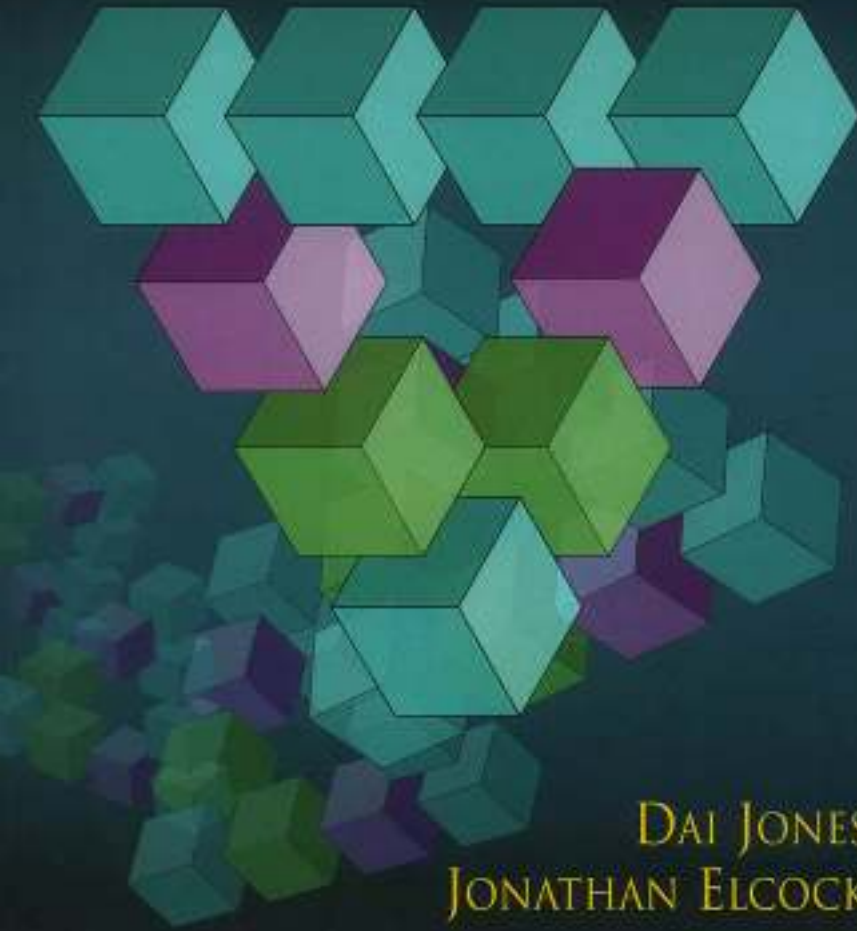


HISTORY AND THEORIES
of
PSYCHOLOGY

A CRITICAL PERSPECTIVE



DAI JONES
JONATHAN ELCOCK

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A Critical Perspective

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PREFACE

The nature and aims of this book are detailed in the introduction. Here, we want to take the opportunity to thank all those involved in helping its production. We would like to thank our students for acting as guinea pigs for some of the ideas and material contained within, particularly those studying the modules *Psychology and Social Issues* and *History and Theories of Psychology*. We would also like to thank Jo Shutt for allowing us to make use of material collected for her final year project, which comprises part of Chapter 6. A number of authors have been important in shaping our ideas, but we would particularly like to acknowledge Graham Richards for his support in our development of a critical, historical curriculum, and for his support in the preparation of the book proposal. In acknowledging support, we would like to thank our friends and families for their forbearance during times of stress, and our college for giving us the freedom to develop these ideas within the curriculum and for their practical support and encouragement in producing the book. Particular thanks go to our publishers for taking a chance on unknown authors, and for putting up with more than one missed deadline. Finally, our thanks to Kati Gegen for her support and patience in proof-reading the manuscript. As usual, any errors and omissions are the sole responsibility of the authors.

