

조작주의와 조작화에 대한 최근 몇가지 관념들

Some Recent Conceptions of
Operationalism and Operationalizing

Paul Marshall

- I. Introduction
- II. The Development of Operationalism
- III. The Development of Operationalism Within the
Social science
- IV. Operational Formulations in Recent Political
science
- V. Theoretical Problems of Operationalism
- VI. Practical Problems of Operationalism
- VII. The Conflation of Operationalism,
Measurement and Indicators
- VIII. Summary



Paul Marshall,

1948년 영국의 Liverpool에서 태어나 영국 맨체스터 대학교(1969)와 웨스턴 몬타리오 대학교(1972)에서 지질학을 전공한 후 캐나다 요크 대학교에서 정치학 박사 학위를 취득하였다. 현재 그는 캐나다 토론토에 있는 기독교 학문 연구소(The Institute for Christian Studies)에서 정치학을 가르치면서 정치 및 사회문제 전반에 걸쳐 폭넓게 활동하고 있다. 저서로는 「기독교세계관과 정치」, 「Human Rights Theories in Christian Perspective」(ICS), 「Labour of Love: Essays on Work」(Wedge) 등이 있다.

편집자 주 - '조작주의'(operationalism)란 한 구성개념의 타당도는 그 구성개념의 수립에 사용된 절차들의 타당성에 의존한다는 일반론이다.

조작주의는 본래 자연과학의 영역과 과학철학에서 대두된 개념이다. 일반적으로 물리학자인 P. W. Bridgman이 조작주의의 창시자로 간주될 수 있는데, 그는 우리가 사용하는 과학적 개념들은 일련의 조작에 지나지 않는다고 했다. 즉 개념은 상응하는 일련의 조작과 동의어로서, 만약 조작들이 존재하지 않는다면 그 용어는 아무런 의미가 없다고 한다. 이런 견해는 여러 측면에서 비난의 화살을 맞았지만 과학철학의 영역을 벗어나 다른 학문영역으로 그 영향력을 증대시켜 갔는데 사회과학 분야가 그 좋은 예가 될 것이다.

조작주의의 최근 발전을 주목해 보면 논리경험주의(logical empiricism)의 발전과 결부되어 있음을 보게 되는데, 우리는 그 결과로 그것이 행동주의(behaviourism)의 발전과도 연계되어 있음을 본다. 그래서 조작주의의 영향을 많이 받은 심리학 같은 경우에는 어떤 발전이 그것에 의해 되었는지 아니면 행동주의에 의해서 이루어졌는지 구별하기 어려운 경우도 있는 것이다. 확실히 행동주의 심리학자인 B. F. Skinner나 정신측정학의 창시자인 S. S. Stevens 같은 이들은 조작주의에 진 빛이 많이 있다.

사회학에서 일어난 조작주의의 발전은 심리학에서의 그것과 유사하다. 조작주의를 둘러싼 논쟁은 30년대와 40년대에 절정에 달했는데, 그때 조작주의적 입장을 취한 대표적 사회학자는 C. A. Lundberg였다. 그에 의하면 과학적 사회학에 관련된 모든 용어들은 가설적 실체들이나 일반적 본질들에 근거한 것이 아니라 반드시 측정되어질 수 있는 것이라야 한다. 사회학에 대한 조작주의의 영향 중 가장 핵심적이라 할 수 있는 것은 물리학에서의 마찬가지로 수량화(quantification)와 관련된 것이다.

정치학에 있어서의 상황은 일면 급세기에는 정치학의 발전이 제대로 성립 안되었다는 사실 때문에 해명하기가 더 어렵다. 그러나 우리가 세밀히 추적해

불 때 2차 대전 이전에 미국의 정치학계에는 이미 수량적 방식들에 대한 강조가 있다가 대전 이후에 와서는 소위 ‘행동주의 혁명’(behavioural revolution)이 일어나 조작주의의 영향이 다양한 방식으로 나타나게 되었다. 이리다가 근년에 이르러 정치학에 있어서 조작주의적 영향이 보다 강화되었는데, 이런 일련의 과정에서 우리는 두 가지 모호한 점을 보게 된다. 첫째는 ‘이론적(theoretical)’ 용어들에서 ‘관찰 가능한(observable)’ 용어에로의 전이가 수량화 과정을 필수적으로 수반하는지의 여부와 관계된다. 둘째는 이 ‘이론적 용어’가 어떤 실재로 존립하는지 아니면 단순히 연구의 목적을 위해 도입된 하나의 이론적 구성물인지 하는 문제에 관계된다. 이런 두 가지 측면을 고려하면서 우리는 지난 십수년 동안 정치학적 연구들이 대략 다음의 다섯 가지 형태를 띠고 있음을 볼 수 있다.

① 조작주의의 본래적 형태의 모습을 띤 것으로 오로지 조작주의적 용어들만이 과학적 분석의 요구에 부응한다고 생각하는 입장(J. L. Payne).

② 이론적 용어와 경험적 용어를 양분하여, 전자는 개념의 조직적인 정합성과 상관성을 확립하기 위해, 후자는 질량에 관계되는 것으로 사용하는 입장(H. M. Blalock, H. D. Lasswell, K. W. Deutsch etc.).

③ 관찰 가능한 조작적 용어들이 이론적 개념들과 같은 어떤 것의 지시자로 나타난다고 보는 입장(R. Dahl, W. Buchanan, G. D. Garson).

④ 이 입장은 두번째 입장과 유사하지만 조작적 용어들이 오로지 척도 혹은 수량적 지시자의 형태로 이해된다고 보는 입장(W. P. Shiveleg).

⑤ 조작화 한다는 것을 다른 개념을 위한 척도나 수량적 지시자를 발견한다는 것으로 이해하는 입장(S. S. Stevens).

이런 다섯 가지 입장을 종합적으로 볼 때 ①은 거의 사라져 버렸고 ④는 ②에 비슷하여 그것에 부속된 것으로 볼 수 있기에, 우리의 비판은 일단 ②의 입장에 집중될 수 있다. ②의 입장이 갖는 근본적인 특징은 이론적인 개념과 관찰 가능한 개념간의 구분으로 이론적 개념은 관찰될 수 없고 그것의 원리적 기준은 다른 이론적 개념들과의 관계에만 놓인다는 것이다. 즉 이론적 개념의

동질성은 어떤 실재를 지시함으로써 존립하기 보다 다른 개념들과의 구분에서 존립한다는 것이다.

그러나 우리의 비판은 모든 이론적 용어들은 우리의 경험 속에 있는 어떤 것을 지시하거나 아니면 적어도 우리의 경험과 관련되어 있는 다른 이론적 용어들과 관계되어야 한다는 점이다. 이 이론적 용어들은 우리가 다른 사물들과 구분하고 인식할 수 있는 어떤 것을 지시해야 한다. 말하자면 그것은 단순히 조작적 지표들을 사용함으로써만 존립되어서는 안된다.

다음으로 이런 견해는 이론과 경험의 구분에 있어 어떤 더 많은 특징들이 고려될 때 지지받을 수 있겠지만 우리는 그런 특징을 더 이상 발견할 수 없다. 결론적으로 조직주의가 주장하는 이론적 개념들과 경험적 용어들 간의 극단적 유형의 구분은 주장되기 불가능하다. 사실 이런 극단적 구분을 통한 조직주의의 모습은 유치하고 빈곤한 연구방법으로 이끌게 되고 그것은 실제적으로 적용할 때 조사과정을 왜곡시키는 등 많은 문제를 야기시키게 된다.

③과 ⑤의 입장은 이런 문제점들과는 동떨어져 있는 것으로 보인다. 그것은 측정의 문제에 관계되는지(⑤번 입장) 아니면 유용한 자료에 우리가 어떻게 이론을 관계지우는지에(③번 입장) 관련되어 있다. 이 입장들은 '조직주의적'이라고 간주되는 것과 달리 그 기초는 실상 조직주의와 무관한 것이다. ③번의 입장은 자료를 수립하는데 유용하게 또는 쉽게 하는데 이론적 용어들을 관련시키는 일에 관계한다. 그리고 ⑤번의 입장은 이론적 용어들에 수량적 측정을 제공하는데 관계된다. 이것은 여기에서 다른 입장은 못되며 전술한 바처럼 ①번 입장은 사라졌고, ②번과 ④번 입장이 '관찰 가능한 것'과 '경험적인' 것에 따라 이론적 용어들과 조작적 용어들로 이분화 하는 것은 앞서 논의한 바와 같이 여러 측면에서 타당하지 못하다.

I. Introduction

While operationalism, as a distinct view within the philosophy of science, has largely died out, the influence of operationalist views still continues within the social sciences. This is particularly the case in texts purporting to be guides for empirical research. The purpose of this paper is to trace this development and to unravel something of the conflation of operationalist views with methods of research which might otherwise be unproblematic.

The particular area which will be considered is political science. This is two for reasons. First, this is the area in which I am most familiar with such methods. Second, as political science has been slower than other social sciences in following a road to increased quantification, the justifications offered for such procedures in this field must necessarily be less compact, hence the structure of the argument can be more easily discerned than in another field where it tends to be assumed rather than argued. Despite this particular focus, most of the comments made in this paper are also applicable to other social sciences.

