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Recent Polish Methodology of Empirical Sciences : a Bibliographical Note

Organon 7, 295-308

1970

Artykuł umieszczony jest w kolekcji cyfrowej Bazhum, gromadzącej zawartość polskich czasopism humanistycznych i społecznych tworzonej przez Muzeum Historii Polski w ramach prac podejmowanych na rzecz zapewnienia otwartego, powszechnego i trwałego dostępu do polskiego dorobku naukowego i kulturalnego.

Artykuł został zdigitalizowany i opracowany do udostępnienia w internecie ze środków specjalnych MNiSW dzięki Wydziałowi Historycznemu Uniwersytetu Warszawskiego.

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RECENT POLISH METHODOLOGY OF EMPIRICAL SCIENCES
A BIBLIOGRAPHICAL NOTE

The aim of the present paper is to provide readers interested in Polish methodology with some orientation in recent writings on this subject. To some extent, the choice and arrangement of the material will be arbitrary. The demarcation of methodology from both logic and philosophy is assumed, though there are no sharp lines of demarcation. In discussing the methodological problems the attention is limited, with few exceptions, to those of the empirical sciences. Although remarkable results have been achieved by Polish scholars in the domain of methodology of the deductive sciences, the subject is too comprehensive to be treated adequately in so short an article. This note covers the publications that appeared since 1955 to 1969 but it is not a complete presentation, as some omissions were necessary for want of space.

Section I presents the works attempting to clarify some basic concepts of methodology relevant to both the empirical and the rational sciences. The remainder of the paper will divide into two main parts. Section 2 deals with the general problems referring to the empirical sciences, and those pertaining to the particular branches of empirical investigation are covered in section 3. The last section 4 contains a list of handbooks including interesting chapters on methodology.

The traditional methodology is opposed to metascience both in its subject-matter and method in K. Ajdukiewicz's article „Metodologia i metanauka” (Methodology and Metascience, *JiP* *). The former is conceived

* Abbreviations are explained at the end of the paper.

as a descriptive science accounting for the procedures and principles of inquiry of recognized special sciences as well as their justification; it attempts to define and further clarify such terms as induction deduction, empirical meaning, etc. The latter investigates the structure of scientific theories and its results are of formal character. In the same author's article "Zagadnienie empiryzmu a koncepcja znaczenia" (The Problem of Empiricism and the Conception of Meaning, *JiP*) the question is asked if all *a priori* elements can be eliminated from science: the answer varies depending on the adopted conception of language. The author abandons his previous view assuming that in every language there are sentences that cannot be rejected without a violation of their meanings; a new conception of language is suggested which makes the above elimination possible. The possibility of radical empiricism is treated by the same author in "Logika a doświadczenie" (Logic and Experience, *JiP*) where languages permitting of testing laws of logic as empirical hypotheses are discussed. In "Metodologiczne typy nauk" (Methodological Types of Sciences, *JiP*) different branches of science are classified according to the character of the ultimate premises adopted.

T. Kotarbiński's *Wybór pism* (Selected Papers, Warszawa, 1957), contains the paper "O istocie i zadaniach metodologii ogólnej" (On the Essence and Tasks of General Methodology) where the general methodology of sciences is conceived as a specific branch of praxiological inquiry; in the article "O pojęciu metody" (On the Notion of Method) the concept of method in the praxiological sense is given a clear meaning. Those interested in the history of methodology can find in *Selected Papers* some studies on this subject.

R. Suszko in "Logika formalna a niektóre zagadnienia teorii poznania" (Formal Logic and the Evolution of Knowledge, *LTN*; available also in English in *Problems in the Philosophy of Science*, Amsterdam, 1968) discusses formal properties of evolution of knowledge in terms of diachronical formal logic and constructs a scheme of development of science.

