THE STIPULATIVE FUNCTION AND INDUCTION

H. R. Fossler
University of South Dakota

In a number of papers I have laid the groundwork to show the significance of the organizational and exploratory ordering functions in experience, experience being used in the ordinary sense of life events in relation to the world in which they occur. If man is to become the artificer of his experience rather than the victim of it, experience is not only something to be had; it must be directed and something must be learned from it. The record of many orders invented by man to arrange his experiences more or less adequately for various purposes is called our cultural heritage. There is ample scope for the invention of new orders. Ordering operations have been considered as a form of action indispensable to ordered living. Learning and problem solving revolve around order and the psychological operations by which it is invented and applied.

In approaching the problem of order I have taken a functional view, considering order not as something imposed upon experience from without but as something differentiated from within by man for the realization of his purposes. Order is the instrument by which experience is funded, utilized and extended. One recognizes many working orders at different levels of analysis devised to satisfy varied demands. The claim that a familiar useful order is the order of things is insupportable. In meeting any problem situation the funded experience upon which one stands performs a legislative or regulative function; that by which one reaches performs an exploratory function. What is found out step by step is ordered and articulated in some way with one's funded experience. On this view any order is evaluated in terms of its service in formulating and solving one's problems.

I have analyzed briefly the origins of order in the differentiations made in the matrix of experience, particularly in connection with change and movement which best present the conditions of comparison and recognition. In manipulating things one discovers that qualities, properties, and relations are functions of the conditions of their appearance rather than inherent or intrinsic in objects. This discovery opens up a field of high adventure in exploration. Experiences are not waited for; they are contrived with all the technical apparatus available.

The basic tools by which the organizational and exploratory operations of problem solving are carried on have been developed. They include the symbolic, stipulative, and sign functions; classification, from loose aggregates based upon superficial marks to articulated systems based upon functional relations; and unit construction involving the correlative operations of analysis and synthesis by which events, facts, factors, and consequences are marked out and ordered over a wide range of complexity.

In terms of this groundwork some structural features of a frame of reference may be indicated. A frame of reference is a constructed unit framework of organization in which a problem is envisaged, a solution is sought, and results are funded. Such a unit may be relatively simple or complex, loosely organized or closely knit. It may involve multiple sub-frames or a variety of frames of different orders and sorts side by side. It includes purposes and plans which may be analyzed to any level of convenience. It determines what shall be considered as facts or events and what relevance shall be ascribed to them. Within it are found regulative and funded elements. Fertility rather than finality characterizes an adequate frame. It must provide direction, firm but flexible, in the service of inquiry.

A frame of reference grows and develops through revision or reconstruction. In the pursuit of inquiry there are many shifts in frame elements even though the broad features remain stable. As investigation goes on, some elements hitherto accepted become problematic and other elements hitherto considered problematic are resolved and accepted. New findings are not always to be simply ordered. They may stubbornly resist assimilation to an established

order and demand a revised order to incorporate them in a system. The required revision may be slight; it may reach to the foundations of the system. Frame and findings, being correlative distinctions within a field of inquiry, develop together and support each other.

Such frame revision has been characteristic of every science. A common practice in mathematics is the revision of definitions to permit extension to a wider domain, an example being the redefinition of number to include signed numbers, irrationals, and imaginaries. Another significant sort of revision occurs when new stipulations are constructed on the basis of observed correlations. Physics amply illustrates the development of articulated systems, defined in terms of interactions, from systems defined in terms of superficial marks. Revision emphasizes the correlative stipulative functions of organization and exploration in system development, regardless of difference in subject matter. It shows clearly that although stipulations enjoy a degree of freedom not controlled by the conditions of their origin, their legislative tenure depends upon the fruitfulness of their use.

In a system of funded knowledge one encounters propositions expressing two distinct sorts of generality, differentiated according to function. The one expresses relations among stipulations which are legislative within the system. The other, expressing relations between such stipulations and exemplifications of them, material or symbolic, discovered in inquiry, incorporates funded findings concerning ordered things. The one expresses generality in the legislative sense, the other in the sense of holding without exception over a limited range. Each performs a special duty, neither being reducible to nor replaceable by the other. The investigator employs both, each for its special duty. In a system one expects to find different orders and levels of generality in the first sort and different degrees of generality in the second sort.

A psychology of problem solving must cover the operations of inquiry wherever they occur, whether in what has

been called deductive science, as in mathematics, or in what has been called inductive science, as in physics. The difference between symbolic and material objects as subject matter of investigation is fully acknowledged, but relative to the operations of problem solving, there are important similarities which deserve emphasis. I have noted before that any recognizable quality, property, or relation may itself become an object of analysis. One is, therefore, prepared to see that stipulations may be exemplified by symbolic structures as well as by material objects. Symbols of symbols and symbols of stipulations are manipulated according to the same principles as symbols of material objects. The mathematician and the physicist test implications in the same way and deal with different orders and degrees of generality. They employ general propositions of both sorts in the same way. They both seek stipulations that shall hold over a specified range and seek to determine the range over which given stipulations are found to hold. That is to say, they establish general principles of the second sort in the same way. They employ the same legislative and exploratory functions. Both deduce conclusions from given premises and both search for premises from which a conclusion, otherwise arrived at, may be drawn. The mathematician as investigator uses the same psychological operations as the physicist or any other investigator. Any one is free to investigate systematic relationships with or without consideration for application. There seems, then, no reason for segregating sciences in terms of the classical deductive-inductive approach. Mathematics may be integrated with the natural sciences without sacrificing anything of its distinctive quality or impairing its prestige, so far as inquiry is concerned.