II. The Development of Operationalism

One of the intriguing features of operationalism is that, unlike much philosophy of science, it was formulated by people working in the natural sciences rather than philosophers. As Bridgman put it, "it must be remembered that the operational point of view suggested itself from the observation of physicists in action."¹⁾ The nineteenth-century discovery that Euclid's geometry was not logically unique, and that other geometries, based on different axioms, could also be internally consistent, raised questions about the nature of physical space. Toward the end of the century many physicists tended towards a view that if one could not devise operations which could show whether or not space was Euclidian, then no definite geometrical properties could be ascribed to space.²⁾ However, in order to demonstrate this, one would need rods of constant length to use as standards. The fact that the length of these rods remained constant could not be demonstrated except by another rod of constant length. A similar problem would arise with this other rod and so on ad infinitum. Consequently, the nature of space appeared indeterminate. Space appeared to have no intrinsic metric and it was thought to be a matter of convention whether space obeyed this or that set of geometric axioms.³⁾

1) In "The Present State of Operationalism," P. Frank, ed., *The Validation of Scientific Theories*, (Boston, 1956), p.79.

2) A good introduction to Operationalism is G. Schlesinger's, "Operationalism" in the *Encyclopedia of Philosophy*, Paul Edwards, ed., 8 vols. (New York, 1967), vol.5, pp.543-7. Some of the material following is taken from this.

3) See P. W. Bridgman, *The Logic of Modern Physics*, (New York, 1927), chap.II.

Dilemmas such as these led P. W. Bridgman, a Nobel Laureate physicist, to formulate an explicit theory of, and program for, the use of operational definitions. Bridgman is generally regarded as the founder of operationalism.⁴⁾ The central idea of his operationalism was that the meaning of every scientific term must be specified by indicating a definite testing operation that would provide a criterion for the application of the term.⁵⁾ Bridgman said, "in general, we mean by any concept nothing more than a set of operations, *the concept is synonymous with the corresponding set of operations.*" (Bridgman's emphasis.)⁶⁾ Bridgman further held the view, antedating the views of logical positivism, that "If the operations cannot exist... the question (term) has no meaning."⁷⁾

Such a view naturally creates a lot of problems and Bridgman's views were immediately the object of much criticism.⁸⁾ This criticism focussed on several points, three of these were: a) In practical scientific work one often spoke of one operation as being better than another; this is not possible except in relation to something "beyond" them. b) Many useful scientific concepts do not have an exhaustive definition. Their connection with laboratory operations may be quite indirect, though they may be involved in a

4) Beginning with Bridgman, *op. cit.*, see also his *The Nature of Physical Theory*, (Princeton, 1936); *The Nature of Thermodynamics*, (Cambridge, Mass., 1941); *The Nature of Some of Our Physical Concepts*, (New York, 1952).

5) Cf. the discussion of C. Hempel, *Philosophy of Natural Science*, (Englewood Cliffs, 1966), p.88.

6) *The Logic of Modern Physics*, p.5.

7) *Op. cit.*, p.28.

8) E.g. L. J. Russell, "Review" of *The Logic of Modern Physics in Mind*, vol.68, (1929).

set of statements some of which entail the description of physical operations. It might be responded by an operationalist that, if this is the case, then so much the worse for such scientific concepts. However, this criticism does hurt the operationalist claim to be a description of the current state of affairs in the natural sciences(particularly physics) and shows that its nature was far more prescriptive. c) The operationalist thesis implies that different sets of operations “tap” different things. For example, it implies that two “intelligence” tests will measure two different things whose relation we have no means of establishing. In physics this would be a particular problem in such things as temperature measurement; different types of thermometers would have to be regarded as measuring different things⁹⁾

Partly in response to these criticisms and partly in response to his own reflections on developments in physics and mathematics, notably those developments associated with the formulation of

9) For further criticisms of operationalist views see L. B. Lindsay, “A Critique of Operationalism in Science,” *Philosophy of Science*, vol.4 (1937); Hans Margenau, *The Nature of Physical Theory*, (New York, 1952); A. Pap, “Are Physical Magnitudes Operationally Definable?” in C. West Churchman and P. Latoosh, eds., *Measurements, Definitions and Theories*, (New York, 1959); G. Schlesinger, *Method in the Physical Sciences*, (London, 1963), chap. 4; H. Feigl, “Operationalism and Scientific Method,” *Psychological Review*, vol.52(1945); P. Frank, *The Validation of Scientific Theories*, (Boston, 1956); C. G. Hempel, “A Logical Appraisal of Operationalism,” in *Aspects of Scientific Explanation*, (New York, 1965), pp.123~133; “Fundamentals of Concept Formation in Empirical Science,” in *International Encyclopedia of Unified Science*, vol.2, No. 7, (Chicago, 1954); “Methods of Concept Formation in Science,” in the *International Encyclopedia of Unified Science*, ed., O. Neurath, R. Carnap and C. W. Morris, vol.I, (Chicago, 1952).

Heisenberg's quantum principle and Godel's logical theorem, Bridgman made extensive reformulations in his view of operationalism.¹⁰⁾ Bridgman's reformulations involved three basic points. Firstly, he expanded his view of operations to include "paper and pencil operations." By this he apparently meant mathematical maneuverings so that a particular concept under consideration had some connection with instrumental operations.¹¹⁾ This indirectly admitted the need for some theoretical significance in scientific concepts. He now advanced the view that operations were only a necessary characterization in the sense that, unless one knows the operations, one does not know the meaning of concepts. He no longer claimed that meaning involved nothing more than operations. However, he still maintained the view that this expanded conception of operations(which also included verbal operations) must be *reducible* to laboratory operations, to things that can be "directly sensed,"¹²⁾

Secondly, in parallel with his first reformulation, Bridgman admitted the need for and advocated the use of theoretical(as opposed to operational) terms. Only in this way could the relevance of the concept be assured.¹³⁾ The theory must be used

10) See Bridgman's own discussion in his *The Way Things Are*, (Cambridge, Mass., 1958), Introduction, pp.1~12; *Reflections of a Physicist*, (New York, 1950), chaps. 1,7,8.

11) See note 10.

12) See P. W. Bridgman, "Operational Analysis." *Philosophy of Science*, vol.5(1938), pp. 114~31. See also the discussion of Floyd Matson in *The Broken Image*, (New York, 1964), pp.237 ff.

13) Bridgman, *op. cit.*

together with operational concepts and definitions so that it would have a secure experimental foundation.¹⁴⁾

He went even further to the view that it was probably not good to start with operational definitions but rather one should start with significant theoretical terms and then seek operational definitions for them.¹⁵⁾ In this formulation Bridgman suggested a polarity and juxtaposition of theoretical and operational terms which has many parallels within logical empiricism. The “theoretical” terms have been variously described as “hypothetical constructs,” “theoretical constructs,” “theoretical concepts” and “theoretical objects.”¹⁶⁾ Hempel described them as “presumptive objects...which cannot be perceived or otherwise directly observed by us.”¹⁷⁾ The “operational” terms have been variously described as “empirical terms,” “experimental terms” and “observables.”¹⁸⁾ A further aspect of this reformulation of the problematics of operationalism was that attention was shifted away from concepts taken too much in isolation. Beforehand operationalists had tended to try to consider the meaning of a particular *term or sentence*. Now it was realized that meaning was contextual and that one must regard the meaning of a term relative to a specified *system* of theoretical, observa-

14) *Op. cit.*

15) *Reflections of a Physicist*, pp. viii ff. See also R. Carnap, *The Philosophical Foundation of Physics*, (New York, 1966), pp. 248ff.

16) See the discussion of K. McCorquodale and P. Meehl, “On the Distinction Between Hypothetical Constructs and Intervening Variables,” *Psychological Review*, vol.55, (1948), pp. 95~107.

17) *Aspects of Scientific Explanation*, p.177. See also Carnap, *op. cit.*, p. 227.

18) See note 16

tional and mixed statements¹⁹⁾

Thirdly, largely in response to his consideration of the developments within quantum mechanics initiated by Heisenberg, Bridgman had adopted an interactionist view of the nature of experimentation.²⁰⁾ It was in fact the problem of the possible effect of an experiment on that which was experimented upon which operationalism had, in part, been devised to avoid. But to talk of the possibility of interaction implied that there exists an entity which may be different before the possible effects of experimental operations. It was a realization of this that pushed Bridgman to the two further reformulations discussed above.²¹⁾

With these revisions the formulation that Bridgman arrived at was very similar to that current in logical positivism or logical empiricism. In logical empiricism terms the concept need not be defined observationally, but one must be able to construct a sentence that, in conjunction with other sentences, implies that observations may take place.²²⁾ The only difference between this formulation and that of operationalism is that the latter was tending to emphasize linkage to experimental activities whereas logical empiricism accepted a wider definition of observation.²³⁾ In

19) See R. Carnap, "The Methodological Character of Theoretical Concepts" in *Minnesota Studies in the Philosophy of Science*, vol. I, H. Feigl and M. Scriven, eds., (Minn., 1956), pp.37~8.

