

PIAGET AND KNOWING: STUDIES IN GENETIC EPISTEMOLOGY

Edited by
Beryl A. Geber

PIAGET

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Studies in Genetic Epistemology

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 **Routledge**
Taylor & Francis Group
London and New York

First published in 1977

This edition first published in 2006 by
Routledge
2 Park Square, Milton Park, Abingdon, Oxon, OX14 4RN

Routledge is an imprint of Taylor & Francis Group, an informa business

Transferred to Digital Printing 2007

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British Library Cataloguing in Publication Data
A CIP catalogue record for this book
is available from the British Library

Piaget and Knowing
ISBN10: 0-415-40230-1 (volume)
ISBN10: 0-415-40219-0 (set)

ISBN13: 978-0-415-40230-9 (volume)
ISBN13: 978-0-415-40219-4 (set)

Routledge Library Editions: Piaget

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270 Madison Ave,
New York NY 10016

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ISBN 0 7100 8500 1

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PREFACE

There is an interesting progression to the student's contact with psychology. When the young man or woman first decides that psychology is really what he most wishes to study he is quite certain about the nature and possibilities of the discipline. Year after year interviewing prospective students one learns that psychology is the study of behaviour - hopefully human, but not necessarily so - and that it helps one to understand people. It is all so simple, so straightforward, so total. This is stage one: an understanding of psychology through a glorious global, head-on attack.

This stage does not survive long into the first years of undergraduate life. In the face of the frontal attack psychology fragments, its spurious simplicity and coherence fractured. Like a distracted traveller the student is led into by-ways and narrow alleys, losing the certainty of following a single main route. The side roads are interesting, even fascinating, but it is not always easy, in this stage of the student's contact with psychology, to bring together these separate ways into a clear topography of psychology. Increasing distinctions between the paths as they are travelled frequently produce a sense of loss, of bewilderment; there is a need to reconstruct the separate ways into a 'true' representation of the 'reality' which has been lost. And so from the distractions of stage two to the synthesis which marks stage three.

Attempts at synthesis do on occasion give new insights into psychological processes. But they commonly serve a more important function - they allow the student to feel the master of his subject, to attain a sense of competence and of operative under-

standing. Synthesis also marks the gaps, inconsistencies and the inadequacies in current theory and research which may not appear until it is clear that the parts do not fit together into an acceptable facsimile of the conceived whole. It is from these discrepancies, discovered in attempts at synthesis, that new research can arise.

The fourth stage in the student's contact with psychology marks a return from synthesis to fragmentation. A discrepancy, a problem of some sort, is now dissected, its minutiae examined, its structure and mode of functioning put under the intellectual microscope. The focus is narrow, penetrating. It is this stage that characterises empirical psychology.

Quite often the student, his headlong assault on psychology leaving him holding but a segment of the whole, finds the process of synthesis almost impossible. And the researcher and teacher, absorbed in the challenging details of their researches, are not always able to help put the parts together again. For the research psychologist too, working along a fairly narrow problem-bounded part of psychology, what is happening outside his immediate area of interest is often unknown, and the relation of his work to other developments in psychology is not always clear.

It was these twin problems - helping students synthesise separate aspects of psychology and, as research workers, familiarising each other with our own thinking - that prompted the series of seminars on which this volume is based. It represents an integration of a number of separate researches all of which are concerned, in one way or another, with the basic problem of how we know. This book, like its associated seminars, represents not only the interests of the authors but also the needs of students, both undergraduate and graduate, for whom it has been prepared.

The seminars were held in the Psychology Department at the London School of Economics and Political Science, and drew upon only a portion of those psychologists who were working in this, and related areas. Its aim was to focus on synthesis through examination of the relevance of the theories of Jean Piaget to particular research areas in psychology.

This is not the first volume to owe its existence to the impetus given to psychology by Piaget. It will certainly not be the last, nor the most comprehensive. What it aims to do is to present an integration of some of the research problems that are current by showing how each is concerned with the problem of knowing and

understanding and how together they throw light on some of the issues raised by Piaget.

The London School of Economics was a particularly appropriate venue for these seminars concerned as it is with the social sciences. It is these disciplines that reflect our conception of the workings of society, be the context political, economic, geographical or sociological. What the seminars aimed to do was to investigate some of the psychological processes involved in the development of our conceptual system. As we shall later argue, one of the major implications of psychological studies of cognition after Piaget is that the way we conceive of our world, particularly the causal relationships we imply, reflects closely the current status of our view of the development of knowledge.