Dei Jones
Jonathan Elcock
April 2001

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INTRODUCTION

OVERVIEW

This book is intended in part as a history of Psychology, but not as a complete history – the coverage given is partial and truncated. (In the current volume, we follow the convention of Richards (1996), in using 'psychology' to refer to the subject matter of psychology, and using 'Psychology' to refer to the discipline that studies that subject matter.) A large number of histories of Psychology are available, varying in scope of coverage, and in the approaches taken by the authors. For the current volume, we have decided on a limited coverage of the historical development of the discipline, allowing space for a greater discussion of contemporary Psychology than is normally the case. Thus rather than presenting a detailed history of Psychology, and concluding with a chapter describing contemporary Psychology, we present an overview of the history of Psychology, and give detailed coverage of issues of debate within contemporary Psychology. The choice of historical material has been directed by our interests, and also to highlight the central argument of the book, that the development of the discipline has been, and continues to be, contingent on a wide range of factors. Having said that, we believe that the presentation of the history of Psychology given here is both valid and valuable, for the reasons given below.

In addition to being a history of Psychology this book is a resource for critical Psychology. A major focus of the book is on investigating a number of issues and debates within contemporary Psychology. In doing so, we draw on a wide range of sources and arguments, including those within the discipline and from related disciplines such as philosophy and sociology. We also consider the variety of contexts within which the discipline has developed and is currently developing. Examining the history of Psychology provides a framework for the approach to critical Psychology that the book adopts. Thus we start by considering how Psychology has been shaped in the past by a variety of factors, and then show how similar forces are operating on the contemporary development of the discipline. This book is therefore more than a history of Psychology. As suggested in the preceding paragraph, the book is

a combination of a critical history of Psychology, and a critical look at current issues in Psychology. We believe that the history of the discipline provides an important resource for critical psychologists, in that it provides a rich set of material for the practice of metatheory. In the remainder of this introduction, we shall justify this by defining some of the terms used, and drawing together our arguments. This, we hope, will prepare you for the approach we are taking to the book. Over the course of the book as a whole, we hope to provide plenty of evidence as to the validity and value of the approach.

What Is Critical Psychology?

Different psychologists use the term 'critical Psychology' in many different ways. Before looking at the value of studying history as a resource for critical Psychology, it is important to be clear what sense of the term we are using. Here, we will review some approaches to critical Psychology. What unites these different approaches is a degree of rejection of mainstream Psychology, so we will start by considering what 'mainstream' Psychology is.

Fox and Prilleltensky (1997) describe mainstream Psychology as a view of Psychology as a science conducted by objective researchers and practitioners who uncover the truth about human behaviour. This form of Psychology, they argue, is that which is most often taught in institutions, and practised by applied and research psychologists. This view holds the practice of Psychology to be value free, and unaffected by what might be termed extradisciplinary concerns.

In contrast, there are a number of positions, described as critical Psychology, that reject this view of Psychology as an objective science conducted in isolation. Critical Psychologies variously emphasize the influence of a range of factors in shaping the development of the discipline, the reflexivity of the discipline itself, and the sociopolitical consequences of psychological theory and practice. We will discuss these various forms of critical Psychology in two coarsely defined groups: political critical Psychology, and metatheoretical critical Psychology.

An important aside here is to note the debate around the identification of internal and external factors. In a naïve view, it is possible to identify discrete factors influencing the development of the discipline, some of which are internal to the discipline, and others of which are external to the discipline, these factors having largely discrete effects. It seems more reasonable to say that there is a range of factors influencing the discipline, which vary in the degree to which they are identified as important to Psychology. Further, these forces act interactively and reflexively.

Political critical Psychology is concerned with developing a Psychology that has themes of social justice, the welfare of communities, and altering the status quo of society in general and Psychology in particular (Fox and Prilleltensky 1997). Such critical Psychologies discuss the nature of mainstream Psychology in these terms, with an emphasis on achieving change. Examples of this kind of critical Psychology include feminist Psychology and many forms of discursive Psychology.

What we (cautiously) term metatheoretical critical Psychology has a more academic concern, and is less concerned with effecting change, although the work of political critical psychologists is an important resource. Metatheoretical critical Psychology is particularly concerned with assessing the adequacy of theory, method, and practice within Psychology. This approach aims to encourage a stronger appreciation of the strengths and weaknesses of particular approaches and theoretical positions in Psychology, and emphasizes the need for contextual and integrative interpretation. Writing as lecturers, we see this as not only a more realistic approach to the subject matter of the discipline, but also as a valuable intellectual approach in its own right.