The problems of definition are dealt with in the articles mentioned below, but additional information is given in section 4, where the methodological problems of particular empirical sciences are dealt with. K. Ajdukiewicz in "Trzy pojęcia definicji" (Three Concepts of Definition, *LTN*) gives precise meanings to the concepts of real, nominal, and arbitrary definitions and argues that there is no general concept of definition. J. Kotarbińska's paper "Definicja" (Definition, *LTN*) confines the analysis to normal definition: its kinds and the conditions of its usefulness with respect to different purposes are discussed in detail. The same author in "Tak zwana definicja deiktyczna" (On the so called Ostensive Definition, *LTN*; available in English in *Philosophy of Science*, 27, 1960) gives a detailed discussion of specific problems connected with this kind

of definition. The related problems are discussed together with the observational terms in section 2. M. Przełęcki in "O tzw. definicji operacyjnej" (On the Operational Definition, *LTN*) points to difficulties and paradoxical consequences implied by the operationist principle in the broader sense. T. Czeżowski in "Definicje analityczne i syntetyczne" (Analytic and Synthetic Definitions, *SF*, 4, 1966) gives his attention to the fact that the analysed concepts have double meanings owing to different principles of division and difference in the extension of the terms. L. Borkowski in "Über analytische und synthetische Definitionen" (in German) in *SL*, 4, 1956, distinguishes three widely accepted concepts of analytic and synthetic definitions. The definitions of these and of correct analytic definition are given and some theorems proved. T. Pawłowski in "Definicja perswazyjna" (Persuasive Definition, *MiS*) offers a new approach to the problem of this kind of definition; the range of the concept is extended to cover partial definitions, the construction varies according to the aim in view.

The problems of classification are treated by S. Łuszczewska-Romahnowa in "Classification as a Kind of Distance Function. Natural Classifications" (in English, *SL*, 12, 1961), where classification is considered as a plan of a segregative ordering either of the whole classified domain or of some subclasses of this domain. S. Łuszczewska-Romahnowa and T. Batóg in "A Generalized Theory of Classification" (in English, *SL*, 16, 1965, and *SL*, 17, 1965) construct a formal theory of classification and give a formal definition of the concept of classification which is a high generalization of the usual one. A nonformal approach to the same problem will be found in T. Wójcik's book *Zarys teorii klasyfikacji* (An Outline of the Theory of Classification; Warszawa, 1965) containing an exposition of methodology of classifying and the main practical applications of classification.

The various aspects of the processes of reasoning accepted in science are considered in a considerable number of papers. The general exposition of the problems of foundation and classification of reasonings is given by K. Ajdukiewicz in two articles: "The Problem of Foundation" (in English) is an introductory article to *FSD* containing the proceedings of the international colloquium on the methodology of the sciences held in Warsaw, 1961; in the article "Klasyfikacja rozumowań" (Classification of Reasonings, *JiP*) the author gives a critical analysis of the classification introduced into Polish literature by J. Łukasiewicz and maintained by T. Czeżowski and T. Kotarbiński, then suggests his own classification of wide comprehension by crossing the division of inferential processes and that of problems to be solved. The general exposition of the problem of foundation is contained in "Bemerkungen zum Problem der Begründung" (in German, *SL*, 12 1962) by R. Ingarden, who intends to show that this problem requires also epistemological analysis for its

solution. The same problem is also discussed by Z. Ziemia in "Postulat prawdziwości przesłanki a postulat jej uzasadnienia" (The Requirement of Truth and of Justification of Premises, *SL*, 12, 1962).

Some methodological problems of deduction are discussed by M. Koszyńska in "O dwojakim rozumieniu uzasadniania dedukcyjnego" (Two Concepts of Deductive Justification, *SL*, 13, 1962), and in "O dedukcji" (On Deduction, *LTN*; available in English in *RL*), where the question of deductive justification is considered, including the role of the concept of analyticity. In K. Ajdukiewicz's paper "Systemy aksjomatyczne z metodologicznego punktu widzenia" (Axiomatic Systems from the Methodological Point of View, *JiP*; available in English in *SL*, 11, 1960), the deductive systems are divided into assertive and hypothetical, and the possibility of constructing a justified system of assertive type is considered. The author attempts to show that both the methods of terminological convention and of deduction are insufficient for that purpose; the method of intuition seems necessary, and, if abandoned, the assertive systems should be replaced by neutral ones. The role of intuition in mathematics is considered by A. Grzegorzcyk in "Uzasadnienie aksjomatów teorii matematycznych" (On the Validation of Sets of Axioms in Mathematical Theories, *SL*, 13, 1962).