The preparation of this book has involved many people. Each of the contributors has been aided by research assistants or associates and many of the papers reflect comments and criticisms made during their presentation at the seminar series. As editor I have been encouraged by the patience and forbearance of all my co-authors. I have been particularly fortunate in being able to call on Professor Norman Hotopf, who organised the initial seminar series and whose brain-child this volume is, for help and advice. Dr Peter Wason, whose kindness resulted in his being especially consulted, is owed particular gratitude. I should like also to thank Routledge & Kegan Paul for permission to publish in slightly altered form Roger Holmes's paper from 'Legitimacy and the Politics of the Knowable', London, Routledge & Kegan Paul, 1976.

My colleagues in the Department of Social Psychology at the London School of Economics have shown considerable interest in this volume and have been encouraging when the inevitable crises occurred. To all of them, to the secretaries who have prepared the manuscripts, and to Michael, Jan and Nicholas who were always around, my thanks.

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INTRODUCTION: ON KNOWING

Beryl A. Geber

This is a volume concerned with the question of knowing, with how we realise and understand the world around us, both physical and social, concrete and abstract. The immediacy of many of our transactions with the world, and indeed with each other, masks the complexity of the process by which these transactions occur. Whether tinkering with motor-car engines, or working out new recipes in the kitchen, budgeting our expenditure to fit our income or reading a novel, we are engaged in making assumptions on the basis of our knowledge and adjusting our expectations in the light of what actually, or even potentially, happens. Even in less obviously intellectual pursuits, such as recognising objects or trying to catch the eye of a busy shop assistant, the observed action is based on sets of relatively complex, interlocking expectations. The speed of many judgments and decisions belies the complexity that goes into their making.

In a similar fashion the certainty with which we decide on a course of action or with which we assign labels to objects and assign objects to categories belies the changing nature of the assumptions on which they are founded. We are all aware of the charm and humour of the child's errors in thinking: that water poured from one beaker into another taller and thinner is now *more* water, that the sun is called 'sun' because it *is* the sun and shines. We expect these oddities in childhood, we expect them to disappear in adulthood. These are clear alterations in the structure of the concepts on which we base our assumptions. Yet even as adults the forms of our thought are not static, and certainly historically thought and knowledge, in its content, has undergone change as remarkable as that of child to adult.

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How we achieve knowledge and the nature of the corpus acquired have been matters of concern to philosophers and scientists throughout time. This is not the place to summarise the history of their speculations and conjectures, nor to describe the methods devised for their testing. What is worth noting, however, is that the psychologist, studying the process of knowing - both the acquisition and the use of knowledge - does so against a long and honourable tradition.

The concern with knowing, with the process of cognition, is central to psychology. It is central not simply because we need to understand the operation of this process within the context of the subjects of our discipline, but also because understanding the growth of knowledge and the process by which we know reflects back onto the status of the discipline of psychology itself. Whether it is unique in this regard is a matter of speculation, but certainly the study of knowing has a reflexive function for psychology. The status of our own data, of our own speculations and research, is affected by the evidence that we accumulate about the development of knowledge in the individual.

The idea that understanding the process by which the individual acquires knowledge can illuminate the more general epistemological process is an important one, and one that reflects the debt that we owe to Jean Piaget. For Piaget the study of the development of knowledge in the individual through his life space is an important method for investigating the more extensive issue of the development of our epistemological system - 'the problem of knowledge, the so-called epistemological problem, cannot be considered separately from the problem of the development of intelligence' (Piaget, 1970, p. 704).

The relevance of studies of cognition for psychological theory is therefore twofold - it describes and explains the processing of information by the individual and his development and utilisation of knowledge and reflexively illuminates the processes by which psychological knowledge is constructed. There are implications for the body of psychology in the models we build of cognitive functioning. And, of course, the opposite also applies. The concern of psychologists for a science based on observable public data leads not only to suspicion of the mental and mentalistic, but also to a model of behaviour and of cognition which is distinctly mechanistic. A mechanistic predictive discipline describes mechanistic predictable responses.

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There are inherent limitations in the mechanistic model, even in the area where it has traditionally had strong support, namely learning. Recent evidence from learning studies strains considerably the assumptions on which this model is based (see Sameroff 1971, for a discussion of this), and certainly in describing the development of knowledge the model is not of great value. And yet, discarding the model may well mean altering our ideas about the nature of psychology itself. If we are to support a transactional, or even a dialectical model, where the subject and the object define each other and can alter their nature in the process thereof, what does this imply for the nature of psychology?