Approaches To History

A number of approaches to history have been identified, for example, by Richards (1996), which will be briefly summarized. Old style histories tended to have a narrow, intellectual focus, tracing the circumstantial development of the discipline. They were largely celebratory (or Whiggish, or progressivist), describing development as a progressive process of finding the truth. Such histories generally overlooked the wider context in which the discipline developed. Such an approach might be described as internalist (in contrast to externalist, but see above). In such histories, the progressive development of the discipline occurred in intellectual and cultural isolation, and so was (implicitly) immune to contamination by outside forces. Presentist histories are histories in which the author's theoretical position represents the truth, and are generally written to show previous theories as a developmental process leading to this true position. Such histories fail to accept that the present theoretical orthodoxy may be no more valid than previous orthodoxies, which were themselves viewed as the true position by the presentist historians of the time.

Recently, a number of alternative approaches to history have been adopted. Particularly interesting are revisionist and anti-revisionist histories, and what might be called new history, all of which are discussed below. These histories share, to varying degrees, a rejection of the progressivist and internalist approach, but the presentist approach is harder to avoid – it is clearly impossible to write history from anything other than the present. Even so, it is important to avoid the trap of discussing contemporary theories as largely true.

There are a number of reasons why we might want to study history. Briefly, and looking, for now, at the study of history in its own right, we can identify:

- 1 Interest
- 2 Understanding

One way to appreciate the nature of the discipline is to examine how it got to be the way it is. Thus we can look at the questions that have been asked about psychological issues, and the ways in which the questions have been addressed, as a way of understanding current work in Psychology.

3 Learning the Lessons

In Psychology, theories come and go, as do methodologies. By studying the history of Psychology, we can learn the lessons of the past. If we are replacing previously accepted theories or methodologies with new ones, we have to address the difficulties that led to the rejection of the old. For example, introspection was criticised as being subjective, so any replacement had to not be (overtly) subjective. More importantly, however, sometimes theories or methodologies are revisited, and when they are accepted anew it is important to improve on any previous weaknesses, as is currently the case in neuropsychology. Relatedly, previous theories or methodologies may have been rejected prematurely, and with hindsight the values of those theories can be seen, for example, the work of Bartlett.

4 Critical Understanding

Understanding how psychology got to be the way it is is all very well. However, studying history offers far more than this. In particular, by studying history we can benefit from hindsight, and use this perspective to examine the way in which the development of theories in Psychology is dependent on a range of factors, most of which have little to do with the subject matter itself.

Having looked at the types of history that are pursued, and looked broadly at the reasons for studying history, it is important to consider the rules that history can play. Historical accounts are not neutral, and involve some degree of selection of focus and choice of interpretation. Mainstream Psychology is often seen as being supported by a certain type of history – the traditional, celebratory, history that serves to justify the status quo, making it seem the inevitable consequence of a progressive development. Clearly, such histories are necessarily intellectual.

Just as mainstream Psychology is supported by traditional histories, so is political critical Psychology supported by critical histories, most notably those written from a feminist perspective. However such histories, in seeking to challenge the mainstream, run the risk of being revisionist. For example, Leon Kamin, and Stephen Jay Gould have both been accused of revisionism (Harris 1997), for *The science and politics of IQ* and *The mismeasure of man* respectively.

Critical histories need not necessarily be revisionist. Harris describes the programme of the new history of Psychology that tries to be more contextual, more inclusive, and avoidant of the problems of celebratory and revisionist histories. This kind of history, with an emphasis on social context and political concerns, is of great value to political critical psychologists. Of particular interest to us as metatheoretical critical psychologists is the question, what role can history play in supporting our work?

