AN EPISTEMOLOGICAL CRITIQUE OF THE NEW SOCIAL STUDIES

Thesis for the Degree of Ph. D. MICHIGAN STATE UNIVERSITY RICHARD F. NEWTON 1969



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AN ABSTRACT OF A THESIS

By Sec Richard F. Newton

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ABSTRACT

AN EPISTEMOLOGICAL CRITIQUE OF THE NEW SOCIAL STUDIES

В**у**

Richard F. Newton

Induction and the nature of inductive inferences have become the most prominent aspect of the "new social studies." This thesis examines induction from the epistemological perspective. Induction is defined as a type of inference which is nondemonstrative and ampliative in nature. It may go from a set of general premises to a specific conclusion. or from a specific premise to a general type of conclusion. Deduction thus becomes a demonstrative inference which is nonampliative in nature. It also may go from the general to the specific, or from the specific to the general. The older definition. which is often used in the new social studies. of induction as the type of inference which always goes from the specific to the general is not in keeping with the modern usage of the term. In science, and the philosophy of science, induction is almost always used in the sense of a nondemonstrative ampliative inference. The conclusion of such an inference states more than is found in the premises, and there is no logical necessity for the

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conclusions to be true given that all the premises are true.

Richard F. Newton

David Hume was the first to point out the fact that in induction there is no logical connection between the premises and the conclusion. Since his analysis many attempts have been made to justify the inductive inference. None of these attempst could be called successful in that they are accepted by a majority of people. In this thesis six of the more prominent attempts at justification are explained. Some of these seem to give a reason for utilizing inductive <u>policies</u>, but none offer a <u>logical</u> justification for believing that the conclusion of a single inductive inference will follow <u>necessarily</u> from the premises.

That the social sciences must cope with this inductive problem becomes clear through the analysis of two of the major modes of explanation found in social science. These are the functional and empirical types of explanation. In functional explanations one must assume that nature has been orderly and regular in the past, is so in the present, and will continue to be so in the future. The assumption is unprovable, but is necessary if a functionalist explanation is to have any predictive value. In empirical explanation the results of any investigation are always assumed to be tentative and subject to either further confirmation or disconfirmation. In the empirical type of explanation absolute certainty regarding matters of fact is unobtainable. New evidence in the fu of the re E as being Also exam[was the A School Ge Social St addition eramined projects Some ep for the Curricu Massia and ho mater the 1 Wishe unexe in the future could always lead to the disconfirmation of the results reached at an earlier time.

Edwin Fenton and Byron Massaialas were examined as being representative figures in the new social studies. Also examined to see how the inductive problem is handled was the Anthropology Curriculum Study Project, the High School Geography Project, the Sociological Resources for Social Studies, and the Harvard Social Studies Project. In addition the Curriculum Materials Analysis System was examined. There is a great deal of variation in how these projects, and people, handle the problem of induction. Some episodes produced by the Sociological Resources for the Social Studies, some of the units in the Anthropology Curriculum Study Project and some of the writings of Byron Massialas do the best job of explaining the inductive problem and how the social scientist works with it. Even these materials though could do a better job at explaining the logical problem that induction presents to one who wishes to make future predictions or statements about unexamined members of a larger population.

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To fully acknowledge all the people who have aided in helping me reach this point would require something longer than the thesis itself. Thus, for practical reasons our specific thanks must be limited to those directly responsible for help. Kathi and Cliford must, of course, come first. Next I wish to thank Drs. John Useem, Troy Stearns, and Frank Blackington III of the guidance committee. Most important has been the immense help of Dr. Stanley P. Wronski, who as chairman, has provided help in more ways than he will probably ever be aware of. Without the help of these people, and others, this thesis might never have been completed.

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Introduction

Inductive approaches to knowledge are once more in great fashion. This is especially apparent in the more recent programs for social studies in the secondary schools. These are the programs that generally go under the heading of "the new social studies," and this is how we shall refer to them from this point on. One needs only to look at some of the more recent titles in social studies education to see just how much in vogue induction really is.¹ This thesis will look at induction from an epistemological standpoint.² This will be done in the hope that we may

¹An example of this offered below: Edwin Fenton, Teaching the New Social Studies in Secondary Schools: An Inductive Approach, (New York: Holt, Rinehart and Winston, 1966), Byron Massialas and Benjamin Cox, Inquiry in Social Studies, (New York: McGraw Hill, 1966), Bernard Kravitz and Diane J. Soroka, "Inquiry in the Middle Grades," Social Education, vol. 33, no. 5 (May, 1969), p. 540. It also seems clear that the emphasis is on inductive

ways of knowing rather than on learning. While none of the new programs are explicit on this point the conclusion seems justified. This is because of the emphasis on inductive inferences, methods of inquiry, and patterns of explanation. All this would indicate that when induction is used in the new social studies it refers to knowing in the philosophical sense rather than to learning in the psychological sense.

²One definition of epistemology is found in Readings in the Theory of Knowledge, (eds.) John V. Canfield and Franklin H. Donnell, (New York: Appleton-Century-Crofts, 1964), p. v.

"Epistemology is concerned with what it is to

then have some guidelines as to just what can, and cannot, be done with the inductive method.

The first part of this thesis will attempt to define exactly what is meant by the term induction. or inductive inference. Also, the inductive problem, as formulated by David Hume, and some of the various attempted solutions will be set down. This will be done because so few classroom teachers and social studies educators seem clear on this material. The next part of this work will look at how social scientists have worked around or with, the epistemological problems of induction. If social studies teachers are going to teach inductive methods of gaining knowledge they must be aware of what the working social scientist does. The main thrust of secondary school social studies should be towards explaining and demonstrating the process of the social sciences rather than the product. The product must, of course, be a part of any course for it provides a kind of perceptual base for the ongoing process. The product of the various social sciences is constantly changing

know and other questions pertinent to this: What it is to believe, be certain, perceive, remember, justify or have grounds for what one claims to know; what it is to be true or to be probably true; what concepts, properties, and propositions are." This thesis will be concerned with the problem of justifying what one claims to know inductively.

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while the process, or methodology, will remain almost unchanged over time. If the knowledge students acquire in schools is to be of more than just passing utility then the emphasis in social studies classrooms should be on teaching the process of the various social sciences. All of this will be examined in closer detail later.

The final section of this thesis will look at some of the work being done in the new social studies. Up until this time no one has examined the new social studies material in terms of its epistemology. There is a serious question as to whether the people designing the new material are aware of several assumptions that are often made in the development of inductive inferences. The purpose of this thesis is to look at induction, and how it is used in the new social studies, in a careful and critical manner to examine just what is being done with the inductive problem. There has been no work done which deals with the new social studies in this manner.

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Chapter 1

Induction: The Problem and Attempted Solutions

What is Meant by Induction?

One of the most widespread misconceptions is the belief that deductive arguments proceed from the general to the specific and inductive arguments proceed from the specific to the general. This is not true.³ The following examples will help to demonstrate this.

Deductively Valid Arguments

general to general

All gorillas are apes.

All apes are mammals.

All gorillas are mammals.

³"In traditional terms, deductive inference goes from the general to the particular, inductive inference from the particular to the general. No doubt there are deductive and inductive inferences, in the modern sense of 'deductive' and 'inductive', that satisfy this definition."

"In contemporary logic and philosophy of science 'deductive inference' is used in the sense of <u>necessary</u> (demonstrative) inference: the conclusion, in deductive inference, is claimed to follow with logical necessity from the premises."

"An inductive inference, again according to contemporary usage, is an inference whose conclusion is not claimed to follow necessarily but only with some degree of probability"

Arthur Pap, An Introduction to Philosophy of Science, (Glencoe: The Free Press, 1962), pp. 139-141.

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Alfred is a wolf. Alfred has a tail. Alfred's tail is the tail of a wolf.

particular to general

One is a lucky number. Three is a lucky number. Five is a lucky number. Seven is a lucky number Nine is a lucky number.

All odd numbers between 0 and 10 are lucky numbers.

In much the same manner inductive arguments do not simply fall into the narrow category of arguments which go from a set of particular premises to a general conclusion.

Inductive Arguments:

general to general

All economic recessions in the past have come to an end only with the outbreak of war.

All recessions come to an end only with the outbreak of war.

particular to particular

Boat A is a Chris-Craft, and boat B is a Chris-Craft. Both boats have 265 horsepower engines. Both boats have the same size and shape hulls. Boat A can go 30 knots. Boat B can go 30 knots.

general to particular

All emeralds previously found have been green. The next emerald to be found will be green.

Thus, the difference between inductive and deductive arguments is not to be found in the generality or particularity of premises and conclusion, but rather in the definitions of deductive and inductive.

Having dispensed with the definition which most people use when they talk of induction the question arises; what is induction? Probably the best way to explain the difference between deduction and induction is to show some examples.

Example of a deductive inference:

 (I) No gournets enjoy banana-tuna fish souffles.
(I) Mark enjoys banana-tuna fish souffles. Therefore Mark is not a gournet.⁴

(I) is a valid deductive inference. The conclusion follows <u>necessarily</u> from the premises. The form of this inference is such that <u>if</u> the premises are true; <u>then</u> the conclusion <u>must</u> be true. In contemporary logic and philosophy of science, "deductive inference" is used in the sense of necessary(demonstrative) inference; the conclusion is claimed to follow with logical necessity from the premises.

Example of an inductive inference:

	George is a man.
(11)	George is 100 years old.
	George has arthritis.
	George will not run a four minute mile tommorrow."

⁴Brian Skyrams, <u>Choice and Chance: An Introduction</u> to Inductive Logic, (Belmont, California: Dickenson Publishing Co., 1966), p. 7.

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In (II) the conclusion is (at most) only logically <u>probable</u>, not necessary. In an inductive inference, the truth of the premises does not guarantee the truth of the conclusion. If the premises are true, the conclusion may or may not be true. An inductive inference is an inference whose conclusion is not claimed to follow necessarily but only with some degree of probability; hence inductive inference is commonly used interchangeably with "probable inference."

Before going any further we must make clear the meaning of the term demonstrative inference.⁶ It is important that we understand that a demonstrative inference is one whose premises necessitate its conclusion: i.e., if the premises are true then the conclusion <u>must</u> be true. A nondemonstrative inference is simply one which fails to be demonstrative; thus, its conclusion is not necessitated by its premises. The conclusion could be false even if the premises are true.

As Braithwaite puts it:

Induction is not a demonstrative form of inference like deduction. In deduction the reasonableness of belief in the premises as it were overflows to provide reasonableness for the belief in the conclusion. This happens because the

Wesley C. Salmon, <u>The Foundations of Scientific</u> <u>Inference</u>, (Pittsburgh: Univ. of Pittsburgh Press, 1967), p. 8.

This term is used not only by Salmon but by a great many other writers in the philosophy of science.

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conclusion is a logical consequence of the premises and cannot be false while the premises are true. 7

This source of difference between an inductive and deductive inference is the property of truth preservation. Indeed, this is what demonstrative and nondemonstrative inferences are all about. This truth preservation is achieved by sacrificing any extension of content. "The conclusion of such an inference (demonstrative) says no more than do the premises "⁸ We refer to this type of conclusion as being nonampliative: The conclusion cannot be false if the premises are true because the conclusion says nothing that was not already stated in the premises. This is why deduction presents no logical problem.

The case is quite different for induction. "There is no logical impossibility in the premises being true and the inductive conclusion false. The circumstances which would make the premises true are not included in the circumstances which would make the conclusion true....⁹ Thus, induction is called

Richard Bevan Braithwaite, Scientific Explanation; A Study of the Function of Theory, Probability and Law in Science, (London: Syndics of the Cambridge University Press, 1968), p. 257.

⁸Wesley C. Salmon, <u>The Foundations of Scientific</u> <u>Inference</u>, p. 8.

⁹Richard B. Braithwaite, <u>Scientific Explanation</u>: <u>A Study of the Function of Theory, Probability and Law in</u> <u>Science</u>, p. 258.

ampliative; the conclusion has content not present either explicitly or implicitly in the premises.

This characterization is quite different from some of the more traditional definitions of induction. "Induction is not defined as inference from the particular to the general; it is not defined as the inverse of deduction; it is not defined as induction by enumeration; it is not defined as a method of discovery."¹⁰ Rather, induction is a nondemonstrative type of inference whose conclusion is ampliative. It seeks "to establish a conclusion on the basis of premises which do not logically exhaust the content of those conclusions."¹¹

Hume's Problem

David Hume, in the seventeenth century, raised the fundamental question about this inductive method. How do we obtain knowledge of the unobserved? This is really the problem in (II) above. The basic problem with induction is one of obtaining inductive evidence

¹⁰Wesley C. Salmon, "Inductive Inference," <u>Philosophy of Science: The Delaware Seminar</u>, vol. 2, (ed.) Bernard Baumrin, (New York: Interscience Publishers, 1963), p. 346.

¹¹<u>Ibid.</u>, p. 347. It should be kept in mind that no one individual definition is widely accepted amongst philosophers. "There is no unanimity among logic writers about the definition of induction:" Stephen F. Barker, <u>The Elements</u> <u>of Logic</u>, (New York: McGraw-Hill Book Co., 1965), p. 17.

which allows us to predict the future.¹²

Let the course of things be allowed hitherto be ever so regular; that alone, without some new argument or inference, proves not that, for the future. it will continue so. In vain do you pretend to have learned the nature of bodies from your past experience. Their secret nature, and consequently all their effects and influence. may change, without any change in their sensible qualities. This happens sometimes, and with regard to some objects: Why may it not happen always, and with regard to all objects? What logic, what process of argument secures you against this supposition? My practice, you say, refutes my doubts. But you mistake the purport of my question. As an agent, I am quite satisfied in the point; but as a philosopher, who has some share of curiosity, I will not say scepticism, I want to learn the foundation of this inference. 13

The fundamental question is one of justification of conclusions concerning unobserved phenomena, or concepts. The discovery of knowledge, and the justification of knowledge are two entirely different subjects. Confusion

¹²"It must be observed that this timecharacteristic of inductive inference, which is sometimes mentioned in the definition of it, is of no essential importance, and that induction may also proceed from past cases to other unexamined instances belonging to the past." Georg Henrik vonWright, The Logical Problem of Induction, 2nd ed. rev., (London: Basil Blackwell, 1957), p. 1.

¹³David Hume, <u>An Enquiry Concerning Human</u> <u>Understanding</u>, Part IV, (Harvard Classics; New York: P. F. Collier & Son Corporation), pp. 316-317.

arises though, for "when we ask how we can <u>acquire</u> knowledge of the unobserved, it sounds very much as if we are asking for a method for the <u>discovery</u> of new knowledge. This is, of course, a vital problem, but it is not the fundamental problem Hume raised."¹⁴

The question is thus: Given that one has "established, or highly confirmed, a certain conclusion according to the accepted canons of scientific justification, on what grounds may we accept this conclusion as embodying knowledge?"¹⁵ when one applies a scientific method it is usually done so in anticipation of gaining knowledge. What David Hume did was to demonstrate exactly how difficult it is to legitimize the cognitive claims of science. Indeed, his analysis was such a searching and probing one that even today no one has really provided universally accepted answers to his questions.

¹⁴Wesley C. Salmon, <u>The Foundations of</u> <u>Scientific Inference</u>, pp. 6-7. This is also discussed in a book by Georg Henrik von Wright, <u>A Treatise on Induction and Probability</u>, (New York: Harcourt, Brace & Co., Inc., 1951), pp. 17-20. ¹⁵Wesley C. Salmon, "Inductive Inference,"

p. 342.

Some Proposed Solutions to the Problem of Induction

From the time of David Hume's original criticism people have attempted to solve the problem of induction. No one has yet been successful. What we have are a great many varied proposed solutions. It is an impossible task to summarize, or examine, all of these. What I have done here is to select a few on the basis of how commonly they are used, and also how effectively they might be integrated into the new social studies. It is this last criterion - effectiveness - that is the most important. While Baye's Therom deals with the inductive problem as well as any other proposal, I have not included it because of the difficulty that would be encountered in effectively introducing it into secondary school studies curriculums. Also left "aside has been the response of . . . unregenerate deductivists who strive vainly to show Hume's analysis wrong "¹⁶

The reader should be well cautioned not to regard the following proposed solutions as being anywhere near a complete catalogue of attempts to justify induction. Rather, the rest of this chapter should be seen as a listing which demonstrates the

¹⁶Israel Scheffler, <u>The Anatomy of Inquiry</u>, (New York: Alfred A. Knopf, 1963), p. 228.

seriousness and extreme difficulty of the inductive problem, as raised by David Hume.

