth. It can be fairly said that issues of income measurement absorb a great deal of time of accountants.

On the other side are those accountants, especially those interested in "information economics," who maintain that accounting information, like any other economic good, does not necessarily have anything to do with truth but rather with satisfaction of the consumer.

As it stands, this controversy appears, and probably is, irresolvable. As a result, a further examination in the context developed in this research is provided. Within the paradigm set forth here, actors are viewed as using information in two ways--the predictive and the evaluative. This situation, described as the "dual purposiveness" of

accounting statements, clearly reveals the nature of the controversy.

Those who view accounting questions in the context of "economic good" questions are wont to remark that, given equal cost, the solution to the question should be in favor of that which yields a more finely discriminated object world. Those who advocate true income approaches, meanwhile, will decide the question according to a standard of nearness to some ideal income construct. Within the paradigm of this research, an accounting information question is solvable only by reference to prediction and decision models, i.e., by reference to known and relevant ways to discriminate the object world. The relevant dimensions are specified by the semantical systems encompassed by prediction and decision models used by the rational subject-actor.

The controversy is placed in perspective as follows: The "true income" accountants, if they view accounting statements as useful to a rational actor, must admit that the measurement of the success of an actor/entity during some period allows the determination of future actions. Their approach is to define success along a scale called "income" which is, under the paradigm of this research, a measurement along some evaluative dimensions. But, according to the results of this research, in order for such a measurement to provide information useful for choice among future alternatives, the objects represented must first be

discriminated along prediction-model relevant dimensions and then along evaluative dimensions. Thus, it follows that true income accountants (and probably many more) view accounting information as unique in that it represents states of affairs along evaluative dimensions which are also useful for predictive purposes.[1]

On the other hand, the "information economics" accountants view accounting statements as partitioning the object world along certain unspecified dimensions. And since this discrimination is not restricted in any way, it follows that alternative discriminations are often non-comparable along a scale of "degree of information." More specifically, the issue dealt with is choice among alternative accounting information packages (goods) which partition the object world in different ways. But, according to the paradigm set forth here, the actor cannot choose without some information of a predictive and evaluative nature. Thus, the approach of the information economists involves a regress from choices of information system users to choices of information systems selectors or evaluators. In order to choose among accounting systems, the subject-actor (information system evaluator) must be able to discriminate among those systems. The decision process, if rational, demands predictive and evaluative

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[1]Exactly this approach is taken by Lawrence Revsine, Replacement Cost Accounting (Englewood Cliffs, 1973).

discrimination, including knowledge of the way each alternative system partitions the object world, the actions of object-actors (information system users) upon receipt of messages from the alternative systems, and so forth. Indeed, a similar problem was encountered in this research. As a result, it was initially assumed that the devices of cognitive discrimination were available, i.e., prediction and decision models were given.

Thus, to avoid infinite regress, the information economists must admit of devices specifying relevant dimensions of the object world. But, in that case, if they view accounting information as a cognitive tool that is to be useful to a rational subject-actor, it follows that semantical truth is a necessary requirement of accounting information, whether "accounting information" is interpreted as information necessary to choose information systems or information resulting from such systems.

In summary, then, both parties to the controversy appear to be committed to the necessity of truth, provided that usefulness to a rational actor as subject is maintained as the purpose of accounting information. The apparent disagreement is simply one of emphasis. The information economists emphasize the economic aspects of choice among information packages. But this in itself implies cognitive discrimination along predictive and evaluative dimensions and, thus, the necessity of semantical truth. The "true income" accountants emphasize accounting

information as measurement along predictive-evaluative dimensions and must also accept the necessity of semantical truth.