20) See *Reflections of a Physicist*, pp. 94~6, 373; *The Way Things Are*, chap. I, pp.7~8 ff.; *The Nature of Physical Theory*, pp.121~2.

21) *Op.cit.*

22) See Carnap, *loc. cit.*; Hempel, *loc. cit.*

23) See Hempel, "A Logical Appraisal of Operationalism" and *Philosophy of Natural Science*, *loc. cit.*

both cases the exact meaning of the term “observation” was still vague although the implication was that it dealt with physical entities or sense data.²⁴⁾

One of the further criticisms of Bridgman which now arose was that, in weakening the demands of operationalism so as to include theoretical terms with, often tenuous, links to experimentation, the theory had become sufficiently anemic so as to lose most of its significance. It was argued that if all that is required in the final instance is that concepts are in some way linked to operations, observables and experience, then not much has been added to our understanding of the nature of science which has not been current for as long as men have engaged in scientific work.

Bridgman responded to such criticisms and continued to change and develop his views in a way quite remarkable for one at the pinnacle of his field. Later in life he arrived at the position that “The scientific method, as far as it is a method, is nothing more than doing one’s damndest with one’s mind, no holds barred.”²⁵⁾ Whilst this remark is directed at the practice of science rather than the structure of scientific theories, if such a distinction may be made, it still illustrates a temper quite far removed from his original considerations. He further concluded that “we never get away from ourselves, and that the operations in any scientific performance are irreducibly individual.”²⁶⁾ In fact he was subjected to charges of solipsism, especially by his erstwhile proteges, the

24) See Bridgman, “Operational Analysis,” pp.126~8.

25) *The Way Things Are*, p.7.

26) *Loc.cit.* See also *Reflections of a Physicist*, pp.372~3

operationalists.²⁷⁾ However, he still maintained a large part of the ideas of his revised operationalism.²⁸⁾

It was remarked above that operationalism is very similar in some ways to logical positivism. As the term positivist currently has something of a pejorative connotation, especially in the social sciences, it may be worthwhile pointing to three of the important questions which operationalism has raised. One is the question as to what conditions have to be fulfilled in order to make sure that the application of different methods does not alter the object under investigation. Secondly, on what basis do we assert that we are dealing with the same object when we are using different methods to investigate it? This is a particularly important question in the social sciences. Finally, operationalism poses the problem of the extent to which an object of empirical study is dependent on the instruments used to investigate it.²⁹⁾

One final comment may be made on operationalism. There is a persistent ambiguity in much of the literature concerning operationalism and quantification. In some conceptions operationalism is regarded as dealing with nonquantitative concepts with no criteria or provision for *degrees* of a particular attribute. However, such things as "length," "mass," "temperature," and so forth are also considered, where the principal intent is to assign numerical values to a concept.³⁰⁾ This ambiguity also reappears in the use of the

27) *The Way Things Are*, p.4.

28) *Op. cit.*, pp.viii ff.

29) These questions are taken almost verbatim from L. Kolakowski, *The Alienation of Reason*, (New York, 1966), pp.190 ff.

term “observable.” Philosophers and physicists tend to have different meanings. In most logical empiricist views “observable” is taken to refer to such phenomena as “blue,” “hard,” “hot,” whereas in physics it usually refers to any *quantitative* measure.³¹ This point will not be considered now but is important to bear in mind when quantitative work in the social sciences is considered.

Having briefly considered the genesis and development of operational theory, largely in relation to the natural sciences, we will now consider its appropriation, effects, and development within the social sciences.³²

III. The Development of Operationalism Within the Social Sciences

In the same way that later developments in operationalism are intertwined with developments within logical empiricism, so the development of operationalism within the social sciences is intertwined with the development of behaviourism, with which it shows strong parallels.³³ Consequently it is difficult to distinguish

30) Cf. Hempel, *Philosophy of Natural Science*, pp. 89 ff.

31) Cf. R. Carnap, *The Philosophical Foundations of Physics*, pp. 225 ff.

32) For an annotated bibliography on operationalism see S. S. Stevens, “Psychology and the Science of Science.” *Psychological Bulletin*, vol.36, (1939), pp221-63.

33) For example, Watson’s views, such as “now what can we observe? We can observe behaviour – what the organism says and does,” show a

between developments stimulated by behaviourism and those stimulated by operationalism. This is especially true in psychology, the first social science where operationalism took hold. Similarly, logical empiricism itself exerted a separate influence on the development of psychology. The acceptance of logical empiricist ideas reinforced a tendency toward behaviourism, though this was not exclusively so, for such figures as Rudolf Carnap and Hans Reichenbach showed a leaning toward psycho-analysis. Nevertheless the logical empiricist interest in the nature of measurement and the nature of probability contributed greatly on the growth of disciplines which were strongly behaviouristically oriented. S. S. Stevens remarked that the principal stimulants to the development of psychometrics in the thirties were "behaviourism in psychology, operationalism in physics and logical positivism in philosophy... all three of these movements have sought to clarify our scientific discourse by ridding its concepts of metaphysical overtones and untenable meanings."³⁴⁾ Similarly, the physicalism of Otto Neurath and Carnap in the thirties had obvious resemblances to psychological behaviourism in its rejection of what were called "introspective" sources of knowledge.³⁵⁾

Certainly such leading figures of behavioural psychology as B. F. Skinner and Clark L. Hull acknowledged a debt to operationalism. Their works are distinctly operational in character.³⁶⁾

strong kinship with the operationalist desire to do away with non-experimental terms; J. B. Watson, *Behaviourism* (Chicago, 1958; original edition 1924), p.5.

34) "Measurement and Man," *Science*, vol. 126(1958), p. 386.

35) Cf. A. Brecht, *Political Theory*, (Princeton, 1959), pp. 174 ff.

Perhaps the leading advocate of operationalism was S. S. Stevens, one of the principal founders of the discipline of psychometrics.³⁷⁾

One interesting feature of these developments in psychology was that the form of operationalism which was embraced was the earlier form that Bridgman had advocated. This was in spite of the fact that, at the time these developments took place, in the thirties and forties, operationalism had been severely criticized on its home ground in physics, and also in philosophy of science circles generally, and that Bridgman himself had also, by 1936, largely reformulated his own views.³⁸⁾ In radically behaviouristic psychology – of the view that “behaviour... is simply the movement of an organism or one of its parts in a frame of reference provided by the object itself or by various external objects or fields of force”³⁹⁾ – this phase of operationalism is accepted to this day. In this view, outward movement of a body, taken to include speech, is regarded as the sole concern of scientific

36) For overviews see C. C. Pratt, *The Logic of Modern Psychology*, (New York, 1939); K. W. Spence, “The Postulates and Methods of Behaviourism,” *Psychological Review*, vol. 55, (1948), pp. 67~70; P. Crissman, “Operational Definition of Concepts,” *Psychological Review*, vol. 46(1939); L. J. Hearnshaw, “Psychology and Operationalism,” *Australian Journal of Psychology and Philosophy*, vol. 18,(1941); H. Feigl, “Operationism and Scientific Method,” *Psychological Review*, vol. 52(1945).

37) See S. S. Stevens, *op. cit.*, also “The Operational Basis of Psychology,” *American Journal of Psychology Review*, vol. 46,(1935); “The Operational Definition of Psychological Concepts,” *Psychological Review*, vol. 42,(1935).

38) *The Nature of Physical Theory*, pp. 121~2.

39) B. F. Skinner, *The Behaviour of Organisms: An Experimental Analysis*,(New York, 1938), p.8.

psychology, and such things as intention or emotion are denied even the status of useful theoretical constructs. The observable behaviour, which parallels the concerns of operational concepts, is taken to be all.⁴⁰⁾

However, in many forms of psychology which are still characterized by the rubric "behaviourism" the developments which had taken place within operationalism were followed.⁴¹⁾ For purposes of terminological clarity it is perhaps a pity that the term "behaviouralism," coined in political science, was not used for the newer developments. S. S. Stevens in particular formulated, systematized and developed the revised versions of operationalism.⁴²⁾ In his conception, sensation, images and thought processes are not longer regarded as beyond the reach of scientists. However, they are to be studied via the study of overt behaviour, just as in physics nonobservables were studied indirectly through experimental observation. The terms of the psychology need not be defined solely in terms of observables or operations but they must be linked to such. Both these versions of operationalism in psychology were subjected to criticism when they were first adopted and such criticism has, of course, continued up to the present.⁴³⁾

40) Cf. B. F. Skinner, "Behaviourism at Fifty," *Science*, vol. 120,(1963); see also his popular writing such as *Beyond Freedom and Dignity*, (New York, 1969).

41) E.g., K. McCorquodale and P. Meehl, *op. cit.*

42) S. S. Stevens, *op. cit.*; see also his "On the Theory of Scales of Measurement," *Science*, vol. 103,(1946), pp. 677-80.

43) One of the more stringent methodological critiques is R. Peters, "Observationalism in Psychology," *Mind*, vol. 68(1959).