Uniformity of Nature

One of the more commonly offered justifications is that nature is uniform. Hume directed a great deal of his efforts at just this point. He explained that one cannot expect inductive inferences to yield true results if nature is not uniform.

All inferences from experience suppose, as their foundation, that the future will resemble the past, and that similar powers will be conjoined with similar sensible qualities. If there be any suspicion that the course of nature may change, and that the past may be no rule for the future, all experience becomes useless, and can give rise to no inference or conclusion.¹⁷

The question now becomes one of attempting to prove that nature is uniform, for if this can be proven then indeed we will have justified induction. The first thing we realize in this quest is that a deductive inference could not possibly prove that nature is uniform in the required sense(past, present, and future) for deduction is nonampliative; it can tell us nothing about the future.

This leaves us then attempting to prove that the world is uniform through an inductive argument. At this point we become open to the challenge as to why we should place our faith in such inductive arguments.

¹⁷David Hume, <u>An Enquiry Concerning Human</u> <u>Understanding</u>, p. 316.
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We cannot reply; because nature is uniform, for that is what we are trying to prove. Thus, we are left attempting to prove that induction is justified on the ground that we have inductivly ascertained that nature is uniform. This cannot be done.

Thus, it cannot be demonstrated, or proven, that nature is uniform through either inductive or deductive arguments. "Furthermore, the distinction between valid deduction and nondemonstrative inference is completely exhaustive. Take any inference whatsoever. It must be deductive or nondemonstrative."¹⁸

Common Sense or Rational Justification

This position holds that inductive arguments are justified if they yield true conclusions from true premises most of the time. This can be established only inductively, or deductively. The reasons for this

18 Wesley C. Salmon, <u>The Foundations of Scientific</u> Inference, p. 20.

In the previous discussion I have not mentioned the work of Nelson Goodman on the idea of uniformity of nature. This was done so as not to be confusing several issues at once. In Fact, Fiction, and Forecast, 2nd ed., (New York: The Bobbs-Merrill Co., Inc., 1965), chapt. 3, "The New Riddle of Induction," Goodman points out that the regularities found in a sequence of events may well depend on the language one uses. He goes on to demonstrate that if we try to project all regularities that may be found by using any language, our predictions may well conflict with one another. This is usually discussed under the rubric of linguistic invariance. The Journal of Philosophy, LXIII, May 26, 1966, devoted an entire issue to the problem Goodman raised, and it may be of interest to those who wish to look at this problem in more depth.

are the same as were given above; our definition of induction and deduction are exhaustive. An inference must be demonstrative (deductive) or inductive.

A deductive argument could not possibly justify the use of induction for it is nonampliative. Hence, one can only make claims about the past and present, not the future. It is the future that we are concerned about. Will any of our inductive inferences in the future hold true?

If we could [justify induction deductively] we would have proved that the conclusion must be true if the premises are. That would make it necessarily truth-perserving, hence, demonstrative. This, in turn, would mean that it was nonampliative, contrary to our hypothesis. Thus, if an ampliative inference could be justified deductively it could not be ampliative. It follows that ampliative inferences cannot be justified deductively.¹⁹

A deductive argument can only state that induction has worked in the past and present, not the future.

Likewise we cannot justify any type of ampliative inference inductively. To attempt to justify induction by an inductive argument we are in the position of having to <u>assume</u> that induction is reliable to prove that induction is reliable. Salmon writes that to justify any sort of ampliative inference inductively would

require the use of some sort of nondemonstrative inference. But the question at issue is the justification of nondemonstrative inferences, so the procedure would be question begging. Before we can properly employ a nondemonstrative inference

¹⁹Wesley C. Salmon, <u>The Foundations of Scientific</u> Inference, p. 11.

in a justifying argument, we must already have justified that nondemonstrative inference.²⁰

Thus, induction cannot "be justified by reference to the past successes of inductive procedures of predictive policies."²¹

Before leaving this section I wish to look further at one of the more complex attempts to justify induction inductively. Max Black has produced a highly sophisticated and widely discussed attempt to justify induction through the use of self-supporting arguments The major point in this argument is that the traditional fallacy of circular argument (<u>Petitio</u> <u>principii</u>) entails the assumption, as a premise, that the conclusion is to be proved. Black holds that the situation is quite different for self-supporting inductive arguments.

He has formulated two inductive rules:²²

R₁ To argue from all examined instances of A's have been B To all A's are B.

R To argue from Most instances of A's examined R in a wide variety of conditions have been B to (probably) the next A to be encountered will be B.

²⁰<u>Ibid.</u>, p. 20. Salmon also writes that this argument is circular and "the trouble with circular arguments is obvious: With an appropriate circular argument you can prove anything." (p.13).

p. 315. 22

Max Black, "The Inductive Support of Inductive Rules," <u>Problems of Analysis</u>, (Ithaca: Cornell Univ. Press, 1954), p. 196.

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(a₁): All examined instances of the use of R_1 in arguments with true premises have been instances in which R_1 has been successful.

Hence:

All instances of the use of R_1 in arguments with true premises are instances in which H_1 is successful.

 (a_{11}) : R₁ has always been reliable in the past.

Hence:

R₁is reliable.

(a₂): In most instances of the use of B₂ in arguments with true premises examined in a wide variety of conditions, R₂ has been successful.

Hence:

In the next instance to be encountered of the use of R_2 in an argument with a true premise R_2 will be successful.

 (a_{22}) : B_2 has usually been successful in the past.

Hence(probably):

R₂ will be successful in the next instance.

"Our task accordingly marrows itself down to determining whether and in what sense either (a_1) or (a_2) is guilty of circularity."²⁴ What ever is present it is not the circularity of <u>petitio principii</u>. for any argument that is circular in this traditional sense must be a valid deductive argument (the conclusion

> ²³<u>Ibid</u>., p. 197. ²⁴<u>Ibid</u>., p. 198.

nust be nor (a cannot demons irrefu the pr rules 9 oj bi fi ti Thus " applica what al intere not sai i syste that s system to Ind Inferer to Indu Inferen must be true if the premises are true). Neither (a_1) nor (a_2) are deductively valid; thus the argument cannot be circular.

Both Skyrams²⁵ and Salmon²⁶ have fairly coherent demonstrations that Black's work, while essentially irrefutable, is nonetheless of little value in solving the problems of inductive justification. Using Black's rules both authors show how it is possible to create

a system of inductive logic that would be <u>diametrically</u> opposed to scientific inductive logic and would be one which presupposed on all levels that the future will not be like the past. We shall call this system a system of <u>counterinductive logic</u>.²⁷

Thus "it sounds as if a self supporting argument is applicable only to rules we already know to be correct."²⁸ What all this amounts is that while Black's argument is interesting and of theoretical significance it does not satisfy the requirements for an inductive justification. A system for justification must give reasons for using that system rather than any other. "Thus if two inconsistent systems, scientific induction and counterinduction

²⁵Brian Skyrams, <u>Choice and Chance: An Introduction</u> to Inductive Logic.

²⁶Wesley C. Salmon, <u>The Foundations of Scientific</u> <u>Inference</u>.

²⁷Brian Skyrams, <u>Choice and Chance: An Introduction</u> to Inductive Logic, p. 34.

²⁸Wesley C. Salmon, <u>The Foundations of Scientific</u> <u>Inference</u>, p. 16.

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.... "²⁹ can meet the requirements then the system cannot be an adequate definition of justification.

This section has demonstrated that the logical justification of induction, within this type of conceptual framework, is seemingly impossible. It cannot be done through a demonstrative inference since that is nonampliative, and neither can it be done through an ampliative argument since that would be circular (with the exception of Black's formulation, which seems to be of little practical consequence). As Salmon writes:

It is extremely difficult, psychologically speaking, to shake the view that past success of the inductive method constitutes a genuine justification of induction. Nevertheless, the basic fact remains: Hume showed that inductive justifications of induction are fallacious, and no one has since proved him wrong.³⁰

Hypothetico-Deductive

One of the more interesting ways of coping with the inductive problem is the hypothetico-deductive approach. This is often regarded as a process which has great usefulness if one assumes that induction presents no problem. It is not often thought of as constituting a pure justification. From a general hypothesis and particular statements of initial conditions a particular predictive statement is formulated. This includes the

²⁹Brian Skyrams, Choice and Chance: An Introduction to Inductive Logic, p. 36.

³⁰Wesley C. Salmon, <u>The Foundations of Scientific</u> Inference, p. 17. "deducing [of] the hypothesis in question from higher level hypotheses which have themselves been inductively established."³¹ Also, these hypotheses could be framed on the basis of some experience with empirical data.

Policies for establishing general hypotheses in accordance with inductive principles of inference on the basis of empirical data will be called "inductive policies." They all have the feature in common that they require a basis of experience to build upon; in this they differ from many non-inductive policies for establishing general hypotheses, e.g. that of deducing them from metaphysical premises.³²

This notion of experience is most important in scientific work utilizing the hypothetico-deductive method.

After the selection of a particular hypothesis it is accepted, at least for a time, as being true. This statement is now regarded as one having predictive value. By careful observation it is determined whether the predictive statement turned out to be true.³³ It is this idea of predictive value which is most important, in that it provides a motive for using a scientific model of explanation. The reason

scientists use the inductive policies that they do use is the predictive value of these

³¹Richard Bevan Braithwaite, <u>Scientific</u> <u>Explanation</u>, p. 261.

³³Herbert Feigl in "Naturalism and Humanism," <u>Readings in the Philosophy of Science</u>, (eds.) Herbert Feigl and May Brodbeck, (New York: Appleton-Century-Crofts, Inc., 1953), lists five regulative ideals in the quest for scientific knowledge. They are: (1) Intersubjective testability, (2) Reliability, or a sufficient degree of confirmation, (3) Definiteness and precision, (4) Coherence or systematic structure, (5) Comprehensiveness or scope of knowledge. (pp. 11-13)

^{32&}lt;u>Ibid</u>.

policies - their success in yielding hypotheses from which testable consequences can be deduced . . . This is the justification for following a particular inductive policy . . namely, that following this policy yields hypotheses which are in fact confirmed and not refuted by experience. Good inductive policies are those which do what we require of them; they enable us to predict, and thereby partially to control the future.

With this model man proposes hypotheses and nature decides on their truth, or falsity. If by observation we determine that a particular hypothesis has no predictive value, i.e., it turned out to be false, then we say that this hypothesis is disconfirmed. A point that has caused some discussion is the idea of rejecting an hypothesis. Many hold that one contrary instance is not adequate for the rejection of a hypothesis. There are generally only two cases where it might indeed be the case that the proponent of a hypothesis would continue to hold his hypotheses after encountering contrary evidence.

The first of these cases may be where "the thesis is a statistical hypothesis where the rejection of the hypothesis on the evidence of a set of observations is always a provisional rejection which may have to be cancelled on the basis of further evidence."³⁵ This would be where one establishes acceptance, or rejection, at the .05 or .01 levels of significance. The second case does not involve a statistical hypothesis as such, but nonetheless the hypothesis might "be treated as a statistical one in that it is to be rejected (and only provisionally rejected at that) only if the contrary instances show deviations from the value asserted in the hypotheses which exceeds a certain amount."³⁶ This might be found in some functionalist explanations where certain conditions are thought to be necessary for a specific type of activity to be carried out, but this is expressed in a nonstatistical manner.

If the observation reveals that the statement is true, or of predictive value, we then say that the hypothesis is confirmed to some extent. The important idea here is that the hypothesis is <u>not</u> conclusively proved by any one or more positively confirming instances. It may only become more highly confirmed.

Since the conclusion of an induction is a general hypothesis, there is no time at which it is conclusively proved. The hypothesis may, of course, be established by the induction, but its establishment at one time will not prevent its refutation at a later time if contrary evidence occurs.³⁷

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The question "naturally arises at this point whether we ever have or ever can have adequate evidence."³⁸

> ³⁶<u>Ibid</u>. ³⁷<u>Ibid</u>., pp. 265-266. 38

38 Arthur C. Danto, <u>Analytical Philosophy of</u> <u>Knowledge</u>, (London: Syndics of the Cambridge University Press, 1968), p. 132.

Braithwaite, in <u>Scientific Explanation</u>, goes into the notion of a hierarchy of hypotheses, and how the notion of confirmation is related to whether the hypothesis is of the lower or highest order. He explains that "since a change in the lowest-level hypotheses in a man's rational corpus will involve a change in some of the highest-level hypotheses, while the highestWhat is usually the problem at this point is that there exists a misunderstanding of the difference between <u>understanding</u> and <u>knowing</u>. To understand something is to only be a party to a convention. This is quite different from "'knowledge' in the epistemological sense."³⁹ Danto sees this as a problem in the adequacy of languange and feels the first step should be concentrating on the difference between understanding and knowing. For our purposes here it will suffice to say that no hypothesis can ever be totally confirmed, but only highly confirmed. This is the skeptical position assumed in most scientific investigations.

The question is often asked as to why this model is viewed as an inductive one? It is because the inference from the original observation to the hypothesis is surely not deductive. This inference cannot possibly be thought of as a demonstrative one, hence it must be nondemonstrative or inductive. Another distinction is that: "A pure deductive system, like that of arithmetic hangs from its summit and can be indefinitely extended downwards; on impure

level hypotheses can all change with the lowest-level hypotheses remaining the same, the totality of the highestlevel hypotheses in his rational corpus is held with less tenacity than are the lowest-level hypotheses. Of course any particular set of highest-level may be held very tenaciously, being treated as 'functionally a priori' propositions, but this will only result in the others being held less tenaciously."

³⁹Arthur C. Danto, <u>Analytical Philosophy of</u> <u>Knowledge</u>, p. 133.

deductive system, like that of a natural science, is supported on its empirical basis and can be indefinitely extended upwards."40

It took along time for scientists to realize that the hypothetico-deductive inductive method of science was epistemologically different from the prima facia similar deductive method of mathematics; and that, in properly imitating the deductive form of Euclid's system, they were not ipso facto taking over his deductive method of proof.41

The big difference between math and science is that in math, and logic, the propositions are logically necessary, while in the sciences they are only logically contingent. In the next chapter we will return to this hypothetico-deductive system and see how several social science disciplines have made great use of it.

Even though this system is, or can be, both effective and elaborate it does not refute Hume's charge. The hypothesis of the hypothetico-deductive is still ampliative; the conclusion is a statement whose content exceeds the observational evidence. Indeed, this is why we can never say that a hypothesis is true, but rather must be satisfied with a highly confirmed, or falsified hypothesis.

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Pragmatic Justification.

This attempt seems to be quite fruitful even

40 Richard Bevan Braithwaite, <u>Scientific</u> Explanation, p. 354. 41<u>1bid</u>., p. 353.

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though, as with the others, it does not fully solve the problem. The pragmatic approach accepts Hume's argument up to the point of agreeing that it is impossible, <u>a priori</u>, to establish that any inductive inferences will ever again have true conclusions. This position holds, as with Hume, that we cannot validly show either <u>a priori</u>, or <u>a posteriori</u>, that nature is uniform in the sense of past, present, and future, prior to a justification of induction.

At this point the advocate of the pragmatic justification would claim that even if induction cannot be justified on logical grounds, and hence its success as a method of prediction cannot be established in advance, induction can be shown to be superior to any alternative method of prediction. As we stated above it cannot be demonstrated that nature is uniform, but advocates of this position argue that we can examine two possibilities: Nature is uniform or nature is not uniform. "It is fairly clear that inductive inferences will successfully establish knowledge of the unobserved if nature happens to be uniform, and that they will fail if nature should turn out to be chaotic and lawless."⁴²

This in no way guarantees that we shall be successful in any particular instance considered but only says that in repeated applications the number of

> 42 Wesley C. Salmon, "Inductive Inference," p. 354.

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successes would be greater than if we acted against inductive conclusions. What comes from this is the following table:⁴³

	Nature Uniform	Nature not Uniform
Induction Employed	Success	Failure
Cther Method Employed	Success or Failure Possible	Failure
Most important is	the last entry in the tab	ole for here
it is asserted "th	nat even the alternative m	nethods will
fail if nature is	not uniform."44 Hans Rei	chenbach ⁴⁵ , the
major proponent of	the pragmatic method, re	asons that
the continued succ	ess of any alternative me	thod would
constitute a unifo	ormity, contrary to the pr	inciple of
non-uniformity. 1	hus, if this other method	worked then

induction would also work.

Hence induction will be successful <u>if any other</u> <u>method could succeed</u>. "We have, therefore everything to gain and nothing to lose by induction."⁴⁶ If induction is destined to failure then so also is any other method. Reichenbach, in working through this, essentially uses

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43<u>Ibid</u>.
44<u>Ibid</u>., p. 355.
45 Hans Heichenbach, <u>Experience and Frediction</u>.
(Chicago: University of Chicago Press, 1938).
46 Wesley C. Salmon, "Inductive Inference," p. 355.

