SENSE, CERTAINTY AND SIGNALING

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By

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CHAPTER I

INTRODUCTION

The purpose of this thesis is to point out a little
(i.e. not sufficiently) noticed relation between the
problems of defining such troublesome semantical predicates
as "true", "denotes" and "means" and some problems of
epistemology, particularly those concerning the grounding
of empirical beliefs.

At the outset, establishing a connection may not
seem too problematical. Yet, the problems of semantics
are not in any obvious sense problems concerning the
justification of beliefs. Rather, they result from an
attempt to give an adequate analysis of semantical
predicates -- and these latter, as we shall see in this
thesis constitute a somewhat different kettle of fish.

I

Epistemological problems, prima facie, are problems
of justification. Allowing, even, that insofar as these
are philosophical problems what is demanded here, as well,
is an adequate analysis of troublesome predicates, one
still should note that epistemologists are concerned with
predicates such as "credible", "knows", "believes", etc.
which are pragmatic rather than semantical predicates.

In each case, the problems arising are many and

familiar. They will not be reviewed here.

Instead, let us recall one aspect of each of these sets of problems. It is required for the analysis of semantical predicates that proffered definitions be relativized to a specified language.[1] This requirement results from the possibility of a sentence that is true in one language being false or meaningless in another. A rule of truth for a specified language asserts that a sentence of the language will be called "true" on the condition that a semantical relation specified by the rule obtains between the sentence and extralinguistic events.

As epistemologists, suppose we are concerned with rules of confirmation for scientific theories. We would like to present an adequate analysis of the predicates "confirmable" and verifiable". We assert that a theory is confirmed when certain logical relations obtain between the theory and a batch of true observation statements. Of course, no theory is ever completely confirmed. But that is not the issue here. The point here is to call attention to the semantical problem of defining "true" for the observation statements of a theory or for some statements which will confirm observation statements.

C. I. Lewis[2] has proposed that there are some statements that are (and indeed must be) immediately verifiable. The meaning and truth of these statements is indubitably recognized in experience. He takes the position that such

statements are necessary for confirmation of theories.
Adopting a slightly worn usage we shall call such statements
"protocol statements".

Without protocol statements, according to Lewis, <u>we</u> <u>can</u>
<u>only</u> <u>establish</u> <u>logical</u> <u>relations</u> <u>among</u> <u>the</u> <u>statements</u> <u>of</u>
<u>science</u>, and "no logical relationship, by itself, can ever
be sufficient to establish the truth, or the credibility
even, of any synthetic judgment. Unless the beliefs so
related, or some of them, have a warrant which no logical
principle can assure, no logical relation of them to one
another constitutes a scintilla of evidence that they are
even probable."[3]

Goodman disagrees with the view that these problems of
confirmation require the certainty of some statements
for their solution. Basically, I take his position to be
that Lewis, without explicit awareness, is really concerned
with two, closely related problems, the confounding of
which has tended to mislead him.

In discussing Lewis's position, Goodman says:

> Consider the familiar problem faced by a
> common version of pragmatism. The meaning and
> truth of a statement are said to lie in its
> predictive consequences. These consequences
> are themselves statements; for from statements
> we can deduce, or even infer with probability,
> nothing but other statements. But, if the
> truth of these predictions depends in turn upon
> the truth of others derived from them, we are
> lost in an endless regress. The theory rests
> upon our being able, when a particular moment
> arrives, to decide with some degree of confidence

whether a predic tion made concerning that
moment is or is not fulfilled. Addordingly,
statements describing immediate experience
are specifically exempted from the predictive
criterion. But what, then, is to be said
concerning them? What sort of relationship to
experience makes such a statement true or
credible?[4]

There are two problems raised in the final question

of this passage. What sort of relationship to experience

makes such a statement true? And what sort of relationship

to experience makes such a statement credible? The first

of these is a semantical problem. The second is a prag-

matic or epistemological problem.

Goodman's proposal for solution of the semantical

problem, one which establishes the relationship of the

latter to pragmatics in epistemology, is that semantical

predicate s such as "true", "denotes" and "means"

be systematized in terms of some non-semantical primitive.

He conjectures that a predicate available to be accepted

for the systematization of semantical predicates is "is

a genuine signal of". Semantical predicates should turn

out to be definable in terms of this primitive, if the

systematization is to be adequate. It should be noticed

that this proposed analysis of semantical predicates

would subsume them under a more general relation: a

relation obtaining between or among extralinguistic events

as well as between linguistic and extralinguistic events.

It should be obvious that this does not at all

preclude the possibility of analysing "credibility",
or the justifying grounds for asserting an empirical
judgment, in terms of the grounds justifying taking it
as a genuine signal (or taking the statement of it as
a genuine signal). This _is_ an epistemological problem,
and I shall maintain that not only is this possibility
not precluded but that, in point of fact, it _is_ this
problem to which Goodman is addressing himself under
the rubric of the "The Problem of Projectibility" in
Fact, Fiction and Forecast.[5]

To summarize Goodman's proposals, the important
points are the following:

1) Semantical predicates may be definable in terms
of the predicate "is a genuine signal of".

2) Successful _projection_ of a hypothesis is, under
specified circumstances, an index as to its genuineness
as a signal. Anticipating considerations to be presented
below, we might say that, roughly, under specified
circumstances one may be justified in accepting as a
genuine signal a hypothesis containing only well-entrenched
predicates. (An outline of the details of these
proposals is presented in Chapters 4 and 5 of this thesis.
The first of these proposals is put forth "Sense and
Certainty", the second in Fact, Fiction and Forecast.

<div align="center">II</div>

Lewis has been quite critical of "Sense and Certainty"

The following is a crucial passage from his reply to

Goodman:

> In order to be knowledge, empirical judgment must
> not only have predictive import of what will
> verify or confirm it; it must also be distin-
> guished from a merely lucky or unlucky guess
> or hazard of belief by having some justifying
> ground. And in the nature of the case, what so
> justifies an empirical judgment cannot be some-
> thing future to it and presently uninspectible
> but must lie in something antecedent to or
> compresent with it. Where it is perceptual
> cognition which is in question, the point is
> that the interpretation of experience--the per-
> ceptual belief--is significant of the future and
> verifiable, but, in order that this belief have
> validity, that which functions as the ground of
> it much be present and given.
> ...And it is on account of that point that I
> could not accept Goodman's pragmatic proposal:
> by interpreting empirical findings in terms
> of what is future to them, it would invite
> confusion of the ground of knowledge which is
> there and given with what is not there but
> anticipated.[6]

But to take these remarks as a cogent criticism of

"Sense and Certainty" is to confuse point (1) above

with point (2). Though it is the case that the justify-

ing ground for believing an empirical judgment must lie

in conditions antecedent to or compresent with it, it

is precisely the problem of which antecedent conditions are

relevant to belief that Goodman considers in Fact, Fiction

and Forecast. That he does not concern himself with this

problem in "Sense and Certainty" probably results from the

fact that there he is concerned with proposal (1) and

not with the problems of validation or justification.

III

Now, though these remarks have touched upon the
relation of importance we hoped to indicate between
semantics and epistemology, we have not clearly in-
dicated what this relation is. On one hand, there is
the problem of systematizing the predicates of semantics;
and, on the other, there is the problem of presenting
adequate theories of confirmation, lawlikeness, and
projectibility, required for systematization of the
predicates of science. In what sense are these dependent
problems?

The following comments appear in Fact, Fiction and
Forecast:

> If I am at all correct, then, the roots of inductive
> validity are to be found in our use of language.
> A valid prediction is, admittedly, one that is in
> agreement with past regularities in what has been
> observed; but the difficulty has always been to
> say what consitutes such agreement. The suggestion
> I have been developing here is that such agreement
> with regularities in what has been observed is a
> function of our linguistic practices. Thus the
> line between valid and invalid predictions (or
> inductions or projections) is drawn upon the basis
> of how the world is and has been described and
> anticipated in words.[7]

The dependence of the problems, then, is somewhat as
follows: an adequate theory of confirmation requires the
distinction of lawlike from non-lawlike statements.
This, in turn, requires a theory of projectibility, which
"is drawn upon the basis of how the world is and has been
described and anticipated in words." But under what

circumstances has the world been described and anticipated in words?

A concern with this latter problem is a concern with the "root relations" between language and that which it describes; and this is the problem discussed in "Sense and Certainty". To say that some bit of language describes or anticipates an event is to say, in the terms of "Sense and Certainty", that this bit of language is in a relationship to the extralinguistic world (e.g."true"), which relation is definable by the relation "is a genuine signal of".

Thus, the general problem is with the definability of both the semantical and pragmatic predicates mentioned in terms of a relation which is pragmatic; i.e. which holds among extralinguistic events as well as among linguistic and extralinguistic events.

If Goodman has shown this definability, then he has shown how such predicates as "true", "means", "credible" and "is a well entrenched predicate" are reducible to a common basis. This would amount to an extremely important step in providing a systematized language of the predicates of science.

The central problem of this thesis, then, is to expand and clarify the none-too-clear glimpses of arguments thus far presented and to scrutinize the

adequacy of Goodman's position when compared with some alternative views.

NOTES

[Numbers following author's name refer to entries in bibliography.]

1. Tarski (16), p. 14..

2. Lewis (7), (8), (9).

3. Lewis (8), p. 169.

4. Goodman (5), p. 164.

5. Goodman (4),

6. Lewis (8), p. 175.

7. Goodman (4), p. 117.

CHAPTER II

In the introduction it was indicated that we are going to be concerned at least in part with an epistemolog- ical problem, and some attempt was made initially to characterize this problem. In addition, we hinted that one of the positions alternative to Goodman's on this problem, and one to be considered, is that propounded by Lewis. By focusing attention on the papers presented by Lewis and Goodman in a symposium in which they both participated, we shall be able to characterize more fully the problem and to indicate the pivotal differences between their points of view. Throughout it should be kept in mind that our end in view is to present a common basis for some important semantical and pragmatic predicates, and our comments are partly directed toward this end.

I

In "The Given Element in Empirical Knowledge"[1] Lewis offers an effective summary of his conclusions on the grounding of empirical knowledge as follows:

> ...I seem to find only two alternatives for
> a plausible account of knowledge: either there
> must be some ground in experience, some
> factuality it directly affords, which plays
> an indispensable part in the validation of
> empirical beliefs, or what determines empirical
> truth is merely some logical relationship of
> a candidate-belief with other beliefs which
> have been accepted.[2]

These two alternatives are, Lewis believes, exhaustive.

His strategy of argument with Goodman is roughly the
dilemma complicated by what appears to be an interpreta-
tion of "or" in the exclusive sense. In his argument,
he attempts to show that Goodman denies the first of the
above alternatives and is, therefore, committed to an
objectionable coherence theory of truth plus abandonment
of the traditional sense of "empirical knowledge".

In order to determine if Lewis is correct in this
charge, it will be necessary for us to examine the first
alternative with some care. In particular, we should
scrutinize Lewis' position to determine what sort of
"factuality" he takes to be directly afforded in exper-
ience. A key to his position is the meaning of "directly
afforded". Of course, also crucial to his argument is
the indispensability of this directly afforded factuality.

I take it that Lewis' position is a familiar one.
Only its familiarity justifies the brevity of the account
to be presented here, for my eventual aims do not permit
the detailed, lengthy exposition otherwise merited. Let
the following serve, perhaps, as a reminder.

As a beginning, let us recall a passage quoted in the
introduction. We noted there that Lewis says:

> Where it is perceptual cognition which is in
> question, the point is that the interpretation of
> experience--the perceptual belief--is significant
> of the future and verifiable, but, in order that
> this belief have validity, that which functions
> as the ground of it must be present and given.3

For Lewis, then, there are three basic aspects of
empirical knowledge: first, perceptual cognition or
empirical judgment and its significance; second,
perceptual belief; third, that, present and given, which
functions as the ground of perceptual belief. Perceptual
beliefs are predictive, whereas, we shall see, that which
is present and given is not. We must now ask what it is
that is directly afforded in experience, i.e. present and
given.