A final feature of the later versions of operationalism in psychology may be mentioned. There is an ambiguity as to whether the “theoretical concepts” which are to be operationalized, for example thought processes, are regarded as real entities, for which experimental correlates are being found, or whether they are purely constructs for the purpose of explanation and theoretical consistency⁴⁴⁾ This is not a point which will be considered at this juncture but it will re-occur when we consider some more recent methodological literature in the social sciences.

The developments which took place in psychology were paralleled by developments in sociology. Indeed the controversies surrounding operationalism probably reached their peak in sociology in the thirties and forties.⁴⁵⁾ Although views similar to operationalist ones had been advanced earlier in sociology by F. H. Giddings,⁴⁶⁾ the principal exponent of operationalism in sociology was C. A. Lundberg.⁴⁷⁾ His views reflected Bridgman’s earlier

44) Cf. K. McCorquodale and P. Meehl, *op. cit.*; R. Peters, *op. cit.*; H. Feigl, *op. cit.*; M. Hesse, “Models of Method in the Natural and Social Sciences,” in *Methodology and Science*, vol. 8,(1975); G. Maxwell, “The Ontological Status of Theoretical Entities,” in H. Feigl and G. Maxwell, eds., *Minnesota Studies in The Philosophy of Science*, vol. 3 (Minn., 1962); C. G. Hempel, “A Logical Appraisal of Operationalism.”

45) Cf. the comments of H. M. Blalock in *Measurement in the Social Sciences*, (New York, 1974), p.6. Much of the follow discussion is from Blalock.

46) See his *Studies in the Theory of Human Society*, (New York, 1922). For comments see N. S. Timasheff, *Sociological Theory, Its Nature and Growth*, (New York, 1955), pp. 137 ff.; D. Martindale, *The Nature and Types of Sociological Theory*, (London, 1961), pp. 317 ff.

47) Cf. his “Contemporary Positivism in Sociology,” *American Sociological Review*, vol. 4(1939), pp. 42~55; “Operational Definitions in the Social Sciences,” *American Journal of Sociology*, vol. 47, (1942), pp.727~43; *Can Science Save Us?*(New York, 1947).

formulations. Lundberg thought that all terms relevant to a scientific sociology could be measured and that one should not be concerned with hypothetical entities or “common essences”.⁴⁸⁾ Any concern with such “essences” he regarded as based on the incorrect position that “measurement is not a way of defining things, but is a process which can be carried out only after the “thing” to be measured has been defined.”⁴⁹⁾ Lundberg, following the psychologist Binet, regarded the only legitimate understanding of intelligence as being what an intelligence test measured. Similar views became quite widespread in sociology.⁵⁰⁾

As may be expected, such views came under sustained critique.⁵¹⁾ For example, Franz Adler maintained that such operationalism hindered the advancement of science as it tended to have a rigidity and finality which discouraged further work and made one unable to deal with new situations or questions presently beyond our scientific scope. Adler’s critique also paralleled those directed towards Bridgman as he pointed out the operationalists’ difficulty in establishing how and why one specified a particular set of

48) See Blalock, *op. cit.*; G. A. Lundberg, *Foundations of Sociology*, (New York, 1939), p. 68.

49) Lundberg, *loc. cit.*

50) E.g., R. Bain, “Sociology as a Natural Science,” *American Journal of Sociology*, vol. 53(1947), pp. 10 ff.; see Timasheff, *loc. cit.*

51) See P. H. Furly, *The Scope and Method of Sociology: A Metasociological Treatise*, (New York, 1953), pp. 38 ff.; G. Simpson, “The Assault on Social Science,” *American Sociological Review*, vol.14,(1949), pp. 303~10. In a similar vein see K. Mannheim, *Ideology and Utopia*, (New York, 1959), pp. 39 ff. Also his book review in the *American Journal of Sociology*, vol.36(1932), pp.273~82. For an overview see F. Matson, *op. cit.*, chap.3.

operations for a particular concept.⁵²⁾

Whatever may have been the direct effect of these criticisms, it appears that such an unresonstructed operationalism has died out in sociology. The later version of operationalism with its emphasis on the necessity, indeed the priority, of “theoretical concepts” and with its division between such concepts on the one hand, and operational (observable, empirical) terms on the other hand, appears to have taken its place. It is difficult to trace the beginnings of this later phase, however its primary development is within the literature on measurement in sociology. Here the writings of Paul Lazarsfeld and C.H. Coombs are prominent.⁵³⁾ Its influence was very widespread however, and it has continued to develop so that, in more recent years, almost any work on methodology in sociology which attempts to deal with questions of quantity and measurement shows traces of operationalist views.⁵⁴⁾

There is one further feature in which the developments in sociology have paralleled those in physics and the philosophy of science. It was noted above that to physicists an operation usually meant something to do with quantification, whilst philosophers had

52) F. Adler, “Operational Definitions in Sociology,” *American Journal of Sociology*, vol.52,(1947), pp.438~44.

53) Cf. C. H. Coombs, “Theory and Methodology of Social Measurement,” in L. Festinger and R. Katz, *Research Methods in Behavioural Science*, (New York, 1953); *A Theory of Data*, (New York, 1964); P. Lazarsfeld, “Evidence and Inference in Social Research,” *Daedalus*, vol.87,(1958); *Mathematical Thinking in the Social Sciences*,(New York, 1954).

54) Earlier works include R. Bierstedt, “Nominal and Real Definitions in Social Theory” in L. Gross, ed., *Symposium on Social Theory*, (New York, 1959), chap.4; also the frequently cited W. S. Torgerson, *Theory and Method of Scaling*, (New York, 1958).

also included carefully specified, qualitative concepts. In sociology much of the literature on operationalism has been concerned, often solely concerned, with quantification and measurement. It is at times difficult to tell whether an operational definition or procedure is being advocated because it is regarded as the empirical correlate of a theoretical concept, or whether it is being advocated as a *measure* of a theoretical concept which may or may not be regarded as somehow empirical.

In political science the situation becomes more difficult to unravel, partly because of the fact that there are no adequate histories of the development of political science in this century. Freud, Hobbes and Weber were all prominent influences on A. F. Bentley, Charles Merriam and Harold Lasswell, who were the principal figures in the United States urging a more rigorous, quantitative political science.

Despite this variety of influences at least two themes do appear constant in the interwar period. One is an emphasis on the use of quantitative methods and the other is borrowing from the methods and substance of other disciplines, notably psychology.⁵⁵⁾ These two trends came together in the use of measurement techniques. In the earliest attempts at quantification, in the late twenties, there is no

55) Cf. G. Catlin, "Delimitation and Measurability of Political Phenomena," *American Political Science Review*, vol.31(1927), pp. 255~69; C. Merriam, "Progress in Political Research," *American Political Science Review*, vol.20(1926), pp.1~13; "The Present State of the Study of Politics," *American Political Science Review*, vol.21(1927), pp.173~95; *New Aspects of Politics*, (Chicago, 1931), pp.37ff., 116, 151; H. D. Lasswell, *Psychopathology and Politics*, (Chicago, 1930), pp. 58ff.; See also H. M. Kallen, "Political Science as Psychology," *American Political Science Review*, vol.17(1923).

indication that operationalist views had any influence.

However, operationalism began to influence these attempts at measurement and quantification along two paths. One was directly from physics and the philosophy of science, the other was via the influence of the other social sciences. The more direct influence is shown in the work of W. B. Munro who, in a presidential address to the American Political Science Association, suggested that by paralleling the “operational study” of physics political science might one day achieve objectivity on a par with that discipline.⁵⁶ However, the stronger influence of operationalism appears to have been via sociology and psychology. Particularly influential was the work of Stuart R. Rice, a sociologist with a particular interest in politics. He was strongly influenced by early operational views and appears to have regarded terms without operational meaning as being terms devoid of all meaning.⁵⁷ Rice was in turn a marked influence upon George Catlin, Charles Merriam and Harold Lasswell, all of whom frequently acknowledged their debt to his work.⁵⁸ With the influence upon these men operational views

56) “Physics and Politics: An Old Analogy Revisited,” *American Political Science Review*, vol. 22,(1928), p.10.

57) S. R. Rice, *Quantitative Methods in Politics*, (New York, 1928), pp. 21~25. See also his “Some Applications of Statistical Methods to Political Research,” *American Political Science Review*, vol. 20,(1927), pp.313~29.

58) G. Catlin, *Systematic Politics*, (Toronto, 1962), p. 12; “Delimitation and Measurability of Political Phenomena,” p.263; C. Merriam, *New Aspects of Politics*, p.37; Lasswell *op. cit.*, pp. 58 ff.; See also W. Anderson in A. Haddow, *Political Science in American Colleges and Universities*, (New York, 1939), pp. 264~6; B. Crick, *The American Science of Politics*,(London, 1959), pp. 165~9; S. R. Rice and H. D. Lasswell, *Methods in Social Science: A Case Book*,(Chicago, 1931). Charles Merriam was one of the principal inspirers of this effort.

became current within political science.