The clarification of the basic methodological concepts of induction and its justification is dealt with in the work mentioned below. M. Koszyńska in "O dobrej i złej indukcji" (On Good and Bad Induction, *SL*, 5, 1957), tries to find a theory marking out some types of non-deductive inference as types of correct induction and appeals to Keynes' theory of logical probability. K. Ajdukiewicz in "Zagadnienie racjonalności zawodnych sposobów rozumowania" (On the Rational Character of Uncertain Inference, *JiP*) finds neither the theory of probability nor confirmation theory satisfactory for solution of the problem of justifying induction, unless complemented by the general praxiological concept of rational human behaviour. A sympathetic exposition of Popper's theory can be found in J. Giedymin's "Inductionism and Anti-inductionism" in *LTN*. The basic differences between the respective methodological systems in their treatment of hypotheses are formulated. J. Kotarbińska in "Kontrowersja: dedukcjonizm-indukcjonizm" (The Controversy: Inductionism Versus Deductionism, *LTN*; available in English in *Logic, Methodology and Philosophy of Science*, Stanford, 1962) attempts to demonstrate that Popper's arguments against the inductive method failed because either his objections are misdirected or they refer only to a simplified version of the theory of induction.

Various question suggested by the problems of statistical inference are answered in the following papers by K. Szaniawski: in "Wnioskowanie czy behaviour" (Inference or Behaviour?, *LTN*) an account of the controversy over the status of statistical procedures is given. In "Some

Basic Patterns of Statistical Inference" (in English; *SL*, 11, 1961) there is a comparison of justification of inferential rules in the classical theory of statistics with that in the theory of decision. In "Pragmatyczne uzasadnienie zawodnych sposobów wnioskowania" (Pragmatic Foundation of Uncertain Inferences, *SL*, 12, 1962) there is a reconstruction of a part of the parametric inference assuming the interpretation of rules of inference as rules of purposive behaviour. The paper "A Pragmatic Justification of Rules of Statistical Inference" (in English; in *FSD*) also suggests treating rules of inference as prescribing certain purposive behaviour and analyses the justification actually provided by statisticians. In "Zasada największej wiarogodności" (The Principle of Reliability, *RL*) the author points at the fact that this principle requires a pragmatic justification in spite of its intuitive value. In "W sprawie racjonalności zawodnych sposobów wnioskowania" (On the Rational Character of Uncertain Inferences, *SF*, 2, 1959) the author criticizes the criterion of rationality suggested by Ajdukiewicz (see above) and answers negatively the question if it is possible to show in general the rational character of statistical inference. Z. Czerwiński characterizes different kinds of statistical inference by means of the notion of induction in "Wnioskowanie statystyczne a dedukcja i indukcja tradycyjna" (Statistical Inference and Traditional Deduction and Induction, *SL*, 7, 1958); the same author in "Zagadnienie probabilistycznego uzasadnienia indukcji enumeracyjnej" (The Problem of Probabilistic Justification of Enumerative Induction, *SL*, 5, 1957) and in "Enumerative Induction and the Theory of Games" (in English; *SL*, 10, 1960) undertakes the problem of justification applying some criteria taken over from statistical inference and the game theory. Z. Ziemia in "Częstościowe kryterium zasadności wnioskowań niededukcyjnych" (The Frequency Criterion of Justification of Nondeductive Inferences, *RL*) points to some shortcomings of the criterion and in "Racjonalna wiara i prawdopodobieństwo zasadności wnioskowania indukcyjnego" (Rational Belief, Probability and the Justification of Induction, *SL*, 12, 1961) criticises the attempts following Keynes and suggests his own solution. S. Łuszczewska-Romahnowa in "Indukcja a prawdopodobieństwo" (Induction and Probability, *SL*, 5, 1957) finds the probabilistic answer to the problem of induction false.

The related problems of justification of other kinds of reasonings are dealt with in I. Dąbrowska's paper "Kilka uwag o rozumowaniach na podstawie analogii" (On Arguments from Analogy, *RL*) where the formal structure and justification of arguments is examined. The further analysis of the problem and of logical and epistemological problems of the natural sciences can be found in the book by the same author "Dwa studia z teorii naukowego poznania" (Two studies on Scientific Knowledge; Toruń, 1962). J. Giedymin in "Charakterystyka pytań i wnioskowań kontrfaktycznych" (Counterfactual Questions and Inferences, *SM*,

1, 1965) offers a logical analysis and explication of counterfactual conditionals and gives an account of different appraisals of their cognitive role. J. Kmita in "Potoczny okres warunkowy" (The Conditional in Ordinary Language, *SM*, 3, 1967) offers an explication in terms of the conditional formulated in ordinary language.