For Lewis, we describe the presentational element of
experience when we use the language of appearances. This,
as he calls it, is language in its "expressive use".[4]
When I say, for example,[5] "There is a flight of granite
steps before me," I commit myself to something beyond
my present experience, according to Lewis. I am committed
to the existence of the steps, at least. But a statement
in phenomenal language, a protocol statement, involves
no such commitment. "I see what <u>looks like</u> granite steps
before me" describes only what is given in my experience.
As Lewis puts it:

> The distinctive character of expressive language,
> or the expressive use of language, is that such
> language signifies <u>appearances</u>. And in thus
> referring to appearances, or affirming what
> appears, such expressive language <u>neither asserts</u>
> <u>any objective reality of what appears nor denies</u>
> <u>any</u>. It is confined to description of the content
> of presentation itself.[6]

According to Lewis, this argument supports two contentions of his. This lack of commitment to "objective reality" is construed by him to indicate that protocol statements are both non-predictive and incorrigible. If what a protocol statement describes is confined to an evanescent moment of experience, then it says nothing about future experience; hence, it is non-predictive. And after that moment has vanished, therefore, there is no experience relevant to the disconfirmation of this protocol statement; hence, it is incorrigible.

Another argument that Lewis presents for the incorrigibility of protocol statements was mentioned in the introduction. There we pointed out that Lewis takes indubitable protocol statements to be necessary for the confirmation of theories.

Lewis makes a distinction between terminating and non-terminating judgments, on which this new argument relies. Briefly, a terminating judgment is rendered in expressive language. For instance: "If I feel that I am walking toward what looks like a flight of granite steps, then each step will appear to become larger" approximates a terminating judgment. For Lewis, terminating judgments are characterized by being completely confirmable or disconfirmable in experience. Non-terminating judgments, on the other hand, such as statements of science, are

never completely confirmed. Continuing to discuss

non-terminating judgments, Lewis says:

> However, if the suggested account should be
> correct, then the judgment of objective fact implies
> nothing which is not theoretically verifiable.
> And since any, even partial, verification could
> be made only by something disclosed in some
> passage of experience, such an objective and
> non-terminating judgment must be translatable
> into judgments of the terminating kind. Only
> so could confirmation of it in experience come
> about. If particular experiences should not
> serve as its corroborations, then it cannot
> be confirmed at all; experience in general would
> be irrelevant to its truth or falsity; and it
> must be either analytic or meaningless.[7]

The argument runs, then somewhat as follows:

requisite to the confirmation of non-terminating judgments

is their translation into terminating judgments. Though

terminating judgments can result in incorrigibility, they

are subject to error and, hence, qualify as knowledge

for Lewis. Still, non-terminating judgments are never

completely confirmed, because they translate into an

infinite set of terminating judgments. On the other hand,

to say that protocol statements are dubitable would imply,

for Lewis, that we are unable to recognize a such and so

experience as such and so when we have it. (I am assuming

that to recognize a such an so experience is to identify

it as that sort of experience. Since Lewis asserts that

mistakes in labeling can be made, I suppose he denies that

identifying and labeling come to the same thing.)[8] He

maintains that if we cannot recognize an experience for what

it is when we have it, then we cannot verify terminating
judgments and, hence, cannot confirm non-terminating
judgments. Thus, according to Lewis, the indubitability of
protocol statements is a necessary condition for the
confirmation of theories, i.e. non-terminating judgments.

Furthermore, he maintains, without indubitable
protocol statements theories of science lose the
connection to experience required by empiricism. Without
this "connection to experience" we can define truth for
the statements of science only in terms of relationships
holding among such statements. This amounts to defining
truth in terms of logical relations among statements and
is, thus, a form of (objectionable) coherence theory of
truth.

One further comment is required before proceeding
with our exposition of Goodman's "Sense and Certainty".
Throughout our exposition, it seemed we were discussing
the truth of terminating and non-terminating judgments as
viewed by Lewis. But now we come upon an even more
interesting problem. Non-terminating judgments are never
known to be true, i.e. never completely confirmed. We
can, at most, make a decision as to their credibility.
According to Lewis, this also depends on protocol state-
ments and their indubitability.

In order to better illustrate the way in which this

situation becomes problematic, let us turn to an account

of Goodman's position.

<div align="center">II</div>

It is, perhaps, best to begin by summarizing the

points we made in the introduction. Goodman takes Lewis

to have confused two problems, expressed by the question:

What sort of relationship to experience makes a statement

describing immediate experience true? And what sort of

relationship to experience makes such a statement credible?

The first of these, Goodman proposes, may be solved

through defining truth in terms of signaling. To illustrate

how such a definition might proceed, let us suppose a

statement "F" says there will be a red patch in the visual

field at some future time, t. Goodman continues with the

example as follows:

> Suppose the statement P "There is now a red patch
> in the visual field" occurs at the time t above in
> question. P does not signal the simultaneous
> occurrence of the red patch; for signaling is
> always forecasting. Nevertheless, we know that
> P is true if an only if F is true. Hence P is
> true just in case F is a genuine signal. Although
> P does not itself signal the occurance of the
> red patch, the truth of P is explained in terms
> of the truth of the earlier statement F, which
> does signal this occurence. Statements in the
> past tense can be handled in the same way as those
> in the present tense; and tenseless statements,
> depending on whether they occur before, during, or
> after the time they pertain to, in the same way
> as statements in, respectively, the future, present,
> and past tense.[9]

This is obviously not a completed definition and there

are problems yet to be solved. Some of these we shall uncover in the next chapter, some in chapter 5. Yet, this passage does outline a strategy for giving such a definition, and a crucial task of this thesis will be an assessment of whether this strategy will work.

If this strategy does work, then one among its advantages will be our ability cogently to reject the thesis of the indubitability of protocol statements and thus "save" a major tenet of post-Kantian empiricism: namely, that all non-analytic statements are corrigible. We will have adequate means for accounting for the truth of terminating and non-terminating judgments on the basis of their pre-dictiveness; and we will be able to define "true" for protocol statements, while admitting that there is, and explicating some sense in which they are non-predictive. Such a definition would show there is no theoretical requirement in empiricism that protocol statements be indubitable.

Though Goodman has rejected the first alternative in the dilemma, to the extent that it requires the indubitability of protocol statements, we shall see that he is, nevertheless, not committed to a coherence theory of truth. On the contrary, the signaling relation is a broad basis including a wide variety of experiences, and his theory of projectibility calls for a variety of data as to the

predictive use of language and verificatory experiences.

However, as we pointed out earlier, Lewis seems also
to take the indubitably present and given to be required
for the credibility even of terminating and non-terminating
judgments. In the passage with which we began this exposi-
tion, Lewis says:

> ...the interpretation of experience--the perceptual
> belief--is significant of the future and veri-
> fiable, but, in order that this belief have validity,
> that which functions as the ground of it must be
> present and given.
> ...And it is on account of that point that I
> could not accept Goodman's pragmatic proposal:
> by interpretating empirical findings in terms of
> what is future to them, it would invite confusion
> of the ground of knowledge which is there and
> given with what is not there but anticipated.[10]

This judgment that Goodman's proposal is too pragmatic
results from Lewis' confusion, mentioned above, of the
purely semantical with the epistemological problem. He
construes Goodman as saying we must await the occurence
of P before we can decide upon the credibility (or as
he puts it "validity") of F. But it is simply not the case
that Goodman says this. The occurrence of P (and other
events as well) determines the truth of F, but we can
decide F's credibility on quite other grounds, e.g. the
precise grounds that Goodman adduces in terms of past
predictions in his theory of projectibility.

The theory of projectibility in Fact, Fiction and
Forecast is addressed to the problem of determining the
projectibility of generalized hypotheses, rather than
to statements such as F or P above. Yet, the theory can

be readily extended to cover singular hypotheses.
There are two reasons why this extension is virtually
automatic. First, projectibility of a general hypothesis
is inherited by its instances. Hence, if we are concerned
to determine the projectibility of some singular hypothesis,
we can do so by appropriately generalizing this hypothesis
and determining the projectibility of the hypothesis of
which the one in question is an instance. Second, it is
a logical thesis of both Goodman and Quine that any singular
statement is equivalent to some general statement; thus,
comments in Fact, Fiction and Forecast are applicable to
singular statements after all.

Though Lewis is right in pointing out the pragmatic,
predictive aspect of Goodman's account, he is incorrect
in assuming credibility must be decided now on the basis
of the future outcome of present predictions. This would
be an odd situation indeed, but it is not entailed by
Goodman's proposal.

On Goodman's view, prima facie credibility amounts
to prima facie projectibility. It is not required that
a hypothesis be true, only that the total relevant
information available warrants use of the hypothesis for
predicting.

Thus, we may conclude that what is required is a
clear notion of the genuine signal relation and an
exposition of Goodman's theory of projectibility understood
as a reply to Lewis, i.e. as an attempt to provide grounds
of credibility contemporaneous with the need for them.

In the meantime we shall examine the semantical definition of truth. Throughout this chapter we have referred to the (as yet here) unclarified notion of truth. It has sometimes been supposed that an adequate definition of "truth" would resolve some of the difficulties we have encountered.[11] Thus, we turn to a definition that has been proclaimed adequate for epistemology to discover if this is the case.

NOTES

1. C. I. Lewis (8).

2. Ibid., p. 168.

3. Ibid., p. 175, my ital.

4. See, for example, exposition of this use of language in (7), ppp. 178-82.

5. This example is taken from (7), p. 179.

6. Ibid., p. 179.

7. Ibid., p. 181.

8. For significance of this parenthetical remark, see (6), pp. 99-101, and (5), pp. 160-1.

9. Goodman (5), p. 166.

10. Lewis (8), p. 175.

11. See, for instance, A. J. Ayer (1), p. 238.

CHAPTER III

In the introduction it was pointed out that we are concerned to indicate an important relation between problems of defining semantical predicates, e.g. "true", and problems of defining pragmatic predicates, e.g. "credible". At the end of Chapter II, we noted that some philosophers have assumed that an adequate definition of truth will solve the problem of defining "credible". Since Tarski's definition of truth[1] has been proclaimed adequate by some, we shall examine his proposals in order to determine if this is indeed the case.

There are three points important for us to consider: 1) Tarski's definition is given only for certain, precisely specified, formal languages.

2) The definition of truth is given in terms of "satisfies", which Tarski takes to be a semantical predicate, but which others, e.g. Bergmann, have taken to be a syntactical predicate, as used by Tarski.

3) In the light of the above we must scrutinize the adequacy of Tarski's definition in relation to Goodman's proposals.

Tarski requires of his explication of the semantical predicate "true" that his definition of truth be both materially adequate and formally correct. Our purpose in this chapter will be to question the adequacy of Tarski's definition, taken as a proposed means to solve the problem

of defining "credible". We may find grounds for determining that his definition is inadequate for this purpose, even though the definition is considered materially adequate and formally correct according to Tarski's own explicit criteria.[2]

I

In order to specify a criterion of material adequacy, Tarski considers the extension and intension of the predicate "true".

In regard to the extension of the term he says:

> The predicate "true" is sometimes used to refer to psychological phenomena such as judgments or beliefs, sometimes to certain physical objects, namely, linguistic expressions and specifically sentences, and sometimes to certain ideal entities called "propositions." By "sentence" we understand here what is usually meant in grammar by "declarative sentence"; as regards the term "proposition," its meaning is notoriously a subject of lengthy disputations by various philosophers and logicians, and it seems never to have been made quite clear and unambiguous. For several reasons it appears most convenient to apply the term "true" to sentences, and we shall follow this course.[3]

He adds in a footnote that he understands "sentences" to refer to "classes of inscriptions of similar form"[4], to classes of physical things rather than to individual physical things. Put another way, "true" is taken by Tarski to be a predicate of sentence types.

This results in a limitation on the definition of truth. The definition must be relativized to a particular language, according to Tarski, since different languages

may contain sentence tokens of the same type with differing truth values. Thus, for Tarski, "true" is a predicate of sentence types that must be defined in regard to the tokens of a type appearing in some language or other.

Tarski gives the criterion of material adequacy as an intensionalistic criterion. He wants his definition to conform to the actual meaning of the term "true" as used classically.