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induction to mean induction by enumeration, rather than induction by elimination. Induction by enumeration is where we wish to go from an observed sample of a class to an inference which governs the entire class. He couples the rule we discussed above to a frequency interpretation of probability. He then holds that the limit of the relative frequency of the finite sequence equals (or is closely approximate to the relative frequency of the sequence as it nears, or reaches, infinity).⁴⁷

This pragmatic method of inductive justification is rather successful, but it is not a justification; that is, a justification in the sense that it provides a reason for logically making inductive decisions. It is a justification only in the sense that it provides a motive for using inductive policies. The major difficulty is that it is a formidable task to state a principle of uniformity that is strong enough to assure the success of inductive inferences and weak enough to be plausible. This is a variation of the Goodman 48 paradox again. Uniformity of nature is not an all-or-none affair; it seems to exist in degrees and this is where the pragmagic method for inductive justification becomes unsatisfactory. Still it offers many possibilities and if it is possible to overcome the paradox concerning the uniformity of nature it will become even more useful.

⁴⁷Hans Reichenbach, "The Logical Foundations of the Concept of Probability," <u>Readings in Philosophical</u> Analysis, (eds.) Herbert Feigl, and Wilfred Sellars, (New York: Appleton-Century-Crofts, Inc., 1949).

⁴⁸Nelson Goodman, Fact, Fiction, and Forecast.

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A Probabilistic Approach

One of the approaches to solving the problem of induction that has found great favor is the probabilistic method. It begins with the belief that Hume's original search for the justification of induction was misconceived. The problem begins when people try to find a way of proving that inductive inferences with true premises will always have true conclusions. This is seen as the task of <u>deduction</u>. The only thing that an inductive argument does is establish a conclusion as probable.

As used by philosophers of science probability has two basic meanings. They are: (1) probability refers to the degree of confirmation, and (11) probability refers to the long run relative frequency.⁴⁹ Each notion of probability has its own set of advocates. The frequency interpretation is usually associated with von Mises,⁵⁰ Reichenbach,⁵¹ and Feigl.⁵² Probability when conceived of in terms of the degree of confirmation is best

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⁴⁹Rudolf Carnap, "The Two Concepts of Probability," <u>Readings in Philosophical Analysis</u>, p. 334. ⁵⁰Richard von Mises, <u>Probability, Statistics</u>, <u>and Truth</u>, (rev. ed.), (New York: The Macmillan Co., 1957). ⁵¹Hans Heichenbach, <u>The Theory of Probability</u>, (Berkeley: University of California Press, 1949). ⁵²Herbert Feigl, "The Logical Character of the Principle of Induction," <u>Readings in Philosophical</u> Analysis, p. 297.

represented by Jeffreys,⁵³ and Keynes.⁵⁴

Neither side views the other as having much to offer and hence they reject all other theories but their own. Carnap believes that this "controversy between representatives of different conceptions of probability is due to the blindness on both sides with respect to the existence and importance of the probability concept on the other side."⁵⁵ We need not concern ourselves here with this mutual disagreement except in that it allows us to speak of two distinct meanings of the concept of probability.

Probability as Frequency

Probability viewed as a theory of frequency essentially says: That which has happened often in the past, and is now happening often in the present, will continue to happen often in the future. The claim is not that inductive inferences will always be true, but rather that they will frequently be so. If X has happened frequently in the past it will probably happen at about the same frequency (or rate of regularity) in the future. This, as a form of

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⁵³Harold Jeffreys, <u>Theory of Probability</u>. (Oxford: The Clarendon Press, 1939). ⁵⁴John Maynard Keynes, <u>Treatise on Probability</u>. (London: The Macmillan Co., Ltd., 1921). ⁵⁵Rudolf Carnap, "The Two Concepts of Frobability," p. 335.

inductive justification, clearly does not suffice. Hume has already shown that this claim cannot be substantiated. There is no question that inductive inferences cannot be expected to lead to the truth in all cases. This was hardly the point of dume's argument. Instead he argued that we not only "cannot justify the claim that <u>every</u> inductive inference with true premises will have a true conclusion, but further that we cannot prove that <u>any</u> inductive inference with true premises will have a true conclusion."⁵⁶

Probability as the Degree of Confirmation

This position takes the calculus of probability to be formulated in terms of statements and is often thought of as the logical interpretation of probability. The notion of whether or not a statement is probable is tied closely with the notion of decision making. Thus, probability is viewed as some sort of degree of rational belief. This raises the whole idea of evidence, and what constitutes evidence.

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Under this idea of probability to ask if we should accept conclusion X is to ask if we should believe, or accept, the evidence. Salmon feels that this tantamount to asking if we should be

⁵⁶ Wesley C. Salmon, "The Justification of Inductive Rules of Inference." <u>The Problem of Inductive</u> Logic, (ed.) Imre Lakatos, (Amsterdam: North-Holland Publishing Co., 1968), p. 30.

rational.⁵⁷ He then formulates a problem and sets up three inductive rules concerning the evidence. Depending on which rule one selects there are three possible outcomes.⁵⁸ Now the question becomes which conclusions are acceptable. "Whether a given conclusion is supported by evidence - whether it would be <u>rational</u> to believe it on the basis of given evidence - whether it is made probable by virtue of its relation to given evidence - depends upon selection of the correct rules from among the infinitely many rules we might conceivably adopt."⁵⁹

Now the question of what does it mean to be rational becomes an important question. Is it rational to believe on the basis of evidence as defined by one rule as opposed to another rule? What indeed constitutes evidence? The inductive problem still exists. It is simply reformulated as a problem concerning the provision of adequate gounds for the selection of inductive rules. "It is easy to show that inferences which conform to our accepted inductive rules establish their conclusions as probable. Unfortunately, we can find no reason to

> ⁵⁷<u>Ibid</u>., p. 30-31. ⁵⁸<u>Ibid</u>., p. 31. ⁵⁹<u>Ibid</u>.

prefer conclusions which are probable in this sense to those which are improbable."⁶⁰ These questiona are essentially a reformulation of the original problem. "Introduction of the concept of probability does not dissolve the problem of induction though it may lead to some interesting reformulations."⁶¹

Conclusions

In no way should the preceding positions on induction be seen as a complete catalog of the attempted solutions. We have not even touched on the postulational approach of Bertrand Russel.⁶² nor the doctrine which holds that there are synthetic <u>a priori</u> truths.⁶³ Neither have we gone into the work done by John Stuart Mill.⁶⁴ Rather what I have

60 Wesley C. Salmon, The Foundations of Scientific Inference, p. 52. ⁶¹Wesley C. Salmon, "Inductive Inference," p. 353. 62 Bertrand Russell, Human Knowledge: Its Scope and Limits, (New York: Simon & Schuster, 1948). ⁶³This position is not held by many people today. The best known advocate of this position would be Immanuel Kant in the Critique of Fure Reason, translated by Norman K. Smith, (New York: The Humanities Press. 1950). 64 John Stuart Mill, <u>A System of Logic</u>. (London: Longmans, Green, and Co., 1879). The theory on which Mill's methods rested is explored quite fully by Georg Henrik von Wright, A Treatise on Induction and Probability, (Patterson, N.J.: Littlefield, Adams, & Co., 1960).

attempted is to show the difficulty of the problem Hume has presented. His argument has so far withstood all attacks; hence we are left with a problem concerning the validity of judgments about future or unknown cases. Essentially the problem is that "what <u>has</u> happened imposes no logical restrictions on what <u>will</u> happen."⁶⁵

65 Nelson Goodman, Fact, Fiction, and Forecast,

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p. 59.

Chapter 2

Induction and the Social Sciences

In this chapter attention will be focused on how the social sciences use inductive methods for gaining knowledge, and how they cope with Hume's problem. Almost all social scientists are concerned with theories and generalizations. Thus they must be concerned with proof and methods of verification. Our attention will be focused on how the social sciences offer proof for their explanations and predictions which have been arrived at through inductive processes.

Methodology

Teachers of the new social studies must be concerned with the methodology of the social sciences and how this methodology applies to secondary school social studies programs. The first question normally raised by teachers is: What is methodology? This is no easy question to answer. As one political scientist writes; "method and methodology are the least developed and most misunderstood components of political science."¹ Excluding perhaps economics

¹ Heinz Eulau, "Comments on Professor Deutch's

this comment applies equally well to all of the social sciences.

Robert K. Merton, in the fashion of most social scientists, simply refers to it as being the "logic of scientific procedure."² Abraham Kaplan, being more specific, writes that methodology is the "description, the explanation, and the justification of methods, and not methods themselves."³ One constant source of confusion over methodology arises because too few people are precise about the distinction between methodology and technique. Richard Rudner discusses this source of confusion and writes that "the method of science <u>is</u> . . . the rationale on which it bases its acceptance or rejection of hypotheses or theory."⁴ This "methodology of validation, of explanation, or of prediction is precisely what is referred to when it is asserted . . . that the

Paper," <u>Design for Political Science: Scope, Objectives</u> and Methods, (ed.) James C. Charlesworth, (Philadelphia: The American Academy of Political and Social Science, 1965), p. 179.

Robert K. Merton, <u>Social Theory and Social</u> <u>Structure</u>, (rev. ed.; New York: The Free Press, 1957), p. 18.

Abraham Kaplan, <u>The Conduct of Inquiry:</u> <u>Methodology for Behavioral Science</u>, (San Francisco: Chandler Publishing Co., 1964), p. 18.

⁴ Richard S. Budner, <u>Philosophy of Social</u> <u>Science</u>, (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1966), p. 5.

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scientific method is pervasive through all the sciences, or is applicable, in the investigaiton of social as well as nonsocial phenomena."⁵ Thus defined, methodology becomes a set of procedural rules by which a study is validated. Technique then is such things as factor analysis, or chisquare tests. The tendency to confuse methodology and technique is the source of untold confusion.

A teacher of the social studies must be familiar with methodology. In 1959, Stanley Wronski wrote one of the first articles advocating the teaching of methodology. He proposed "that there be a radical shift in social studies teaching from the <u>what</u> of the the social sciences to the <u>how</u> of the social scientist."⁶ To simply know the results of working social scientists is not enough. To teach the social studies today the teacher must also know the logic of the procedures, or procedural guidelines, by which those results were obtained. "In short, what is the methodology underlying the social sciences."⁷ As of late

⁵<u>Ibid.</u>, p. 6. ⁶ Stanley P. Wronski, "A Proposed Breakthrough for the Social Studies," <u>Social Education</u>,XXIII (Nay, 1959), p. 215. ⁷<u>Ibid</u>.

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there has been a great deal of emphasis on the teaching of the structure of disciplines.⁸ One cannot teach. let alone understand the structure of disciplines unless one has an understanding of methodology. The newer social studies also believe that students should be taught how the social scientist operates within the logic of validation, so that the students may do likewise. It is held that to simply teach what other social scientists have discovered will no longer suffice in an age when knowledge is expanding at an ever increasing rate, making it entirely possible that today's knowledge will soon be outmoded. What must be taught is how the social scientist operates within the context of validation. The teacher cannot be of benefit in this type of classroom unless he understands the logic of social procedures. He cannot give descriptions of the logic, or aid students in utilizing this logic unless he understands the methods of social science.

One of the major problems facing anyone who wishes to examine the methodology of the social sciences has been the lack of material on this subject. A ٠.

⁸The current interest in structure was touched off by Jerome S. Bruner, <u>The Process of Education</u>, (New York: Vintage Books, 1960).

person attempting to familiarize himself in this area

will not receive much help from the writings of social scientists. Their writings tend to consist on the one hand, of instruction in research techniques, and on the other of some remarks on induction as viewed by John Stuart Mill.

Thus, what work that has done in this area has often been left to the philosophers, who have generally carried on discussions amongst themselves, but the social scientist often is unlikely to comprehend the meaning of these discussions. For secondary school teachers of the social studies there has been even less of a dialogue.

Kaplan raises an issue which should be brought out before proceeding at too great a length and that is the difference between logic-in-use and reconstructed logic.¹⁰ The descriptions of what social scientists do is by necessity an approximation of what social scientists actually do. It is normally an idealized version of the practices that are carried out in the conduct of the inquiry. "This reconstruction idealizes the logic of science only in showing us what it would be if it were extracted

⁹Robert Brown, <u>Explanation in Social Science</u>, (London: Routledge & Kegan Paul, 1963), p. 1. ¹⁰Abraham Kaplan, <u>The Conduct of Inquiry:</u> <u>Methodology for Behavioral Science</u>. and refined to utmost purity."¹¹ It cannot be any other way since it would be impossible to record exactly what procedures and considerations the social scientists went through in his work. It should be obvious that this issue would be of far greater importance if we were discussing methods of discovery.

Scientists may, and do, disagree on whether there exists such a thing a logic of discovery, but there is not too much controversy on whether or not a logic of validation exists. There must be agreement as to what constitutes verification or no results would ever be agreed upon. One need only look around at the number of accepted knowledge claims to see that some agreement on methods of validation exist. Thus, the necessity of working with reconstructed logic should prove to be of no great handicap in looking at the validation of knowledge claims. The important thing is to simply be aware of this difference between logic-in-use and reconstructed logic.

In this chapter we will be concerned with only one aspect of methodology: The justification

¹¹<u>Ibid</u>., p. 11
of knowledge which utilizes inductive procedures. We will be looking at two types of explanation; functionalism and empiricism. Robert Brown in <u>Explanation in the Social Sciences¹²</u> lists seven such types of explanations, but not all are widely used. The two most widely used, not only in the social sciences, but also in social studies, are the functionalist and the empiricist. For this reason we will confine ourselves to these two types of social science explanations.

Functionalism

Having attempted to define functionalism on previous occasions I fully realize that this is an impossible task. Demerath is probably close to the truth when he says that we have no answers as to what constitutes functionalism.¹³ Richard Rudner likewise writes that to examine the available material is "to become convinced that the major task of saying clearly what constitutes functionalism still remains."¹⁴ Each author seems to have a slightly

12_{Robert Brown, Explanation in Social} Science, p. 42. ¹³_{N.J.} Demerath III and Richard A. Peterson (eds.), <u>System, Change, and Conflict</u>, (New York: The Free Press, 1967), p. 499. ¹⁴_{Hichard S. Rudner, Philosophy of Social} Science, p. 85. different twist to his meaning of function and functional explanation. Another problem that often arises is that many writers use the term function indiscriminately. Thus many empiricists talk of function in a loose manner to mean purpose. This is quite different from the meaning functionalists give to it, and the meaning we shall be using here.

With this in mind we will look at functionalism as exemplified A.R. Hadcliffe-Brown. His method seems to be somewhat representative of the field at large, thus making generalizations about functionalism more valid. In addition Radcliffe-Brown did a great deal of field work utilizing this method which aids in discovering just what functionalism means.

The first task confronting us is the definition of function. It can have three different interpretations depending on the context in which it is used. It can mean: (1) What should a social item's purpose be? (2) What effects does a social item serve? (3) What purpose does this social item serve? The third is the one with which we are most concerned. Radcliffe-Brown writes that "the function of a particular social usage is the contribution it makes to the total social system."¹⁵ To give

¹⁵A.R. Radcliffe-Brown, "On the Concept of Function in Social Science," <u>American Anthropologist</u>, XXXVII(July-Sept., 1935), p. 397.

the function of an item then constitutes telling the purpose "it plays in the social life as a whole and therefore the contribution it makes to the maintenance of the structural continuity."¹⁶ This entails viewing society in holistic terms with the parts being interrelated. This type of view

Another assumption which is made in defining functionalism is that a society is in a state of dynamic equilibrium. This means that the dominant tendency is towards stability and integration. Robert Brown refers to this as a self-persisting system.

A self-persisting system is commonly taken to be a system which maintains at least one of its properties in an equilibrium position despite variations in the other properties, either inside or outside the system, to which the presence of the first property is causally related.¹⁸

This creates a great deal of difficulty for the validity

¹⁶Ibid., p. 396. ¹⁷Ibid., p. 395-396. ¹⁸Robert Brown, <u>Explanation in Social Science</u>, p. 110. of predictions. In point of fact it requires an ungrounded assumption that this system will remain to be self-persisting, or equilibrated in the future.