Finally, it should be noted that the above "resolution" of the controversy holds only with respect to rational subject-actors. For example, suppose that some accounting information evaluator (the subject-actor) is choosing among accounting information packages for the purpose of transmission to some user (the object-actor). If the subject-actor is rational then his choice process will be as explicated in this research. The information package chosen will depend on the subject-actor's prediction and decision models. And for the subject-actor, empirical validity of the information used is necessary for a cognitively unhindered decision process. In other words, semantical truth is necessary. However, with respect to the object-actor no such assertions are possible unless that actor is characterized according to the pattern-variables of Chapter III. In any event, when one turns to the object actor's choice process from his point of view, that actor, by definition, becomes a subject-actor. In short, without pattern-variable characterizations of the user of accounting information, no statements about the requirements of accounting information are possible.

A third extension involves the interpretation of the balance sheet. Accounting statements function to provide knowledge of existing initial conditions in prediction-

model-relevant form and representations of alternative means-outcome packages in decision-model-relevant form. As popularly interpreted, the balance sheet is recognized as a statement of financial condition. The basic idea is that the balance sheet provides a statement of the condition of a firm at some point in time. Thus, the implied purpose of the balance sheet appears to be to provide information as to the existing initial condition for purposes of prediction. As a result, it is essential that those statements are identified with a semantical system that specifies relevant conditions.

A final extension involves a case against the matching concept at a fundamental level. This research accepts a means-goal paradigm of action, which results in viewing accounting as providing statements for purposes of prediction and evaluation. Prediction ultimately results in alternative instrumental plans of action; there is a listing of alternative instrumental actions and resulting outcomes. Evaluation involves choice among those alternatives. However, there is not necessarily an attaching of "costs" to means and "benefits" to outcomes. In other words, the distinction between prediction and evaluation is most fruitfully viewed as two aspects of one problem. Prediction involves the determination of the impact of alternative actions on the state of affairs, while evaluation involves choice among those alternative actions given the resulting impact. Choice is not necessarily constrained by a

requirement that alternative actions (means) are negative aspects and that the new states of affairs (outcomes) resulting from those actions are positive aspects. While the means-outcome distinction is beneficial for purposes of prediction, evaluation of alternatives may be along dimensions that cut across the previous means-outcome distinction.

In short, it is a truism that the actor will choose the means-outcome package that provides the greatest net benefit. But, at the point of evaluation, the alternative packages are the objects of choice; it is not necessarily a situation of sacrificing means to achieve outcomes. However, the concept of matching, as put forth by many, appears to embrace the concept of matching costs of sacrifices against the benefits achieved by that sacrifice. Moreover, the objects of sacrifice and objects of benefit are determined prior to all actions. In other words, the matching concept implies the identification of the objects of sacrifice (means) and objects of benefit (goals), where costs attach to the means and benefits attach to the goals. For example, examine the following quotation from a popular accounting text:

> The basic principle is to match expenses with revenues; 'let the expenses follow the revenue.' Thus, expenses should be recognized not when wages are paid or necessarily when work is performed but when that work actually makes its contribution to revenue. . . . The matching principle thus dictates that efforts (expenses) be matched with accomplishments (revenue) if

feasible.[2]

The weakness of this concept is now apparent. Objects of sacrifice are specified prior to all actions and only negative aspects (costs) are identified with those actions; objects of benefit are identified prior to all actions and only positive aspects (revenues) are identified with those actions. This eliminates the possibility of positive aspects of instrumental actions and negative aspects of the resulting outcomes. In other words, there is an attaching of costs to means and benefits to outcomes, where means and outcomes are specified prior to action. Evaluation, it has been argued, is more fruitfully viewed as an aspect of the choice process that is unconstrained by the prior predictive aspect. At point of evaluation, the means-outcome distinction is unnecessary.

The much stronger concept provided in this research recognizes accounting systems as encompassing immediate semantical systems. This concept of accounting emphasizes the importance of the informative function and, as shown in this section, provides a useful tool for examining various accounting issues, including income measurement.

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[2]Donald E. Kieso and Jerry J. Weygandt, Intermediate Accounting, 2nd ed. (New York, 1977), p. 31

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