> Consider the sentence "snow is white". We ask
> the question under what conditions this sentence
> is true or false. It seems clear that if we
> base ourselves on the classical conception of
> truth, we shall say that the sentence is true
> if snow is white, and that it is false if
> snow is not white. Thus, if the definition of truth
> is to conform to our conception, it must imply the
> following equivalence:

> The sentence "snow is white" is true if, and only
>   if, snow is white.[5]

This procedure may be generalized as follows: first, we arbitrarily choose a sentence and replace it by the letter 'p'. Next, we replace the name of this sentence by the letter 'X'. Then, an equivalence of the form we are concerned with is written:

> X is true if, and only if, p.

"We shall call any such equivalence (with 'p' replaced by any sentence of the language to which the word "true" refers, and 'X' replaced by a name of this sentence) an 'equivalence of the form (T).'"[6]

Tarski's criterion of material adequacy may be phrased as follows: A definition of truth is adequate only if it implies all equivalences of the form (T).

There are two points to be considered in regard to formal correctness. First, the language for which "true" is to be defined must be exactly specified. This is required to avoid the occurrence of antinomies which would vitiate the definitions. Tarski uses the antinomy of the liar as an example which involves the predicate "true". Though we shall not present this antinomy here,[7] we shall discuss the assumptions which lead to it. According to Tarski, these are:

> (I) We have implicitly assumed that the language in which the antinomy is constructed contains, in addition to its expressions, also the names of these expressions, as well as semantic terms such as the term "true"referring to sentences of this language; we have also assumed that all sentences which determine the adequate usage of this term can be asserted in the language. A language with these properties will be called "semantically closed."

> (II) We have assumed that in this language the ordinary laws of logic hold.[8]

Tarski considers the consequences of rejecting assumption (II) to be too obvious to require elaboration. He concludes we must avoid using a language that is semantically closed.

This brings us to the second point. Tarski takes the problem of formulating a semantical metalanguage for a natural language to be a vague,and therefore, invalid problem. In natural languages we do not know precisely what are the sentences and which sentences are assertible. It

is difficult to decide, for instance, whether or not
natural languages are semantically closed, in the sense
specified.[9]

The metalanguage Tarski has in mind must contain all
of the sentences of the object language. It must be
rich enough for the construction of names for these
sentences, and it must have a basic logical apparatus.
Tarski also points out that the condition of essential
richness of the metalanguage, which is not to be further
explored here, is both a necessary and sufficient
condition for a satisfactory construction of the definition
of truth.

In addition to all these requirements, Tarski says:

> It is desirable for the metalanguage not to contain
> any undefined terms except such as are involved
> explicitly or implicitly in the remarks above, i.e.:
> terms referring to the form of the expressions
> of the object-language, and used in building names
> for these expressions; and terms of logic. In
> particular, we desire semantic terms (referring to
> the object-language) to be introduced into the
> meta-language only by definition. For, if this
> postulate is satisfied, the definition of truth,
> or of any other semantic concept, will fulfill what
> we intuitively expect from every definition; that
> is, it will explain the meaning of the term being
> defined in terms whose meaning appears to be
> completely clear and unequivocal. And, moreover,
> we have then a kind of guarantee that the use of
> semantic concepts will not involve us in any
> contradictions.[10]

II

The definition of truth is given in terms of the
notion of satisfaction. Satisfaction is defined through a

recursive procedure; and, as it turns out, "a sentence
is either satisfied by all objects, or by no objects.
Hence we arrive at a definition of truth and falsehood
simply by saying that a <u>sentence</u> <u>is</u> <u>true</u> <u>if</u> <u>it</u> <u>is</u> <u>sat-</u>
<u>isfied</u> <u>by</u> <u>all</u> <u>objects,</u> <u>and</u> <u>false</u> <u>otherwise</u>."[11]

According to Tarski, this definition is materially
adequate; and, in addition, since the definition implies
all equivalences of the form (T), it uniquely determines
the extension of the term "true". (Thus, any other
materially adequate definition of truth would be equivalent
to, or "imply", the one given by Tarski.

If we agree that the definition is materially adequate
and formally correct as Tarski claims, we may still raise
other questions of adequacy. Bergmann,[12] for instance,,
has argued that Tarski has not defined the <u>semantical</u>
predicate "true", since "satisfied" in terms of which
"true" is defined is not, as Tarski maintains, a semantical
predicate but is, rather, a syntactical predicate. Thus
Bergmann concludes, Tarski has defined a sense of "true"
other than the philosophically important, semantical
predicate "true".

Yet, even if we assume that Bergmann is correct in
taking Tarski's predicate "satisfied" to be a syntactical
predicate, it does not follow that Tarski's predicate
"true" is not a semantical predicate. It may mean, instead,

that Tarski has broken the semantical circle through

defining a semantical predicate in terms of a non-

semantical predicate. Fortunately, we need not attempt

to decide this issue here. It is sufficient for our

purposes to note that if Tarski has broken the semantical

circle, he has done so with a syntactical predicate rather

than with a pragmatic one.

We are, after all, concerned with defining "credible"

for phenomena . If Bergmann is correct in maintaining

that "satisfied" as used by Tarski is a syntactical

predicate, his argument fortifies the claim that an

adequate definition of "credible" cannot be given in

terms of Tarski's sense of "true".

Tarski attempted to utilize the clear specification

of truth conditions given by his definition to resolve

epistemological difficulties. One such attempt is a

postulate he proposed on the acceptability of scientific

theories. This postulate reads:

> As soon as we succeed in showing that an
> empirical theory contains (or implies) false
> sentences, it cannot be any longer considered
> acceptable.[13]

Yet this is a useful postulate only when we have

means available for determining when a sentence of a

theory is false. Tarski indicates such means for theories

that are self-inconsistent. I am sure there are many

arguments for the unacceptability of an inconsistent theory. But how do we know a theory is no longer acceptable when it is self-consistent or, at least, when we are unable to prove it inconsistent? In short, the general problem of acceptability is one of decision in the absence of definite information as to the truth or falsity of any of the statements of the theory. The semantical conception of truth does not provide a solution to this problem.

Though the definition does define truth conditions for the statements of a theory, it does not provide solutions to the various problems of confirmation. An adequate analysis of confirmation will employ the semantical prodicate "true"; yet, here again, a problem in defining degree of confirmation is that such be assignable in the absence of definite information as to the truth or falsity of any sentences of the theory.

The pragmatic predicates of epistemology are not fully definable in terms of the predicate, "true", as defined by Tarski. The semantical definition of truth gives the conditions under which a sentence of a theory is true; but it does not tell us how we, as fallible observers, can decide when this condition is fulfilled. Obviously, it is asking too much to demand this of Tarski's analysis.

Yet, we cannot dismiss the issue by saying that an adequate analysis of epistemological predicates will employ the semantical predicate "true". We should like to show how this predicate can be employed in such an analysis. In the next chapter we shall examine the question of whether or not Goodman's theory of projectibility, supplemented by the semantical predicate "true", is adequate to define "credible" for phenomenal statements.

NOTES

1. Tarski (16).

2. We accept Rudner's view—(14), p. 15--that the adequacy of an analysis is to be judged by the efficiency of the analysans in serving most important purposes served by analysandum.

3. Tarski (16), p. 14.

4. Ibid., p. 42.

5. Ibid., p. 16

6. Ibid., p. 16

7. Ibid., pp. 19-20.

8. Ibid., p. 20.

9. Max Black has taken issue with Tarski on the invalidity of this problem. He points out means of clarifying and solving the problem in such a way that Tarski's definitions may be rendered applicable to a natural language. Yet, though this problem is interesting and pertinent to our own problem, considering it in detail here would amount to a lengthy digression that we cannot afford, however tempting.

10. Tarski, Op.Cit., pp. 22-3.

11. Ibid., p. 25.

12. Bergmann (2), pp. 17-23.

13. Tarski, Op. Cit., p. 39.

CHAPTER IV

It was pointed out in the introduction that an adequate theory of confirmation requires a theory of projectibility. In this chapter, something of the rationale for this claim will be presented in a discussion of Goodman's theory of projectibility.

According to Goodman, the theory of projectibility "is drawn upon the basis of how the world is and has been described and anticipated in words." Our task here will be specifically to investigate Goodman's proposed theory of projectibility with a view to establishing how this dependence of confirmation on projectibility impinges on the problem of the grounding, or credibility of phenomenal statements. In the course of this investigation we shall attempt, also, to show how this theory is related to the semantical problems previously considered. The ultimate goal will be to show that "projectible" is definable in terms of the predicate "is a genuine signal".

For our exposition of Goodman's theory of projectibility we shall concentrate on two chapters from Fact, Fiction and Forecast, the chapters entitled "The New Riddle of Induction" and "Prospects for a Theory of Projection".[1]

In "The New Riddle of Induction", Goodman briefly covers the history of the problem of justifying induction. He points out that the problem of justifying induction

debated in recent years results from a misconstrual
of Hume's treatment of induction.

Hume argued that there are no necessary connections
of matters of fact. His account of prediction is an
explanation of prediction as habit. We make a prediction
on the basis of its accord with past regularities. This
account has been construed as avoiding the "real" problem of
induction. This problem, according to Hume's critics, is
one of providing a warrant for making predictions. The
counter to Hume's argument is that Hume's account was an
attempt to explain rather than to justify induction. Thus,
the "real"problem of induction was traditionally construed
to require some sort of justification for predictions.

Goodman has, however, given an apt reply to these
criticisms. If the problem is one of justification,
then what sort of justification is required to solve it,
Goodman asks? "If the problem is to explain how we know
that certain predictions will turn out to be correct,
the sufficient answer is that we don't know any such
thing. If the problem is to find some way of distinguish-
ing antecedently between true and false predictions, we
are asking for prevision rather than for philosophical
explanation."2

According to Goodman, we can clarify this problem of
justifying induction by calling attention to how deductions

are justified. A deduction is justified when it is shown to accord with the codified rules of deductive inference. The rules of the codification are justified insofar as they yield acceptable inferences. But, as Goodman comments:

> This looks flagrantly circular. I have said that deductive inferences are justified by their conformity to valid general rules, and that general rules are justified by their conformity to valid inferences. But this circle is a virtuous one. The point is that rules and particular inferences alike are justified by being brought into agreement with each other. A rule is amended if it yields an inference we are unwilling to accept; an inference is rejected if it violates a rule we are unwilling to amend. The process of justification is the delicate one of making mutual adjustments between rules and accepted inferences; and in the agreement achieved lies the only justification needed for either.[3]

If we apply this principle to the problem of justifying induction, we see that an induction should be justified by its conformity to valid cannons of induction. The cannons themselves are valid insofar as they reflect accepted inductive practice.

Thus, Hume's attempt to explain actual inductive practice was directly to the point of the problem. Briefly, Hume's thesis was that confirming instances of a general hypothesis provide a sanction for using the hypothesis to predict further instances. His attempt, however, was unsuccessful, since, as J. S. Mill pointed out,[4] some inductions are incorrect though made on the basis of a great deal of available evidence. Equally supported

hypotheses are not equally sanctioned. Goodman's thesis
that the sanction provided varies with both the support
a hypothesis has and its projectibility.

Thus, not all past regularities will support a
prediction. Yet, it is a mistake to construe Hume's efforts
as being misguided. The problem requires attention to
actual inductive practice in order to define the difference
between valid and invalid predictions.

We have still to indicate the dependence of the
problems with which we introduced this chapter. The prob-
lem of projectibility is one of determining when it is
legitimate to project from any given set of cases to a
wider set. What conditions sanction such an expansion?
The problem of induction on the other hand is one of
providing a sanction for projecting from past cases to
future cases. Hence, the problem of projectibility is the
more general problem, and its solution should solve the
problem of induction.

On this latter problem, let us attend to Goodman's
comments on the recent efforts of Hempel in confirmation
theory. The problem of defining valid induction as approach-
ed by Hempel is one of defining "the relation that obtains
between any statement S1 and another S2 if and only if S1
may properly be said to confirm S2 in any degree."[5]

As reviewed by Goodman, some progress has been made
in defining this raltion purely syntactically. Various

improvements have been made in the way of tightening the
criteria by which it is determined that which evidence
statements confirm.

Yet, as Goodman points out, satisfaction in this
progress is shortlived. A purely syntactical elaboration
of Hume's generalization procedure is subject to criticisms
analogous to those made of Hume's formulation of this
thesis. Hempel's criteria also allow generalizations
from the available evidence to incredible as well as
credible hypotheses.[6] Other than syntactical features of
a hypothesis are involved in determing its confirmation
by an instance.