Explanation and Prediction in Functionalism

A great deal has been written on the difference between explanation and prediction. Some hold it is possible to predict and still not be able to fully explain while others hold that explanations in some subjects (e.g., history) are possible whereas predictions are not possible. Hempel feels that no valid distinction between explanation and prediction exists. He states:

The customary distinction between explanation and prediction rests mainly on pragmatic differences between the two. While in explanation, the final event is known to have happened, and its determining conditions have to be sought, the situation is reversed in the case of a prediction.19

Thus, a <u>complete</u> explanation will have predictive value. If functionalism can offer a complete explanation it could conceivably offer us valid predictions. To discover how it handles explanation then would give us a clue as to how it would handle

19 Carl G. Hempel, "The Function of General Laws in History," <u>Readings in Philosophical Analysis</u>, p. 462. statements about the future, which would cntail the inductive problem.

Hempel is quite critical of the explanatory nature of functionalism and to him explanation and prediction are simply two heads of the same coin; to examine an explanation is to also look at a statement's predictive force. Thus to look at one is to look at both. We may look at the predictive nature of functionalism keeping in mind that we are now also discussing the quality of prediction which functional explanation offers. In attempting to explain the occurrence of item i in a system s at time t, functionalists commit the fallacy of affirming the consequence.²⁰ The weakness in this type of explanation becomes quite apparent when one asks if there could be any alternatives to i in s at t. Functionalism "simply fails to explain why the trait i rather than one

²⁰Carl G. Hempel, "The Logic of Functional Analysis," <u>Readings in the Philosophy of the Social</u> <u>Sciences</u>, (ed.) May Brodbeck, (New York: The Macmillan Co., 1968), p. 191.

Irving M. Copi, <u>Introduction to Logic</u>, 3rd ed., (New York: The Macmillan Co., 1968), explains that the fallacy of affirming the consequent is where one has a categorical premise which affirms the consequent of the conditional premise. (p. 202)

^{1.}C. Jarvie also discusses this point in "Limits to Functionalism in Anthropology," <u>Functionalism</u> in the Social Sciences, (Philadelphia: The American Academy of Political and Social Science, 1965). Jarvie finds functionalism to be rather lacking in its explanatory power. He feels that its greatest merits lie in its heuristic value.

of its alternatives is present in s at t."²¹ As a comparison a nomological deductive argument would account for i rather than any of its alternatives.

> In sum then, the information typically provided by a functional analysis of an item i affords neither deductively nor inductively adequate grounds for expecting i rather than one of its alternatives. The impression that a functional analysis does provide such grounds, and thus explains the occurrence of 1, is no doubt at least partly due to the benefit of hindsight; when we seek to explain an item 1, we presumably know already that 1 has occurred.²²

At this point it should become clear that the predictive value of functionalism is practically nonexistent. If functional analysis cannot explain the occurrence of one set of items, as opposed to a set of alternatives, then it surely cannot allow us to predict. What functional analysis does to make predictions then is that through hindsight it explains the function of an item i; e.g. "since the demand for the services of special privileges are built into the structure of the society, the Boss fulfills diverse functions for this second subgroup of business-seeking

> ²¹<u>Ibid.</u>, p. 193. ²²<u>Ibid.</u>, p. 194-195.

privilege."²³ For this to act as a predictive statement a postulate that states that the future will be the same as the past must be implicit. Also the word "since" must be taken to mean that within limits the structure of society will stay the same. This can be thought of as an implicit hypothesis of self-regulation.

Richard Rudner refers to this tendency as <u>preferedness</u>. Functionalism seems to require an assumption that an item <u>prefers</u> function X, or prefers to direct itself towards goal G. What exactly this preference behavior is "must be qualified by the kind of preference behavior to which we are referring."²⁴ With this qualification we can surely have no prediction because item i may simply demonstrate a preference for goal H rather than goal G at time t' as opposed to time t. The only way out of this situation is to produce a law which holds that item i always functions in the <u>same</u> manner in system s, regardless of time. We are now left in a situation where "we can only predict, and explain, in terms of functions where explanations contain law-like

23 Hobert K. Merton, <u>Social Theory and Social</u> <u>Structure</u>, p. 76. ²⁴_{Richard} 3. Rudner, <u>Philosophy of Social</u> <u>Science</u>, p. 100.

generalizations."²⁵ Usually this involves "our knowing that the system is self-regulating . . . "²⁶ Without this we have no grounds for either prediction or complete explanations.

Functional systems must have this implicit hypothesis of self-regulation in order to have any predictive value. This hypothesis is normally untestable just as it is empirically undefinable. As Hempel writes:

It will no doubt be one of the most important tasks of functional analysis in psychology and the social sciences to ascertain to what extent such phenomena of self-regulation can be found, and can be represented by corresponding laws.²⁷

25 Hobert Brown, <u>Explanation in Social Science</u>, p. 129. Hempel, "The Logic of Functional Analysis," feels that one way this might be done is to add a premise which sets the future: "The predictive use of [functional arguments] likewise requires a premise concerning the future . . . but there is often considerable uncertainty as to whether [this] will in fact prove to be true."

26 Nobert Brown, <u>Explanation in Social Science</u>, p. 130.

27 Carl G. Hempel, "The Logic of Functional Analysis," p. 205.

Abbert Brown, <u>Explanation in Social Science</u>, feels that when the point is reached where laws are developed we will have no need for functional analysis. Here he is thinking of functionalism as a heuristic device only. This is similar to Nagel, "A Formalization of Functionalism," <u>Logic Without Metaphysics</u>, (New York: The Free Press, 1957).

In support of this idea Brown points out that of all the social sciences which utilize functional explanation economics is not among them. He holds that this is because they have developed the laws which other areas are still searching for. This idea is discussed by Sherman Roy Krupp in "Equilibrium

Functionalism and Induction

It should be rather clear by now that this hypothesis of self-regulation is the same as the postulate that nature is uniform. This idea was discussed at some length in the first chapter. The idea that item 1, in system s, in the past, has functioned in manner X and will continue to do so in the future is the same as saying that nature has been uniform in the past, is uniform in the present, and will continue to be uniform in the future. Indeed Brown and Ghiselli write that "the utilization of functional analysis . . . is predicated upon the postulate of the uniformity of nature."²⁸ This, as was shown in the first chapter, is not justified. There is simply no way of proving this postulate. It must be taken on faith. One must assume that nature is uniform.

Raising again the question we opened with: How do the social sciences handle the inductive problem? We may now answer that functionalism copes with this problem by assuming that nature is uniform. It assumes that if a

Theory in Economics and in Functional Analysis as Types of Explanation," <u>Functionalism in the Social Sciences</u>. As Krupp points out, economics has much to lend to the other social sciences since it has developed analytic and systematic methods more than any of the other social sciences.

²⁸Clarence W. Brown and Edwin E. Ghiselli, <u>Scientific Method in Psychology</u>, (New York: McGraw-Hill Book Co., 1955), p. 56.

certain item, e.g., witchcraft, incest taboos, etc., function in a certain manner in society A, B, and C, this item if found along with many similar conditions, in society D, will perform the same function. Functionalism assumes that time and place will not drastically alter things. To prove this it has been shown that law-like generalizations would be needed. In order to have law-like generalizations one <u>must</u> have uniformity. Functionalism has never actually reached this point. It <u>assumes</u> nature to be uniform. This is how functionalism circumvents the problem of going from the known cases to unknown cases.

Empiricism

One of the difficulties with methodological problems is that the terminology differs widely from writer to writer. The social sciences are especially guilty of this confusion. Not only is technique confused with methodology but one type of methodology may be confused with another type of quite different methodology. Also, little regard seems to be shown for what others in the field have done before. Thus, one must be very careful in using different terms, and this shall be kept in mind in the ensuing discussion on empiricism. Empiricism can initially be discussed by referring to the functional method of explanation we just finished.

It should first be made clear that I am not using empiricism in the specific sense that it is used to designate a school of philosophy. While parts of this may sound very similar to work done by the logical empiricists it should not be thought that the entire model of explanation conforms perfectly. Rather I wish to use the term empiricism as simply one type of model used for obtaining knowledge. Empiricism then is seen as an explanatorypredictive generalization. Functionalism, as previously discussed, if not in the exact form of a teleological explanation is at least directly related to a teleological type of purposive explanation. In contrast empiricism performs its explanatorypredictive role through law-like generalizations. This is similar. in form, to a deductive-nomological explanation. In empirical generalizations X is taken as a law. "It is [then] used as one of the premises of an argument in which the fact to be explained is derived as the conclusion."29 An empirical generalization is very close to what Kaplan

29 Robert Brown, <u>Explanation in Social Science</u>, p. 45.

calls a nomic generalization. ³⁰ One difference though is that an empirical generalization does not have to be derivable from other laws. It may be derived solely on the basis of experience, and not related to any grand theory. Many people, Kaplan amongst them, are quite displeased with "mere empirical generalizations" and feel that they are not worthy of one's time. This seems to be somewhat naive. Social science is not so far advanced, nor perhaps is any other science that it can find no use in mere empirical generalizations which are unrelated to a grand theory.

This whole notion of theory is one of the most confusing and misunderstood topics in social science literature. There are at least three different senses in which it is found. It is often used to refer to an explanation which is untested and whose truth status is questionable. At other times theory refers to a rule, or a set of rules, which are opposed to practice. In the third sense in which it is found it refers to a set of procedural rules which contain a schema for terminology and classification. It is this last meaning of theory

30 Abraham Kaplan, <u>The Conduct of Inquiry</u>: <u>Methodology for Behavioral Science</u>, p. 92.

which has the most usefulness for our purposes, but it also seems to be the least used meaning of the word. Social scientists use the term quite indiscriminately and with little regard for consistency. It is for this reason I will not look at theories, <u>per se</u>, for to do so would only result in undue confusion (and in an area which needs little more). To attempt to clarify the situation would be beyond the scope of this work.

When explanation takes the form of an empirical generalization it usually takes the form of a hypothesis. Brown and Ghiselli explain the hypothesis in the following manner.

A hypothesis is a proposition about factual and conceptual elements and their relationships that projects beyond known facts and experiences for the purpose of furthering understanding. It is a conjecture or best guess which involves a condition that has not yet been demonstrated in fact, but that merits exploration. It may be framed as a potential solution to a problem, or as an explanation of some unknown fact. It may describe an element or a relationship which, if found true would by logical inference offer support to some explanation

One problem enters at this point to further complicate the issue. This is the difference between a hypothesis and a tendency statement. It is impossible "to determine by simple inspection

³¹Clarence W. Brown and Edwin E. Ghiselli, Scientific Method in Psychology, p. 153. whether a sentence . . . is habitually interpreted by economists as a universal hypothesis about all countries, or as a tendency whose limitations are well known."³² One of the major reasons for this source of confusion is that "it is always possible for investigators to choose between stating their hypotheses in a simple form that may mislead outsiders and stating them in a more complicated and accurate fashion which enlightens the bystander while inconveniencing the worker."³³

The derivation of the term empirical comes from the next stage of this process of the inquiry. The verification of the hypothesis depends on empirical evidence. How the hypothesis came into being falls in the context of discovery and need not concern us here since we are mainly concerned with the validation of knowledge claims. In this process of verification of the tentative, or suggested, hypothesis the social scientist must turn to empirical evidence. haufman stresses the importance of the empirical evidence and writes of two levels of clarity in understanding the meaning of the methods of empirical science, only the first of which will be immediately discussed.

32 Robert Brown, <u>Explanation in Social</u> <u>Science</u>, p. 155. 33 <u>Ibid</u>.

- 1. The first is reached as soon as it is realized that knowledge of reality is acquired through systematic observations and their interpretation in terms of theoretical principles.
- 2. The second is reached when the process of inquiry is freed of all interpretations that ascribe to its results an 'absolute' validity transcending possible human experience. 34

DiRenzo similarly writes that "an adequate and complete explanation in the behavioral sciences must in some manner be one of an empirical nature, one whose validity and precision may be established through empirical verification."³⁵ This point has been stressed far too little in the social sciences. Even though it seems obvious enough many social scientists go off creating deductive systems using Euclid's system of geometry as a model. Seldom do they stop to consider the difference between a social order and a triangle.

The major difference is that in mathematics the propositions are true or false independent of empirical existence. A triangle exists by definition even though

34relix Kaufman, Methodology of the Social Sciences, (New York: The humanities Press, 1958), p. 13.

³⁵Gordon J. DiHenzo, "Toward Explanation in the Behavioral Sciences," <u>Concepts, Theory, and</u> <u>Explanation in the Behavioral Sciences</u>, Gordon J. DiRenzo (ed.), (New York: Random House, 1966), p. 251. Hobert Merton in <u>Social Theory and Social</u> <u>Science</u>, talks about the <u>empirical verification</u> of hypotheses also. This at first may seem to pose a problem as to which category he should be placed in;

no person has ever perceived a true triangle. This is usually referred to as analytic knowledge. These sentences are true or false solely by virtue of their form. In the social sciences the worker is dealing with synthetic knowledge. The propositions are often referred to as being confirmed, or disconfirmed, on the basis of empirical evidence. They cannot be shown to be true or false outside of observational support. As was brought out in the section on the hypothetico-deductive method many people rushed to emulate the "true scientist" only to discover. or worse, have not yet discovered, that two different types of knowledge are involved. It will suffice here to simply bring this point out and add a note of caution for this mistake has been made a great many times, and will doubtlessly be made many more times. Social scientists must keep in mind the fact that they are usually working with synthetic knowledge. Thus, empirical evidence is necessary for the confirmation of a hypothesis.

As was pointed out above "failure to distinuish between deductive logic in the strict

functionalist or empiricist? What he calls for though is an empirical testing of "theories of the middle range." In working through the larger conceptual schema he maintains a more orthodox functionalist arrangement.

sense and the logic of scientific procedure leads to an inadequate formulation of scientific problems, methods and solutions."³⁶ This is most evident when some social scientists deal with the validation and disproof of hypotheses. Many fail to reslize that a hypothesis can never be <u>proved</u>; proved, that is, in the sense of a mathematical theorem, an ultimate sort of proof, i.e., good for all times. This was Kaufman's second point in the earlier quotation. If any notion of truth is used with a synthetic proposition, it must refer to that proposition's <u>empirical</u> validity. This empirical validity cannot be substantiated to the degree of an analytic proposition; it is always subject to change in the future.

what then are we speaking about when we often note that we can base our actions on a proven hypothesis? Essentially we are saying that it has not been disproved. "Factual evidence can never 'prove' a hypothesis; it can only fail to disprove it, which is what we generally mean when we say, somewhat inexactly, that the hypothesis has been 'confirmed' by experience."³⁷

36 Felix Kaufman, Methodology of the Social Sciences, p. 230.

37 Milton Friedman, Essays in Postive Economics, (Chicago: Univ. of Chicago Press, 1953), p. 9.

Brown and Ghiselli write:

Hypotheses are never proved. The term carries the notion of 'certainty', of 'always' or 'absolutely true.' That is if a proposition is proved, then there is no further question about its truth characteristics; it is established for all time. In this sense we can never prove a hypothesis.³⁸

The reason for this is that a true answer for today "may not be true tomorrow, despite empirical verification today."³⁹ In contrast to the functional explanation which was built on an assumption that tomorrow would resemble today, empirical explanation is built upon a distrust of nature and its patterns. Indeed DiRenzo writes that "science must always assume a certain cynicism regarding the reliability of its answers."⁴⁰

Explanation and Prediction

It should be evident that empirical explanation is very close to providing a causal explanation for phenomena. As was pointed out earlier it is an attempt to explain through the use of law-like

³⁸ Clarence W. Brown and Edwin E. Ghiselli, Scientific Method in Psychology, p. 171.

39 Gordon J. DiRenzo, "Toward Explanation in the Behavioral Sciences, " p. 258.

40 Ibid.

This brings us then to the predictive power of empirical generalizations. We must keep in mind that a hypothesis is only tenative and can never be fully accepted. Milton Friedman argues that "the only relevant test of the <u>validity</u> of a hypothesis is its predictions with experience."⁴² DiRenzo also writes that "the validity and the adequacy of an explanation can be demonstrated by its predictive power."⁴³ Thus, if the hypothesis enables us to make successful predictions this fact may be seen as another piece of evidence which further confirms the hypothesis.

41 Abraham Kaplan, <u>The Conduct of Inquiry:</u> <u>Methodology for Behavioral Science</u>, p. 329.

42_{Milton Friedman, Essays in Positive} Economics, p. 8-9.

43Gordon J. Diffenzo, "Toward Explanation in the Behavioral Sciences," p. 251. Friedman argues that it is by the criterion of predictive power that a science of economics can be judged. He feels that the ultimate goal of a science should be the development of hypotheses that yield valid and meaningful predictions about phenomena not yet observed.