We are only now beginning to understand the full impact on our scientific assumptions of a general system's theory such as that of Van Bertalanffy. And of a perspective such as that of Piaget's: 'the limit between subject and object is in no way determined beforehand and what is more important, is not stable' (Piaget, 1970, p. 704). This perspective, which implies that objectivity is in no way an initial property, demands the notion of knowledge being constructed out of the interaction between subject and object. The structures so constructed are not given in the objects, nor in the subjects, but in the interactions between them. What students of cognition now have to do is to explicate the process by which structures are built, understand the organisation of such structures, and account for both their stability and change.

Mechanistic models, tied to the observable, suspicious of the mentalistic, can only aim for descriptive representations of the psychological visible. To use a term of Piaget's (Piaget, 1970, p. 717), they are indices, signifiers that are not differentiated from their significant and imply a relatively static view of knowledge. What these cannot do is account for change - knowledge, both personal and psychological, is seen as a fact, not as a process.

Throughout his exceptionally productive career Piaget has charted the development in the child of particular types of intellectual structures, concentrating on the dynamic processes by which these come about. The process is anchored on the one hand to the biological evolutionary history of the species and on the other to the historical and cultural milieu within which life occurs. This duality, looking both to biology and to society, permits his theory

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great explanatory range. It can be of relevance to the student of perception, of memory and of learning as much as to the student of language development, of education and of social behaviour. Piaget's writings serve admirably as a structure on which one may attempt to synthesise and integrate separate strands of development in psychology itself. The theories have value not only in themselves, not only in their reflexive impact on psychology but also as a bond between separate strands of psychological endeavour. The chapters which follow will reflect this commonality.

The tributes to the work of Piaget are to be found not only in the volumes analysing his theory and presenting supporting research, but also in the number of simplified descriptions of his theoretical position provided for teachers, social workers, laymen and even psychologists. A further description in the context of this book seems redundant. Individual authors will be drawing attention to specific aspects of the theory relevant to their own research. There are, however, certain assumptions about the development of knowledge which Piaget makes, which should be discussed in order to provide a frame for the separate papers. It is also important to emphasise that the theory of Piaget is constantly being modified. Piaget has referred, quite rightly, to himself as 'one of the chief "revisionists of Piaget"' (Piaget, 1970, p. 703). It is one of the excitements of working in this area that there is a fluidity, a sense of movement and of change, in the relationship between the theory and the research.

Piaget's theory assumes that the same explanation is involved in three processes: the adaptation of the organism to its environment during growth, the adaptation of intelligence in the course of the construction of its own structures, and finally the establishment of epistemological or cognitive relations. All of these involve sets of structures constructed and continuously reconstructed in interaction between the subject and the external world. The central concept of the theory is that in order to know something one must act upon it and therefore transform it; and related to this, that structures are the result of construction. 'The living organism is not a mere mirror image of the properties of its environment. It evolves a structure which is constructed step by step in the course of epigenesis ...' (Piaget, 1970, p. 705).

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Piaget has described the development of structures, through the processes of assimilation and accommodation. Assimilation is the integration of external elements or input into existing structures. All behaviour, in his system, is grafted onto existing structures, and therefore involves assimilation. If however only assimilation were involved we could not account for change or development: for Piaget there can be no assimilation of input to existing structures without these structures being modified thereby. This counterpart to assimilation is accommodation and refers to the modification of a structure by the elements it assimilates. Cognitive adaptation consists of an equilibrium between assimilation and accommodation. The ratio of accommodation to assimilation in any activity may vary 'but as long as assimilation and accommodation are in equilibrium ... we are back in the proper domain of intelligence' (Piaget, 1970, p. 709).

The fundamental equilibrium between accommodation and assimilation is attained with greater or lesser difficulty depending on the level of development reached and the nature of the problems encountered. The theory describes the process of stages of development necessary for the attainment of true or proper intelligence. Research by Piaget and his associates has traced the developmental stages or principal periods of development, in the construction of knowledge of space, time, movement, number, cause and so on. Integrated into the general theory are the processes of language, play, imitation, perception, memory and representation, so that the theory, although frequently variously interpreted by others, presents the potential for linking many different lines of psychological endeavour.