2

The methodological problems of empirical theories are discussed in the largest number of papers. M. Przełęcki in his book *The Logic of Empirical Theories* (London, 1969) examines the language of empirical theories in terms of the theory of models. Special attention is given to the problem of the interpretation of formalized empirical theories and the difficulties connected with the interpretation of theoretical terms. The same author in "Teorie empiryczne w ujęciu logiki współczesnej" (Empirical Theories from the Standpoint of Modern Logic, *F* III) identifies modern logical methodology of the empirical sciences with logical reconstruction of empirical theories regarded as formalized axiomatic systems. The traditional methodology found the modified everyday language satisfactory for its purposes while modern analysis makes use of the concept of formalized language and its model which afford possibilities for explication of important methodological concepts. R. Wójcicki in "Semantyczne pojęcie prawdy w metodologii nauk empirycznych" (The Semantic Concept of Truth in the Methodology of the Empirical Sciences, *SF*, 3, 1969) offers an extension of Tarski's theory of truth which he finds of limited use in the methodology of the empirical sciences. The idealization of models of empirical theories and their relevance to the actual subject-matter of scientific research can be investigated in terms of semantical concepts for which definitions are laid down; an analysis of the theory of classical particle mechanics exemplifies the introduced concepts. In M. Przełęcki's article "Interpretacja systemów aksjomatycznych" (The Interpretation of Axiomatic Systems, *SF*, 6, 1960) the problem of empirical meaningfulness of specific terms of empirical theories is understood as the problem of interpreting specific terms of axiomatic systems and two ways of performing the interpretation are discussed.

The problem of empirical meaningfulness is treated by R. Wójcicki in: "Semantical Criteria of Empirical Meaningfulness", (in English; *SL*, 19, 1966) where the author applies some methods of model theory in order to analyse the concept of empirical meaningfulness and to investigate some of its properties; and in "O warunkach empirycznej sensowności terminów" (On Conditions of Empirical Significance, *TiD*) where he investigates some semantic relations between theoretical and obser-

vational terms and introduces a new definition of the concept of empirical meaning of theoretical terms. The article "Sprawdzalność i znaczenie" (Testability and Meaning, *SF*, 4, 1967, and *SF*, 1, 1968) by A. Zabłudowski is devoted to a critical analysis of the verifiability theory of meaning. W. Krajewski in "O empirycznej sprawdzalności twierdzeń filozoficznych" (On Empirical Testability of Philosophical Statements, *TiD*) interprets philosophy as having the methodological character of empirical sciences and discusses the empirical testability of some philosophical statements. A. Grzegorzczak in the paper "Sprawdzalność empiryczna a matematyczna" (Empirical and Mathematical Testability, *RL*) analysing the theory of algorithm and theories of the empirical sciences compares the concepts of computability with that of empirically decidable property to find essential analogies.

The methodological status of theoretical terms is discussed by M. Przełęcki in "W sprawie istnienia przedmiotów teoretycznych" (On the Existence of Theoretical Objects, *TiD*) where it is argued that predicates designating unobservables and theorems on existence of theoretical objects are admissible in the language of empirical theories. In "Postulat empiryczności terminów przyrodniczych" (Empirical Meaning of Terms in Natural Sciences, *F* II) he discusses some ways of definitional introduction of terms of the natural sciences providing them with empirical meaning, granted empirical significance of primitive terms; in "Pojęcia teoretyczne a doświadczenie" (Theoretical Concepts and Experience, *LTN*), the same author deals with criteria of applicability of theoretical concepts in empirical theories, giving his attention to partial definitions. H. Mortimer in "O warunkach przyjmowania postulatów probabilistycznych" (On the Conditions of Acceptance of Probabilistic Postulates for Theoretical Terms, *TiD*) offers an analysis of probabilistic postulates stating relative frequencies with special consideration of their analicity. J. Kmita in "Uwagi na marginesie problemu sensu empirycznego terminów teoretycznych" (Remarks on Empirical Meaning of Theoretical Terms, *TiD*) questions some widely accepted assumptions in the formulation of the problem to offer a solution of its modified version.