Its task is to provide a system of generalizations that can be used to make correct predictions about the consequences of any change in circumstances. Its performance is to be judged by the precision, scope, and conformity with experience of the predictions it yields.⁴⁴

It should be quite evident that prediction about unknown states is quite important to an empirical mode of explanation, indeed it almost becomes central to the operation of this type of explanation.

Empirical Explanation and Induction

It should be rather clear that all of the above has really constituted a hypothetico- deductive method of operating with the problem of induction. The hypothesis is formed on the basis of experience with some empirical data and is accepted, at least for a time, as being true. This statement is then regarded as having predictive value and by

44 Milton Friedman, <u>Essays in Postive</u> <u>Economics</u>, p. 4. careful observation it is determined whether the predictive statement turned out to be true.

In the empirical model for explanation. as in the hypothetico-deductive system, prediction is of central importance. Also the notion of a hypothesis never being found true, but only highly confirmed is common to the two. Another idea found in both is that the establishment of a hypothesis at one time will not prevent its refutation at a later time. Ine interesting thing is that few social scientists refer to this type of explanation as the hypothetico-deductive type of explanation and even fewer view it as having anything to do with the problem of induction as formulated by Hume. At times people elaborate on the model of the hypothetico-deductive pattern and then refer to it as a straight deductive system.45 This is due, in great part, to the great lack of sophistication which many social scientists have in dealing with methodological problems. Fany are highly skilled in techniques of data-gathering And analyzing; and these tools are used to great benefit today. These tools often seem to be used with

⁴⁵Helvin Marx commits this error in a chapter methodology. "The General Mature of Theory Construction," <u>Theories in Contemporary Esychology</u>, (New York: The Macmillan Co., 1963), p. 14.

little understanding of the methodology implicit in them. Nonetheless it is quite significant that many social scientists make use of a hypotheticodeductive pattern of explanation as a means of overcoming the inductive problem raised by David Hume. Chapter 3

The New Social Studies and Induction

Having now looked at the problem of induction, and how the social scientist works with this problem, we turn our attention to how the new social studies deals with this phase of methodology. In the last chapter we noticed that the social scientist is seldom very concerned with the underlying philosophical problems in his discipline. Kaplan has written that this detachment between problems of a philosophical nature and how research actually gets done is characteristic of philosophical methodology. "It affects science only very indirectly."¹ Social Studies being one step removed from the social sciences feels the effect of philosophical problems even less.

Thus it should be of little suprise to find out that the various programs in the new Social studies seem to be little concerned with

Abraham Kaplan, The Conduct of Inquiry: Methodology for Behavioral Science, p. 23.

the problem of induction. Of course, different projects, and people, handle it differently, just as they are aware of the problem to a greater or lesser extent. One of the most interesting items must be the fact that the problem is dealt with at all, even if in an obtuse manner. In the early stages of this inquiry whenever I explained how I wished to look at how the new social studies dealt with the problem of induction most philosophers and methodologists would shake their heads and explain that the problem was probably not dealt with at all. While it is not true that the problem is totally neglected, it is relegated to a rather low level of priority in many of the materials.

Part of this is due to the nature of the newer social studies programs themselves. They are usually a joint venture between social scientists and educators. Since neither one of these groups are usually overtly concerned with problems of methodology it should be expected that these new programs might also reflect this lack of concern. Of course this is not equally true of all programs. Actually at this point we are almost twice removed from the original problem.

The problem of induction is philosophical in nature and problems of this sort. as was pointed out. affect the social scientist only indirectly. Then, as programs have been traditionally formulated for public schools the social scientist has been only indirectly involved. (this has changed somewhat in the last ten years, but still not totally). Thus, by the time social studies materials are released to educators, we are two steps removed, not only from the problem itself, but also from people who might be familiar with this material. This is not as it should be and educators must become more involved in the philosophical foundations of the disciplines they are teaching. One could almost make a case for the argument that Secondary school teachers should be more familiar with this material than the field researcher, something this writer does not intend to do here.

Since to look at all of the programs, and leaders, which come under the rubric new social studies would prove to be an impossible task I have selected a few which seem to be representative of the field. It is a slightly ironic twist that in a critique of induction, as used by secondary school social studies, that at this point we suffer from the same problem of induction. We must select a sample from the total population, which hopefully is somewhat representative of the whole. This has been done on the basis of attempting to look at a broad selection of the various types of material available for today's achools.

If one person must be labled as the major figure in the new social studies most people would agree on Edwin Fenton. Thus the inclusion of his writings becomes mandatory. Likewise Byron Massiales must be considered as one of the major figures in the new social studies programs. It was the book, <u>Inquiry in Social Studies</u>, co-authored with C. Benjamin Cox, which was one of the first of the new methods books on the market.

Another important aspect of the new programs has been the addition of social scientists from the various disciplines to the groups which develop the various curriculums. This has usually been Patterned after the pioneering efforts in physics, although certain variations can be found. From this type of arrangement I have selected portions of the materials developed by the American Anthropological Association, and several units of of the material developed by the American Sociological Society will be examined. In addition the geography course which has been jointly developed by the Joint Committee on Education of the Association of American Geographers and the National Council for Geographic Education will be looked at.

One of the most important developments in social studies education has been the projects run by the various universities and funded by the Cooperative Research Branch of the Department of Health, Education, and Welfare. Here it is impossible to make any generalizations because the materials range from elementary to secondary schools and also from entire social studies curriculums to single courses of study. Even the term "structure of the discipline" varies from one project to another. With this lack of the the possibility of generalization in mind we will look at how the project at Harvard University dealt with the problem of induction.

One of the most consistent cries, heard from the very beginning of this new interest in the social studies, was the need for evaluation and a ready index of the efforts of the new Programs. To this end Irving Morrissett and his associates have developed the Curriculum Materials Analysis System. By looking at an instrument designed to evaluate the new social studies programs it should become much more evident as to how much the problem of induction is on the minds of the social studies educators.

Edwin Fenton

Professor Fenton must be considered one of the leading figures in the new social studies. From an early interest in secondary school social studies he became involved, as co-director, in the Social Studies Curriculum Development Center at Carnegie Institute of Technology(now Carnegie-Mellon). Today he has to his credit a high school social studies program, and materials for a college course in the methods of teaching secondary school social studies. One of the problems with attempting to analyze any materials produced by a team of people is that one is never too clear about what has been written by whom. In this instance I have simply decided to limit my critique to those materials and publications which bear the name of Edwin Fenton. There is no doubt that he had a great deal of responsibility for

all the Carnegie-Mellon materials, but so also did a great many others. Since it is impossible to separate the work of Alfred Hall, or John Good from that of Edwin Fenton I will look only at material Fenton has personally authored. This poses no real problem as he has written a fair amount, and is rather explicit in describing how he personally feels the social studies should be taught.

when Fenton uses the term induction he means the type of argument which goes from the specific to the general and is nondemonstrative. In this scheme the important thing is that the teacher ask the proper analytical question. Fenton writes that "the type of questions a teacher asks as he leads a student to look at the logical implications of his position holds the key to success."² As the student becomes more skilled in the process of inductive inquiry the teacher becomes less important. Fenton believes that "a student knows how to use analytical questions x = a part of thinking only when he can do so independently."³

²Edwin Fenton, <u>The New Social Studies</u>, (New York: Holt, Rinehart and Winston, 1967), p. 44. ³<u>Ibid</u>., p. 48.

For Fenton the structure of a discipline is the "analytical questions which historians and social scientists put to data in order to make it meaningful."4 This is quite different from what others in social studies education mean when they refer to the structure of a discipline. Without going into too much detail it can simply be said that many others see structure as being the main body of concepts and generalizations which make up the discipline. For our purposes the most important thing about Fenton's definition is that these analytical questions generate hypotheses.⁵ Fenton is not particularly clear on what exactly constitutes a hypothesis. Nonetheless one could not be too far wrong in assuming that he intends nothing unusual here from the definition we gave in chapter two.

The next step is the validation, or confirmation, of the hypothesis. Fenton considers this to be a Very important idea.

> The development and validation of hypotheses constitute the heart of the mode of inquiry in both history and the more rigorous

⁴Edwin Fenton, "History in the New Social Studies," <u>Social Education</u>, May, 1966, p. 326. ⁵<u>Ibid</u>.

social sciences.⁶

The social studies projects devote much of their efforts to teaching the rules by which social scientists verify, modify, or reject hypotheses.⁷

A well trained student ought to be able to state specifically the steps required in the process of developing and validating a hypothesis.

We increase our store of useful knowledge in both our personal and professional lives by developing and validating new hypotheses.

From the above quotes it should be quite clear that Fenton definitely believes that there is a logic to the <u>development</u> of hypotheses. Not all people would agree that there is a logic to the development of hypotheses that can be taught, but this is not our concern here. Rather, we are interested in how Fenton views the logic of validation. Fenton is never clear on this point.

⁶ Ibid.
7 Edwin Fenton, The New Social Studies,
p. 15.
8
Edwin Fenton, Teaching the New Social
Studies in Secondary Schools: An Inductive Approach,
(New York: Holt, Rinehart and Winston, 1966), p. 188.
9 Edwin Senton Teacheris Guide for
Euwin Fenton, Isonel & Ville Tot
Three Experimental Units, (New York: Holt, Hinemart
and Winston, 1966), p. 5.

After giving validation of hypotheses a place of importance in the course of study he moves on to other aspects of the curriculum. Even when he gives sample lessons it is still almost impossible to determine what exactly is meant by the logic of validation. This weakness occurs in all of his writings. One must agree with Fenton that the process whereby social scientists modify, verify or reject hypotheses are important, but one would prefer that this receive more clarification. The closest Fenton comes to elaborating on this issue is when he lists the "Steps in a Mode of Inquiry for Social Studies:"¹⁰ The last item in his list of six steps is

- 6. Evaluating the hypothesis in light of the data.
 - a. Modifying the hypothesis, if necessary.
 - (1) Rejecting a logical implication unsupported by data.
 - (2) Restating the hypothesis.
 - b. Stating a generalization.

From this it must be surmised that Fenton is using the hypothetico-deductive model of explanation. He goes from the hypothesis back to the data in search

¹⁰Edwin Fenton, <u>The New Social Studies</u>, P. 16-17. of confirming evidence. From this step one then decides what to do with the hypothesis. It may be modified, accepted, or rejected. Fenton is not too clear on either the status of a hypothesis which has been confirmed or one which has been rejected. He does not discuss the notion that a hypothesis is never fully confirmed - confirmed to the extent that we may have fully guaranteed results. Nor is he clear on when we should reject a hypothesis.

This comes from his apparent lack of concern about the nature of evidence, and the place of unobserved instances when one makes a generalization. It is extremely difficult to find an instance where Fenton discusses the nature of future cases in a law-like generalization. Neither does he talk of the difficulties of going from a sample to the entire population of whatever one is discussing. Fenton looks at the process of validation as being something that is not too difficult, at least he gives this impression. As we have previously shown though, it is extremely difficult. Fenton does not mention, or even allude to, the problem with induction that Hume formulated. Even though he is using a hypothetico-deductive mode of explanation he does not bring this out, nor does he clearly explain why one why one uses such a pattern of explanation.

While Fenton does speak of methodology he does so in such an imprecise manner so as to be of limited utility. If one is going to utilize the methodology of the social sciences in the teaching of the social studies it should not be simplified to such an extent that it does an injustice to the magnitude of the problems involved. To simplify the nature of methodology so that it looses all meaning is to be guilty of a practice which has been going on for a long time in the schools. I will return to this same point in the next chapter after looking at some other material in the new social studies to see what they do with the same material.

Byron Massialas

Another individual who has achieved a certain degree of prominence in the new social studies is Byron Massialas. Unlike Fenton, he has not been Connected with Project Social Studies, but rather has become prominent more on the basis of his Writings. Massialas prefers the term inquiry to that of induction, or analytic question, and draws on the work of John Dewey.¹¹ This is well demonstrated in his work, and he is very thorough in his explanation as to what constitutes an inquiry approach. If one were inclined to complain at the free and easy use of terms by Edwin Fenton then Byron Massialas might prove to be much more enjoyable, not to mention his being more informative. In Massialas's main book, <u>Inquiry in the Social Studies</u>,¹² he makes the probabilistic nature of induction(inquiry) very clear. Also, rather than lightly dismiss the problem of induction he feels it <u>must</u> be dealt with. This is probably best done, according to Massialas, by the rigor with which students analyze problems.

Massialas works within a definite empiricist framework, and is skeptical of the orderliness of the universe.

Contrary to an accepted myth, science makes no assumption of an absolutely orderly universe. Were this the case, scientists could state their findings in more definitive terms than they do.¹³

The problem of making an inference from the sample

¹¹One book's influence seems especially strong. That is John Dewey's <u>How We Think</u>, (D.C. Heath and Co., 1933).

12 Byron G. Massialas and C. Benjamin Cox, Inquiry in Social Studies.

¹³<u>Ibid</u>., p. 92.
to the population, or the process of inferring something from a number of known cases to the unknown cases, is also dealt with. This presents itself as a problem in the formulation of laws. The problem is that

the exact nature of the law will never be known for certain since all possible cases and instances can never be accounted for. While science and the scientific method yield reliable knowledge, both the conclusions and the methods are open-ended and self-correcting i.e., they are subject to continuous revision and confirmation.¹⁴

This represents one of the clearest statements that might be formed in social studies on the nature of the hypothetico-deductive approach to the inductive problem. That Massialas is utilizing the hypothetico-deductive method should be quite obvious, since he seems to emphasize the idea that an answer may never become true, but only highly confirmed. Also, the fact that an answer is always subject to continuous revision if some of the empirical facts change is typical of the hypothetico-deductive solution to the inductive problem.

For Massialas, a hypothesis "is the primary, declarative general statement of explanation or

14_{1bid}.

solution . . . ¹⁵ Working from this the student collects and arranges his data to see whether or not the hypothesis is tenable. This data which is marshaled is offered as evidence to support, qualify or refute the hypothesis under consideration.¹⁶ If the evidence is generally supportive to the hypothesis under consideration then a generalization is arrived at.

If the evidence marshaled for the consideration of a hypothesis is largely supportive, then the concluding generalization will be similar or even the same as the hypothesis. . . if the discussion produces certain data which is true only under qualified conditions, then it is reconstructed so that the conclusion reflects these conditions.

Most important for our analysis here is the tentative aspect of the conclusion reached. To Massialas this conclusion takes the form of a generalization and it

> represents the most tenable solution to the problem based on all available evidence. The generalization however is never taken to represent a final truth. Its tentative nature is recognized.¹⁰

> > ¹⁵<u>Ibid</u>., p. 117. ¹⁶<u>Ibid</u>., p. 115. ¹⁷<u>Ibid</u>., p. 132. ¹⁸<u>Ibid</u>., p. 119.

The aspect of tentativeness is raised several times in this book.

It must be borne in mind that the final conclusion does not constitute an absolute even though all possible data have been brought to bear on its proof - but is always considered as tentative and as an approximation of reality.¹⁹

Massialas thus offers an excellent discussion on the problems of induction to prospective, and also practicing, teachers. He fully explains the nature of the problem without allowing himself to get overwhelmed by purely technical problems. He could, though, bring out the point that he is using only one solution -stressing that results may be subject to change in the future - to the basic problem. Also, what he calls inquiry, or induction, is only one type of probabilistic inference. A probabilistic inference, which is nondemonstrative, and goes from the general premise to a general conclusion is not discussed. Neither is a type of nondemonstrative inference which goes from a general set of premises to a specific conclusion discussed. Nonetheless much material is included in this work, designed for an undergraduate methods

> 19 <u>Ibid</u>. p. 119-120.

course, assuring that the future teacher receives an adequate introduction to the problem of induction.

Anthropology Curriculum Study Project As was mentioned earlier one of the newer trends in education has been the partnership between the members of various academic disciplines, professional educators, and teachers. Thus far this has been most benefical, not only in that it makes social studies resemble the social sciences, but also acquaints social scientists with the tremendous problems educators face. One of these groups of social scientists which has been actively involved in this activity has been the anthropologists.

Anthropology has traditionally had no place in most social studies programs so this group could not simply replace an old course with a new one. To the planners of this project "it seemed more possible to insinuate new units than to shoulder aside courses "²⁰ Thus, there are a series of selected units which may

²⁰<u>Illustrative material from the experimental</u> <u>unit Study of Early Man</u>, (Unit Director) Edwin S. Dethlefsen, (Chicago: Anthropology Curriculum Study Project), p. 11.

be included within prexisting courses of study, the most obvious course being the traditional world history.