In the post world-war-two period came that plethora of developments now categorized under the rubric of the "behavioural revolution."⁵⁹⁾ Various types of operational views continued in the work of such men as Robert Dahl, Herbert Simon, Karl Deutsch, Hayward Alker, Jr. and, Again, Harold Lasswell.⁶⁰⁾ In the beginnings of behaviouralism, Simon, Deutsch and Lasswell adopted views reminiscent of the earlier forms of operationalism, but the first two appear to have modified their views since then.⁶¹⁾ As in the interwar period many of the methodological guidelines were adopted from psychology and sociology, the principal

59) See R. Dahl, "The Behavioural Approach in Political Science: Epitaph For a Monument to a Successful Protest," *American Political Science Review*, vol. 55(1961), p. 763; D. Truman, "The Impact on Political Science of the Revolution in the Behavioural Sciences," reprinted in H. Eulau, ed., *Behaviourism in Political Science*, (New York, 1969), pp.38~67; E. M. Kirkpatrick, "The Impact of the Behavioural Approach on Traditional Political Science," in A. Ranney, *Essays on the Behavioural Study of Politics*, (Urbana, 1962), p. 12.

60) See R. Dahl, *Who Governs?* (New Haven, 1961), pp. 330ff.; H. Simon, *Organizations*, (New York, 1958), pp. 4~6; K. W. Deutsch, "Toward an Inventory of Basic Trends Patterns in Comparative and International Politics," *American Political Science Review*, vol. 54(1960), pp.34~57; p. 36; *The Nerves of Government*, (Glencoe, 1960), pp.4~20, 266~7; *The Analysis of International Relations*, (Englewood Cliffs, 1968), pp 13ff.; *Political Community at the International Level*, (New York, 1954), pp. 47, 55~6; "On Communications Models in the Social Sciences," *Public Opinion Quarterly*, vol. 16, (1952), pp. 356~80, pp. 360~3; H. Alker, *Mathematics and Politics*, (New York, 1965), pp. 23~31; H. D. Lasswell, *The Policy Orientation of Political Science*, (Agra, 1971), pp. 57ff.; *The Analysis of Political Behaviour*, (New York, 1947) pp. 31ff.; H. D. Lasswell and D. Lerner, eds., *World Revolutionary Elites*, (Cambridge, Mass., 1965) pp. 43ff.

61) See below in discussion of types of operationalism in political science.

influences now being Paul Lazarsfeld, H. Torgerson, S. S. Stevens, C. H. Coombs and in more recent years, H. M. Blalock.⁶²⁾

We will now attempt a classification of the various views of the nature, purpose and functions of operationalism and operationalizing within political science.⁶³⁾

IV. Operational Formulations in Recent Political Science

In the previous sections we have outlined something of the history and development of operationalism in philosophy and certain special sciences. Using this as background it is possible to categorize some more current views. In particular, two persistent ambiguities have been noted.

The first concerns whether or not a move from “theoretical” to “observable” terms necessarily involves a process of quantification. The second concerns whether the “theoretical” term is held to be a real entity or merely a theoretical construct used for the

62) E.g., Alker, *op. cit.*, pp. 19, 31; Deutsch, “On Communications Models in the Social Sciences,” p. 363; R. J. Rumme., *Applied Factor Analysis*, (Evanston, 1970), pp. 27, 46, 58, 64. The methodological identity of political science is also stressed, cf. H. Eulau, S. Eldersveld and M. Janowitz, eds., *Political Behaviour: A Reader in Theory and Research*, (Glencoe, 1956), H. Eulau, “Introduction,” pp. 3ff.

63) I have not discussed economics in this section largely because its history is quite different from that of the other social sciences and it has not borrowed as heavily from philosophy of science in recent decades as have other disciplines. Operational views do occur however, cf. Milton Friedman’s, “The Methodology of Positive Economics.” in *Essays in Positive Economics*, (Chicago, 1953), pp. 1~43.

purposes of research. Using these two bifurcations, recent political science works can be considered in a fivefold classification. The works which will be discussed are limited to those of major figures within the discipline, or else works on methodology published in the last decade.⁶⁴⁾

The five classes are as follows: (1) An approach reminiscent of the original forms of operationalism wherein only operational terms are considered to adequately meet the requirement of a scientific analysis. Advocates of this type of methodology are currently quite rare. Perhaps the closest to it is J. L. Payne's *Foundations of Empirical Political Analysis*. Payne does speak of theory terms but their meaning is not explicit, it is the operational term that takes priority, hence "The hypothesis should, if possible, anticipate the operation", "One cannot have complete clarity in the statement of the hypothesis itself. Only the operation can do this." One cannot, and really need not, know if the operation is a valid indicator of something else as such conformity would be "an inherently unmeasurable private apprehension."⁶⁵⁾ This sort of approach has been severely criticized for fifty years and it need

64) I have also considered some works in sociology, such as those of H. M. Blalock, which have been widely used in political science.

65) *Op. cit.*, pp. 16, 20, 34 ff., 69~70. This type of view had been held in the past by Lasswell in *The Analysis of Political Behaviour*, p. 31 ff. As mentioned below his later formulations put more stress on the nonoperational aspects of concepts and theories. The same may be said for Karl Deutsch whose *Political Community at the International Level* has this type of view, but whose more recent works have a type (2) approach. Both authors continue to footnote Bridgman's *Logic of Modern Physics*, even in their recent work even when their discussion of operationalism is quite at variance with the view that Bridgman propounded at that point.

not be dwelt on here. (2) An approach using a bifurcation of theoretical and empirical terms. The former are used to ensure the systematic coherence and relevance of concepts and they are not thought to be observable. The latter may be quantitative or qualitative and are thought to be the only observables in the framework. This is perhaps the most common formulation of operational methodology within political science. It appears to be the form promulgated by such figures as H. M. Blalock, H. D. Lasswell, K. W. Deutsch, H. Alker, Jr. and Herbert Simon.⁶⁶⁾ It also appears in a variety of methodology texts.⁶⁷⁾

The terminology used in these works is quite varied; Rummel contrasts “analytical” versus “empirical” aspects of research,⁶⁸⁾ Lasswell distinguishes “syntactic” and “semantic” statements.⁶⁹⁾

66) See H. Alker, *loc. cit.*; H. Simon, *loc. cit.*; H. D. Lasswell, *The Policy Orientation of Political science, loc. cit.*; Lasswell and Lener, *loc. cit.*; K. W. Deutsch, “Toward and Inventory of Basic Trends and Patterns in Comparative and International Politics,” *loc. cit.*; *The Nerves of Government, loc. cit.*; *The Analysis of International Relations, loc. cit.*

67) Cf. D. McGaw and G. Watson, *Political and Social Inquiry*, (New York, 1976), pp. 125~6, 157; D. H. Everson and J. P. Paine, *An Introduction to Systematic Political Science*, (Homewood, 1973), pp. 29 ff.; G. J. Graham, *Methodological Foundations for Political Analysis*, (Waltham, 1971), pp. 13 ff.; T. R. Gurr in his *Politimetrics*, (Englewood Cliffs, 1972) uses a similar construction at times, cf. pp. 12~3, however, the point of his work is to do with quantification as such, so it is perhaps unwise to regard this as being his general view of the nature of concepts. He also has formulations similar to those of (5), cf. pp. 12, 26. See also R. J. Rummel, *op. cit.*, pp. 19~28; *The Dimension of Nations*, (Beverly Hills, 1972), pp. 33 ff.; D. C. Legee and W. L. Francis, *Political Research*, (New York, 1974), chap. 2.

68) Rummel, *Applied Factor Analysis, loc. cit.*

69) Lasswell, *The Policy Orientation of Political Science, loc. cit.*

Despite the different terminology, the meanings appear to be the same as those previously cited. (3) An approach where the operational terms, observables, are taken to be indicators of something else, the theoretical concepts. The theoretical terms may be observed, specified, and analysed, but for various reasons are best approached via indicators. In this particular scheme, little need be implied about the structure of scientific theory and concepts. It need only suggest particular ways in which one might substitute one expression as an indicator for another where the substituted expression is easier to handle in actual research. For example, one might take statistics about voter participation in elections as indicators of political alienation; nothing need be implied in this act about the status of alienation as a theoretical or empirical term.

This appears to be the approach adopted by Robert Dahl, W. Buchanan and G. D. Garson.⁷⁰⁾ It will be suggested later in this paper that such a conception can utilize most of the specifically technical material on quantification without the attendant theoretical problems and distortions of research which can follow from an adherence to more typically operational views. (4) This group is similar to (2) except that the operational terms are understood to be exclusively a form of measure or quantitative

70) R. Dahl, *Who Governs?*, loc. cit.; G. D. Garson, *Handbook of Political Science Methods*, (Boston, 1971). Garson distinguishes between things which may be measured directly and others which may need indirect measurement; See also W. Buchanan, *Understanding Political Variables*, (New York, 1969), pp 29~30. Buchanan regards an operation as bridging the gap between a theory and available data.

indicator. These terms are still held to be the only observables. Such an approach is rarely explicit but it occasionally appears to be suggested in discussions of measurement where the chief object of discussion is more along the lines of (5). For example, W. P. Shiveley remarks that the “general problem of measurement is that all we can observe is the measure.”⁷¹⁾ (5) An approach whereby to operationalize is conceived of as finding a measure or quantitative indicator for another concept, which concept is itself open to observation and may or may not be understood as a theoretical term as well. ⁷²⁾ This approach speaks of operationalism solely in terms of measurement.. “putting number on things according to a rule” in S. S. Stevens’ phrase. The intent is to put a thing, originally nonquantified, into quantitative terms, to make it into a measurable variable. This approach is taken by several authors.⁷³⁾ As is the case for group. (3), this approach can be free

71) *The Craft of Political Research*, (Englewood Cliffs, 1974), p. 56. At times Shiveley suggests something like (5); J. David Singer, “The Behavioural Approach to International Relations: Payoff and Prospects,” in J. N. Rosenau, ed., *International Relations and Foreign Policy*, (Glencoe, 1969); p.66. J. David Singer and M. Small, “National Alliance Commitments and War Involvement, 1818~1945,” in Rosenau, *op. cit.*, p.514.