The methodological questions induced by the observational terms and sentences are answered by M. Przełęcki in "W sprawie uzasadnienia zdań spostrzeżeniowych" (On Validating Observational Statements, *SL*, 13, 1962) where he discusses various concepts of observational statements and particularly sentences with all terms interpreted directly. The same author in "O definiowaniu terminów spostrzeżeniowych" (On Defining Observational Terms, *RL*) points out that the direct interpretation of observational terms cannot be identified with the ostensive definition unless the latter concept is broadened. J. Giedymin in "O teoretycznym sensie tzw. terminów i zdań obserwacyjnych" (On the Theoretical Mean-

ing of the so called "Observational" Terms and Sentences, *TiD*) rejects the opinion that the division theoretical *vs.* observational can be applied to terms and sentences of the empirical sciences and quotes examples from the history of science in support of his thesis. W. Mejbaum in "O twierdzeniach bazowych" (On Basic Statements, *TiD*) gives an analysis of their methodological function in empirical theory. W. Marciszewski in "Reductionism in the Light of an Analysis of Observation Statements" (in English; *SF*, 1, 1962) defines observation sentence as an expression consisting of terms that have been introduced to the given language by ostensive definition; in the procedure of ostension the elements of interpretation are distinguished from those of "pure" experience defined in terms of physiology of perception. K. Ajdukiewicz in "Subiektywność i niepowtarzalność metody bezpośredniego doświadczenia" (The Subjective and Irreproducible Character of Direct Experience, *JiP*), discusses the way in which direct experience forms a part of the method of arriving at universal statements without depriving it of its character.

The problem of analyticity was undertaken by K. Ajdukiewicz in "Zagadnienie uzasadniania zdań analitycznych" (On Foundation of Analytic Statements, *JiP*; available in French in *SL*, 8, 1958), where the author advocates the view that the foundation of analytic sentences which are not laws of logic requires not only terminological convention but also existential premises which may need appealing to experience. Z. Czerwiński objects to the above view in "Zdanie analityczne, logika i doświadczenie" (Analytic Sentence, Logic and Experience, *RL*). The paper by K. Ajdukiewicz stimulated further inquiries and the two authors obtained, quite independently, similar results: R. Wójcicki in "Analityczne komponenty definicji arbitralnych" (Analytic Components of Arbitrary Definitions, *SL*, 14, 1963), and M. Przełęcki in "O pojęciu zdania analitycznego" (On the Notion of the Analytic Sentence, *SL*, 14, 1963), approach the problem of defining the notion of analytic sentence in terms of meaning postulates, but to avoid some objectionable consequences of this definition a postulate is analysed into an analytic and a synthetic component; only the logical consequence of an arbitrary set of analytic components is regarded as analytic. R. Wójcicki in "Analityczność, syntetyczność, empiryczna sensowność zdań" (Analyticity, Syntheticity, Empirical Meaningfulness of Sentences, *SF*, 3 1966), deals with the same problem and gives a precise meaning to the concept of a synthetic sentence and introduces the concept of empirical meaningfulness to be used in methodological analysis of empirical theories. These two authors published the article "The Problem of Analyticity" (in English, *Synthèse*, 19, 1969) which presents the recent results obtained within the conceptual framework of the model theory. A very comprehensive bibliography covers Polish works on the subject both published and forthcoming. H. Mortimer in "Remarks on the Controversy over the

Analitycity of Some Statements of Natural Science" (in English: *SF*, 1, 1962) aims at a clear formulation of the problems involved in the controversy over conventionalist thesis.

The important methodological notions relevant in studying the empirical theories are discussed by J. Giedymin in "A Generalization of the Refutability Postulate" (in English, *SL*, 10, 1960), who aims to show that the acceptance of a hypothesis on the ground of confirming evidence and absence of disconfirming evidence; the possibility of deriving the refutability postulate from some general conditions of rational behaviour is considered. W. Mejbaum in "Falsyfikacja hipotez" (Falsification of Hypotheses, *SF*, 3, 1967) presents a formal approach to the problem of elimination of falsified hypotheses from an empirical theory; in "Wielkość fizyczna i doświadczenie" (The Physical Magnitude and Experience, *SF*, 2, 1965) he discusses the acceptance or falsification of hypotheses containing terms denoting physical magnitudes. J. Such in "Problem uniwersalności praw nauki" (The Problem of University of Scientific Laws, *SM*, 5, 1968) discusses various concepts of universality and the problem of the openness in reference to the class appointed as the scope of law; in "Prawo nauki a generalizacja historyczna" (The Scientific Law and Historical Generalization, *SF*, 2, 1967), his aim is to draw the demarcation line between these two important types of general statements in science. J. Kmita in "Wyjaśnienie naukowe a metafora" (Scientific Explanation, *SF*, 3, 1967), gives an analysis of scientific explanation which implies that it can never be of metaphorical character. The more general problem of the cognitive significance of a metaphor is answered in M. Przełęcki's paper "O metaforze" (On Metaphor, in: *Moralność i społeczeństwo, Księga Jubileuszowa dla Marii Ossowskiej*, Warszawa, 1969).