In this section we will look at one of units entitled "The Study of Man," which is fairly representative of the entire project. This particular unit deals with the bio-cultural evolution of man and contains sections on the various kinds of archeological evidence, types of archeological influences, the emergence of culture, and early development of culture.

The writers of the program maintain that the material does not conform to any special educational formula, but rather makes use of several.

However, the most common activity is practice in induction. With their teacher's guidance, students are encouraged to analyze available data and to syntheize their own conclusions. 21 They are not "told" the "facts" of evolution.

Also predominant throughout this unit is the use of functional analysis. While the materials are never explicit on this point one cannot fail to see this when reading through the materials. Time and time again the term function arises and it is usually used in the sense of what an item might

²¹<u>Ibid</u>., p. 111.

possibly have contributed to the ongoingness of a particular society. The introduction discusses what specific facts combined with a site, and its assemblege of artifacts, might contribute to knowledge. The authors hold that "with information of this sort one can be much more assured about the correctness of inferences regarding <u>function</u>."²² Function is thus used in the teleological sense, and is typical of the entire unit.

As was mentioned earlier, inductive inferences are widely used in this program. While the probable nature of an inductive inference is never explicitly brought out the students ate constantly reminded of the tentativeness of any conclusion they might reach.

You the student, have talked about some kinds of archeologically provable <u>facts</u> and some kinds of things that <u>might</u> be true, but for which archeology alone can provide no absolute proof.²

Some answers must forever be prefixed with "Perhaps."24

One must exercise caution in intuiting beyond the level of information provided by the data.²⁵

22<u>The Study of Early Man: Teaching Flan</u>, (Chicago: Anthropology Curriculum Study Project, 1966), p. 9. 23 <u>Ibid</u>., p. 9. 24 <u>Ibid</u>., p. 21. 25 <u>Ibid</u>., p. 24. Due to the nature of the evidence, and the need to interpret in the light of environmental adaptation, one must proceed with caution in evaluating Paleolithic materials.²⁰

Several of the readings also go into this subject more throughly. One such example is a reading on archeological dating by Charles F. Merbs.²⁷ This reading deals with the problem of induction in that it explains why several methods for establishing dates must be used. It stresses the idea that if several techniques are used, and give similar results, then the original hypothesis regarding an artifact may become more confirmed, or modified, in light of the new data. This reading on dating relies on a rather straightforward empirical mode of explanation and in this respect is quite different from many of the other readings. Nonetheless it does show how one might deal with the problem of induction.

A straight functional analysis is found in a reading entitled "Report on Grand Central

²⁶<u>Ibid.</u>, p. 58. ²⁷Charles F. Merbs, "Dating," <u>The Study of</u> <u>Early Man.</u> (Chicago: The Anthropology Curriculum Study Project, 1966). Terminal."²⁸ This is an attempt to show the student how easily a faulty generalization may be made when only partial evidence is available. The reading centers on some future archeologists attempting to determine the function of pay toilets, and how they draw wrong inferences from the data.

One exercise further demonstrates the use of functional analysis and introduces the notion that nature is uniform.²⁹ The students are asked to write a reconstruction of what life must have been like at Torralba, an early stone age site. They are to be reminded, by the teacher, that some things which they have learned from a previous reading about present day Bushman³⁰ may be of help in writing this reconstruction. This, in essence, is telling the student that

28 Leo Szilard, "Report on Grand Central Terminal," <u>The Study of Early Man</u>, (Chicago: The Anthropology Curriculum Study Project, 1966). 29 <u>The Study of Early Man: Teaching Plan</u>, p. 113. In the second chapter of this work it was pointed out that functional analysis is based on the postulate that nature is uniform. To make inferences from one society another society

will be, fullfilled in each society. ³⁰Richard B. Lee, "Kalahari - 1: A Site Report," <u>The Study of Early Man</u>, (Chicago: The Anthropology Curriculum Study Project, 1966).

one must assume that similar functions must, and

similar artifacts must have performed functions similar to those we find in today's primitive tribes. This is based on the assumption that primitive societies have a certain degree of uniformity, whether they have existed in prehistorical times, or exist today. None of this is explicit, but it is quite apparent upon closer analysis.

This material very clearly displays the work of professional anthropologists. Just as functional analysis is often combined with the empirical testing of certain specific hypotheses in anthropology so also with this unit for high school students. Also quite apparent in this unit is the lack of explanation concerning the reason for this combination. In this unit, as in field work, there is really no way for establishing dates functionally, thus one must go to an empirical mode of explanation. After a date of origin is sufficiently confirmed the method of analysis switches back to a functional analysis. What was this tool used for? How did it contribute to the socio-cultural complex? Indeed, one skill to be taught in the discussion on tools is the notion

that "the artifact is more meaningful when seen as part of a once-functioning culture complex."³¹

Thus, there is no doubt that the student is asked to utilize a functional mode of explanation. As with much of the material written by anthropologists of the functionalist approach. the postulate that nature is uniform is not clearly stated. From the standpoint of this analysis, the project and the materials suffer because because of this neglect. Failure to bring out the assumptions underlying an inductive method of obtaining knowledge allows the student to arrive at faulty conclusions regarding the possible uses of inductive reasoning, not to mention the mistakes he may make in the subject matter itself. The student should be told of the assumptions underlying a functional analysis, and he should be aware that this assumption of the uniformity of nature is unprovable.

One point on which the project is to be commended though is the extent to which it explains to the student the probable nature of any conclusion that is arrived at through inductive inference. As was shown in the earlier quotations

p. 27. 31 The Study of Early Man: Teaching Plan,

the student, with the help of the teacher, should become quite aware of the inductive problem by using this material. Nonetheless the methodological problems inherent in a functional analysis seems to be neglected; specifically the idea of forming the postulate concerning the uniformity of nature. There is a very real need to bring out the foundations underlying this type of explanation.

High-School Geography Project

The High-School Geography Project represents a merger between professional geographers and educators. It began in 1961 under the sponsorship of the Joint Committee on Education of the Association of American Geographers and the National Council for Geographic Education. In the early years funding came from the Fund for the Advancement of Education and in later years from the National Science Foundation. The first year of the project was given to the defining of the place of geography in the schools, and considerations of what type of course should exist. The next year was given to the testing of new methods and materials developed by secondary school teachers, aided by professional geographers. Since that time a ten unit sequence, based on a settlement theme has been developed.

One assumption that the people in this project held from the beginning was "that the principle objective of a geography course should be to communicate the geographer's way.^{1,32} The problem then became one of translating the geographer's way into the reality of a high school course. Out of this work grew "The Settlement Theme Course Outline," one of the earliest attempts to lay out the sequence of the course. From the beginning the course "emphasizes the geographer's mode of inquiry rather than his accumulated knowledge."³³ It is recognized though that inductive modes of validation cannot make up the entire course. Inductive approaches must be balanced with other items in the course. After all we are interested in seeing that the student is acquainted with induction, not that he learn all things through an inductive mode.

The inductive approach is used in the course whenever it is feasible. However, a healthy balance must be struck between the inductive and deductive, and time does not permit the inductive development of all concepts.³⁴

³²Robert McNee, "An Approach to Understanding the Current Structure of Geography." <u>Concepts and</u> <u>Structure in the New Social Science Curricula</u>. (ed.) Irving Morrissett, (West Lafayette, Ind.: Social Science Consortium, Inc., 1966), p. 57.

> ³³<u>Ibid</u>., p. 61. ³⁴<u>Ibid</u>., p. 62.

The actual course materials reinforce an attitude of skepticism as to the extent to which the course is committed to induction. In Unit 3. "Networks of Cities." by Edward J Taaffe and Leslie J. King, one of the activities is to look at the population size and spacing of urban settlement in a region. The whole exercise seems designed to convince the student of the validity of Christaller's central place theory.³⁵ The various exercises, excellent as they may be, seem designed to bring the student to the same conclusions as the author's. Nowhere does there seem to be room for the student to develop his own hypothesis and attempt to validate it. If the student does not find the opportunity to do this then the problem of inductive conclusions can have little meaning.

An optional unit on Japan, which was in its final stages of development in the Spring of 1968, lists one of its objectives as: "Select, analyze and apply data to test hypotheses."³⁶ In fact though,

³⁵A good summary of this may be found in "Recent Developments of Central Place Theory," by Brian J. L. Berry and William L. Garrison, <u>Introduction</u> to <u>Geography: Selected Readings</u>, (eds.) Fred E. Dohrs and Lawrence M. Sommers, (New York: Thomas Y. Crowell Co., 1967). 36

Japan, Teacher's Guide, (Association of American Geographers, 1968), p. 11.

this unit does not approach the caliber of some of the other material on the market. The data are prearranged and the presentation is generally quite superfical. Few real methodological problems are discussed and nothing is said about the validity of the concluding generalization which the student arrives at. This unit is an excellent introduction to regional geography, but a very questionable example of how induction should be handled. If students are to select, analyze and apply data to test hypotheses, the High School Geography Project might not be an example of the ideal introduction to the material.

Sociological Resources for the Social Studies

Another of the current projects in the new social studies that grew out of the concern of practicing social scientists is the Sociological Hesources for the Social Studies(SRSS). It is an official project of the American Sociological Association, funded by the National Science Foundation. Project headquarters are at 503 First National Building, Ann Arbor, Michigan. The staff works under the direction of Robert C. Angell of the University of Michigan. The goal of SRSS is "to develop superior instructional materials which accurately characterize sociology as a scientific discipline and which can easily be integrated into social studies courses . . . in the senior high school."³⁷ This emphasis on integration into existing courses is somewhat different than some of the other projects, with the exception of the Anthropology Curriculum Study which we looked at earlier.

One thing which the SRSS scheme allows is for the materials to reach more students than would be possible in any type of elective sociology course. Throughout the various episodes³⁸ the emphasis is on presenting the student with an opportunity to experience sociology first-hand. "Students

³⁸ The material has been produced in the form of episodes, each one being a self-contained set of materials designed to occupy about ten classroom periods. Each of these episodes deals with a limited topic to which sociology has made a significant contribution. These various episodes greatly resemble the traditional unit with which classroom teachers are very familiar.

³⁷Sociological Resources for the Social Studies, <u>Informational Materials for the Michigan Council for</u> <u>the Social Studies</u>, (Ann Arbor: Sociology Resources for Secondary Schools, 1967), p. 1.

participate in gathering, classifying, and manipulating data through laboratory procedures and field operations."³⁹ The various episodes may be placed under five different broad classifications. These are:

- 1. Methodology
- 2. Demography
- 3. Social Structure
- 4. Social Change, Conflict, and Deviance
- 5. Social Psychology

For our purpose here two episodes have

been selected: <u>Hypothesis-Testing in the Social</u> <u>Sciences</u>, and <u>The Difference Between Two and Three</u>: <u>Family Size and Society</u>. The first comes under the topic of methodology and the latter under demography.

This project, as do many of the others in the new social studies, emphasizes inductive techniques.

From its inception, SRSS has emphasized inductive procedures, both in teaching and in dealing with sociological problems. To sociologists and high school teachers designing our materials we said: '... all SRSS materials must be organized around the data of actual empirical investigations, which point toward significant theoretical conclusions.' 40

For this project induction is defined as "reasoning from the particular to the general 41

³⁹SRSS, <u>Informational Materials for the</u> <u>Michigan Council for the Social Studies</u>, p. 2. ⁴⁰<u>Ibid</u>., p. 3. ⁴¹<u>Ibid</u>. They would begin the process with questions which would lead to "thinking through to plausible answers and getting the evidence - assembling and analyzing the data that enable a choice among plausible answers first preferred."⁴² This is quite in keeping with our definition of induction that was given earlier in this work. The main difference is that the SRSS prefers a narrower type of definition.

The first episode to be examined is the one entitled <u>The Difference Between Two and Three: Family</u> <u>Size and Society</u>. One of the stated purposes of this episode is to illustrate "some methods and concepts used by sociologists and demographers to study human behavior . . . "⁴³ "The teaching strategy suggested is an <u>inquiry</u> approach."⁴⁴ This episode consists of two sets of exercises. The first is

. . . designed to enable the student to see how social standards - norms - affect not only people's attitudes about what a good family size is and how many children they themselves expect to have, but also the number of children

42 <u>Ibid.</u>, p. 4. 43 SRSS, <u>The Difference Between Two and</u> <u>Three: Family Size and Society</u>; Instructor's Guide, p. 1. <u>44</u> <u>Ibid</u>. actually born. 45

The second set of exercises is set up so that

students can determine the numerical potential of various family sizes for population and growth in the United States.⁴⁶

One possible criticism that may be leveled against this episode is the one so often made against many of the new programs in the new social studies. A student must inquire in such a manner so that he reaches a conclusion which has already been designed into the material. The data presented to the student. along with several readings seems pointed toward getting the student to accept certain value positions. The teacher should use this material not as an exercise demonstrating open inquiry, but rather an example of one exercise which deals with the logic of validation. The episode rather than saying the students "will use an inquiry approach to reach their conclusions."47 might better state that a certain mode of inquiry (inductive) will be used to demonstrate the logic of validation. The purpose of this episode should be to show how inductive validation is carried out within certain types of explanation. This exercise is not meant to be an openended type of activity which allows all manner of answers. rather it is best used as an example of inductive explanation working within an empirical framework.

> ⁴⁵<u>Ibid</u>. p. 3. ⁴⁶<u>Ibid</u>. ⁴⁷<u>Ibid</u>. p. 2.

This episode though does little to point out that inductive arguments contain conclusions which are, at best, only highly probable. It tends to leave one with a feeling of certainty in the conclusions. The episode also uses inquiry in the somewhat restricted sense of an inductive argument which goes from particular premises to a generalized conclusion. As was earlier pointed out inductive arguments are not limited to this one type. Another problem with this episode is that throughout the emphasis is on technique rather than on methodology. The student is given a set of questionnaires which have already been filled out by another class, and all the student working with the episode must do is organize the data on predesigned worksheets.48 The data is then transferred to worksheet 2, a predesigned graph. The emphasis seems to be on data collection and the tabulation of this data. Thus, even though the word inquiry is used in defining the purpose of the episode it should be clear that technique, as it was defined in the previous chapter. is the proper term for this sort of activity. Very little, if any, material is designed to show the student the logic, or procedure, whereby

⁴⁸"Worksheet 1, to be provided by your teacher, will enable you to conveniently summarize the responses which the other class . . . gave to the questionaire." <u>The Difference Between Two and Three:</u> <u>Family Size and Society</u>, Students material, p. 5.

the social scientist validates his conclusion. Inductive problems are discussed very little; instead the emphasis is on the utilization of demographic techniques.

Another episode, <u>Hypothesis Testing in the</u> <u>Social Sciences</u>, does an outstanding job in the very area which drew so much criticism in the previous episode. As in the other episode the mode of explanation is empirical. The teacher's guide explains that the student

will state a hypotheses, predict behavior, construct and administer a questionnaire, tabulate and analyze data, test their hypotheses, draw conclusions, and generalize."

The stated aim of this episode "is to introduce students to one method of inquiry in the social sciences . . . 50 Early in the episode the material mentions the notion of verification and reliable knowledge. The teacher's guide points out that "this exercise should provide a contrast between the easy generalization of everyday life

49 SRSS, <u>Hypothesis Testing in the Social</u> <u>Sciences</u>; Instructor's Guide, p. 1.

⁵⁰<u>Ibid</u>., p. 8.

and the careful (and skeptical) search for reliable knowledge the social scientist pursues as he sets up hypotheses as targets for testing."⁵¹

The notion of the hypothesis and its relation to prediction is brought into the disucussion quite early.

In a way, the statement of a hypothesis is a prediction. The hypothesis states that under certain conditions . . . a given variable . . . will enable us to predict likely responses.⁵²

One of the problems inherent in induction is the notion of generalizing from the sample to a population. This is always a problem in that the generalization is not demonstrative, or necessary. This episode asks the student "suppose we had drawn a different sample . . . How probable is it that we would have obtained similar results?"⁵³ This is essentially the problem which Hume raised in his writings. Here the student is asked to cope with it. Also, the notion of induction being an argument whose conclusion is, at best, probable, is clearly

⁵¹<u>Ibid</u>., p. 10. ⁵²<u>Ibid</u>., p. 15. ⁵³<u>Ibid</u>., p. 31. The same material is found on page 11 of the student's booklet. brought out. The student is cautioned that he "should always be prepared to say how <u>probable</u> it is that knowledge about the part(the sample) gives us reliable knowledge about the whole."⁵⁴ One solution that is pointed out to the student is the commonplace practice of reporting probability values (.05, .01, etc.) so that the reader may draw his own conclusions. Also, the student is cautioned that:

> Any generalization . . . would have to be <u>qualified by specifying the conditions</u> under which it holds true. An investigator should therefore make it clear that he is generalizing only to a particular population.⁵⁵

The episode ends by pointing out the difficulty involved in stating a causal connection between two variables. What is usually done is a correlational study. This entire episode is an excellent example of how the problem of induction may be presented to students in secondary schools. While it introduces students to techniques which social scientists use, such as the Chi-Square, it also deals with methodological problems. The entire

54<u>Ibid</u>.