As Goodman says:

> That a given piece of copper conducts electricity
> increases the credibility of statements asserting
> that other pieces of copper conduct electricity,
> and thus confirms the hypothesis that all copper
> conducts electricity. But the fact that a given
> man now is this room is a third son does not
> increase the credibility of statements asserting
> that other men now in this room are third sons,
> and so does not confirm the hypothesis that all
> men now in this room are third sons. Yet in both
> cases our hypothesis is a generalization of the
> evidence statement. The difference is that in the
> former case the hypothesis is a lawlike statement;
> while in the latter case, the hypothesis is a merely
> contingent or accidental generality. Only a
> statement that is lawlike--regardless of its truth
> or falsity or its scientific importance--is capable
> of receiving confirmation from an instance of it;
> accidental statements are not. Plainly, then, we
> must look for a way of distinguishing lawlike from
> accidental statements.[7]

Goodman gives an example to indicate both the
difficulty and the importance of making this distinction.

Suppose that for every emerald examined before time t we can assert evidence statements that each of these emeralds is green, thus supporting the hypothesis that all emeralds are green. Then, suppose we introduce another predicate, "grue", that applies to anything examined before time t that is green and also to anything else that is blue. We can then assert in an evidence statement, for each emerald examined before time t, that it is grue, thus supporting the hypothesis that all emeralds are grue and the prediction that the next emerald examined after time t will be blue.

There are two important points illustrated by this example. First, we can choose other predicates like "grue" such that our observations of emeralds will provide support for any prediction whatever about future cases. Second, though we feel we know which of the hypotheses leading to incompatible predictions is "genuinely support-ed" by the evidence, we have no criterion for determining this, i.e. we have no criterion for determining which of the hypotheses is lawlike.[8] Thus, without a criterion of lawlikeness our generalization criterion of confirmation is rendered otiose, since it fails to exclude any predictions whatsoever.

Goodman reviews four proposals for solving the problem of distinguishing between lawlike and accidental

hypotheses, each of which has proved unsuccessful. It would not be of particular advantage here to consider each of these proposals. It is enough for our purposes simply to observe that Goodman's appraisal of each as unsatisfactory seems conclusive, and shall be so assumed here. Accordingly, we are confronted with the unsolved problem of distinguishing between accidental and lawlike hypotheses, "the new riddle of induction", as Goodman calls it.

The remainder of the chapter on the new riddle of induction is employed in indicating how this problem is reducible to the problem of projectibility. Goodman points out that "the problem of prediction from past to future cases is but a narrower version of the problem of projecting from any set of cases to others."[9] Thus, the problem of distinguishing between accidental and lawlike hypotheses is more generally the problem of distinguishing between non-projectible and projectible hypotheses. But before continuing with the exposition of Goodman's attack on this problem, it is necessary to review some of his previous remarks that serve to characterize the problem of projectibility.

In Chapter II of <u>Fact, Fiction and Forecast</u>, "The Passing of the Possible", it is noted that the general problem of <u>dispositions</u> is:

> ...the problem of characterizing a relation such that if the initial manifest predicate "Q" stands

in this relation to another manifest predicate
or conjunction of manifest predicates"A", then
"A" may be equated with the dispositional coun-
terpart -- "Q"-able" or "QD" -- of the predicate
"Q". But the question when such a 'causal' con-
nection obtains or how laws are to be distinguish-
ed from accidental truths is an especially per-
plexing one.

   In this grim picture, we can find one small note
of comfort. Observe first that solution of the
general problem will not automatically provide
us with a definition for each dispositional predi-
cate; we shall need additional special knowledge
in order to find the auxiliary predicate that
satisfies the general formula -- i.e. that is re-
lated in the requisite way to the initial manifest
predicate. But on the other hand, discovery of
a suitable definition for a given dispositional
predicate need not in all cases wait upon solution
of the general problem. If luck or abundant special
information turns up a manifest predicate "P" that
we are confident coincides in its application with
"flexible", we can use "P" as definiens for "flex-
ible" without inquiring futher about the nature of
its connection with "flexes".[10]

The problem of dispositions is thus one of projecting

an initial manifest predicate to cover a wider range.

Scheffler has illustrated "projecting to a wider range"

in terms of defining "is playable" on the basis provided

by "is played".[11]

   ...we may denote as "played" every record which,
at any time, is actually put on the turntable of
some record player of familiar type and, with the
needle in position, produces recognized music or
speech. Aside from these, we may denote as
"playable" also certain other objects, e.g.,
records accidentally shattered before ever
reaching the turntable. Asked to explain the
latter term, we should naturally try to do so by
reference to the former via recourse to notions
such as capability, possibility or potentiality,
to the use of the subjunctive, or to devices like

reduction-sentences. And each of the latter courses
seems to point to a queerness inherant in the
predicate "is playable"; it talks about something
else than what is actually the case in our world.
Consider, however, that everything in the above
sense playable is a record of music or speech,
meeting rather definite specifications as to form,
shape, and history, and conversely, that every such
record is playable. [my ital.] This means that
"is playable" is definable in terms of those
predicates by means of which such specifications
are stated, without recourse to possibility or the
subjunctive. Assuming that such predicates are
among the primitive observational terms of a given
system S, we now have a situation in which one
predicate ("is playable") is dispositional with
respect to another ("is played") in S, but is
fully definable and non-dispositional with respect
to certain others, also in S.[12]

Thus, there is nothing mysterious involved in

projecting to a wider range. The problem is to find some

set of manifest predicates, applicable to all actually

played objects and certain other objects not actually

played, such that the dispositional predicate "is play-

able" can be defined in terms of these. To accomplish

this for some particular dispositional predicate need

not await solution of the general problem of dispositions,

i.e. we need not concern ourselves with questions on

'causal' connections obtaining between "is played" and

"is playable".

It is important to notice that the problem of defining

some particular dispositional predicate may not depend upon

the solution of the general problem. The importance of

this possibility not being excluded becomes obvious when

we recognize that the problem of projection may be construed as one of defining the dispositional predicate "projectible" on the basis of the manifest predicate "projected". It is a problem of projecting "projected".

The immense saving of effort that is accomplished by reducing the problems of lawlikeness and dispositionals to the problem of defining "projectible" should not be overlooked. What in effect is accomplished is that the general problem of dispositionals is neatly reduced to the more manageable problem of defining one dispositional predicate, the solution of which should also provide means for distinguishing accidental from lawlike hypotheses. I do not intend by these comments to give the impression that I consider this new problem to be a simple one. I do desire to call attention to its importance.

Goodman speaks in the following manner about this new problem:

> The reorientation of our problem may be por-
> trayed in somewhat more figurative language.
> Hume thought of the mind as being set in motion
> making predictions by, and in accordance with,
> regularities in what it observed. This left him
> with the problem of differentiating between the
> regularities that do and those that do not thus
> set the mind in motion. We, on the contrary,
> regard the mind as in motion from the start,
> striking out with spontaneous predictions in
> dozens of directions, and gradually rectifying
> and channeling its predictive processes. We ask
> not how predictions come to be made, but how --
> granting they are made -- they come to be sorted
> out as valid and invalid. Literally, of course,
> we are not concerned with describing how the mind

works but rather with describing or defining
the distinction it makes between valid and
invalid projections.[13]

For the most concise presentation of Goodman's treat-

ment of projectibility, we should, perhaps, merely offer

at this point his chapter on the theory of projection

within quotation marks and with proper acknowledgment.

But we shall do our best to summarize without disastrous

loss of detail.

At the close of the chapter on the new riddle of in-

duction, Goodman concluded that this problem could not be

solved on the basis of purely semantical or syntactical

grounds. Thus, in the chapter "Prospects for a Theory of

Projection" he introduces a pragmatic predicate to serve

as primitive in the construction of the definition of

"projectible". Goodman summarizes this chapter as follows:

In brief review, the route of definition I have
outlined starts with the explanation of the primi-
tive "is a much better entrenched predicate than"
in terms of actual projections, and runs as follows:
first, definition of presumptive projectibility
by means of the rules of elimination; second, defini-
tion of initial projectibility index for presump-
tively projectible hypotheses; and third, definition
of degree of projectibility in terms of the initial
index as modified by correlative information
through overhypotheses.[14]

This summary suggests a helpful division for our exposition.

We shall subsume our expository comments under the follow-

ing topics: "The Basis: Elimination", "Presumptive Pro-

jectibility: Expansion", "Degree of Projectibility".

The Basis: Elimination

Since the purpose of Goodman's analysis is to define

"projectible" on the basis of the manifest predicate
"projected", the basis of the analysis will be the
hypotheses that may be said to have been actually pro-
jected prior to a given time. The temporal reference is
necessary throughout, since Goodman does not consider
in these lectures the question of defining "projectible"
without temporal qualification.

A hypothesis will be said to be actually projected
if it is explicitly used to predict the outcome of examining
previously unexamined cases and if it is _at_ _that_ _time_ neither
violated, exhausted, nor unsupported. A general hypothesis
is violated when a negative instance has been discovered,
it is exhausted when there are no unexamined cases re-
maining, and it is supported when at least one positive
instance has been discovered.

The above criterion isolates the class of actually
projected hypotheses. The strategy Goodman employs in
defining the class of projectible hypotheses involves
solution of two problems. First, _unprojectible_ hypotheses
that _have_ been actually projected must be eliminated from
the basis. This is accomplished through introducing rules
based on entrenchment. Second, the basis must somehow be
expanded to include _projectible_ hypotheses that have _never_
been actually projected.[14a]

We can eliminate from the basis all hypotheses that
have either been violated or exhausted since projection.
Though this was a fairly simple beginning, elimination of

other hypotheses will have to be accomplished in terms of
rather complicated conflicts. This is further compli-
cated by the fact that it is not desirable to eliminate
all conflicts, since some conflicts must await settle-
ment through further experimentation. We want criteria
that will settle only those conflicts involving questions
of the validity of one or the other of the hypotheses.
Goodman settles such questions with three rules involving
a comparison of entrenchment.

As an illustration of conflicting hypotheses, Goodman
uses the hypotheses containing the predicates "green" and
"grue". You will recall from our previous use of this
example that the hypotheses containing these predicates
resulted in incompatible predictions. The question is:
how are we to eliminate the invalid hypothesis containing
the predicate "grue"?

We may do this be consulting the history of actual
projections of the two predicates. If we do this, we shall
discover that the predicate "green" has been projected
much more frequently than the predicate "grue". We may then
say that the predicate "green" is much better entrenched
than the predicate "grue". Thus we have:

Rule 1: "A projection is to be ruled out if it conflicts
with the projection of a much better entrenched predicate."[15]

An important feature of entrenchment is that not only
one predicate becomes well entrenched by its frequent pro-
jection (and it is important to emphasize that it is

projection and not merely use that accrues entrenchment
for a predicate) but also all predicates coextensive
with it. Thus it is the class which the predicate selects
which becomes entrenched, and "to speak of the entrench-
ment of a predicate is to speak elliptically of the entrench-
ment of the extension of that predicate."[16] This feature
of entrenchment has an advantage in regard to unfamiliar
predicates which we should not, of course, like to discard
out of hand. Such a predicate may inherit entrenchment
from the frequent projection of a predicate coextensive
with it.

Another point in regard to unfamiliar predicates, it
should be recalled, is that we are not concerned with the
elimination of predicates at all. The problem with which
we are presently concerned is the elimination of objection-
able hypotheses from those actually projected. Care must
be taken, of course, to insure that new predicates are
not eliminated by rules designed to eliminate such hypo-
theses.

Goodman indicates that there is available a means
for broadening the basis of reference hypotheses. This
expansion of basis will enable us initially to strengthen
Rule 1. The expansion is effected by means of the predi-
cate "could have been projected". This predicate is ap-
plicable to any actual hypothesis that has not been actually
projected up to the time in question, that is supported,

unviolated and unexhausted at that time.[17] These addi-

tional hypotheses, of course, have no affect in deter-

mining entrenchment, since this is determined on the basis

of actual projections.

Now we may revise rule 1 as follows:

Rule 1a: A projection is to be ruled out if it conflicts

with the projection of a much better entrenched predicate

or conflicts with a much better entrenched predicate that

could have been projected.