3

In this section the methodological problems of the special sciences are grouped according to the principal methodological patterns which the sciences are supposed to reveal, but which are not exclusive of one another.

T. Pawłowski's book *Metodologiczne zagadnienia humanistyki* (Methodological Problems in the Humanities, Warszawa, 1969) consists of several essays dealing with the problems of the language used in the humanities: persuasive definitions and arguments, the methodological function and logical structure of typological concepts, the basic concepts of the theory of questions, the concept of measurement and its applicability, some problems concerning indicators and explanation. I. Lazari-Pawłowska in "O pojęciu typologicznym w humanistyce" (On the Concept of Type in the Humanities, *LTN*) discusses its definition and me-

thodological function. J. Kmita and L. Nowak in the book *Studia nad teoretycznymi podstawami humanistyki* (Studies on Theoretical Foundations of the Humanities, Poznań, 1968) give a logical reconstruction of foundations of the branches of humanities dealing with the structure of behaviour. The authors oppose antinaturalistic views from the naturalistic standpoint assuming a theory of rational behaviour.

J. Kmita in his book *Problematyka terminów teoretycznych w odniesieniu do pojęć literaturoznawczych* (Theoretical Terms in the Theory of Literature, Poznań, 1967) offers methodological analyses related to methodological naturalism, assuming the fundamental methodological similarity between theory of literature and empirical theories. T. Batóg in the book *The Axiomatic Method in Phonology* (London, 1967), covers almost all essential problems of theoretical phonology; a set of basic concepts and their axiomatic characterization are given.

S. Nowak in the book "Studia z metodologii nauk społecznych" (Studies in the Methodology of the Social Sciences, Warszawa, 1965) discusses the conceptual apparatus, construction of a theory and empirical verifiability in the social sciences; the author's aim is to realize a model of sociology in the form of a system of interrelated theories, including high-level generalizations. The problems discussed in detail are: the historical character of scientific laws, theoretical interpretation of statistical connections, empirical definability, structure of a social theory and the problem of inductionism. The logical foundations of the social sciences are the subject-matter of J. Giedymin's book *Problemy, założenia, rozstrzygnięcia* (Questions, Assumptions, Decidability, Poznań, 1964). Traditional methodology as opposed to history of science is enriched with the concept of information. The book offers an analysis of questions and answers, a generalization of the concept and procedure of appraising the reliability of informant, a discussion of various concepts of rationality and decidability of prognostic questions. The methodological works by S. Ossowski are collected in the posthumously published *Dzieła* (Works), vol. 4 entitled *O nauce* (On Science, Warszawa, 1967). The discussion of the laws of genetic systems in "Prawa historyczne w socjologii" (Historical Laws in Sociology) leads to the conclusion that the categories of law and of historical statement are not mutually exclusive. The new concept of historical generalization is introduced in terms of the notion of a system isolated in some respect in the paper "Dwie koncepcje historycznych uogólnień" (Two Concepts of Historical Generalizations). "Zoologia społeczna i różnicowanie kulturowe" (Social Zoology and Cultural Differentiation) discusses three levels of generality of statements about social behaviour of the human being. The book *O osobliwościach nauk społecznych* (On the Peculiarities of Social Sciences) is S. Ossowski's main work on methodology. An attempt is made to define the basic concepts of society and of social group, the typological diffe-

rentiations useful in analysis of definite communities are discussed, then the types of controversies on the social sciences, the evolution of the social sciences, their various functions and relations to other branches of science. A. Malewski in "Dwa modele socjologii" (Two Models of Sociology, *SS*, 3, 1961) distinguishes sociology as historical science from sociology as theoretical one by their method and subject matter.