⁵⁵<u>Ibid</u>., p. 74. The same material may be found on page 39 of the student's material. problem of making inferences from sample to population and the notion of the predictive value of hypotheses are examples of this. In this episode the student receives a complete introduction to the hypotheticodeductive style of explanation. Thus, the student should become quite aware of the nature of the inductive problem.

Harvard Social Studies Project

One of the projects funded by the Cooperative Research Program of the United States Office of Education was the Harvard Social Studies Project. This program, under the direction of Donald W. Oliver, developed a program based on the analysis of public controversy. Its objective is to train students to examine and analyze the kinds of controversies that give rise to social conflicts. The material is designed to encourage students to consider situations and problems in the light of social science theories and explanations. The materials are now produced by American Education Publications, 55 High Street, Middletown, Connecticut. The material is published in the form of case studies, each one dealing with a problem, or value dilemma, which has persisted throughout history and across cultures.

The object of each case study "is to gather detailed information about a relatively small class of phenomena, such as the growth of a corporation, the decision to drop the atomic bomb, the living conditions of a Negro family in an urban slum, or the behavior of a politician seeking election."⁵⁶ It is then "assumed that examination of a <u>limited</u> incident will yield conclusions applicable to a more <u>general class</u> of incidents."⁵⁷ An example of how this is encouraged may be found in the booklet entitled <u>The Railroad Era: Business Competition</u> and the Public Interest. After examining the railroads at the turn of the century, the student is given an analogous case on tevelsion regulation.

It is interesting that the material points the out that A"inductive (or 'discovery') approach allows students to search for and reach conclusions on their own . . . "⁵⁸ As we talked about in the first chapter, methods of discovery, and processes

Cases and	⁵⁶ Donald W. Oliver Controversy: Guide	and Fred M. Newman, (eds.), to Teaching, (rev. ed.),
(Middleton 1968), p.	wn, Conn,: American 8.	Education Publications,
	57 <u>Ibid</u> .	
	58 Ibid., p. 9.	

of validation are two different things. Discovery of new knowledge is not the same as the justification of an inductive inference, yet here the author seems to be using the two interchangeably. It could well be that they are stating their belief that there is an inductive method of discovery, or more likely, the authors are simply using the most popular word in the new social studies. The complaint is not with their methods, but rather with the looseness which they give to the term induction. It would have been much better had they stayed with the term discovery, for it describes the approach better and would have resulted in less confusion.

The materials which are meant to explain this project point out that "it is important . . . to distinguish between two ways of applying the approach,"⁵⁹ i.e., open-ended and closed inductive discussion(either of which might better be termed discovery approaches). In the closed approach the teacher already has in mind the knowledge, structures or conclusions the students are expected to discover. This might also be called contrived

59 Ibid.

discovery. Since comments were made earlier on this type of activity, any further treatment of this would simply be repitious. Granted that closed inductive approaches may well have a place in social studies education, but it is questionable whether it should so much emphasis.

The <u>open-ended</u> approach occurs when the teacher has not previously decided what knowledge or conclusions the students are supposed to gain from the study or a case. The teacher himself is willing to entertain whatever issues and approaches the students suggest, so long as these issues and ₆₀ approaches seem serious and relevant.

The materials in the Harvard Project all seem designed to be used with this open-ended approach and the authors seem to stress the idea of value-oriented questions which cannot be absolutely resolved.

While not a part of the AEP materials, <u>Teaching Public Issues in the High School</u>,⁶¹ did grow out of the Harvard Social Studies Project. The authors point that there are three levels of disagreement in the study of public issues.

- 1. The values surrounding the disagreement are in conflict.
- 2. The facts around the conflict are not in agreement.

60<u>Ibid</u>.

⁶¹Donald W. Oliver and James P. Shaver, <u>Teaching</u> <u>Public Issues in the High School</u>, (Boston: Houghton Mifflin Co., 1966). ⁶²<u>Ibid</u>., p. 89. • 1 3. The meaning of the words surrounding the conflict need clarifying.

In elaborating on the second category above, the authors discuss one aspect of the problem of induction.

Whether or not a claim is actually true depends upon the quality and quanity of evidence supporting it. Because evidence is always limited we never know for sure whether a claim is absolutely correct or absolutely false.

Based on what evidence is available we may refer to a knowledge claim as a fact, probably true, false, beyond reasonable doubt, probably false, and doubtful or controversial. It is this problem of ascertaining what a knowledge claim's status is which helps in the clarification of public issues. Thus, we can easily see how the problem of induction enters into the handling of values. Unless one is reasonably sure of the factual areas in a disagreement then the value conflict cannot go to another level. Oliver and Shaver seem to be working in a kind of empirical framework when talking of this problem, and the hypothetico-deductive model for explanation

⁶³<u>Ibid</u>., p. 110.

is the one used. The idea of never attaining perfect certainty and also of a gradient of confidence is common to both the Harvard materials and what we have been calling the hypothetico-deductive approach.

In the AEP materials, the problem of ascertaining the status of a knowledge claim is brought out to the student when he is asked questions concerning the facts of a case. This is done before the student is asked questions concerned with valuation and normative standards. This then is where the inductive problem enters into the Harvard materials. It is not referred to as such though. It might be better if they were to simply drop the use of the term induction the way it is now used in the materials, using instead the term discovery. The way the Harvard Social Studies Project now uses the word induction simply seems to add confusion, for it is almost as if the term induction is used solely on the basis of its popularity. Worse yet, when they do deal with the problem of drawing conclusions from the premises in an inductive inference they do not mention the nature of the problem by its proper name.

Curriculum Materials Analysis System

One of the problems with the new social studies is that there is simply an overwhelming amount of material on the market, more material than the average specialist in social studies education can ever hope to keep up with. For the classroom teacher, or curriculum generalist the task is doubly difficult. One can well imagine the difficulty of an assistant superintendent of schools attempting to find out what programs are available for possible use in his school district. To simply know what is available though is only half the task for then he must look through all of this material to locate what each course of study attempts to do. In an effort to help educators in this task Irving Morrissett and his associates have developed a Curriculum Materials Analysis System (CMAS).

The earliest version was simply a "brief mimeographed form containing a dozen or so questions."⁶⁴ After being revised and enlarged

⁶⁴Irving Morrissett, W,W, Stevens, Jr., and Celeste P. Woodley, "A Model for Analyzing Curriculum Materials and Classroom Transactions," p. 2. This is due to be published in the 1969 National Council for the Social Studies Yearbook. The page numbers shall refer to the pages as they appeared in the draft, and may not correlate with those as they finally appear in the published edition which should appear in the fall of 1969.

several times an early version was published in 65 It is worth looking at the Social Education. CMAS to see if it is capable of handling the problem of induction in its evaluations since one possible use for the CMAS is "to introduce teachers to new ideas and approaches in curriculum material "66 If the CMAS is to fill this aim then it becomes pertinent to the central issue of this thesis: Are teachers and students being introduced to the problem of induction through the new social studies materials? Since it is easy to envision the CMAS becoming widely used, whether or not it deals with the inductive problem, it is imperative that we examine it. If it does not critique the new programs, or courses of study, on how it uses induction, then teachers will miss an opportunity for possible exposure to an important philosophical problem.

The CMAS has six major headings:⁶⁷

65 Irving Morrissett and W.W. Stevens, Jr., "Curriculum Analysis," <u>Social Education</u>, Oct., 1967, p. 483.

66 Irving Morrissett, W.W. Stevens, Jr., and Celeste P. Woodley, "A Model for Analyzing Curriculum Materials and Classroom Transactions," p. 3. 67 <u>Ibid.</u>, p. 27.

- 1. Descriptive Characteristics
- 2. Rationale and Objectives
- 3. Antecedent Conditions
- 4. Content
- 5. Instructional Theory and Teaching Strategies
- 6. Overall Judgments

What we wish to look at could come under either Content or Instructional Theory and Teaching Strategies, but the previous uses of the CMAS have remained fairly close to <u>teaching</u> strategies in the section on Instructional Theory. The CMAS as a whole does not really concern itself with problems of an epistemological nature. Rather, the section on content might be more pertinent to our purpose. The entire section as it appears in the basic instrument is reproduced below.⁶⁸

4.0 Content
4.1 Cognitive structure
4.11 Overall view of subject
4.111 Major concepts(or schemes, or conceptual atructures, or fundamental ideas)
4.112 Major processes of the discipline
4.113 Facts

68 Merle M. Knight and James O. Hodges, "Curriculum Materials System: A Summary of Experience," Social Science Education Consortium, May, 1969, p. 1.

- 4.12 Curriculum subject content 4.121 Major concepts 4.122 Major processes 4.123 Facts
- 4.2 Affective content
 4.21 Author's views of affective content of the discipline(s)
 4.22 Curriculum content
- 4.3 Psychomotor skills 4.31 Gross muscular use, conditioning, and coordination
 - 4.32 Fine muscular use, conditioning, and coordination

The National Council for the Social Studies Yearbook for 1969 has a chapter on the CMAS and shows examples on how the CMAS has been used. In this chapter the Harvard Social Studies Project and ECON 12 (San Jose State College, Project Social Studies), are used as examples of how the CMAS 4.1 (Cognitive Structure) has been used. It is pointed out that ECON 12 "discusses the processes used by the economist and indicate the outcome of doing economics."⁶⁹ This then could be an appropriate place to ask how the materials handle the problem of induction, although in this case it is not done. The phrase "discusses the processes used by the economist"

69 Irving Morrissett, W.W. Stevens, Jr., and Celeste P. Woodley, "A Model for Analyzing Curriculum Materials and Classroom Transactions," p. 35. is really too broad to allow any insight into the material. Nonetheless the possibility for doing an adequate job exists. Perhaps 4.112(Major processes of the discipline) might be the most appropriate place to discuss the inductive problem. Since all of the social sciences use induction, and many of the new social studies do also, then this might well be the best place for such a critique.

Simply because the one example we looked at fails to examine the problem is no reason for feeling that the instrument can not handle the inductive problem. It must be remembered that the CMAS is a tool, a tool that is used by people. If the people who are using the tool are aware of the nature and problems of induction then the analysis will demonstrate this. Likewise if the people doing the analysis are not aware of the problems one may encounter in using inductive arguments then the final analysis will also show this. In neither case is the tool the responsible agent.

At present the Social Science Education Consortium has "approximately 140 analyses of about ļ
25 different curriculum units or packages."⁷⁰ These no doubt wary quite widely in quality and scope. To evaluate the CNAS at this date on what it has done and how it has been used, would be an injustice. Hather, it would be much better to concern ourselves with what the instrument is capable of. In this aspect the CMAS is fully capable of critiquing a social studies curriculum on the basis of how it handles induction. Indeed, it might well present an excellent opportunity to make teachers aware of the problem encountered when dealing with inductive inferences.

⁷⁰<u>Ibid.</u>, p. 7. In addition to the ones mentioned in the text four others were examined. These were the Curriculum Materials Analysis of the Anthropology Curriculum Study Project by Gary 5. Stainbrook, Aubrey Hillman, and Anthony DeStefanis (CMAS #76), and an analysis of the same materials by Robert Janke (CMAS #7). Also two analyses of the High School Geography Project were examined; one by Robert W. Ahrens et. al. (CMAS #52) and one by John Truiillo, Ray Ostrom, and Terry Masters (CMAS #85). The two dealing with the Anthropology Curriculum Study Project examine how the materials cope with the problem of verification under the section on Major Frocesses of the Discipline (4.112). The two dealing with the High School Geography Project do not discuss this problem. This should serve as a reminder that the CMAS is only a tool and that what is done with it is largely dependent upon the person using it.

Chapter 4

Summary and Conclusions

We have now viewed induction. and how it is used in the social sciences as well as in the new social studies. We found that the only conclusion that one can come to is that presentations of the inductive problem vary widely. Another conclusion that could be reached is that almost all of the programs might be revised so as to do a better job on this inductive problem. If the programs are going to call themselves inductive, and utilize inductive inferences, then they ought to acknowledge, and cope with, the problems of verification of inductive conclusions. Also students should be introduced to the nature, and attempted solutions, of this problem. To not do this, is to fall into a trap which has ensared many educators. Picking up a title of a method and tacking it on things which are quite different from what the original was. Educators are often very guilty of believing in some type of verbal magic. At times we do not

seem to care as much about what we are doing as we do about whether or not it <u>sounds</u> good. Induction is not immune to this ailment.

All of the projects in the new social studies, for instance, identify induction as being the type of argument which goes from a set of specific premises to a general conclusion. This is different from the way people involved in the philosophy of science define induction. As was shown in the first chapter, induction today is regarded as a nondemonstrative, ampliative inference. It may consist of an argument whose premises are either general or specific and whose conclusion may also be general or specific. Most important though is the nature of the conclusion; it is at best only probabilistic. This is where much of the material in the new social studies meets its downfall. The nature of the conclusion is too often left in such a manner that the student may well think that it may not be subject to change in the future.

Of course this quality varies from one set of materials to another and in one case (the

Sociological Resources for the Social Studies) varies widely with the set of materials. Edwin Fenton is one individual who is seemingly guilty of this error of omission. As was pointed out earlier, it is difficult to be explicit about him because of the vagueness of his own writing. Nonetheless his writings do almost nothing to bring out. and make explicit, the tentative nature of an inductive conclusion. Even in history, which is essentially a type of empirical research endeavor (any conclusion is subject to constant revision, or rejection on the basis of new evidence which might be discovered), inductive inferences are important. This is because our knowledge is incomplete and as new documents (empirical evidence), become available a conclusion must be revised. This is what is meant by saying that a conclusion is tentative. This is where Edwin Fenton is rather weak.

He does little to bring this out, just as he also fails to be specific enough on the nature of a hypothesis. Fenton completely neglects to bring out the predictive nature, or uses, of

a hypothesis. Milton Friedman, as we saw in chapter two, considers this most important. So also does Byron Massialas. The Sociological Resources for the Social Studies brings this out quite well in the episode on hypothesis-testing. Indeed the idea of a hypothesis and its predictive usages is one point which separates the various programs in terms of quality. It is in the handling of this aspect of induction that one can see wide differences in the materials.

A complaint that one might well have against the newer materials is that they do not make explicit what style of explanation they are using, i.e., functionalist or empirical. If the materials utilize one mode of explanation little is done to point out that there are other types of explanation. A student working with the anthropology unit would receive a very good explanation of a functionalist mode of operation, but would get very little insight into the operation of an empirical frame of reference. Perhaps by utilizing several different sets of materials in the organization of a course, this liability coud be

overcome. But this should not have to be done. After many years of struggling with implied political party lines (mainly conservative) in social studies materials, we are now faced with a seemingly hard core methodological line.

This brings us to another weak point in almost all the new social studies materials methodology. The one point which the new social studies often proclaims the loudest - "We teach the methods of social science, not just facts," is often the weakest point the new materials. Too little is done to explain to the student that there are several types of methods at work in the social sciences. Even the materials which do the best jobs, such as the episode on hypothesis testing, produced by the Sociological Resources for the Social Studies, are weak. This unit overwhelmingly consists of techniques, with doses of methodology as needed. Little is done to explain the difference between the two. To confuse methodolgy with technique is to add confusion to an area which needs little more. Later I will discuss several ways in which teachers can familiarize themselves with these differences. This familiarization is something that should be done before attempting to work with the new social studies programs

To return now to our original question: How well do the new social studies handle induction? We might answer that it depends. It depends on which new programs one is talking about and even what parts within a total program. The picture is not really bleak for some do a very good job of introducing the student to induction. Others do a rather poor job. Still others seem to call their programs inductive because it is fashionable; the Harvard Social Studies Project is the most notable example in this category.

Why should the student become aware of the inductive problem?

At this point some people might be asking: Why must the student be aware of the inductive problem? If the scientist seems to be little bothered by it, as some claim, then why must secondary school teachers and students be concerned -----

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with Hume's formulation of the inductive problem? Essentially there are three reasons for this and each of these will be developed in this chapter. In no way does the order in which they are given reflect the order of importance attached to them. I am sure each person will see them in a different order and this is quite acceptable.

The Inductive Problem Appears in the Social Sciences and Should Therefore Appear in Social Studies Classes.