Thus extended, this rule now enables us to throw out

objectionable hypotheses that conflict with projectible

hypotheses that have not been actually projected.

The second rule provides an extension of the class of

reference hypotheses to include some hypotheses that could

not have been projected at the time of conflict. A hypo-

thesis that has been both violated and supported or one

that has been neither violated nor supported up to the time

in question could not have been projected, since it fails

to satisfy the requirements for projection. In this re-

gard, the evidence for hypotheses in these two circumstances

is said to be neutral. But if the evidence is neutral for

a hypothesis, then it is also neutral for the contrary of

that hypothesis. It is for this reason that some conflicts

can be ruled out.

It is necessary that the second rule be restricted

to hypotheses with the same antecedents and conflicting

consequences. Otherwise, the rule is too powerful and

would eliminate almost all projections of weakly entrenched predicates.

Rule 2: "A projected hypothesis with an ill-entrenched consequent is to be rejected if it conflicts with another hypothesis (1) that has the same antecedent and a much better entrenched consequent, and (2) that is either (a) both violated and supported or (b) neither."[13]

This rule, however, does not handle difficulties resulting from conflicting antecedents. Though we have taken care of projections of ill-entrenched predicates over the extensions of well-entrenched ones, we have yet to eliminate projections of well-entrenched predicates over the extensions of ill-entrenched ones.

Suppose we have a hypothesis, H1:

All emerubies are green,

where "emeruby" applies to emeralds examined for color before time t and to rubies not examined before t. Obviously, this hypothesis conflicts with the hypothesis, H2:

All rubies are red,

and can be eliminated by Rule 1 so long as the latter hypothesis is supported, unviolated, unexhausted, and, thus, could have been projected at t. But if we suppose that H2 is either violated or unsupported at the time in question, then H2 could not have been projected and could not have served to eliminate H1. Since the antecedents are not the same, neither could the second rule have eliminated H1.

A new rule is required to eliminate H1 on the grounds
of its conflict with the hypothesis, K:

All emeralds are green.

H1 and K project the same predicate over different ex-
tensions, since K projects "green" over all emeralds,
while H1 projects "green" over some emeralds and some
rubies. Yet, though the positive instances supporting H1
are the same as those supporting K, H1 projects the predi-
cate "green" over a larger and less well entrenched ex-
tension than K. Thus, for Rule 3, according to Goodman:

> The underlying principle is that where a consequent
> could have been projected over the extension of
> a given antecedent by a hypothesis, any other hy-
> pothesis is illegitimate if it has nothing additional
> in its evidence class and yet uses a much less
> well entrenched antecedent to project the same
> consequent over other things.[19]

Rule 3: A projected hypothesis is eliminated "when some
other hypothesis with the same consequent could have been
projected, and the antecedent A of the original hypothesis
'disagrees' with the much better entrenched antecedent A'
of the other hypothesis in the following way: although
among things to which the common consequent has been
determined to apply, A applies only to those that A'
applies to, nevertheless A applies to some other things
that A' does not apply to."[20]

On the basis of our expanded class of reference
hypotheses and with the guide of entrenchment, these three
rules eliminate many of the objectionable hypotheses from
the class of actually projected hypotheses. The remaining

members of this class, the new class making up the so-called "working basis", are all and only those actually projected hypotheses not eliminated by the application of these rules. Before turning to the problem of expansion of this working basis and to other means of eliminating additional objectionable hypotheses, it should be worthwhile to explain Goodman's notion of a "parent" predicate. It will be seen that parent predicates serve to increase the effectiveness of the rules of elimination.

> As Goodman explains:
> ...a predicate "P" is a parent of a given predicate "Q" if "P" applies only to mutually disjoint classes, and one of these classes is the extension of "Q"...[21]

Thus, "senate" would be a parent predicate of "senator in the U.S. Congress". One of the mutually disjoint senates of the world is made up of the senators of the U.S. Congress.

Increased effectiveness of the rules is brought about by entrenchment being a hereditary character. Entrenchment of a parent predicate is inherited by its descendants. If we cared to, we might define "siblings" as "coextensive predicates", since either earned or inherited entrenchment of a predicate would apply also to any predicates coextensive with it.

At any rate, we can modify and increase the precision of our methods of gauging entrenchment. If two conflicting predicates are of about equal earned entrenchment, we shall

favor one with a much better entrenched parent predicate.
Furthermore, as Goodman puts it, "the requirement, in
our rules of elimination, that a given predicate be much
better entrenched than another is met if the former either
has much greater earned entrenchment than the latter or
has about equal earned and much greater inherited entrench-
ment."[22]

We turn now to the problem of expansion of the working
basis to include projectible hypotheses that have not been
actually projected.

Presumptive Projectibility: Expansion

The definition of presumptively projectible hypo-
theses allows the necessary expansion to include all,
though as yet not only, what we want to call projectible
hypotheses. We have available as tools for constructing
the definition the working basis of actually projected
hypotheses, the primitive predicate and rules of elimina-
tion, and, lastly, the innocous[23]"could have been projected".

It should be recalled from our previous remarks on
the general problem of dispositions and our remarks
characterizing the problem of projectibility as Goodman
treats it that the problem of defining the dispositional
predicate "projectible" is one of finding an auxiliary
manifest predicate related in a suitable manner to the
initial manifest predicate "projected" such that this
suxiliary predicate can be used as definiens for "pro-

jectible". It will be quite important to notice whether "presumptively projectible" satisfies these requirements.

The obvious first step in the expansion is that we want to consider of the unprojected hypotheses only such as could have been projected, since we can safely ignore unsupported, violated or exhausted hypotheses. Yet, not all of this batch of unprojected hypotheses are projectible. Some we shall want to eliminate through application of our three rules. The next step, then, is to render the rules applicable to these unprojected as well as to projected hypotheses. According to Goodman, this can be accomplished simply by changing the rules from "a projected hypothesis is to be eliminated (from the working basis) if..." to read "a hypothesis that could have been projected is to be eliminated (from the realm of hypotheses that could have belonged to the working basis) if...". This eliminates the unprojectible of the unprojected hypotheses.

We are now in a position to offer a definition of "presumptively projectible", which Goodman does as follows:

> ...a hypothesis could have belonged to the working basis if and only if that hypothesis is supported and unviolated and unexhausted and does not run afoul of disagreements that call for its elimination by our rules. All and only such hypotheses are presumptively projectible.

Presumptively projectible hypotheses are thus members of a class containing both projected and unprojected hypotheses from which certain objectionable hypotheses have

been eliminated. We now have a well-expurgated working
basis for discriminating projectible hypotheses. Yet, it
would be difficult to assess the adequacy of "presumptive-
ly projectible" in a definition of "projectible". First,
our rules will allow us to speak only of comparative
entrenchment. Given any hypothesis, we should be able
by this means to determine whether it is presumptively
projectible, but no clear sense has been established for
the meaning of "degree of projectibility". Second, it
is not the case that we have expurgated our working basis
of all objectionable hypotheses.

Therefore, there is still much to be done, and we
turn now to the question of degree of projectibility
for the resolution of both of these issues.

Degree of Projectibility

The difficulty that we now face is that of finding
precise rules to reflect the rather delicate variation of
projectibility between similar hypotheses brought about
by different circumstances. For instance, the hypothesis

"All marbles in bag B are red"

may be much more projectible than the quite similar hypothesis

"All marbles in bag C are blue"

under different circumstances, though both are presumptively
projectible and contain equally well-entrenched predicates.
To uncover the method Goodman adduces to reflect this
difference, it is necessary that we examine his treatment

of initial projectibility index as modified by overhypo-
theses.

The initial index of degree of projectibility is deter-
mined for presumptively projectible hypotheses by compar-
ing the entrenchment of their predicates. Here, of course,
we include both earned and inherited entrenchment. As
Goodman puts it:

> If the antecedent or consequent of one such
> hypothesis is much better entrenched than the
> corresponding predicate of a second, and if the
> remaining predicate of the first hypothesis is
> no less well entrenched than the corresponding
> predicate of the second, then the first has the
> higher initial projectibility index.[25]

This initial index is modified, either positively or
negatively, by the affect of overhypotheses, a method
of bringing to bear what might be viewed as indirect
evidence on the projectibility of hypotheses. Through
overhypotheses we can gauge the affect of certain evidence
not directly supporting or violating a given hypotheses.

Let us illustrate with a certain bagful of marbles B
in stack S. We might have as a presumptively projectible
hypothesis, H:

"All the marbles in bag B are red"
for which we determine the initial projectibility index.
We have examined only some of the marbles in bag B, let
us suppose, but through examination of other bagfuls in
stack S have determined only positive instances of the
hypothesis, G:

"Every bagful in stack S is uniform in color."
This hypothesis has, of course, as one ot its, as yet
undetermined, instances, G1:

"Bagful B is uniform in color,"
which greatly increases the projectibility of H, so
long as G itself is highly projectible. Again, if G.is
highly projectible, the acceptability of predictions of
its undetermined instances is increased. One of these
undetermined instances is the statement that B is
uniform in color. This, then, increases the projectibility
of any presumptively projectible hypothesis that we have
to the effect that the marbles in B are some one par-
ticular color or other, and as long as H is presumptively
projectible any hypothesis stating that the marbles in
bag B are some color other than red will be violated and,
hence, not presumptively projectible.

Goodman characterizes such hypotheses as follows:

> ...a hypothesis is a positive overhypothesis of
> a second, if the antecedent and consequent of the
> first are parent predicates of, respectively,
> the antecedent and consequent of the second.[26]

However, not all overhypotheses have a positive
affect. In some cases, an overhypothesis may serve to
reduce the projectibility of a hypothesis. For instance,
if a highly projectible G were:

"Every bagful in S is mixed in color,"
it would have the effect of reducing the projectibility
of H. In this case, the consequent of G is not the parent

of the consequent of $\underline{H}$ but is the complement of the parent, since "mixed in color" applies to just those bagfuls of marbles to which "uniform in color" does not apply. Thus, the greater the projectibility of this new $\underline{G}$, the less the projectibility of $\underline{H}$.

There are, however, conditions on the effectiveness of an overhypothesis, either positive or negative. First, it is noticeable in the above examples that the over-hypotheses are required to have a high degree of projecti-bility, as for any other presumptively projectible hypotheses, is provided by the initial projectibility index as modified by the affect of overhypotheses. But we are not forced to retreat through a hierarchy of overhypotheses. Goodman points out that $\underline{G}$ may have an overhypothesis such as $\underline{F}$:

> "Every stack of marbles in Utah is homogeneous
> in color variegation"

with a high degree of projectibility and well entrenched predicates, but it is not likely that the parents of these predicates would be well entrenched. Therefore, $\underline{F}$'s degree of projectibility would be in terms of its initial index, unmodified by overhypotheses, since the overhypo-theses of $\underline{F}$ would not be presumptively projectible.

Furthermore, quite similar reasoning can be employed to show that a hypothesis with a low initial projectibility index will have a low final degree of projectibility. A hypothesis with a low initial index can have little of either earned or inherited entrenchment for its predicates.

Yet, to say that it has little inherited entrench-
ment is to say that its parents have little earned or
inherited entrenchment. Since any of its overhypotheses
much contain one or another of these ill entrenched parent
predicates, none of the overhypotheses would be presumptively
projectible and could not, therefore, be used to increase
the low initial projectibility index of the hypothesis in
question.

The second requirement is that the overhypothesis be
well supported. This requirement is different from the
first. An overhypothesis can be presumptively projectible,
hence merely supported, without being well supported. But
it does not seem much argument is required to make this
second point. Obviously, the better an overhypothesis
is supported, the greater degree of credibility is trans-
mitted to its undetermined instances and, thereby, to the
hypothesis of which its predicates are parents.

The third condition is a bit more difficult to present
adequately. Let us follow Goodman's procedure and illus-
trate with an example used previously. Recall that the
hypothesis,$\underline{H}$:

"All the marbles in bag B are red"
was increased in degree of projectibility through the
affect of the overhypothesis, $\underline{G}$:

"Every bagful of marbles in stack S is uniform in color,"
and the support that we had for this overhypothesis from

examination of bagfuls of marbles in stack S. But suppose

we attempted to use this support to increase the pro-

jectibility of the hypothesis, H1:

"All the marbles in bag W are red,"

where W is in some stack other than S but also in Utah.