In J. Topolski's paper "Założenia metodologiczne *Kapitału* Marksa" (Methodological Assumptions of Marx's *Capital*, *SF*, 3-4, 1969), the central idea of the reconstruction of the Marxian theory assumed by the socio-economic analysis contained in *Capital* is an activity thesis, which is given a full discussion in terms of methodology. The same author in "Integracyjny sens materializmu historycznego" (The Integrative Sense of Historical Materialism, *SM*, 1, 1965) shows the role of historical materialism as a theory with a high degree of generality in the process of scientific integration. A. Malewski and J. Topolski in "Metoda materializmu historycznego w pracach historyków polskich" (The Method of Historical Materialism in the Works of Polish Historians, *SF*, 6, 1959) characterize the method of studying the historical process. A. Malewski in "Empiryczny sens teorii materializmu dialektycznego" (The Empirical Meaning of Historical Materialism, *SF*, 2, 1957) analyses the continuity of the Marxian ideas which result in the system of three theories including hypotheses of strict universality and having regard for the postulate of empirical testability.

J. Topolski's book *Metodologia historii* (Methodology of History, Warszawa, 1968) is a monograph of inquiries upon history assuming that the development of structures is the subject-matter of history, while its method includes observation as independent of theory. The meaning and scope of the notion of methodology of history is elucidated and various types of reflection upon history as the science and the course of events are discussed. The concept of background knowledge is discussed and recommended in procedures of reconstructing historical processes. The question of the idiographic character of history is answered by an analysis of the methodological structure of history. In *Studia z metodologii historii* (Studies on Methodology of History, Warszawa, 1960) J. Topolski and A. Malewski analyse actual methods used in historical research to elucidate the problems of idiographic character of history, determination of historical facts, statistical methods and causal explanation. In J. Giedymin's papers "Z logiki wnioskowań na podstawie świadectw" (On Inferences Based on Historical Sources, *RL*) and "Authorship and Reliability of Informants" (in English, *SL*, 12, 1961) historical sources are treated as an instance of rational behaviour and the problems of authorship are discussed. The same author in the book *Z problemów logicznych analizy historycznej* (Some Logical Problems of Historical Analysis, Poznań, 1961) contributes to the current discussion on the definition and

classification of historical sources, deals with the peculiarities in inventing and testing hypotheses in the analysis of documents.

A. Malewski in his book *Zastosowania teorii zachowania* (On Applications of the Theory of Behaviour, Warszawa, 1964) offers a methodological analysis of science as a system of theorems of different levels of generality and considers the integrative function of the behaviour theory which consists in the possibility of reduction of at least some theorems of social sciences to those of the theory of behaviour. The author gives an account of applications of behaviour theory and mutual relations between it and selected social theories. J. Rejkowski in "Próba programu integracji" (A Tentative Integration Program, *SM*, 1, 1965) criticizes the above program, and a refutation of this criticism is found in J. Giedymin's paper "W sprawie programu integracji twierdzeń psychologii" (A Note Concerning the Systematizing of Behaviour Theories, *SM*, 2, 1966). J. Topolski's "O znaczeniu teorii zachowania dla wyjaśnienia historycznego" (On the Role of Learning Theory for Historical Explanation, *SM*, 5, 1968) discusses the explanatory function of learning theory and the possibility of its application.

T. Pawłowski in *Z metodologii nauk przyrodniczych* (Some Methodological Problems of the Natural Sciences, Warszawa, 1959) regards definition and classification as the most important ways of introducing scientific concepts and discusses the conditions of non-formal correctness or scientific usefulness of definition and classification. M. Przełęcki in "O pojęciu genotypu" (The Concept of Genotype, *SF*, 5, 1961) gives a critical exposition of Woodger's definition of the concept of genotype and attempts to modify it. M. Kokoszyńska, T. Kubiński and J. Słupecki in "Zastosowanie pojęć logiki matematycznej do wyjaśnienia niektórych pojęć przyrodoznawstwa" (The Application of Logistic Concepts to the Explication of Some Concepts in the Natural Sciences, *SL*, 4, 1956) intend to show the usefulness of the logical methods for the natural sciences and offer the explication of some biological concepts in terms of definition by abstraction. H. Mortimer in "O pewnej definicji genotypu" (About a Certain Definition of Genotype, *RL*) criticizes both the usefulness of the above method and the adequacy of the definition obtained in that way. The same author in "Definicja probabilistyczna na przykładzie definicji genotypu" (Probabilistic Definition as Exemplified by a Definition of Genotype, *SL*, 15, 1964) points at the usefulness and characteristic properties of probabilistic definitions. Further analyses can be found in H. Stonert's "Analiza logiczna teorii atomistycznej w klasycznej chemii" (Logical Analysis of Atomistic Theory in Classical Chemistry, *F* II) and in J. Majewski's "Miejsce fizyki wśród nauk przyrodniczych" (The Place of Physics in the Natural Sciences, *SF*, 3, 1967).