72) I am not attempting any definition of the terms “empirical,” “theoretical,” “observable,” etc. I am using the terms largely as they appear in the texts concerned, where their exact meaning is sometimes less than clear. The preceding discussion of operationalism is, hopefully, enough to indicate the differences between the various approaches. On the variety of conceptions of the nature of “theory” in the social sciences see G. C. Homan, in “Contemporary Theory in Sociology” in *Handbook of Modern Sociology*, ed. R. E. L. Faris, (Chicago, 1964), chap. 25; R. K. Merton, *Social Theory and Social Structure*,(Glencoe, 1957).

73) Cf. Abraham Kaplan, *The Conduct of Inquiry*, (San Francisco, 1964), chap.

of the particular problems which attend a consistently operational position.

When criticizing some of these views, (1) can be neglected as largely defunct. (2) and (4) are very similar, the only difference being that (4) confines operations to matters quantification. Consequently (4) will be regarded as a subset of (2) and criticism will be focussed on the problematics of formulation (2).

V. Theoretical Problems of Operationalism.

The principal feature of (2) is its distinction between theoretical concepts and observables. The theoretical concept is held to be nonobservable and its principal criterion is its relation to other theoretical concepts. We will now seek to demonstrate that such a distinction is in fact untenable. We will attempt to do this by examining two, highly interrelated, facets of this problematic, these are (a) the nature of validity and (b) the reality of "theoretical" and "observational items."

(a) The question of the relation between an operation and the theoretical concept of which it is held to be an indicator is usually described as the question of *validity*.⁷⁴⁾ Questions of validity have

5, "Measurement"; R. T. Golembiewski, W. A. Welsh, W. J. Crotty, *A Methodological Primer for Political Scientists*, (Chicago, 1969), pp. 32~3, 48, 50~1, 58~63, 71~2. For Gurr see *Politimetrics*, pp. 12, 26. See Shiveley, *op. cit.* The status of Shiveley's "theory terms" is not clear so the formulation generally can be conceived of as taking the form of (5). Another example is W. Wallace, *The Logic of Science in Sociology*, (Chicago, 1971), esp. pp. 55~6.

74) This is the term used to describe this question in all the methodology books cited in the previous section.

many forms, especially in quantitative analysis. Various terms have been used in connection with different aspects of the question, these include “discriminant validity,” “criterion validity,” “construct validity,” “convergent validity,” and “face validity.” It is the question of “face validity” with which we are primarily concerned. This is a “facevalue” form of validity. In our normal experience and language does the indicator appear to be a valid reflection, does it correspond to the theoretical term we are considering?

The question of face validity often receives short shrift in methodology texts. As mentioned Payne describes it as “an inherently unmeasurable private apprehension.”⁷⁵⁾ Blalock says it must be bridged by “common agreement or an a priori assumption, rather than by any logical process.”⁷⁶⁾ However, the question of face validity poses a problem which none of the other forms of validity can tackle.

Discriminant validity, construct validity and convergent validity all refer to various mathematical techniques whose purpose is to ensure that, if several indicators are used, they show a high intercorrelation, i.e., that they point to the *same* thing. Or else, if one indicator is used, their purpose is to show that it has the requisite mathematical properties, such as unidimensionality, to be a useful measure.⁷⁷⁾ As these methods are *confined* to an analysis

75) J. L. Payne, *op. cit.*, pp. 69~70; he also suggests that it is not really necessary to know if an operation is valid because reliability is more important, *op. cit.*, p. 37.

76) Blalock, *op. cit.*, p. 7.

77) Cf. The discussions of types of validity in D. T. Campbell and J. C. Stanley, *Experimental and Quasi-Experimental Designs for Social Research*,

of the structure only of the indicators used, they cannot refer beyond the indicators to the theoretical term which is purported to be measured. This is not to downgrade these techniques for, even should a face validity criterion be met, if quantitative indicators are used they will have little use unless these other validity criteria are met. However, all such mathematical techniques can do is elucidate the *internal* structure and correlations of the indicators. If these techniques show, for example, that the indicators all point to one thing, a unidimensional variable, then we will still have the question of whether this "one thing" refers to the particular concept in the theory under consideration.

Criterion validity refers to the situation when the indicator is accepted on the basis of its correlation with other indicators which purport to measure the concept in question. For example, Shiveley suggests that a measure be correlated with another measure which one is "certain" is strongly related to the concept.⁷⁸⁾ This, however, merely shifts the question, for how is one "certain" that this other measure does correspond to the theoretical item? The mathematical techniques of validity will not do the job. Using

(Chicago, 1966); G. W. Bohmstedt, "A Quick Method for Determining the Reliability and Validity of Scales of Measurement," *American Sociology Review*, vol. 34, (1969), pp. 542~8; Shiveley, *op. cit.*; D. T. Campbell, "Reforms as Experiments," *American Psychologist*, vol. 24,(1969); L. F. Cronback and P. E. Meehl, "Construct Validity in Psychological Tests," *Minnesota Studies in the Philosophy of Science*, vol. I, (1956); D. T. Campbell and D. W. Fiske, "Convergent and Discriminant Validation by the Multitrait-Multimethod Matrix," *Psychological Bulletin*, vol. 56, (1959), pp.91~104.

78) *Op. cit.*, pp. 56~7.

further criterion validity checks will merely shift the problem still further. We are still left with the question of why we think this indicator corresponds to this concept, the question of face validity.

The only way in which one can say if two things are related to one another in this way is if we have some idea of what they both are. To do this we must have some conception of what the theoretical terms refer to. To merely refer the theoretical term to other theoretical terms is to shift the problem on this level. To illustrate this point, we may consider that most common of operational indicators, the intelligence test. Various forms of validity checks can be used to determine whether the various parts of the test all point to the same phenomenon. Nevertheless, we use or discard intelligence tests according to whether their results appear to correspond to that human trait, or perhaps set of traits, which we call intelligence. We have a sense of what it means to be intelligent, highly intelligent, or not intelligent and we check our indicator against this knowledge. We would conclude, I hope, that a most technically sophisticated, highly intercorrelated test which consistently gives chimpanzees higher scores than philosophers may have got of something very interesting, but not that it was measuring intelligence.

Similarly if we are concerned with a measure, or any indicator, of such a phenomenon as conservatism we accept it because the particular features of the measure correspond which what we regard as the features of conservatism in a person. In fact we have to know what set of traits conservatism refers in order to set up a measure of it in the first place. Otherwise we quite

literally do not know what we are talking about.⁷⁹⁾ As Karl Deutsch pointed out, “counting is repeated recognition,” “nothing can be counted which has not been recognized first.”⁸⁰⁾ Similarly if we are vague about what our theoretical terms refer to, then we can only be vague as to whether our indicators indicate them. To quote Deutsch again, in a parallel concern, “simulation at best cannot be much better than our understanding of what it is we are simulating.”⁸¹⁾

All this points to the fact that theoretical terms must refer to something in our experience, or must be related to other theoretical terms which have reference in our experience. As Bridgman himself pointed out, we must relate an operational formulation to “an intuitive knowledge of the language of ordinary experience.”⁸²⁾ The theoretical terms must point to something we can recognize and distinguish from other things, and not solely via the use of operational indicators.

(b) This viewpoint finds support when some further features of a theory / empirical distinction are considered. Despite the fact that such a distinction played a large part in his own view of the logical structure of scientific work, Carl Hempel ultimately expressed the view that such a distinction could probably no

79) For a similar discussion see D. Willer, *Scientific Sociology*, (Englewood Cliffs, 1967), pp. 83~92; R. Petrie, “A Dogma of Operationalism in the Social Sciences,” *Philosophy of the Social Sciences* (1971), pp. 145~60.

80) “Towards an Inventory of Basic Trends and Patterns in Comparative and International Politics,” p. 38.

81) Quoted in round-table discussion in J. C. Charlesworth, ed., *Design for Political Science*, (Philadelphia, 1966), p. 189.