We could use our support for the overhypothesis, G1:

"Every bagful of marbles in Utah is uniform in color."

But the effectiveness of G1 in increasing the projectibility

of H1 is obviously going to be less than the effectiveness

of G in raising the projectibility of H. Therefore, as

Goodman formulates this condition:

> Where two equally projectible overhypotheses
> bring equal evidence to bear, the more specific
> one has the more powerful effect.[27]

The more specific of two overhypotheses is one with

fewer members in the extension of its actecedent predicate,

which is, of course, a parent predicate of the the hypo-

thesis of which the one in question is an overhypothesis.

The importance of these conditions justifies our

being a little repetitious, and I think it is worthwhile

to present Goodman's summary of them:

> ...the comparative effectiveness of different
> presumptively and appreciably projectible
> overhypotheses depends upon three factors.
> Where such hypotheses are equally specific and have
> equal supporting evidence, their effectiveness
> varies with their degree of projectibility.
> Where specificity and also degree of projectibility
> are equal, effectiveness varies with amount of
> support. And where degree of projectibility and
> also amount of support are equal, effectiveness
> varies with specificity.[28]

Summary

It will be recalled that in the example taken from Scheffler the problem was to indicate that "is playable" may be defined through the specification of such manifest predicates as "is a record of music or speech", "is of such and such form", "is of such and such shape", and "has such and such a history". What Goodman has accomplished is to specify a set of manifest predicates in terms of which "projectible" is defined. This set includes the predicates "unviolated", "supported", "unexhausted", "could have belonged to the working basis". Any hypothesis to which all of these predicates are applicable is projectible.

Yet, we have not shown the theory of projection to be applicable to Lewis' problem of the credibility of phenomenal statements. In the next chapter we hope to show that an extension of Goodman's theory should readily solve Lewis' problem.

It is also hoped that in attempting this extension we shall provide an answer to a criticism of Goodman's theory suggested by Scheffler. He comments:

> The most natural objection to Goodman's new
> approach is that it provides no explanation of
> entrenchment itself. In using this notion
> to explain induction, however, Goodman does not at
> all rule out a further explanation of why certain
> predicates as a matter of fact become entrenched
> while others do not. His purpose is to formulate

clear criteria, in terms of available information,
that will single out those generalizations in
accordance with which we make predictions. The
strong point of his treatment is that his criteria
do indeed seem effective in dealing with the
numerous cases he considers.[29]

If we can show that Goodman has suggested an explanation

of entrenchment that is quite advantageous in itself,

we will have indicated some strength in Goodman's theory

that has perhaps been overlooked.

NOTES

1. Goodman (4), Ch. III, pp. 63-83, Ch. IV, pp. 87-120.

2. Ibid., p. 65.

3. Ibid., p. 67.

4. Mill (11), pp. 185-6.

5. Goodman, Op. Cit., p. 69.

6. For an exposition, in detail, of the difficulties
   of the generalization criteria, see Scheffler (17).

7. Goodman, Op. Cit., pp. 73-4.

8. Note the resemblance of this problem to Lewis'
   problem discussed in Ch. II.

9. Goodman, Op. Cit., p. 82.

10. Ibid., pp. 48-9.

11. Scheffler (18).

12. Ibid., p. 16.

13. Goodman, Op. Cit., pp. 89-90. In terms of Goodman's
    figure, the ultimate task of this thesis can now be
    described as an attempt to explain this "motion of
    the mind" as its tendency to respond to events as sig-
    nals of other events. Of the many signaling capacities
    objects or events have for the mind some are gradually
    sorted out as genuine while others are discarded. We
    should like to explain the distinction the mind makes
    between valid and invalid projections on the basis of
    the distinction between genuine and non-genuine signals.
    But first, we shall need to continue with a fairly
    detailed examination of the theory of projection. This
    may enhance our prospects for a theory of genuine
    signality.

14. Ibid., p. 116.

14a. The strategy for the definition of the dispositional
     term 'projectible' is, in short, essentially the same
     as that employed for the dispositional 'playable'
     described on pp. 40-1.

15. Ibid., p. 96.

16. Ibid., p. 96. For an elaboration and extension of the

thesis of entrenchment as a key to the problem
of induction, to value considerations arising
in classification, see Rudner (14), Part III.

17. For Goodman's analysis of the locution "could have
been" and why it is required that the hypothesis
be "actual", see (4), Ch. II, "The Passing of the
Possible".

18. Ibid., pp. 101-2.

19. Ibid., p. 104.

20. Ibid., p. 104.

21. Ibid., p. 105.

22. Ibid., p. 106.

23. Reasons "Could have been projected" can be considered
innocuous are presented in (4), Ch. II.

24. Ibid., p. 108.

25. Ibid., p.108.

26. Ibid,, p. 110.

27. Ibid., p. 115.

28. Ibid., p. 115.

29. Scheffler (17), p. 10.

CHAPTER V

In this chapter we hope to indicate how the solution
we have been suggesting throughout this thesis may be
given to the problems we have been considering. Our sug-
gestion is that a predicate of <u>signals</u> may prove adequate
to provide a basis for systematization of some semantical
and pragmatic predicates. We have further suggested that
such an analysis will serve to relate the problems of
semantics and epistemology with which we have been mainly
concerned.

I

Let us briefly elaborate the suggestion we are making.
We noticed that Tarski's definition of truth is not adequate
to solve the problem posed by Lewis on the credibility of
phenomenal statements. We are proposing that an extension
of Goodman's theory of projectibility, supplemented by
Tarski's definition may be adequate for solution of this
problem. Furthermore, we hope to show that the requisite
extension of the theory of projectibility may be accomplish-
ed on the basis of the predicate "is a genuine signal".

It should be noted at the outset that the actual
construction of the suggested system is obviously not going
to be within our grasp here. What we will do instead is,
first, offer some quite tentative definitions (in the hope
of improving these at some later time) and, second, try

to discover whether or not there is any good reason for assuming that adequate definitions along the lines indicated cannot be given.

Let us begin by reviewing Goodman's comments in "Sense and Certainty". It will be recalled that the truth of a statement P in the present tense saying "There is now a red patch in the visual field" is defined in terms of the truth of an earlier statement F signaling the event P describes. P does not signal the event, since signaling is forecasting; yet, P is true if an only if F is a genuine signal of what P describes. Moreover, and this is the crucial epistemological point, P is credible if we are warranted in taking F to be a genuine signal: i.e. only if F belongs to the class of presumptively genuine signals. Furthermore, as Goodman says of other-tensed cognates of P, "statements in the past tense can be handled in the same way as those in the present tense; and tenseless statements, depending on whether they occur before, during, or after the time they pertain to, in the same way as statements in, respectively, the future, present, and past tense."[1]

First, it is said a statement in the past tense can be handled in the same way as one in the present tense. We may thus follow the schema outlined above. Suppose we have the statement, P1, that at some time t "There was a red patch in the visual field." P1 is true if and only

if $\underline{F1}$, predicting the occurrence of a red patch in the visual field at time $\underline{t}$ and occurring prior to time $\underline{t}$, is a genuine signal.

Second, we have the matter of tenseless statements. Depending on whether they occur before, during, or after the time they pertain to, these are to be handled in the manner, respectively, as future, present, or past tense statements. Suppose we have a statement, $\underline{P2}$: "A red patch occurs in the visual field at time $\underline{t}$." If this statement occurs prior to the time to which it pertains, it is to be handled in the manner of future tense statements. Thus, $\underline{P2}$ is true if and only if it is a genuine signal of the red patch at $\underline{t}$. If $\underline{P2}$ occurs during or after time $\underline{t}$, it is to be handled in the manner, respectively, of present or past statements. In both these latter cases, $\underline{P2}$ is true if and only if $\underline{F2}$, predicting the occurrence of a red patch at time $\underline{t}$ and occurring prior to time $\underline{t}$, is a genuine signal. All of these truth conditions are corollaries of jointly the definition of "genuine signal" to be discussed below and the Tarski treatment of "truth".

We have a means, therefore, for relating the truth, of phenomenal statements in any tense to signaling situations. Yet, we have two crucial and difficult problems to consider before we can decide the success of Goodman's proposal or its extensions. First, we feel that the predicate

"is a genuine signal" must be explicated, should be reduced at least to the broader basis provided by the predicate "is a signal"; since what we wish to explain is (at least in part) "genuine signality". Second, we must provide means for dealing with statements in the present ⋅ or past tense such that no correlative statement in the future tense has happened to occur.

These two problems are much like the twofold problem encountered by Goodman in Fact, Fiction and Forecast. That this is so is indeed the fundamental pivot of this thesis. In Fact, Fiction and Forecast it will be recalled, the twofold problem was to eliminate from the basis unprojectible projected hypotheses and to expand the basis to include unprojected projectible hypotheses.[2] We, on the other hand, have the twofold problem of (1) eliminating non-genuine signals from the basis of actual signals and (2) expanding this basis to include genuine signals that, though actual, were not actually signals on appropriate occasions required for the definition of truth or of credibility. This second problem can be explained as the problem of interpreting a statement like "F" could have been a genuine signal, if it had occurred prior to time t."

In brief, our problem is one of projecting "is a signal" in order to define "genuine signality". Let us attempt further to determine the relevance of this problem to the

theory of projectibility.

II

In Goodman's theory of projectibility, the extra-systematic explanation of the primitive "is a much better entrenched predicate than" is given in terms of actual projections.[3] We should recall that a hypothesis is construed by Goodman to have been actually projected when it has been used to predict the outcome of examining previously unexamined cases at a time when it is supported, unviolated and unexhausted. Some of the undetermined cases of a hypothesis may be past cases. Projection of a hypothesis to such a case is not a prediction. Still, for such a case, the hypothesis predicts the outcome of examination of its instance, i.e. the statement describing the past case. In the sense that outcomes rather than past cases are predicted, we may say that projecting hypotheses is forecasting.

We might say then that if a hypothesis is actually projected, then it is a successful signal of that which it successfully predicts. But we cannot say that if a hypothesis is a successful signal of that which it predicts, then it is actually projected, since a hypothesis may have been violated prior to the signaling in question. And a hypothesis that has been violated in one instance may still be used to predict the outcome of examining some other instance.

To illustrate, suppose a hypothesis, H1, says:

"All the marbles in bag B are blue."

Of the many marbles from bag B so far examined, all but one have been found to be blue. Still, H1 may successfully signal the outcome of examining another marble from bag B. Thus, H1 is a successful signal, though a replica of H1 failed to signal the outcome of examining the non-blue marble.

The sense of "replica" intended at this point is that employed by Goodman in The Structure of Appearance.[4] In this sense, only linguistic events are replicas of themselves and some other linguistic events, e.g. any occurrence of "Paris" is a replica of itself and also of any other occurrence of "Paris".

We might avoid the above difficulty by refusing to acknowledge as a signal an event a replica of which has failed on some occasion to be a successful signal. This, however, would be a costly choice, since it would seriously restrict the breadth of our basis.

In order for our system to have important relevance to epistemological problems, we must start with events actually taken to be signals of other events. We want accordingly to use "A is a signal of B" in such a way as "A is taken to be a signal of B and B appropriately occurs". We do not want to use it in such a way that we are committed to every replica of A signaling every replica of B. The step from "A is a signal" to "A is a reliable signal" is part of the way from "A is a signal" to "A is a genuine

signal". It is just this step we should like to explain.

Yet, it does seem we are on the right track to deter-
mine the reliability of a hypothesis as a signal on the
basis of the success of its replicas. Following this
procedure may also suggest a way of distinguishing non-
genuine signals in the basis of actual signals.

We should like to define the predicate "is more
reliable as a signal than" in such a way that the minimum
qualifications for a hypothesis to be a reliable signal
is that it be supported, unviolated and unexhausted or
that no instances of a reliable hypothesis have failed
successfully to signal that which was predicted. Our con-
tention will be that projectible hypotheses and genuine
signals are at least reliable signals.