As was pointed out earlier there is today a great deal of emphasis on the teaching of <u>how</u> the social scientist operates rather than <u>what</u> he has discovered and written about. There is more stress on the process of social science disciplines than just on the product. In this process the social scientist is confronted with the inductive problem whenever he attempts to formulate a generalization. They have two ways of coping with this problem depending on the mode of explanation they are using; i.e., functionalist or empirical. In a functionalist explanation it is assumed that nature is uniform · · · · ·

and orderly. (There is, as was earlier demonstrated, no way of proving this.) If one is working within an empirical framework, and using a hypotheticodeductive model, then one assumes that the answer, or hypothesis, is tentative and can never be absolutely true. In either case the social scientist is confronted with a methodological problem. Thus if the student is to learn how the social scientist operates within the context of validation he must confront this problem.

Not to introduce the student to the problem of induction, and some of the attempted solutions, is to shortchange the student. It is to say that one is teaching methodolgy, when in reality one is doing no such thing. This type of activity (pretending to do something when you really are not) has been seen quite often in the past. This type of education was also greatly criticized in the past, and rightly so. We are now in the situation of allowing the same thing to happen to inductive approaches in the social studies. In some cases, such as the Harvard Social Studies Project, it seems to have already taken place.

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Teachers must be aware of proper scientific methodology, and not allow themselves to blindly teach the rote application of techniques. They must fully understand, and communicate to the student, methodological problems.

The Teaching of the Inductive Problem may well foster a spirit of inquiry.

The secondary school student is too often given answers to questions he has not formulated, or question which he could care less about. One of the supposed advantages of the inductive approach is that it allows the student to formulate his problems and work them through utilizing inductive methods. This usually results in the student being more motivated, since he can become more involved in the search for a probable answer. All this should happen, we hope, through the utilization of inductive methods. More than likely this will prove to be true, but only if we actually teach inductive methodology, and not prearranged puzzle games.

There is a definite tendency for the

materials to allow the student to inquire only so far but that he can not avoid coming up with the <u>right</u> answer. This was the situation in the episode on family size, produced by the Sociological Resources for the Social Studies, which was examined earlier. The path of inquiry, in that case, was prearranged to such an extent that the student could hardly miss being hit over the head with the conclusions of the author. The student will not get a spirit of inquiry from this type of material. Rather, he will probably become as bored with this material as he has been with the traditional textbook; the one which contains all the right answers in the teacher's edition.

Much better is the episode on hypothesis testing, also produced by SRSS. Here there is no prearranged conclusion which the student must understand. Hather, he is taught some ways in which the social scientist goes about obtaining reliable knowledge about society and its institutions. From this type of material the student should acquire an appreciation of the fact that not all the answers are to be found in colored ink

in the teacher's edition of the text. The student may well come to understand that not all questions can be answered with definitive answers. If the student gains an appreciation of the fact that there is no guarantee that empirical phenomenona will continue into the future, as they have in the past, then he may not be so anxious about right answers. Hopefully the student will develop a critical attitude toward all knowledge claims, and he will also be better prepared to evaluate and weigh the varying evidence. All of this should result in a less dogmatic attitude on the student's part toward his own, and others. knowledge claims. This is not to say that he should always take the position of the extreme skeptic; rather, he must learn to walk the narrow path between the chasms of overskepticism and dogmatisim.

Up to this point the discussion has been centered on the student. Another benefit that might arise by improving the materials is that the teacher will also become more critically minded. In order for this to happen the materials

must realistically cope with the inductive problem. Some teachers are dogmatic. Often. the materials which these teachers work with encourages the notion that the teacher knows the facts and all of the answers to every varying claim that might occur in the classroom. After working through a unit such as the one on archeology which we previously looked at, a teacher might be more willing to admit he does not know all the answers. After all if the experts admit that generalizations based on limited evidence are difficult to make, then perhaps the classroom teacher will find it easier to admit that he also is fallible. In a unit such as the one on hypothesis-testing the teacher is no better off than the students; both are immersed in the problems of methodology. Both are confronted with the problem of inductive knowledge. Hopefully both student and teacher will become more critically minded when dealing with knowledge claims. Both may develop a more skeptical attitude

towards claims of truth and infallible knowledge. Both teachers and students will have opportunities to develop skills which allow them to carefully asses evidence.

This lack of dogmatism may carry over to the affective domain.

One very important result of the fostering of this critical attitude is that there may be a possible carry over into the affective domain. Up until now only the cognitive aspect has been discussed. for it is our main concern here. Nonetheless I fail to see how a critical attitude towards knowledge claims could not fail to have some effect on the student's assessment of normative claims. If one is trained to carefully evaluate the evidence and learns to be wary of any one correct answer in the cognitive domain. it would be unusual for the student not to carry some of this skill over into the affective domain. He would thus become more tolerant of other systems of valuation which differ from his own.

This idea of integration between the cognitive and affective domains is brought out by Martin Scheerer.

Behavior may be conceptualized as being embedded in a cognitive-emotional-motivational matrix in which no true separation is possible. No matter how we slice behavior, the ingredients of motivation-emotion-cognition are present in one order or another.

Usually the distinction between affective and cognitive domains is made only as a means of making it easier to conceptualize behavior.

Rokeach in a similar view has also written on this relationship between the two domains.

> If we know something about the way a person relates himself to the world of ideas we may also be able to say in what way he relates himself to the world of people and to authority.²

¹Martin Scheerer, "Cognitive Theory," Chapter 3, <u>Handbook of Social Psychology</u>, vol. 1, (Cambridge, <u>Mass.: Addison-Wesley</u>, 1954), p. 123.

²Milton Rokeach, <u>The Open and Closed</u> <u>Mind</u>, (New York: Basic Books, 1960), p. 8. What we are looking at then is a complete value complex <u>organized as a unified whole</u>. Turning for a moment to the <u>Taxonomies of</u> <u>Educational Objectives</u>, Handbook I and II, we can easily see how the two domains, cognitive and aggective, are intertwined. On the cognitive level we are asking the student to operate at the sixth level.

6.00 EVALUATION

Judgments about the value of material and methods for given purposes. Quantitative and qualitative judgments about the extent to which material and methods satisfy criteria. Use of a standard of appraisal. The criteria may be those determined by the student or those which are given to him.

In the affective domain we are asking the student to operate at the fifth level.

5.00 Characterization by a Value or Value Complex

At this level of internalization the values already have a place in the individual's value hierarchy, and are organized into

³David R. Krathwohl, Benjamin S. Bloom, Bertram B. Masia, <u>Taxonomy of Education Objectives:</u> <u>The Classification of Educational Goals, Handbook</u> <u>II: Affective Domain</u>, (New York: David McKay Co., Inc., 1964), p. 193. some kind of internally consistent system, have controlled the behavior of the individual for a sufficient time that he has adapted to behaving this way; and an evocation of the behavior no longer arouses emotion or affect except when the individual is threatened or challenged."

The handbook goes on to speak of the generalized set (5.1). This "is a basic orientation which enables the individual to reduce and order the complex world about and to act consistently and effectively in it."⁵ The person at this stage should demonstrate a "readiness to revise judgments and to change behavior in the light of evidence."⁶ In order to have this ability to balance values against one another, as would be necessary for the organization of a value complex, it is implied that the student is capable of Evaluation (6.0). Thus, if a student has an adequate introduction to the problem of induction there should be some carry-over to the affective

> ⁴<u>Ibid</u>. p. 184. ⁵<u>Ibid</u>. ⁶<u>Ibid</u>.

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domain, as well as the cognitive domain. The student should be more open to accepting and evaluating value claims in addition to knowledge claims.

Ways of introducing this material into the classroom.

Now that it has been shown what some of the possible benefits of a systematic study of induction might be, the problem becomes one of introducing the material into the classroom. Many untold innovations have failed at this juncture. This problem cannot be solved in these last few pages. All I mean to do is suggest some possible points that might be considered as ways of teaching the problem of induction.

Essentially I see three basic ways of getting this material into the secondary school classroom: (1) through the introduction of materials directly to the student, such as the ----

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unit on hypothesis testing: (2) through undergraduate and graduate college courses which new and experienced teachers take; (3) through an in-service type of program. Since the subject of educational change and the adoption of new materials is several library shelves in itself, the following should in no way be regarded as a comprehensive <u>plan</u> for bringing about a change in the new social studies. Rather I am only offering some rather loose suggestions for incorporating the inductive problem into the new courses of study. This material should be included on a more regular basis than it is now found. This section may provide some help in accomplishing this goal.

Classroom Materials

The best example of how this problem might be integrated is probably the episode on hypothesis-testing by SRSS. The nice thing about this type of material is that it could be used with almost all of the current social studies

materials. Since it does not represent a part of a course of study persse, there is no real problem in plugging it into existing programs or even integrating it with other programs in the new social studies. Indeed the episode was designed to be used in this way. Of course the teacher must prepare a place in the course for it. To blindly shove the episode into any place that seems convenient would be to guarantee its failure. The teacher must carefully assess where a unit such as the one on hypotheses-testing could be used to elicit the greatest effectiveness. It calls for a measure of curriculum planning on the teacher's part. Placement of this episode will require planning, but if used properly it would constitute a very good way of showing students the difficulty of making generalizations.

Whereas the episode on hypothesis-testing would be difficult to integrate into a world history course, the unit on archeology, produced by the Anthropology Curriculum Study Project,

could easily be integrated into such a course. This unit outlines the problem of induction and shows how an archeologist, dealing with fragmentary evidence, would deal with the problem of making generalizations. The problem of induction shows up then in the practical context of fieldwork. The student should easily see from a unit such as this that we are not discussing an abstract philosophical problem, but one which has immediate consequences for the social scientist.

Both of these, hypothesis-testing and the unit on archeology, are good examples of how induction creates problems for people wishing to arrive at, and state, quite specific conclusions. This is how the material can probably be best introduced to secondary school students. It must be kept in mind that we are concerned with social studies classes, not philosophy classes. Thus, the philosophical problem (and induction is essentially that) must be integrated into the work of social scientists.

The area which allows this blending is methodology. Methodology brings us to the consideration of induction. This is how it was done in the two episodes we have just used as examples of how social studies might best handle the problem of induction. There is no need for a special unit on the problem <u>if</u> it is given proper consideration in the course of teaching about social science methods.

The social studies teacher should be concerned with teaching what the social scientist does perhaps more than any other objective, or at least it should be the equal of any other objective. If social studies are going to teach the methods of social science than they ought to concern themselves with the inherent <u>problems of these</u> <u>methods also</u>. Functionalist and empirical methods of explanation both deal with the inductive problem, and so also should the student who is learning to use these methods.

Teachers must be familiar with the problem of induction.

Up to this point the attention has been centered on materials, not on the people using them. At times it may have seemed as if this writer believes in teacher proof materials, which is hardly the case. There is no such thing as teacher proof materials. No matter how good the material is it can be misused by some poor So also is the reverse true; no teacher soul. can do an effective job with truly poor materials. Teachers and materials exist in a sort of symbiotic relationship. Thus, returning to our problem, if the inductive problem is to reach students then teachers must become aware of it and learn what it is all about. All that is offered here are some suggestions as to where teachers could be exposed to, and learn to work with the materials that have been looked at in this thesis. In no way does this constitute a set of recommendations for teachers. Teachers have not been the center of this thesis, and they can hardly achieve the center of attention in the last few pages. We are looking at teachers only in terms of what

implications the materials have on the teacher and teacher-training programs.

All future social studies teachers are usually required to take some sort of methods course. Today, and probably even more so in the future, inductive approaches are being given a great deal of attention is such courses. Here then is one place for people who are going to be teaching to familiarize themselves with the material on induction. As was discussed in the previous chapter, Massialas and Cox's methods book, Inquiry in Social Studies, is an excellent introduction to the problem of induction. Aside from a few imperfections it is one of the better textbook introductions to the inductive problem. Another way of presenting this material might well be for the methods class to participate in actually doing a unit of the sort they may well be teaching after graduation.

An example of this type of exercise might be the unit produced by the Sociological Resources for the Social Studies, <u>Hypothesis Testing in the</u>

Social Sciences. This might be done by the undergraduates, and would hopefully give them an opportunity to familiarize themselves with the techniques used, and also with the implicit methodological problems. After going through this type of unit the discussion could be centered on the limits of inductive inference. and how it acts as a brake on the making of universal hypotheses. The instructor would necessarily have to supplement the philosophical material to some extent. but this should pose no real problem. This then represents one example of how the material on induction might be presented to future teachers. Most important is the idea that an exercise, such as the one on hypothesistesting, would provide a base on which to build the philosophical discussion. This base may not always arise from the student's work in the social sciences. Too often what instruction an undergraduate does receive in the social sciences consists of lectures, or some instruction in research techniques. Methodology is often neglected.

To present the problem of induction to undergraduates without this base in actual research is to risk doing an ineffective job of the presentation. It is too easy to discuss the inductive problem as a straight philosophical problem, one which future teachers tend to take as a pseudo-problem. Having presented this material to several undergraduate methods courses I fully realize how easily this misunderstanding can take place. If the problem of induction is seen only as a rarefied philosophical problem then the chances are great that the high school student will not become aware of the great methodological problems that induction presents.

If one is working with teachers who are familiar with, and working with, the new social studies materials then the problems encountered are quite different. There is a tendency for these teachers to confuse a critique with criticism. Told that there is no logical reason for inductive conclusions to hold true in the future, these teachers often have a tendency to

feel that perhaps induction should not be used. It is almost as if some of these teachers are looking for an excuse to drop a new approach and regard the slightest limitation as an excuse for doing so. Great caution must be used presenting the problem of induction to such people to prevent this misunderstanding. It must be emphasized that the inductive problem does not mean that induction has no valid uses, but rather that it has limitations that one must be aware of. How serious the limitation is dependent entirely on the nature of the knowledge claim being made. An example of this might well be the difference between a tendency statement and a universal generalization, which was discussed in chapter two.

With caution though, the logical problems that induction presents can be pointed out with little misunderstanding. With experienced teachers there is also less of a chance that it will be viewed as a pseudo-problem. Rather, it will be seen as a problem of immediate concern

to a teacher working with the new materials. As has been shown not all of the new social studies materials actually discuss the problem in its philosophical context. Teachers must be made aware of this problem. The best way for this to be done is a subject that is beyond the topic in this thesis. What we have shown is that there is a need for teachers to know about the problem of induction, since not all the new social studies programs have confronted this issue.

Conclusions

What then have we found in this critique? Many things, some that were expected and many that were not. Perhaps, the most striking thing is the great uneveness in how the materials which make up the new social studies cope with the inductive problem. The full range has been encountered: from Fenton, and the episode on family size, neither of which even alludes to the problem, to Massialas and Cox, and the episode on hypothesistesting, which give the inductive problem great prominence. While it may not be the most critical aspect of the new social studies, the inductive problem is most worthy of a place in the new curriculum.

The problem of induction is real. This is attested to solely by the fact that many people have attempted solutions since David Hume first presented the problem. It is also an extremly difficult problem, as shown by the fact that no one has yet found a widely accepted solution. Also, the inductive problem is of concern to the social scientist as evidenced by the types of methodological solutions which allow one to circumvent the problem: A postulate holding nature to be uniform in functional explanations, and the always tentative nature of the hypotheses in empirical explanations. If one of the desirable characteristics of social studies is that they should resemble the social sciences (in terms of process, as well as product), and earlier we pointed out that they should, then

the inductive problem becomes very important for the new social studies.

First there must be a change in the meaning of induction in these new programs. Bather than defining induction as simply going from a set of specific premises to a generalized conclusion, the nondemonstrative nature of induction must be made more explicit. Then more programs must point out how certain modes of explanation work with this problem in their operations. From these two steps the student will hopefully achieve a much greater awareness of the immense problems involved in stating inductive conclusions.

The student will likewise be made more aware of the complexity of methodological problems by changing some of the new social studies material to give greater attention to the inductive problem. Also students using this type of material may well be less dogmatic in their conclusions regarding matters of knowledge. Students in high school today will undoubtly see a great many knowledge claims revised, and overthrown, in

their lifetimes. Today's student must be flexible for tomorrow. The new social studies must aid the student in achieving this flexibility. We are running a great risk with the new materials if we will not allow for this flexibility. We may be guilty of presenting the new materials in the same straightforward way as the old (here is a problem, find the solution). By explaining exactly how difficult it is to verify a knowledge elaim concerning the future, or unexamined cases, it will be possible to accomplish the goals set out just above. The problem of induction is real. it is tough, and it is not being handled by the new social studies as well as it could be. Work must now be done on seeing that better efforts are made in including the inductive problem into the new social studies.

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