History As Metatheory

In looking at the value of history to metatheoretical critical Psychology, we shall consider two particularly good examples of Harris's new history –

Danziger's (1990) *Constructing the subject*, and Herman's (1995) *The invention of American psychology*. Danziger's book focuses on the way in which Psychology has created its own subject matter, and particularly on the way in which much of what is now accepted as a necessary component of psychological research is a social construction. As such, this historical approach provides valuable insights into the nature of methodology within Psychology, as a counterpoint to the orthodox presentation of current methodology as the right way of conducting psychological research. Herman's book focuses on the role of psychologists in the pursuit of political and cultural authority, and the impact of this pursuit on the nature of theories produced. Rather than presenting Psychology as a tool of authority, however (as revisionist histories might do), she emphasizes the reflexive relationship between the discipline of Psychology and the sociopolitical context within which Psychology is studied and practised.

Both books are good examples of the use of history for the purpose of critical understanding, as described previously. They show how the current orthodoxy in Psychology is the result of a range of contingent factors, rather than some inevitable outcome. These books look at single issues. A similar approach, applied more widely, is used in Richards's (1996) *Putting psychology in its place*.

A critical understanding of the development of contemporary Psychology is fundamental to our metatheoretical critical Psychology, and critical histories are essential in providing this understanding. However, we take the approach further. Having used a historical perspective to demonstrate the factors underlying development and acceptance of theoretical positions, we can use the same techniques to consider issues of debate in present-day Psychology, showing that the same forces are in operation in the ongoing development of the discipline – clearly this involves a rejection of the view of contemporary theories as true. We feel that this approach to the study of Psychology is valuable and powerful, both in terms of developing a clearer view of the nature of Psychology, and in terms of promoting critical engagement with the discipline in students. To quote Harris (1997), 'through historical awareness, it will be easier to critically view what is taking place today'.

ABOUT THE AUTHORS

It is conventional in introducing a text to give a little background information about the authors, either to satisfy the curiosity of the reader or to convince the reader of their credentials. While both are valid purposes, we believe the provision of background information plays a more important role. As stated above, and as will be emphasized in later chapters, any history, and indeed any piece of writing, is necessarily partial, and will necessarily be influenced by the positions of the authors. In order to take account of this, it is necessary to provide information about the authors to enable the reader to judge how the authors' position has influenced the writing. Here, therefore, we will introduce ourselves and attempt to explain how our views have influenced our writing.

We are both lecturers in Psychology at Cheltenham and Gloucester College of Higher Education (CGCHE). I (Dai) am currently, and Jonathan was formerly, course leader for the undergraduate programme in Psychology. My background was originally in computer science, moving into Psychology via an MSc in cognitive science and research in artificial intelligence and cognitive linguistics. I joined CGCHE as a postgraduate student in Psychology before accepting a position there as a full-time lecturer. In studying cognitive Psychology, I was struck by the reliance of conventional cognitive Psychology on particular philosophical positions, and particular modelling techniques and assumptions. My interest was in how such positions and assumptions came to be adopted, having concluded for myself that alternatives were more plausible. In particular, I am connectionist rather than symbolic in my approach to cognitive modelling, and this position has a reflexive relationship to my positions regarding philosophy of mind, and the metaphors underlying cognitive Psychology. Considering such issues necessarily leads to a degree of intellectual metatheoretical criticality. In addition, although my expertise is in the cognitive domain, I am of course influenced by my political beliefs, which are to the left of centre. A combination of concern about the uses Psychology is put to in support of antithetical (to me) political positions, and a nascent metatheoretical criticality, has led me to a broader criticality. Pursuing this interest introduced me to a range of valuable historically based critical material, which hinted at the value of history for metatheory.

My (Jonathan) background is more conventionally psychological than Dai's. I came to Cheltenham and Gloucester the year before the full Psychology degree began. Although my background was more cognitive than social that year (1992) the original course leader was internally promoted, leaving me as both course leader and without a social psychologist. After a year where I taught traditional social psychology I rapidly developed an interest in the, then new to me, challenges to social psychology that discourse analysis presented. That led me towards social constructionism and critical Psychology, two areas that seemed much more consonant with my general views on politics and how things work than mainstream Psychology. For me history is a part of the solution to the puzzle 'just why are things constructed as they are?'