As a definition of successful signaling we propose:

(i) For all replicas of an instance, A, of a hypothe-
sis, H: replicas of A are successful signals of
replicas of B if and only if some replicas of A
are signals of replicas of B, and any previous
replica of A that is described by an instance of
H could have signaled a replica of B.[4a]

The locution "could have signaled" is used here to mean
that if C and D are any replicas of A and B, respectively,
either C did signal D or C occurred just prior to D and
lacked only actually being taken as a signal of D, and
there have occurred some instances of signal taking.[5]

This condition serves, then, at a stroke to effect
both a requisite expansion and a requisite contraction of
the basis. Employing it, we may eliminate any signal that

has replicas which on occasions have been unsuccessful as signals. On the other hand, it expands the basis to include some non-signaling events that could have been signals.

It should be noted that what we are attempting to do in this definition is to match Goodman's requirement that an actually projected hypothesis be both supported and unviolated. We have done fairly well in a matching of the requirement that a hypothesis be supported, but we have somewhat modified the requirement that it be unviolated. On our view the only hypotheses rejected as unsuccessful signals are those that have been explicitly used to predict the outcome of examining previously unexamined cases and have failed to do so. We have not taken account of information we might have of negative instances when no such prediction was actually made, nor of the more difficult case of signalings we should, perhaps, like to call successful though the signaled event does not occur as signaled. However, to take account of these problems would seriously complicate this exposition and not greatly help us accomplish our more modest ends. We are not, after all, pretending to offer final, adequate definitions. We are attempting to suggest a program for at least some initial steps in giving such definitions.

With these qualifications, we are now in a position to suggest a definition for reliability.[6]

At some time _t_:

(ii) <u>A</u> is more reliable as a signal than <u>C</u> if and only if:
(1) the number of replicas of <u>A</u>, that are signals of replicas of that of which replicas of <u>A</u> are successful signals, is greater than the number of such replicas of <u>C</u>;
(2) both replicas of <u>A</u> and replicas of <u>C</u> are successful signals; and
(3) <u>A</u> is taken to be a signal of a replica of that of which replicas of <u>A</u> are successful signals.

We may drop the requirement that both replicas of <u>A</u> and replicas of <u>C</u> be successful signals, if we decide that at this point we are discussing only successful signals.

We are attempting to say in this rather complicated fashion that the reliability of a signal is determined on the basis of the success of its replicas. The final requirement in the definition, that <u>A</u> be taken to be a signal, is inserted for two reasons. First, it would seem odd to say that <u>A</u> is more reliable as a signal than <u>C</u>, when <u>A</u> is not taken to be a signal at all. Second, this requirement parallels Goodman's condition that a hypothesis be unexhausted at time of actual projection. However, <u>our condition is weaker</u> in that it is not required that a hypothesis <u>be</u> unexhausted, only that it be <u>taken</u> to be unexhausted at the time in question.

However, it is likely that the manner in which we have so far defined "successful signal" and "reliable as a signal" will nonetheless determine a class of actually projected hypotheses with fewer members than the class of actually projected hypotheses Goodman uses as his basis.

This is likely because our definitions require that replicas <u>both</u> of an instance of the hypothesis and <u>that</u> which <u>was</u> <u>predicted</u> occur in order for the hypothesis to be a successful signal. To illustrate, suppose <u>H1</u>,

"All the marbles in bag <u>B</u> are blue,"

is explicitly adopted and successfully predicts the outcome of examining the next marble drawn from bag <u>B</u>. On our view, this amounts to a case of signaling only if a replica of both

"The next marble drawn from bag <u>B</u> will be blue"

and

"This marble is blue"

(or some other phrasing of an instance of <u>H1</u> and a report that a given marble is blue) occur at appropriate times. In circumstances such that one or the other of these fail to occur, <u>H1</u> has not been an actual signal on our view, though for Goodman it has been projected in these circumstances.[7]

The remark that the reliability of a signal is determined on the basis of actual successes is similar to Goodman's explanation of entrenchment. He emphasizes, it will be recalled, that entrenchment of predicates is determined on the basis of frequency of actual projection. This similarity suggests deepening Goodman's study by attempting to define <u>entrenchment</u> <u>of</u> <u>predicates</u> <u>in</u> <u>terms</u> <u>of</u> <u>reliability</u> <u>as</u> <u>signals</u>.

According to our proposed definition of "reliable",

replicas of H1 are more reliable than replicas of H2

if and only if H1 has been more frequently used for

predicting than H2. We say, therefore, that H1 is more

reliable than H2 if and only if its replicas are more

reliable than those of H2. Thus, up to time t:

> H1 has been more frequently projected than H2
> if and only if H1 is more reliable as a
> signal than H2.

There is no parallel to this definition in Goodman's

theory. It is required here in order to define the

frequency of projection of predicates, which Goodman uses

to explain earned entrenchment.

Earned entrenchment in Goodman's theory is entrench-

ment of a predicate as an antecedent or entrenchment of

a predicate as a consequent in a general conditional.

When we speak of "antecedent predicate P", we mean "the

predicate P as an antecedent or component of an antece-

dent". "Consequent predicate P" means "the predicate P

as a consequent or component of a consequent".

Up to time t:

(iii) Antecedent predicate P has been more frequently
projected than antecedent predicate Q if
and only if hypotheses with antecedent pred-
icate P have been more frequently projected
than hypotheses with antecedent predicate Q.

Also, up to time t:

(iv) Consequent predicate P has been more fre-
quently projected than consequent predicate
Q if and only if hypotheses with consequent
predicate P have been more frequently pro-
jected than hypotheses with consequent predi-
cate Q.

Thus, the reliability of a hypothesis attaches to the predicates of which it is composed. We may now propose a definition of "entrenchment".

To save space, the following is to be understood as applying _mutatis_ _mutandis_ to the comparison of antecedent predicates to antecedent predicates or consequent predicates to consequent predicates.

At time $\underline{t}$:

(v) Predicate $\underline{P}$ is better entrenched than predicate $\underline{Q}$ if and only if predicate $\underline{P}$ has been more frequently projected than predicate $\underline{Q}$.

After introducing _his_ primitive relation (see p. 45 above), Goodman makes the following comments:

> Like Hume, we are appealing here to past re-
> currences, but to recurrences in the explicit
> use of terms as well as to recurrent features of
> what is observed. Somewhat like Kant, we are
> saying that inductive validity depends not only
> upon what is presented but also upon how it is
> organized; but the organization we point to is
> effected by the use of language and is not at-
> tributed to anything inevitable or immutable
> in the nature of human cognition. To speak very
> loosely, I might say that in answer to the ques-
> tion what distinguishes those recurrent features
> of experience that underlie valid projections
> from those that do not, I am suggesting that the
> former are those features for which we have adopt-
> ed predicates that we have habitually projected.[8]

Like Goodman, we have been concerned so far with the predictive use of language and have framed our definitions with the view to define his predicates. Yet, the first sentence of the quoted paragraph suggests a way of greatly fortifying our analysis. The signal relation holds among non-linguistic events as well as among linguistic and

non-linguistic events. We can expand our analysis by taking into account non-linguistic signals. This step is required if we want to preserve the breadth of our basis.

We could modify the definition of entrenchment to read "predicate P and predicates coextensive with it" and "predicate Q and predicates coextensive with it" in place of "predicate P" and "predicate Q" Then, we could proceed to follow Goodman's analysis in order to define "genuine signality" in terms of "projectible". But this course is prevented by our goal of defining "projectible" in terms of "genuine signality".

III

Though we have indicated how a bridge might be made between a predicate of signals and Goodman's theory of projectibility, instead of attempting to follow through in the manner suggested above, we turn now to the task of admitting non-linguistic signals by modifying our definitions to admit non-linguistic as well as linguistic signals.

In order to accomplish this, we shall extend the sense of "replica" employed here, to cover non-linguistic events. Each event of the events that constitute the extension of a predicate is, in a sense, a replica relative to that extension, of itself and of any other event in the extension of that predicate. We shall, in fact, say that events

are replicas of one another relative to some actual predicate that applies to both. Now, the definition of "successful signal" may be modified so that counted as successful signals may be both non-linguistic members of extensions of predicates as replicas of each other and linguistic replicas.

Correspondingly, we shall speak elliptically of P being a successful signal of Q, and construe this as meaning that members of the extension of P are successful signals of members of the extension of Q, and "P-replica" means "a replica in the extension of P of a member of the extension of P".

Supplementing the definition already offered we have:

> (vi) P is a successful signal of Q if and only if some P-replicas are signals of Q-replicas, and any known P-replica could have signaled a Q-replica.[9]

On this basis we may attempt to define a sense of "reliable" other than that previously considered. Suppose we have a hypothesis, H:

"Whenever P occurs, then Q occurs.

It has been suggested this be interpreted as stating that members of the extension of P are successful signals of members of the extension of Q.

It may occur, for instance, at some time of occurrence of a P-replica, that H signals that a P-replica is a signal of a Q-replica. In this case, H is a reliable

signal if and only if <u>P</u> is a successful signal of

<u>Q</u>. And, in general, we may say:

> (vii) Any signal that one event is a signal of another
> event is reliable if and only if replicas
> of the former are successful signals of
> replicas of the latter.[10]

III

We have examined the question of the <u>relevance</u> of

our problem, of explicating "genuine signality", to Good-

man's theory of projectibility. Let us now turn to an

investigation of our problem.

Our new predicate "is a reliable signal" has an ex-

tension of "observed regularities", including some "regular-

ities" in the predictive use of language, which is similar

to Hume's basis. Taking this predicate, together with

those previously defined, we may now attempt to solve the

twofold problem with which we began this chapter. It

was remarked that this problem is analogous to Goodman's

twofold problem in <u>Fact, Fiction and Forecast</u>, and we

shall, therefore, follow his lead in order to propose

a solution to the problem we are facing.

As previously mentioned, our twofold problem is that

of eliminating non-genuine signals from the working basis

and expanding this basis to include genuine signals that,

though actual, were not <u>actually</u> <u>signals</u> on appropriate

occasions. We have as our working basis all signals that

are reliable according to (vii). In order to avoid con-

fusion, let us differentiate the two senses of "reliable"

so far defined by calling (ii) "reliable$_1$" and (vii)
"reliable$_2$".

It will be a complicated task (and, moreover, one
for the psychologist) to specify the numerous psychological
factors involved in signal-takings. We shall mention
some of these while trying to avoid speculating on the
results of future psychological research. An event oc-
curs and we note it. We have to choose whether as a sig-
nal to take it as a P-replica, Q-replica, etc.. This
choice will be influenced by any number of considerations;[11]
but primarily, perhaps, by (1) to what further events of
interest we could take the occurring event to be, say,
instrumental and (2) how reliable it is as a signal of
those interesting events to which we take it to be instru-
mental. Such decisions require, most often, a rather
delicate and complex balancing of the information avail-
able. We should like to investigate some of the sort
of information that is available for the second of these
considerations.

Let us say an event A occurs that is primarily noted
as a P-replica and an R-replica. (We take, for economy of
exposition, all other predicates applicable to this event
to be "uninteresting" in our value considerations.)

First, let us say, we scrutinize whether A as a P-
replica is a reliable$_1$ signal of a Q-replica and whether
A as an R-replica is a reliable$_1$ signal of an S-replica.

Rules are required in order to enable us to eliminate unreliable signals. And, since we intend at a later point to equate "projectibility" and "genuine signality", we shall follow the rules Goodman invokes to eliminate unprojectible hypotheses from his basis.

Rule 1: A as a signal that a P-replica is a signal of a Q-replica is to be ruled out as a reliable$_2$ signal if:

(1) A as a signal that an R-replica is a signal of an S-replica is more reliable$_1$ than A as a signal that a P-replica is a signal of a Q-replica; and

(2) it is not the case that both A is a reliable$_2$ signal that a P-replica is a signal of a Q-replica and A is a reliable$_2$ signal that an R-replica is a signal of an S-replica.

This rule may be taken to correspond roughly to Goodman's rule 1a, (p. 47 above), though our rule 1 is more explicitly applicable to the extensions of predicates than is Goodman's rule 1a.