82) *The Nature of Physical Theory*, p. 60.

longer be maintained.⁸³ This doubt has since become radical for many other authors,⁸⁴ for instance Maxwell has attempted to show that as theories develop we tend to “see” the theoretical terms.⁸⁵ What an atmospheric physicist would “see” in a thunderstorm would be different from that of another observer.⁸⁶ Political scientists can even be aware of relatives that they know are “authoritarian personalities.” Some authors have maintained that whilst a theoretical / empirical distinction may be necessary in areas in physics, because we have no naive experience of such things as electrons, it is nevertheless of doubtful coherence or use in the social sciences.⁸⁷ Indeed, in considering the model of scientific work taken from nuclear physics which has had some vogue in the social sciences in North America, May Brodbeck was moved to ask, “Why should they hunger after the complexity of the invisible?”⁸⁸ The recent rapid development of works in the

83) See “A Logical Appraisal of Operationalism.”

84) Cf. A. Pap, “Are Physical Magnitudes Operationally Definable?” who maintains that the distinction breaks down, cf. pp. 187~90. See also P. Achinstein, “The Problem of Theoretical Terms.” *American Philosophical Quarterly*, vol. 2(1965); H. Feigl and G. Maxwell, “The Language of Theories” in *Current Issues in the Philosophy of Science*, ed. Feigl and Maxwell, (New York, 1961); W. Sellars, “Empiricism and The Philosophy of Mind,” in *Minnesota Studies in the Philosophy of Science*, ed. H. Feigl and G. Maxwell, vol. I, (Minn. 1956).

85) G. Maxwell, *op. cit.*

86) Cf. the remarks of P. Feyerabend in “An Attempt at a Realistic Interpretation of Experience,” *Proceedings of the Aristotelian Society*, vol. 58 (1958), pp. 144~70.

87) See P. Caws, “Definition and Measurement in Physics” in C. West Churchman, *op. cit.*, pp. 3~17.

88) “Models, Meanings and Theories” in M. Brodbeck, ed., *Readings in the*

history of science emphasizing the social nature of science as the activity of working scientists casts further doubt on a theoretical / empirical distinction. The work of Thomas Kuhn, despite its frequently criticized drawbacks, shows the status of particular scientific items as theories, as observables, as facts, as nonfacts, as different fact, has varied according to the conceptions and milieu of the researcher.⁸⁹⁾

Consequently, it must be concluded that a radical distinction of the type offered by operationalism, between theoretical concepts and empirical terms, is, in fact, impossible to maintain. We will now attempt to show that such a distinction is likely to lead to poor research methods.

VI. Practical Problems of Operationalism

We have tried to show that, before there can be operationalizing, there must be a *previous* recognition and specification of the “theoretical” term to be operationalized. (This, of course, does not do away with the necessity for systematic significance in theoretical terms but rather supplements it.) The point may be illustrated if we take the example of a researcher investigating the relation between authoritarianism, alienation,

Philosophy of Social Science, (New York, 1968), p.600. See also M. Hesse “Models of Method in the Natural and Social Sciences,” in *Methodology and Science*, vol. 8, (1975).

89) For an overview of some of the criticisms see I. Lakatos, ed. *Criticism and the Growth of Knowledge*, (Cambridge, 1970).

ethnocentrism and rightwing political views. At least the first two terms have a long and confused history within writings on psychology and politics. In order to formulate any theory about these particular things one must know what they refer to, what set of phenomena they indicate. If one did not know what sorts of phenomena to classify or not to classify under the rubric of "authoritarianism" then it is difficult to see how any theory would be or could be formulated in the first place. If one merely held that "authoritarianism" was a "nonobservable" theoretical concept then one could do little to refine or specify the term other than to make sure it conformed to the criteria of a particular theory. If specification were attempted by means of an operation, such as an "authoritarianism" scale, then, if the term authoritarianism is left undefined by other means, the scale will be an indicator of something we know little about. If this is true it is difficult to see how one could assert that the scale is in fact an indicator of it. This is the sort of view advocated by Lasswell when he asserts that "the scholar's obligation is discharged when he gives his definition in general terms and shows by specific indices what is meant by the general terms."⁹⁰ But what is in fact required is the pre-operational delineation of the theoretical terms.

If we attempt such a definition or verbal specification of authoritarianism by analysing the particular characteristics which usually go under the name, then we may discover that what we had regarded as one variable, "authoritarianism," may in fact be

90) Lasswell and Lerner, *op. cit.*, p. 4, see also pp. 42 ff., 58; Lasswell, *The Policy Orientation of Political Science*, pp. 54,57.

several different phenomena such as authoritarianism, ethnocentrism or acquiescence to instituted authority. These may vary differently so that a unidimensional measure will tend to cover a multitude of sins. Similarly we may find that a term such as "political development" is in fact a concatenation of diverse entities and processes. It is true that the way one conceives of authoritarianism will depend on one's own presuppositions and the particular theory one is considering, nevertheless the need for specification is there regardless of the theories under consideration.⁹¹⁾

If one has, instead, taken the specification of authoritarianism to be an authoritarian scale then it will be so by (operational) definition. It is of course possible that unusual variations in the mathematical results may cause one to wonder whether the feature being considered is in fact unidimensional. However, as the literature dealing with validity checks is structured to ensure the unidimensionality of the *indicator* rather than that of the *concept*, the tendency will be to assume the unidimensionality of the theoretical concept as given and to ensure the conformity of the indicator to this.⁹²⁾

The general point about specification may also be illustrated with regard to the general questions of quantification and

91) This is also true if one considers the possible functions of paradigms in scientific work or the role of consensus in decisions about theories. The factors we are discussing would operate *within* the paradigms or consensus unless, of course, the paradigms or consensus are of such a nature as to deny the sort of approach being advocated.

92) Cf. The thrust of the validity checks in the works cited in footnote 77.

measurement. As Studdert-Kennedy pointed out, "quantification is not a quantum jump into an independent and methodologically arcane level of thought. We are concerned with an extension of the elementary analytical of making distinctions, of classifying and comparing entities."⁹³⁾ Unless one has an adequate typology or classification of the things being considered, then any premature attempt at quantification will carry an implicit, and often distorting, classification with it.⁹⁴⁾

This may be shown in the work of the *Dimensionality of Nations* (DON) project, headed by R. J. Rummel.⁹⁵⁾ This project and its results have already been extensively criticized in the literature on international relations; this paper will attempt to show that many of the faults which have been noted in the project can be traced back to the operational theory which underlies the

93) G. Studdert-Kennedy, *Evidence and Explanation in Social Science*, (London, 1975), p. 78. See also chap. 4.

94) Cf. G. Sartori, "Concept Misformation in Comparative Politics," *American Political Science Review*, vol. 64(1970), pp. 1033~53. The Point is also made in terms of economics by W. Leontiev, "Quantity and Quality in Economics" in D. Lerner *Quantity and Quality*, (New York, 1965), pp. 117~28. It is also implied in H. F. Weisberg, "Models of Statistical Relationship," *American Political Science Review*, vol. 68 (1974), pp. 1638~55. See also O. Benson, "The Mathematical Approach to Political Science" in J. C. Charlesworth, ed., *Contemporary Political Analysis*, (New York, 1967), pp. 108~33; cf. J. F. Marquette, "Standard Scores as Indices; The Pitfalls Doing Things the Easy Way," *Midwest Journal of Political Science*, vol. 16 (1972), pp. 278~86.

95) *The Dimensions of Nations*. This is the major work of the many works of the Dimensionality of Nations project. For a bibliography of works see "A Summary and Annotated Bibliography of Research by the Dimensionability of Nations Project, 1967~73," *Dimensionality of Nations Project, Research Report No. 69*, (Honolulu, 1973).

methods used. The general research question of the *Dimensionality of Nations*(DON) project was whether there exists a systematic relationship between the attribute differences of nation states(what they are) and their dyadic behaviour (the way they interact with one another).⁹⁶⁾ Little attempt was made at specification of the theoretical terms used and, indeed, the nature of the theory to be tested is rather vague.⁹⁷⁾ The attempt at an empirical taxonomy was made *only* via operationalizing of the general theoretical terms, the technique for providing this taxonomy being factor analysis.⁹⁸⁾ What were obtained as groupings often appear to be highly artifactual and dependent on the clustering technique used.⁹⁹⁾

For example, in the original mode, the linkage expression logically necessitated that the behaviour from nation i to nation j be just the opposite of that from nation j to nation i. Thus, if nation i directed high amounts of conflict behaviour toward j then, according to the model, j would direct proportionally nonconflictual behaviour toward j.¹⁰⁰⁾ Rummel realized the

96) See R. J. Rummel, "The Dimensionality of Nations Project" in R. Merritt and S. Rokkan, *Comparing Nations*, (New Haven, 1966), pp. 110~2; G. Hilton, *A Review of the Dimensionality of Nations Project*, (Beverly Hills, 1973), pp. 29~33.

97) See R. H. Van Atta and D. B. Robertson, "An Appraisal of the Substantive Findings of the DON Project" in F. W. Hoole and D. A. Zinnes, *Quantitative International Politics*, (New York, 1976), pp. 197~200. I am indebted to this work and to L. Hazlewood, "An Appraisal of the Methodology and Statistical Practices used in the DON Project" in Hoole and Zinnes *op. cit.*, pp.176~95, for much of what follows.

98) Van Atta and Robertson, *loc. cit.*

99) *Op. cit.*, pp. 201~2. Hazlewood. p.185.