BOOK ORGANIZATION

As the title suggests, the book is in two parts. The first part, comprising eight chapters, gives an overview of the history of Psychology. Starting with a survey of approaches to history and the philosophy of science, the following chapters give a partly chronological, partly topical, coverage of the development of Psychology. Thus we trace the factors influencing the founding of Psychology as a particular kind of discipline, and the subsequent rapid and early development of a range of different approaches in academic Psychology, up to 1945. We then look at the concurrent development of

applied Psychology, and more closely at the relationship between the psychoanalytic movement and disciplinary Psychology. We finish this time period by looking at the relationship between Psychology and wider society, looking at the reflexive relationship between the two, before going on to look at postwar developments in social and cognitive Psychology. This part of the book will be of particular interest to those interested in the history of Psychology, but as discussed above, the emphasis will not be on tracing the chain of events, but rather on identifying the contextual factors influencing the ongoing development of the discipline.

The second part of the book, comprising seven chapters, looks at a range of issues in contemporary Psychology. In general these chapters can be read in isolation, although there are links between some – these are highlighted in the text. We start by looking at the relationship between Psychology and minorities, including an appropriate historical perspective. We then examine the nature and role of contemporary Psychology, and the tensions operating within the discipline. In part, this chapter marks out the territory to be traversed by later chapters. We then consider current debates around folk Psychology and advocate a closer examination of the content of people's everyday psychologizing – a topic sadly overlooked by much academic Psychology, which leaves a gap to be filled by popular psychology. Following this, we look at methodological issues in contemporary Psychology, and conclude by considering the major branches of modern Psychology, cognitive, and social. In each of these, we critically examine orthodox positions and assess alternative views. The range of issues considered are those that most interest or concern us as authors – different authors would have chosen a different set of issues.

Throughout the book, the intention of each chapter is to act as an introduction to a particular area, rather than as a complete coverage. The intended audience is advanced undergraduate students, who already have some knowledge of the nature of Psychology. To this end, the coverage is intended to be accessible, to favour breadth over depth, and to emphasize arguments and debates rather than description. This means that some readers, particularly colleagues, may find the coverage to be incomplete, and lacking depth. We apologize for this, but we believe it to be a necessary consequence of our audience design. It is expected that having read these introductions to particular topics, the reader will go on to do further reading in the area. To facilitate this, each chapter concludes with a selection of recommended further reading.

FURTHER READING

- Benjamin, L. (ed.) 1997: *A history of psychology: original sources and contemporary research*, 2nd edn. Boston: McGraw-Hill.
- Brentman, J. 1998: *Readings in the history and systems of psychology*, 2nd edn. Upper Saddle River, NJ: Prentice-Hall.

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- Rox, D. and Prilleltzky, I. 1997: *Critical psychology: an introduction*. London: Sage.
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- Lashley, T.H. 2000: *A history of psychology*. Englewood Cliffs, NJ: Prentice-Hall.
- McGhee, P. 2001: *Gambling Psychobiologically*. Basingstoke: Palgrave.
- Richards, C. 1996: *Putting psychology in its place*. London: Routledge.
- Valentine, E. 1997: *Conceptual issues in psychology*, 2nd edn. London: Routledge.

HISTORY AS METATHEORY

INTRODUCTION

The purpose of this chapter is to construct the foundations underpinning our critical approach to Psychology. In many ways it is the most abstract chapter of the book. In the remaining chapters we aim to use history as metatheory and in order to do this we need to understand some of the ways that the sciences, including Psychology, can be seen as social activities. Thus in this chapter we intend to review the ways that science can be regarded, the ways in which history of science can be studied and come to a position that allows us to develop a critical approach to Psychology using history. To some extent we acknowledge that this review is limited and we do not go deeply into the complex philosophical arguments that surround the topic. At the end of the chapter is an annotated bibliography that should guide interested readers towards this fascinating literature.

In developing an approach to history we also develop an approach to science, science as a social activity. To some extent these notions are intertwined, so the bulk of this chapter will explore investigating science as a social activity.

GENERAL ISSUES WITH APPROACHES TO HISTORY

Harris (1997) suggests that there are three ways of writing histories of Psychology, celebratory histories of Psychology, revisionist histories of Psychology and finally critical histories of Psychology.