Rule 2: A as a signal that a P-replica is a signal of a Q-replica is to be ruled out as reliable$_2$ if:

(1) A is also a signal that a P-replica is a signal of a T-replica;

(2) the number of replicas of A that are signals of T-replicas is greater than the number of replicas of A that are signals of P-replicas;

(3) either (a) there is a replica of A that was taken to

to signal a $\underline{T}$-replica and failed to do so, or (b) neither has there been a replica of $\underline{A}$ that was taken to signal a $\underline{T}$-replica and failed to do so, nor has there been more than very few[13] replicas of $\underline{A}$ that are signals of $\underline{T}$-replicas; and

(4) it is not the case that both $\underline{A}$ is a reliable$_2$ signal that a $\underline{P}$-replica is a signal of a $\underline{Q}$-replica and $\underline{A}$ is a reliable$_2$ signal that a $\underline{P}$-replica is a signal of a $\underline{T}$-replica.

This rule is taken to correspond roughly to Goodman's rule 2 (p. 48 above). In our schema it would be difficult to meet both of the requirements that the consequent predicate of the conflicting hypothesis be well-entrenched, and that the hypothesis be neither violated nor supported. We, therefore, substitute for the latter that a signal be neither violated nor well-supported. Perhaps, the degree of neutrality of the available evidence in our formulation is less than in Goodman's, but the difference in effectiveness between "barely supported" and "not at all supported" in this case is likely to be negligible.

Rule 3: $\underline{A}$ as a signal that a $\underline{P}$-replica is a signal of a $\underline{Q}$-replica is to be ruled out as reliable$_2$ if:

(1) $\underline{A}$ is a signal that an $\underline{R}$-replica is a signal of a $\underline{Q}$-replica;

(2) an $\underline{R}$-replica is more reliable$_1$ as a signal than a

P-replica;

(3) any previous Q-replica is both an R-replica and a

P-replica;

(4) any previous R-replica is a P-replica;

(5) there are P-replicas that are not R-replicas; and

(6) it is not the case that both A is a reliable$_2$ signal that a P-replica is a signal of a Q-replica and A is a reliable$_2$ signal that an R-replica is a signal of a Q-replica.

Now we have as our working basis all and only such reliable$_2$ signals that do not violate one or another of the above three rules. We also have a great many problems. The ambiguity we have allowed throughout, i.e. whether events, or characteristics, or occurrences of characteristics construed as other than events, are signals, may ruin our efforts at this point if some care is not taken. We must also take care that the dual sense of "replica" does not lead us to take these rules to be other than they are.

To illustrate these difficulties, we must recall that we have not specified whether "A" in the above is an event, i.e. an occurrence of a (i.e.,one) characteristic. Also, the dual role of "replica" leaves it in doubt whether a replica of A is a non-linguistic event, a linguistic event, or either a linguistic or a non-linguistic event. Obviously, these two problems are not independent.

If we take A to be an occurrence of just one characteristic,
we thereby limit the variety of its replicas to one,
thus eliminating the last of the alternatives. To avoid
this, and also to offer a means of covering known conflicts,
we take A to be an occurrence of characteristics; and
if A is a linguistic event, its replicas are linguistic
events, if A is a non-linguistic event, it has replicas
that are non-linguisitc events and replicas that are
linguistic events.

We explain this latter interpretation as follows:
we are taking A to be an occurrence of a complex of
characteristics, some of which may be "account-takings"
of other characteristics of the complex. To speak of it
loosely, some of these account-takings, when non-linguistic,
may nonetheless be incipient speech or speech patterns.
We should like to hold that the similarities of these
occurrences to linguistic occurrences justifies taking
some of these as replicas of each other. We do not want
to commit ourselves on psychological theories of incipient
speech, yet, taking the above in the way we have seems a
promising course available to us.

On the other hand, if A is a complex containing only
linguistic occurrences, either written or uttered, we need
not assume it has non-linguistic replicas.

These considerations enable us to improve upon some
remarks made earlier. It would seem from the way in which

these rules were introduced that they are applicable only to occurrences like "$\underline{A}$" is a signal $\underline{that}$ $\underline{B}$ is a signal of $\underline{C}$. We have offered, as yet, no clarification of "is a signal that" which is, $\underline{prima}$ $\underline{facie}$, a quite different predicate from "is a signal $\underline{of}$". Further, we have not shown how our rules can be used to determine the reliability$_2$ of such occurrences as "B is a signal of $\underline{C}$". We now assume that any occurrence like "$\underline{B}$ is a signal of $\underline{C}$" can be taken to be an occurrence of "$\underline{A}$ is a signal that $\underline{B}$ is a signal of $\underline{C}$". The rationale underlying this assumption is that the difference between the two predicates is primarily one of emphasis. To see this, it should be remembered that earlier in this thesis we were concerned with the occurrence of a characteristic as a signal of another occurrence. Now, though we are still concerned with the characteristic, we are interest, primarily, in the $\underline{taking}$ of it as a signal. It is hoped these remarks serve both to clarify the locution "is a signal that" and to admit as reliable$_2$ signals all occurrences where $\underline{B}$ is a signal of $\underline{C}$ that do not run afoul of one or another of the three rules.

IV

We have still to eliminate from the working basis all reliable$_2$ signals such that no conflicting signals, as a matter of fact, happened to occur, yet are such that a conflict $\underline{could}$ have occurred. We must also expand our

working basis to include genuine signals that could have

occurred. In both these cases, we assume merely that

the conflicting signal and the reliable$_2$ signal are

actual, i.e. occurred at _some_ time.

Any signal in the working basis is to be eliminated

from the working basis if there is any actual signal

that conflicts with it according to the rules if the

latter had occurred at the time of the former. The

conflicting signal then is the _sum_[14] of the latter actual

signal and the time of the former signal.

All and only the signals _not_ eliminated by our

expanded rules are _presumptively genuine signals_. We

propose the following as a definition for "is a genuine

signal":

> (viii) Any signal is a genuine signal if and only
> if it is a presumptively genuine signal,
> and that of which it is taken to be a signal
> occurs.

We have, finally, the remaining problem of expanding this

basis to include genuine signals that could have occurred.

(ix)   If a certain event $\underline{B}$ occurs and an event $\underline{A}$

occurs before $\underline{B}$, then $\underline{A}$ could have been a genuine signal

of $\underline{B}$ if and only if:

(1) $\underline{A}$ could have been a signal of $\underline{B}$ (in the sense of

"could have been a signal" previously characterized), and

(2) $\underline{A}$ does not run into conflicts according to our expanded

rules. If $\underline{B}$ occurs and $\underline{A}$ occurs during or after $\underline{B}$, then

$\underline{A}$ could have been a genuine signal of $\underline{B}$ if and only if $\underline{A}$

could have occurred prior to B (the sum of A and some
time t prior to B is an individial) and A does not run
into conflicts according to our expanded rules.

V

The nexus of the two sets of problems previously
considered, i.e. those of defining certain semantical
predicates and those of solving certain epistemological
problems, can be found in the definition of "is a
genuine signal".

We have already investigated the dependence of the
problem of analyzing epistemological predicates on a
definition of "projectible". Roughly in our terminology,
if a hypothesis is projectible, then it is a presumptively
genuine signal; and if a linguistic event is a presumptive-
ly genuine signal, then it is a projectible hypothesis.
[There are difficulties in the latter half of this con-
junction, but I think the definition of "linguistic event",
given in such a way that a linguistic event has no non-
linguistic replicas, will handle some of them.]

Also, defining "genuine signal" in such a way that
that which is signaled occurs enables us, as indicated in
Part I of this chapter, to define "true" for phenomenal
statements, though it is not this consideration that
allows a solution to Lewis' problem.

It will be recalled that Lewis was concerned with

the here and now <u>credibility</u> of phenomenal statements and construed Goodman as offering a "predictive" criterion for judging such credibility. However, he mistakenly thought that Goodman was speaking of the predictiveness δf phenomenal statements. An explication of the credibility of phenomenal statements suggested by Goodman in "sense and Certainty" may be offered in terms of the sense of "genuine signal" developed here.

For a phenomenal statement P, "there is now a red patch in the visual field", occurring at time t:

> P is credible, i.e. P may justifiably be believed
> to be true, if and only if <u>red patch</u> at <u>t</u> was
> signaled by a presumptively <u>genuine signal</u>.

For the explication of "true" as it appears here, we can rely upon the Tarski definition and, hence, bring in another strand of the analysis we have followed.

Thus, we have indicated how an extension may be made to Goodman's theory of projection. Further, we have explored how this extended theory, supplemented by Tarski's definition of "true", may be adequate to resolve Lewis' problem on the credibility of phenomenal statements. We have done so with the intent to show that this problem can be handled within the framework of empiricism and that there is, Lewis to the contrary notwithstanding, no theoretical requirement within such a framework for the <u>indubitability</u> of phenomenal state-ments.

Projectible hypotheses lend projectibility to their

instances, such instances when signaling phenomena lend credibility to phenomenal statements. A phenomenal statement is true if the instance predicting what it describes is a genuine signal, and a true instance lends confirmation to a projectible hypothesis of which it is an instance.

<div align="center">VI</div>

Many of the further problems solution of which is still required to render the suggested analysis wholly adequate have already been exposed. It would not further our proposals a great deal to elaborate on these problems. Yet, it seems to the writer that all of the problems that we have exposed have been such that techniques are available for their solution. I think, in fact, that we can conclude, with one reservation to be noted, that we have found no good reason to assume an adequate analysis of these problems cannot be given.

The reservation that we have is that we have so far not commented on the problem of an extrasystematic explanation of the primitive predicate "is a signal of". We have not done so because, in a sense, it is not part of our philosophical problem. As Goodman notes of the signal relation, "so long as we are satisfied that the relation clearly obtains in nonlinguistic experience, we can postpone consideration of its anatomy and genealogy."[15] A psychological account of signaling is not part of our task.

Yet, we should mention what any such account would at least be required to produce in the way of explanation.

In the way of extrasystematic interpretation, the signaling relation will require at least biological, physiological, anthropological and psychological theories to account for the values "things" have historically had for our species in the course of its development, how we learn to discriminate among signals, whether we _see_ values _in_ things and how we thus learn to modify our behavior to render these values accessible to us. All these questions and many more require answer for an adequate systematic explanation of signaling and explication of "signaling". Yet, I think we can decide that any explanation would be inadequate if it fails to acknowledge that _someone_ takes account of _something_ and that that something may be either a linguistic or non-linguistic event.

NOTES

1. Goodman (5), p. 166.

2. See Ch. IV above.

3. See Ch. IV above.

4. Goodman (6), pp. 287-90.

4a. We shall not be concerned to examine the many faults of this proposed definition in detail, since it is ultimately to be replaced. See p. 76 below.

5. We will avoid becoming entangled in problems on the maximum or minimum duration of signaling events. These vary from one species to another and is too involved a problem for us to treat here. It is assumed, however, that such a treatment would be required for an adequate extrasystematic interpretation of the signaling relation. Here, we assume merely that signaling occurs over a brief duration.

6. This definition is intended, as was implicit in (i), to be temporally qualified.

7. We shall not discuss the circumstances under which a replica of either of the above could be uttered in order to qualify $H1$ as having been legitimately a signal in such a case.

8. Goodman (4), pp. 96-7.

9. This definition needs to be improved in at least one important way. As it stands, it fails to count as successful signals occurrences of similar characteristics such that there actually is no predicate applicable to them and only to them. An adequate analysis should handle the problem of specifying circumstances under which such characteristics could have been the extension of a predicate. We need not be concerned with this problem here, since we have already indicated a basis broader than that of the theory of projection.

10. Since an adequate definition of "is a reliable signal" should isolate a working basis similar to that which Hume employed, we can now more fully understand the rationale of Goodman's vindication of Hume. For further light on this issue, see Rudner (14), Part III, and Scheffler (17).

11. A clarification of this situation can be found in Rudner (14).

12.   Throughout this chapter, we have allowed ambiguity
      as to whether we are taking signals to be events,
      or characteristics, or occurrences of characteris-
      tics construed as other than events. It does not
      seem we have as yet good reasons for making a choice
      among these alternatives. We shall attempt to present
      such reasons and resolve the ambiguity on p. 81.

13.   The decision as to how many are "too few" and how
       many "enough" involves consideration of the importance
      of being mistaken. Rudner makes this point clearly
      in (13) and (14), Part I.

14.   The use of "sum" here is intended to be that defined,
      for one place, in (6), Ch. II, Part 4, pp. 42-51.

15.   Goodman (5), p. 165.

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