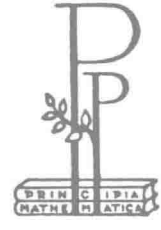
PSYCHOLOGY AND LOGIC

Psychology and Logic

J. R. KANTOR

VOLUME I



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PREFACE

Two basic theses underly the present work.

The first, the specificity theorem, signifies that logic is essentially concerned with specific events and not with universal and transcendent systems.

The second, the interbehavioral theorem, implies that no matter how logic is defined[1] it entails a psychological dimension which must be taken into account. Even those logicians who postulate that there are invariant relations in the universe or ultimate uniformities of nature inevitably face the investigative problem of how they are discovered. Since the various traditional psychological systems have not proved satisfactory in handling such problems and since the interbehavioral event and its product are always implied, an interbehavioral psychology is highly desirable.

The Specificity Thesis. The writer holds that the referents for the term *logic* are always individual human enterprises located in particular fields or frames of reference. Since these enterprises are constructive they comprise (1) actions or performances, (2) materials worked with, and (3) results or products.

Though writers on logic differ in their views concerning the nature of logic, and produce treatises varying widely in scope, content, and principle, they all agree that they are seeking the one true or valid system. Rarely is it suggested that no such universal system is available.[2]

Glance at a telling example. When Locke made his famous declaration that "God has not been so sparing to men to make them barely two-legged creatures, and left it to Aristotle to make them rational,"[3] it is plain that he was merely attempting to dissociate logical action which he called reasoning from formal syllogizing. Yet Joseph[4] accuses Locke of bringing objections against the study

[1] For example, (1) the study of the laws of thought, (2) the science of order, (3) the technique for constructing mathematical or other systems, (4) the methodology of science, (5) the art of proof or demonstration, or (6) the theory of inquiry.

[2] Cf. Lewis, Alternative Systems. Complete titles of cited articles and books are given in the Bibliography at the end of this volume.

[3] Essay, Bk. IV, chap. 17, sec. 4.

[4] Introduction, p. 3.

of logic, since for Joseph there is only one logic and that one the syllogistic.

To support the thesis that there are many logics and to throw some light upon the principle uniting them we propose a sharp distinction between two clearly distinguishable types of logical events. On the one hand, there are (1) the crude data consisting of (a) logical processes, acts of relating things, of inferring, of implying, and (b) the relations and relata—in short, the materials and products of systematization. On the other, there are (2) the views or theories propounded by different writers concerning which of the above processes or things are the subject matter of logic, and their resulting propositions concerning the nature of the accepted material.

By the crude or unanalyzed data of logic we understand actual *logical practice*. Most writers on logic agree that such practice consists of operations of some sort, inferring, reasoning or implying, although the operations are frequently mistaken for faculties or the products of such operations and in some cases even for the material worked upon. The latter is illustrated by the doctrine that logical subject matter comprises autonomous relations or elements to be ordered.

For our part, the crude data of logic consist of specific practices of system building. Since these logical practices have their unique scope and boundaries they differ with respect to (a) problems or purposes, (b) materials worked upon, whether concrete or abstract, and (c) results or products. It is an error to regard the materials for these system constructions as limited to propositions or sentences, or symbolic representations of relations, whether mathematical or not, since logical materials include everyday things as well.

Logical theory, it follows, constitutes the investigation and description of the specific activities of building or organizing systems. These activities may be studied as the personal behavior of individuals or as the conjoint enterprises of the members of schools, groups or traditions. The point here is that all human operations are particular modes of interbehavior of organisms and specific stimulus objects.

Traditional logical theorists have constructed statements concerning the nature of logic on the basis of their own work or that

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of others (Aristotle, Lully, Mill, DeMorgan, Boole, Hamilton, Hegel) with whom they agree or disagree in whole or part. From a scientific standpoint a scale of values for logical theories can be set up on the criterion of greater relative adherence to logical practice or established theory concerning such work. Ideally, of course, logical theory should be derived from observing logical practice, though every theorist is conditioned by his interests, training, and intellectual milieu.

The Psychological Thesis. The history of logic testifies that divergences in view concerning the nature and operation of logic and the achievable results are tremendously influenced by the psychological view of the logical theorists themselves. These views are not always necessarily known to logicians, but may operate upon them by the subtle and effective agency of general cultural or specific school institutions.