Without wishing to denigrate the considerable scholarship of many of the early works in the history of Psychology, the majority of them were celebratory histories and suffered two major defects. The first is the *presentia* bias, the tendency to write a history to justify the current status quo, also known as *Whig history* after the tendency to believe that history was inevitably progressive and so the current state of affairs must be the most advanced. The second was a tendency to be *internalist*, that is little attention was paid to the

various influences from outside of the discipline and was concentrated on the history of theoretical change within the discipline as if it was only driven by empirical and theoretical change.

One possible reason for this was the need for Psychology, or the 'new Psychology' as proponents called it, to represent itself as a coherent discipline with both an intellectual history rooted in western philosophy and a scientific approach that rendered it both separate and superior to other approaches.

While scholarly works on the history of Psychology did not always suffer from these problems the majority of students' first acquaintance with the history of Psychology, often in the first chapter of an introductory textbook, almost certainly suffers from these biases in their most extreme form. While there may be a pedagogical reason for treating the history of the discipline in this way, Richards's (1996) book has demonstrated that it is possible to write successfully for introductory students in a more complex and meaningful way than many other contemporary textbooks.

The second type of histories that Harris identifies are revisionist histories, including examples such as Thomas Szasz's work on anti-psychiatry, Leon Kamin's (1974) book *The science and politics of IQ* and Steven Jay Gould's (1981, revised 1996) *The mismeasure of man*. All of these books, although coming from different ideological perspectives, offer a passionate and articulate account of the failing of some area of Psychology. All of the works were part of a current debate within Psychology and the social policy areas connected to aspects of Psychology. They are a useful corrective to the notion that Psychology stands outside of political and cultural frameworks. However, they share one flaw with celebratory histories. They tend towards a heroic view of history, by suggesting that a particular cadre of psychologists represented all of Psychology. Harris also maintains that the authors of these histories judge past scientists to be in error by the standards of today, and that in the case of Kamin and Gould see malicious intent, on the part of psychologists, whenever there is social injustice.

The final type of history that Harris identifies is critical history, the main part of which is to be a history focused more on social context and political power as well as intellectual history and the beliefs of a few leading figures. Like Harris, we believe that this focus enables a more nuanced understanding both of the past and present consequences of holding particular positions in Psychology.

In developing a critical historical approach to Psychology we believe it is necessary to develop an approach to understanding science as a social activity. In the next, major section approaches to science are reviewed in order to understand that approach. At the end of the chapter we return to the history of Psychology, in order to sketch an approach to understanding historical change in Psychology.

APPROACHES TO SCIENCE

At various points in the history of Psychology there has been great controversy over whether this discipline can, or should be, a science. Windt:

divided his system of psychology between a limited scientific project, part of the *Naturwissenschaft*, and a larger cultural project not amenable to scientific methods, part of the *Geisteswissenschaft*. With the rise of Humanistic Psychology, and the criticisms that this attracted from more orthodox psychologists, Maslow (1966) wrote a book calling for more use of experiential rather than experimental methods. More recently a number of different social constructionist psychologists (for example, Harré, K. Gergen, Kitzinger and Edwards) and feminist psychologists (for example, Holloway, Kitzinger, M. Gergen and Josselson) have called for a variety of different ways of doing Psychology. We return to all of these debates in their contexts in later chapters. Psychologists have, in the main, seen the discipline as either a science or an aspiring science and some of the debates within Psychology have depended on what type of science Psychology should be. For this reason it is important to examine the debates around science with the aim of discussing an approach to science that enables a critical historical perspective.

Logical Positivism and Popperian Anti-Positivism

The modern style of scientific explanation can be linked to a much larger movement in the history of western thought which includes the rise of Protestantism and the associated rise of rationalization, British empiricist philosophers, Descartes's philosophy and later the Enlightenment and modernity. These topics form the substantive topic of the next chapter but the major point is that these developments were not themselves isolated and abstract from cultural conditions.

One foundational figure that can be highlighted is Isaac Newton, who defined the scientific enterprise as the search for a small number of mathematical laws from which the regularities of nature could be deduced. In Newton's scheme there was no need to provide precise mechanisms by which his three laws of motion and theory of gravity operated. The fact that they could be used to predict the motion of planets and moons was sufficient.