It is worth mentioning a distinction that Piaget makes between two types of knowledge - operative and figurative. The operative aspect of knowledge refers to those activities that attempt to transform reality whereas the figurative only attempt to represent reality as it appears. The first embodies what Piaget calls the 'knowledge-as-assimilation' hypothesis (Piaget and Inhelder, 1971, p. 384), the second is 'knowledge-as-copy'. For Piaget's theoretical system the distinction between these two aspects of knowledge is critical, and although both theses (knowledge-as-assimilation and knowledge-as-copy) share the hypothesis that the object exists, they differ in the way they regard our acquisition of knowledge

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of that object. If one accepts the knowledge-as-copy view then the perception of, and image induced by, the object are sufficient to provide knowledge and all that action does is to smooth out the errors which might occur; the epistemological problem is that of matching the phenomenon and its image.

The operative aspect of knowledge, however, assumes that one knows the object by acting upon it in order to transform it, and that one discovers its properties through these transformation. Cognition is not based simply on the object but on the interaction between the subject and the object 'resulting from the action and reaction of the two' (Piaget and Inhelder, 1971, p. 387). It refers to two types of acquisition, one relating to the interconnections between properties of the object, the other to the co-ordination of the actions themselves, which need to be structured - 'the laws of the object are only discovered and established through the instrumentality of the operational structures, since they alone make possible the processes of relating or corresponding ...' (Piaget and Inhelder, 1971, pp. 387-8).

Both these aspects of knowledge, the figurative and the operative, are involved in cognition, but imply different things and emphasise different elements. They do, however, interact in so far as the operative function serves in the structuring of the figurative aspects, and for Piaget knowledge always presupposes the intervention of action; knowledge is not a passive copy of external reality, but transcends and transforms it.

We therefore have a theory of knowledge which emphasises the active construction of knowledge, the interaction of the subject and object. Knowledge develops, it is a dynamic process, influenced both by the social environment and the process of maturation. The process of development is an invariant sequence of stages, with each stage necessary for the formation of the next; the basic processes of assimilation and accommodation would demand this much.

This dependence of the stage on the antecedent ones emphasises the advantages of a developmental, ontogenetic approach to cognitive functioning. The understanding of what occurs at one moment in time is enhanced by what came before and what follows, and indeed it is conceivable that only by putting a behaviour into a time context can it be fully understood. Because psychological processes are complex and multi-determined it is always tempting in trying

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to understand them to separate them from their time-space context. Indeed, it is tempting too, to separate processes from each other, perception from memory, memory from language and so on. This time-space isolation is perfectly legitimate but unless one recognises that this separation has occurred it is possible to misinterpret one's observations.

Many actions which are taken to indicate deep-seated, constant personality traits, may be more appropriately explained by reference to the social context; it is shown in studies judging emotion from photographs that accuracy is increased by knowing the situation in which the photograph was taken, and by knowing the preceding condition of the subject. Errors of interpretation can be minimised by increasing the contextual information against which judgment is made. This is not to deny value to studies which ignore contextual issues, only to point to their limitations.

In a similar fashion it is possible to examine psychological functioning without reference to a time dimension: there are however insights which are best afforded by the use of an extended time period and an examination of development and change during that time. There is nothing discreditable in ignoring the developmental perspective, but it remains true that certain questions are best answered by reference to this perspective. Take, as an example, the vexed question of the relationship between language and thought.

It is certainly clear from the literature that many of the major theses about the question of linguistic determinism or of cognitive independence from the mould of language were posed without recourse to observation of children, and answered similarly. However, it is also equally apparent from the recent exciting advances in studies of language and thought that utilising a developmental perspective provides a dimension which considerably sharpens the evidence on which to base one's eventual conclusion. Similarly, social psychologists have asked and answered questions about the relationship of the individual and his group without examining changes in this relationship over time, particularly over the individual's life span. This is not to say that they have ignored children, but rather that they have regarded children as adults manqués. And very often children have been studied simply because they were available and not for any theoretical reason. They never questioned whether

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groups of children were equivalent to groups of adults and whether the dynamic processes within these groups are similar. Even though the evidence may indeed support the view that groups of children are not really different from groups of adults, what is important is that the idea of a developmental relativity was not even raised. Concern with outcome rather than with process, is often associated with a mechanistic model even though lip-service may be paid to the dynamic processes within the group. And it is not only social psychology that can be faulted: many other studies of children do not adopt a long time-scale, allowing for a truly developmental perspective. The implications of their observations for psychological theory are therefore often obscure.