L. Nowak in *Próba metodologicznej charakterystyki prawoznawstwa* (Essay in the Methodological Character of Jurisprudence, Poznań, 1968)

assumes the thesis of methodological naturalism, i.e. that the social sciences are subject to the same methodological rules as the natural sciences. The author tries to reconstruct the theories of rational behaviour assumed by legal reasoning. F. Studnicki in „Cybernetyka i prawo” (Cybernetics and Law, Warszawa, 1969) gives the methodological analysis of legal sciences in terms of cybernetics. Further methodological analyses of legal sciences can be found in the following papers: L. Nowak, “Pojęcie obowiązywania jako teoretyczne pojęcie prawoznawstwa” (The Concept of Law Validity as Theoretical Term of Jurisprudence, *SM*, 3, 1967), L. Nowak, “Koncepcja racjonalnego stanowienia norm” (The Conception of Rational Legislature, *SM*, 2, 1966); Z. Ziemiński’s “O niektórych przyczynach dezintegracji nauk prawnych” (On Some Reasons of Desintegration of Legal Sciences, *SM*, 2, 1966); Z. Ziemiński, “Rodzaje sporów w prawoznawstwie” (Kinds of Controversies in Jurisprudence, *SM*, 4, 1968); Z. Ziemiński “O wynikaniu norm z norm” (On Consequence Relation Between Norms, *RL*); Z. Ziemia and Z. Ziemiński “Uwagi o wynikaniu norm prawnych” (On the Consequence Relation Between Legal Norms, *SF*, 4, 1964).

O. Lange in the book *Całość i rozwój w świetle cybernetyki* (Wholes and Development in the Light of Cybernetics, Warszawa, 1962) uses the conceptual framework of cybernetics for the exact and methodologically correct way of dealing with the problems of wholes and dialectical development. The same author’s book *Wstęp do cybernetyki ekonomicznej*, (An Introduction to Economic Cybernetics, Warszawa, 1965) presents the application of the conceptual apparatus of cybernetics to the analysis of economic process.

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The works on methodology will be found in the forthcoming *Encyclopedia of Logic*, Wrocław-Warszawa-Kraków, and in the following handbooks: K. Ajdukiewicz, *Logika pragmatyczna* (Pragmatic Logic, Warszawa, 1965); T. Kotarbiński, *Elementy teorii poznania, logiki formalnej i metodologii nauk* (Elements of Gnoseology, Formal Logic and Methodology of Science, 2nd ed., Wrocław-Warszawa-Kraków, 1961); T. Kotarbiński, *Wykłady z dziejów logiki* (Lectures on the History of Logic, Łódź, 1957) available in French as *Leçons sur l’histoire de la logique* (Warszawa, 1965); O. Lange, *Ekonomia polityczna* (Political Economy, vol. 1, Warszawa, 1965).

LIST OF ABBREVIATIONS

- F II *Fragmenty filozoficzne, seria II, Księga pamiątkowa ku uczczeniu T. Kotarbińskiego*, Warszawa, 1959
- F III *Fragmenty filozoficzne, seria III, Księga pamiątkowa ku czci profesora Kotarbińskiego*, Warszawa, 1967
- FSD *The Foundation of Statements and Decisions*, ed. by K. Ajdukiewicz, Warszawa, 1965
- JiP K. Ajdukiewicz, *Język i poznanie. Pisma wybrane*, vols. I and II, Warszawa, 1960, 1965
- LTN *Logiczna teoria nauki*, ed. by T. Pawłowski, Warszawa, 1966
- RL *Rozprawy logiczne. Księga pamiątkowa ku czci K. Ajdukiewicza*, Warszawa, 1964
- SF *Studia Filozoficzne*
- SL *Studia Logica*
- SM *Studia Metodologiczne*
- SS *Studia Socjologiczne*
- TiD *Teoria i doświadczenie. Praca zbiorowa*, Warszawa, 1966