The inherent logical paradox is proof enough that logicians are more influenced by psychological traditions than observations of work. Although logic is obviously a human enterprise, logicians inevitably regard it as *ultimate*, *universal*, and *transcendent*. Not only is this true of the dialectical logicians who look upon logic as an instrument to seize the universe in its totality, but also of the mathematical logicians and scientific methodologists. The symbolic or mathematical logicians seek omnipotent algorithms, whereas the methodologists strive for general techniques transcending specific problems and particular situations.

The *ultimacy* of logic is manifested by the omnipotence and finality which logicians accord proof and demonstration. Boole asks:

> Shall we then err if regarding that as the true science of logic which, laying down certain elementary laws, confirmed by the very testimony of the mind, permits us thence to deduce, by uniform processes, the entire chain of its secondary consequences, and furnishes, for its practical applications, methods of perfect generality?[5]

When such ultimacy is not fortified by the testimony of the mind, resort is had to invariant objective relationships which make conclusions necessary and inevitable from premises.

Logical *universality* is undoubtedly derived from the Plotinian

[5] Laws of Thought, p. 5.

logos. Despite all the variations in logical thinking since Plotinus, the idea that logical procedures are all-embracing and universally valid continues unabated. In the last analysis logic is presumed to involve the universe. Nevertheless, as we might expect, logicians sometimes do admit limited universes, however grudgingly. This was the case when DeMorgan introduced the idea of limited universes which have come to be called universes of discourse. This limitation was forced upon DeMorgan because he worked with words or names, as the following quotation indicates.

> Let us take a pair of contrary names, as man and not-man. It is plain that between them they represent everything imaginable or real, in the universe. But the contraries of common language usually embrace, not the whole universe, but some one general idea.[6]

The universality or absolute coverage of logic he never intended to minimize. Though pairs of common-language contradictories have limits they exhaust a particular restricted field in microcosmic analogy to proper logical names. The latter in the form of one inclusive and one exclusive word (tree and not-tree) would cover absolutely everything. The concession here is similar to that in which DeMorgan as a formalist asserts that logical studies occupy a humble place in the total field of human knowledge.[7] That logic should be partialled out into realms of discourse was certainly remote from DeMorgan's thinking. Logicians too numerous to mention, it may be added, would not even allow his concession on the ground that logic is never concerned with the meaning of common or specific—that is, material—terms, but only with the formal elements of sentences.

The *universality* of logic as a formal discipline is excellently illustrated by the claim that logic is one and indivisible. To the assertion that there is a non-Aristotelian logic as there is a non-Euclidean geometry the answer is returned: "What have recently been claimed to be alternative systems of logic are different systems of notation or symbolization for the same logical facts."[8]

Logical *transcendence* presents two aspects. First, logical procedures are believed to carry over indifferently from one type of

[6] Formal Logic, p. 37.
[7] Ibid., p. 46.
[8] Cohen and Nagel, Introduction, p. v.

subject matter to another. As formal and general techniques logic is regarded as capable of effecting results no matter what the field of application may be. Even the scientific methodologists consider their formalized systems of procedure or investigation as capable of crossing all barriers. Secondly, logic is presumed to transcend all subject matter. Thus, logical processes are endowed with various degrees of *a priority* and infallibility. By means of sentential and symbolic structures or systems the logician supposes himself to obtain omniscience, to know what has not been observed and to attain infinites of various sorts.

Behind the unsatisfactory assumptions that logic is infallible, comprehensive, and transcendent unquestionably lies unsound psychological theory. And so while it is desirable that psychology should contribute something to both logical practice and theory, actually it has not been able to do so. Neither the various forms of traditional faculty psychology nor the current ideas that psychology is concerned with nebulous and intangible states of consciousness or the biological activities of organisms offer satisfactory cooperative techniques of handling logical problems.

Today, we submit, psychology has made such progress toward the goal of an objective science that it can be decidedly useful in illuminating some dark spots in the logical field. Since the time when Peirce stated his doubt that "anybody knows much about the operation of the mind in reasoning"[9] there have been vast improvements in the scientific understanding of reasoning as well as of the nature of linguistic and symbolic things and acts and their interrelation with reasoning. Light can undoubtedly be thrown, for example, upon the connection between words or names, things, ideas, and biological processes. Obviously, of course, logic will no longer be regarded as a universal and transcendent system.

Current improvements in psychological theory, we hasten to add, preclude the traditional notion of the priority of psychological principles in logical study. On the contrary, the theory that psychological data are concrete interbehavioral events sets any such notion completely aside.