100) See R. J. Rummel, "Field Theory and Indicators of International

counterintuitive nature of this supposition when it was pointed out to him. Attention to the substantive content of the interaction terms might have helped avoid such a problem in the first place.¹⁰¹⁾ This problem was deemed sufficiently grave to cause the abandonment of the original model.

In the reformulated model similar problems arose concerning conceptual clarity. This was particularly true with respect to the distinctions made between the "attributes" of nations and the "behaviour" of nations. An attribute was defined as "any descriptive concept which differentiates a social unit from all other social units."¹⁰²⁾ An interaction was defined as a "behavioural act...(that) couples two social units together."¹⁰³⁾ The generality of these definitions led to difficulties in specifying what either of them was. For example, the mobilization of military forces within a nation was regarded as an internal act, an "attribute." However, troop movements and mobilizations were usually treated as behaviour (interactions) since they were presumed to be an attempt to influence another state.¹⁰⁴⁾ The question naturally arises as to in what category "defense expenditures" might more properly be classified. The number of immigrants from one country to another

Behaviour," *DON Project Research Report No. 29*, (Honolulu, 1969); *Field Theory Evolving*, (Beverly Hills, 1976), chap. 4; Van Atta and Robertson, *op. cit.*, pp. 204 ff.

101) See Rummel, "Comments on Reviews of the DON Project," in Hoole and Zinnes, *op. cit.*, p. 275.

102) Rummel, "A Field Theory of Social Action with Application to Conflict within Nations," *General Systems*, vol. 10, (1965), p.198.

103) *Loc. cit.*

104) Van Atta and Robertson, p.210.

was treated as a “behaviour,” as are “trade” and “travel.” But some of these interactions are actually controlled by some governments and hardly at all (or certainly to a lesser extent) by other governments. Are then such events truly a “behaviour” of the states (rather than “attributes” of them) regardless of the type government ?¹⁰⁵⁾

In the same vein, Rummel treated “negative communication,” “students” and “exports” as indicators of behaviour. Meanwhile “number of treats,” “foreign college students” and “exports/GNP” are listed as attributes.¹⁰⁶⁾ This is particularly disturbing as the attributes are intended to *explain* the behaviour. The examples could be increased, out hopefully these are enough to show that there is some ambiguite and confusion about the nature of the DON variables.

Further problems arise in the interpretation of correlations. Some dimensions, e.g., trade, play in both “behaviour” and “attributes.”¹⁰⁷⁾ As the distribution of the “attribute” variables is frequently highly skewed (i.e., only a few of the cases have values appreciably greater than zero) then what tends to result is that variables are largely correlated with themselves.¹⁰⁸⁾ This produces high and, of course, rather fruitness correlations.

105) *Loc. cit.*

106) Rummel, “U.S Foreign Relations: Conflict, Cooperation and Attribute Difference” in *Peace, War and Numbers*, ed B. M. Russett(Beverly Hills, 1972), pp.71~113.

107) S. W. Rhee, “Communist China’s Foreign Behaviour.” *DON project, Research Report No. 57*(Honolulu, 1971); Van Atta and Robertson. *loc. cit.*

108) Rhee, *op. cit.*, p. 158; Van Atta and Robertson, *op. cit.*, p.211.

A further problem arises in the interpretation of the factor scores. For example, Rummel argues that about 80% of the variance ($R^2=0.8$) in intergovernmental organization(IGO) membership can be accounted for as follows,¹⁰⁹⁾

$$\begin{aligned} \text{IGOs} = & 0.57 \text{ Economic development} + 0.51 \\ & \text{Political orientation} + 0.33 \text{ size} - \\ & 0.33 \text{ Catholic culture.} \end{aligned}$$

this can broadly be understood as the degree of intercorrelation between these variables). Further in the same work the IGO memberships variable in the dimension of international relations suggest the following:¹¹⁰⁾

$$\begin{aligned} \text{IGOs} = & 0.7 \text{ Participation} + 0.25 \text{ popularity} \\ & + 0.24 \text{ Ideology} + 0.33 \text{ South America} \\ & + 0.26 \text{ Aid} - 0.35 \text{ Factor 13 (unlabeled).} \end{aligned}$$

This produces and R^2 ("explained" variance) of 0.77. It can be seen that in the interpretation of these two results there can be considerable confusion. As there has been little specification, apart from the factor scores, of the *content* of the theoretical terms there can be little theoretical guidance as to what factors we might *expect* to emerge. The amount of variance "explained" by the factors is hence the sole standard available. Presumably the tendency would be to take the factor which "explains" the highest amount of variance, unless its content is grossly out the step with what we intuit the relations to be.¹¹¹⁾ In view of the fact, mentioned

109) *Dimensions of Nations*, p. 297; Hazlewood, *op. cit.*, p. 192.

110) Rummel, *op. cit.*, p. 499, Hazlewood, *loc. cit.*

111) Hazlewood, *loc. cit.*

above, that occasionally the high correlations are the result of correlating things with themselves, the procedure of selecting the highest explained variance would be doubly dangerous. If the selection procedure is not by taking the highest explained variance then it is difficult to know what it might be.

These problems in the DON project are to some degree caused by the complexity of the model employed. However, it is manifest that the source of many of these faults is the fact that the content of the terms used is never clearly known. This introduces problems both in formulating the model in the first place and also in analysing the results obtained. Rather than specifying such terms, Rummel was content merely to provide operational indicators for them. In fact the procedure that Rummel used is quite in line with the operational theory he espouses. He maintains that "analytic statements" (parallel to "theoretical terms") have little or no operational or empirical content, they may even be "the creation of a scientist's imagination," they need no empirical interpretation. Indeed, "one shouldn't argue about meaning in a conceptual system."¹¹²⁾ What is required instead is an operational indicator of the meaning of the term.

Consequently it appears that a view of operationalizing which asserts the nonobservable nature of theoretical terms has played a large part in the problems of the DON project. One cannot say that a different understanding of operationalizing would necessarily have solved these problems, nevertheless certain operational views seem to have justified the approach which led to the problems in

112) *Dimensions of Nations*, p.33; *Applied Factor Analysis*, pp. 27~8.

the first place. Consequently it may be concluded that operational formulation (2) is not only theoretically untenable but has also introduced problems into actual research.

VII. The Conflation of Operationalism, Measurement and Indicators

We have tried to show that operationalism understood in the senses of groups (1), (2) and (4) is untenable and tends to distort the process of research. Formulations (3) and (5) do not appear to suffer from these problems. They are concerned either with the question of measurement (group 5) or else with the question of how we relate a theory to whatever data are available (group 3), as Buchanan says "operations bridge the gap between concepts and available data."¹¹³ There are still particular problems associated with these views, those concerning the nature of measurement, and those concerning the relation between data and the concept they purport to be indicating.

It is not the purpose of this paper to explore these questions, as they embrace far more than operationalism. But what can be said is that these two conceptions of "operationalizing" in fact owe nothing to the views of operationalism as a school. Such questions and such approaches antedate the appearance of operationalism in each of the disciplines discussed.¹¹⁴ They escape the problems of

113) Buchanan, *op. cit.*, pp. 29~30.

114) H. T. Moore, "Innate Factors in Radicalism and Conservatism," *Journal of Abnormal and Social Psychology*, vol. 20, (1925~6), pp. 234~44; See also L. L. Thurstone and Chave, *The Measurement of Attitude*, (Chicago, 1929);

operationalism not merely fortuitously but because, in their foundation, they have nothing to do with it. The frequent use of the word operationalism to describe such methods represents a conflation of operationalist views with more longstanding questions concerning the handling of data, and this works to the detriment of understanding any of these areas properly. Such methods should not be rejected merely because their proponents needlessly couch them and justify them in terms of operationalist problematics.

VIII. Summary

We have briefly outlined the history of operationalism within philosophy of science and the social sciences. We have attempted to show the development of operationalist views within these various disciplines. From the problematics developed in this history a classification was erected of types of operational views, and several major works and recent texts within political science were categorized in terms of this classification. Type (1), the original operationalist view formulated by Bridgman, is now largely defunct and may be disregarded. Types (2) and (4) dichotomize theoretical and operational terms, in the form of, "nonobservable"

W. H. Cowley, "Three Distinctions in the Study of Leaders." *Journal of Abnormal and Social Psychology*, vol. 23 (1928); S. R. Rice, *Farmers and Workers in American Politics*, (New York, 1924), pp. 174-7. F. H. Allport and D. A. Hartmann, "The Measure and Motivation of Typical Opinion in a Center Group." *American Political Science Review*, vol. 19, (1925), pp. 735-60; See also S. R. Rice, "Some Applications of Statistical Method to Political Research."

versus “empirical” terms. By an examination of the nature of validity and of theoretical terms we have sought to show that such a formulation is inconsistent. By means of examples, we have tried to show that it leads to problems in actual research. Formulation (3) is concerned with relating theoretical terms to available or relatively easier to gather data. Formulation (5) is concerned with providing quantitative measures for theoretical terms. These conceptions are unexceptionable in terms of the problematics discussed here. Much of the technical material concerning validity, reliability and errors developed in connection with the type (2) and (4) formulations may still be relevant and useful in concerns of type (3) and (5)