Sufficient preparation has now been made to meet the problem of induction. First, a brief statement of the background of the problem. The deductive theory of Aristotle, with which we are all familiar, reflected his rationalistic metaphysics. Knowledge ,as narrowly defined in his system, was obtained by operations upon what were claimed to be

a priori self-evident truths under the forms of the syllogism and was claimed to be certain and final. A conclusion was said to be rationally grounded in the laws of the Universe through the laws of logic. The acquisition of such knowledge was held to be the supreme occupation of a rational being. Although modern developments have substituted postulates for self-evident truths and have recognized deductive chains other than syllogistic for the unfolding of implications, claims of necessity and certainty are still cherished by the apostles of rationalism and the product, formal and pure, still esteemed above that yielded by the experimental sciences.

A belligerent opposition to the claims of rationalism came to expression in the metaphysics of empiricism. A counter definition of knowledge was set up which not only included the results of observation, but extolled them as exclusively significant. The basic clash between the systems centered around the grounding of general propositions. Laws and general principles asserted to be immutable laws of the Universe, quite as honorific as the a priori sort, were alleged to be grounded exclusively in the study of particulars. Theory in the legislative sense was disdained; only general propositions about cases were to be admitted. But there was no less ambition to claim certitude and to pronounce upon the nature of things, and to provide a burgeoning experimental science with appropriate metaphysical foundations of which, it was given to understand, it stood in desperate need.

In considering the notorious problem of induction, note that it was rooted in a collision between rationalism and empiricism, with deduction reflecting rationalistic and induction empiricistic propaganda. It did not arise out of the demands of scientific method; it was merely slipped under it. It is of interest here only because induction has purported to be the true method of the experimental sciences and, amazingly enough, has been espoused and defended by many scientists as a competent expression of their procedures. I shall consider the problem in the light of the stipulative function already outlined.

On the deductive side the a priori claim for general legislative propositions has been disposed of by the mathematicians. A postulate raises no extraneous issue, and changing standards of rigor have left the certainty claim for implied conclusions noticeably knock-kneed, since proof is occasionally in doubt even for experts. The filiation of relations is presented as finished, so that in a formal presentation there is no distinction between drawing a conclusion from stated premises and finding premises from which a given conclusion may be drawn. There is nothing to indicate why certain premises are chosen nor why any one should draw a conclusion from them, nor what significance a conclusion might have, even if correctly drawn—all important points in a psychology of inquiry. The product of problem solving is represented but not the process. But the basic confusion in deductive theory, already considered in a paper dealing with class theory, lies in the failure to keep clear the distinction between statements about the relation of stipulations to each other and statements about the relation of stipulations to exemplifications.

On the inductive side, general principles were asserted to be empirically established by the investigation of cases and at the same time were claimed to have the same unlimited scope as regulative principles. This clearly involves the same confusion just mentioned ,which is not surprising if one considers the source of it. It was clear enough that the passage from a statement about all cases so far observed to a statement about all cases, intended to include both observed and unobserved cases, was certainly slippery. A statement about all cases so far observed was sound enough but was regarded as trivial because the range was limited where unlimited range was wanted. The problem of how to arrive at an unlimited general proposition about cases on the basis of limited observation, without going beyond observation, is known as the problem of induction. Assertion beyond observation was held indispensable to investigation and prediction. This scandalous leap from some to all, as the non-too-pure rationalists called it, demanded some acro-

batic reasoning to justify it. Mill, limping to the rescue, blandly proffered his postulate of the uniformity of nature as sufficient to turn the trick. Others, evading the reasoning, recommended faith in the leap because, as they averred, scientists were making discoveries by making it. Still others, in extremity, set it down as an act of animal faith, irrational but inescapable. And this was advertised as the foundation of experimental science.

What then can be said about such a state of affairs upon the assumption that successful problem solving exhibits good sense which, with patience, can be coherently expressed? Abandonment of metaphysical claims removes the condition for the impasse and permits one to consider the functions performed in inquiry by regulative and factual propositions without disputation over the metaphysical status of their origin or content. A legislative proposition, organizational in function, is not a factual proposition about particulars nor should it purport to be. Being stipulative in function, it does not need to be about cases in order to be based upon observation. It expresses a principle of order to be employed, not a fact about ordered things. It directs observation; it does not report upon findings. It is justified by its service in inquiry. Its freedom from limitation is the freedom of unrestricted use. A general proposition about cases must be restricted to a limited range if it is to be established. Removal of such limitation confers no freedom; on the contrary it destroys the sense. Freedom of the legislative sort is not to be obtained by removing limitations of the factual sort. A proposition which combines observed and unobserved cases over an unlimited range in order to appear as a factually established proposition and at the same time to ape the freedom, without the purport, of a legislative proposition is an unmitigated fraud. There is no exigency of inquiry that demands assertion of fact where fact has not been established. Conjectures may be expressed in assumptive statements, and the distinction between assertion and assumption should be respected. This keeps clear the distinction between statements about

stipulations and statements about cases. There is no excuse to use the one to perform the service of the other, nor to invent a monstrosity which is neither to perform the services of both. Moreover, a prediction loses no force by avowing the assumptive element in it. A statement of probability is quite sufficient. Setting the certainty claim of implication over against the probability claim relative to some future event, to the disparagement of probability, will not be perpetrated by a careful thinker.

The psychological machinery developed on this approach is applicable to any field of inquiry. Acknowledgment of the organizational and exploratory functions of stipulations relieves problem solving of the deductive-inductive incubus, thrust upon it by historical circumstance and perpetuated by interests extraneous to inquiry.