The link between social psychology and development has been forged on two levels. The first refers to anthropological literature and makes assumptions about societal change and economic development: McClelland and Atkinson's work on the historical and social correlates of achievement motivation is one such example. Making cross-cultural reference or examining developments within one social group over a period of time demands the adoption of a dynamic framework of analysis, and this implies that we can specify antecedent and consequent conditions. It is sometimes easier to do this if one assumes that these sets of conditions are themselves fixed and unchanging: indeed we frequently in our socialisation prepare children for yesterday or today, rather than for an as yet unknown future. This idea that development is the process of movement between two fixed points may allow for a spurious dynamism within a closed system, but not for the uncertainty of change and growth within an open one.

The second link between development and social psychology is forged through the individual, though concern with the mechanisms and processes of socialisation. Traditionally socialisation theory espoused a model of the passive child moulded by the active society, a mechanistic rather than a dialectic approach: it was essentially an environmentalist view of growth. Recent research has moved the nature-nurture pendulum back to the nature end of the continuum, and the evidence both of the competence of the infant and the orderliness of development have demanded a change in the assumption of the inertness of the infant. The overall, orderly pattern of development reported by Piaget has, as Kelvin (1970) has shown, important

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implications for the social psychologist's interpretation of socialisation. Kelvin suggests that whereas socialisation, that is adjustment to, and adoption of, group behaviours and attitudes, continues throughout life it takes different forms in childhood from adulthood - 'the child becomes socialised by accepting norms of behaviour; the adult becomes socialised by accepting norms concerning values' (Kelvin, 1970, p. 271).

The transition between these two types of socialisation may well be better understood by reference to Piaget, more particularly to the change from specific concrete and action-related relationships which characterise early thought to thought which is more general, abstract and transcends immediate environmental constraints. The implication of this change, as Kelvin indicates, is that 'The child has ... to learn *what* to do before he has the capacity to reason out fully *why* to do it' (Kelvin, 1970, p. 272), and further

he has to start to cope with the demands of the social environment long before he can fully understand the reasons for these demands ... he has to learn to act as if he accepted the values of his community or culture, long before he can have any notion of these often highly abstract values (ibid.).

The implication of this developmental change for social behaviour and social cognition is only now slowly being understood. It raises a number of questions about social control, about responsibility and about the conception of the social reality. It also raises points about social behaviour and social norms; answering these questions would propel us forward in our conceptualisation of social man.

Whenever we have had to consider questions about the nature of man it has proved necessary to look at the very earliest behaviours available to us. There is no value in looking at an ancient, much experienced, well-lived, old gentleman to resolve the issue of the relative contribution of heredity and environment to behaviour: nor is there much value in examining only one such case. It has been shown necessary to look at the responses of new-born infants in many situations and contexts in order to begin to establish the limitations and flexibility of the infants' capacities. Similarly, we can only gain a limited insight into the social nature of man - whether he is unquestionably social or has to learn to become so; whether he is 'naturally' selfish and aggressive or whether

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society makes him so - by ignoring developmental changes. The choice between viewing man as did Rousseau or as did Hobbes can be debated and argued with reference to personal ideology: it can only be sustained by observation of the developing human. In arguing for the use of an historical perspective in understanding the family and the relationship between parents and children, Philippe Ariès (1962) writes

I can tell the particular nature of a period in the past from the degree to which it fails to resemble our present. This dialectic of past and present can be fairly safely neglected by historians of 'short periods' but it must be used in the study of manners and feelings whose variations extend over a 'long period' (p. 9).

It can justifiably be argued that understanding man demands a similarly time-related study.

The implication of all of this for psychology shows our indebtedness to Piaget. Piaget is certainly not unique in calling for studies of change over the individual's life-span, nor even in suggesting that a developmental perspective is essential for understanding intelligence and epistemology. Werner and Bruner amongst others lay stress on describing the pattern of development and explaining the ontogenesis of relatively mature cognition. Where Piaget makes his particular contribution is in the range of problems and the variety of areas to which his articulated theory can be applied. We are indebted to him in bringing to our attention the potential for relating a number of separate psychological processes and domains of content directly, as well as through a developmental perspective.

Understanding cognition, discovering the stages involved in getting to know the world in which we live and understanding ourselves as well, examining the historical and the life-space context of change and of growth, these are some of the benefits Piaget's writings have brought. But theories adjust to information and to criticism in a manner analogous to that of the accommodation of schema. The theory, like all scientific theories, must be amenable to testing, to change, to falsification. In the papers that follow a number of such examinations are presented; they are presented in an order which reflects the matters raised in this chapter.

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Part one

COGNITION AND EPISTEMOLOGY