Psychological principles are coordinate with the biological and anthropological principles which concern the *organisms* or *persons* involved in interbehavioral events. Psychological principles are

[9] Collected Papers, 2.184. Hereafter referred to as C.P.

coordinate likewise with the physical, chemical, and other principles which concern the nature, order, and relations of the *objects* involved in interbehavioral events. The value of interbehavioral psychology for logical investigation lies precisely in the fact that it can fit into a pattern of cooperating disciplines.

During the writing of this book I have been troubled by some overstress of points and expository repetition. This feeling has been somewhat intensified after the work was completed. I here freely make the necessary apologies. Admitting that these and other faults are inexcusable, I nevertheless hope there are extenuating circumstances. Intrinsically, the problem I have set myself, involving a survey of two distinct disciplines as well as the need to point out necessary changes in one—psychology—has resulted in a less orderly and compact exposition than a reader has a right to expect and I would have liked. Among the extraneous factors, of course, are the effects of wartime pressure upon intellectual enterprises.

I wish to acknowledge the great help rendered by H. R. Kantor throughout the writing and printing of this book. In many ways this help was much more on the order of collaboration than assistance. Since some of the material contained in Chapters 1 and 8 of this volume has already appeared in print, I want to express my appreciation to the editors of the *Journal of Philosophy* for their permission to include it in this book. The publication of this work was made possible through the generous aid of my brother, Dr. A. E. Kanter, and the Directors of the Principia Press. I take this opportunity of expressing my sincerest thanks to those who have so willingly supported my efforts.

J. R. K.

July, 1944

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CHAPTER I

PRINCIPLES AND POSTULATES OF SPECIFICITY LOGIC

OF recent methodological and expository developments in logic and science nothing surpasses in merit the increasing practice of setting up postulate systems. It is a tremendous advantage to make clear at the outset of an intellectual enterprise what fundamental assumptions underlie the work. Our purpose, then, in the present chapter is to set down the postulational background of specificity logic.

Before doing so, however, it should be made plain that the nature of postulates and the procedure of constructing postulates themselves require considerable clarification. It is an error to regard the postulation process as a new or unique discovery. Intellectual workers have always been aware of the necessity to set forth the premises or assumptions upon which they base their work, even though they may have thought of themselves as simply announcing their general theories or philosophies. In the more restricted domains of science the construction of hypotheses consists essentially of a postulational technique. To hypothesize is tentatively to take something for granted in order to put it to an experimental or other controlled test.

What we take to be new in any postulation procedure is the deliberate effort to be definite and clear concerning one's investigation. This implies knowing whence principles are derived and how closely one adheres to them. Since no principles are absolute or *a priori* in any traditional sense, it follows that all postulates set up require justification both as to need and validity.

Again, in consonance with the present work postulates cannot be regarded as simply formal statements of general assumptions. Since postulates are set up for different sorts of enterprises, they necessarily vary as the enterprises vary. Naturally any set of postulates must conform to the best-established general principles of postulation, but they must also be justified in the particular enterprise for which they are formulated. In short, a postulate system for one type of logic cannot be satisfactory or valid for another type.

Furthermore, postulates are not arbitrary assumptions even in the sense that mathematical postulates are governed by nothing more than the achievement of a particular coherent system. The present increased interest in postulation may probably be traced to the growing appreciation of mathematicians that axioms are postulates or selected starting points and that mathematical systems are discretional constructions. It must not be overlooked, however, that since mathematics is primarily concerned with systems of relations the manipulation and organization of these relations need not be controlled beyond the coherence of the system. In other sorts of logical enterprises the systems to be attained must be in harmony with the type of subject matter organized. The discretion of the scientific as compared with the mathematical systematizer is therefore limited.

And, finally, postulates are not principles set down at the beginning of an intellectual enterprise as unalterable guides to what the work shall be. Actually, postulates are derived from results of studying a particular kind of material, and thus are subject to modification as the work proceeds. Postulates, then, constitute the statement of principles valid and acceptable up to a given stage of study. The need for postulates of a specificity logic and the merit claimed for them are therefore based upon the assumption that other postulates are not found to be sufficient or satisfactory.

Postulate I
Logic is Operational

Logic constitutes primarily a series of operations. Superficially our linguistic conventions indicate that the referent of the term *logic* is a thing. As a type of human enterprise, however, it is obvious that logic consists essentially of logicizing activities, although as we have indicated in the Preface, the term *logic* also refers to things. In addition to the performances of individuals we must include in our study of logic the materials upon which logicians work and the products resulting from such work whether or not recorded in treatises. In view of the fact that the materials only become logically significant when logically worked upon, and that products always imply the process, we may regard the operations as primary. Especially is this true since frequently the materials of logical op-

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