Comte codified a more extreme version of this marking the beginning of positivism. As Giddens (1974) and May (1997) have remarked, positivism as now used by many sociologists has been stripped of its original meaning and is now used as a term of abuse, to be hurled at anyone who tries to quantify social issues. It is necessary to rescue the term from what may be its current sense in order to understand its impact on science. In the positivist philosophy of science three functions were assigned to science: *description*, *prediction* and *control*.

Description was for positivists the basic goal of science, to remain as close to observation as possible and not to indulge in hypothetical explanations. Under this scheme scientists would closely observe natural events, discover the underlying regularities and propose scientific laws that summarize these descriptions. These scientific laws were not seen as theories or hypotheses but as no more than accurate summary descriptions.

Prediction flows naturally from these descriptions. The scientific laws pro-

posed would allow for the prediction of future events provided that these mathematical summaries were accurate.

Control comes from the ability of, for example, engineers to create objects according to these scientific laws, thus intervening in the natural order.

This scheme is of course impoverished when it comes to explanation. An attempt to save the *logical-positivist position*, as positivism became known as it melded with developments in logic and mathematics, was made by Hempel and Oppenheim. The Hempel-Oppenheim approach to explanation was that scientific explanations could be regarded as logical arguments. The events to be explained, the *explanandum*, could be deduced from the *explanans*, the relevant scientific laws and observed initial conditions. A key feature here is that what is to be explained must be separated from its explanation.

Hempel was aware of at least one of the problems with the logical positivist scheme of science and came up with the famous 'paradox of the raven' to illustrate the problem of drawing generalizations (1946).

Imagine that you are an ornithologist attempting to confirm the hypothesis that all ravens are black. Obviously finding a black raven would, to some degree, confirm the hypothesis, and finding a white raven would irrefutably disconfirm the hypothesis. Hempel's paradox begins with the claim that the hypothesis can be simply restated as 'All non-black things are non-ravens'. Logically this restatement appears to be the same as the original hypothesis. This rewording is a *contrapositivist* and contrapositives of any statement are identical in meaning to the original wording. This is where the paradox begins. 'All non-black things are non-ravens' is a lot easier to test. Sitting at your chair you can see a number of things that are not black and are not ravens which help confirm the hypothesis all ravens are black. It is a lot easier than going to all the places where ravens usually dwell and observing them there. However, the same evidence can be used to support different hypotheses, the hypothesis 'All ravens are white' has as its contrapositivist 'All non-ravens are non-white'; thus a red herring would provide confirmation of both hypotheses. This is clearly absurd. The solution is a set of rules known as Nicod's criterion after the philosopher Jean Nicod. In terms of black ravens these can be stated as:

- 1 Sighting a black raven makes the generalization more likely.
- 2 Sighting a non-black raven disproves the statement.
- 3 Observations of black non-ravens and non-black non-ravens are irrelevant.

The logical-positivist scheme has had a number of impacts on Psychology, not least that at the time that Psychology began to assert its disciplinary identity the main approach to science was logical-positivism. Some of the anti-metaphysical pronouncements of the behaviourists can be linked to the positions of the logical positivists. However, even during this era there were Psychologists, for example, those developing the techniques of factor analysis and the testing of mental and other attributes, whose work cannot be judged as an attempt to follow the structures of logical positivism.

However, by the time that the Hempel-Oppenheim model had been pro-

posed logical-positivism was in trouble, not least from events in physics and the reactions to these events in philosophy.

The anti-positivist philosopher, Popper, proposed an argument in favour of falsifiability as an alternative to positivism. Popper compared the logical-positivist position of science to a bucket into which the wine of knowledge was presumed to flow pure and simple from patiently and industriously gathered facts. The problem that Popper highlighted is that it is possible to find empirical facts to support even the most ridiculous claims. Popper's solution to this dilemma is that scientific theories must be able to make predictions that are in principle falsifiable. The issue is whether it is more important to look for confirming instances or non-confirming instances and with Popper's proposal it becomes more important to develop experiments, or search for observations, that are a test of a hypothesis because they may disprove it.

What Popper gives us is a way of judging scientific theories. Scientific theories should give us hypotheses that are open to refutation. A theory that provides too many limits on the observations it accepts, or in the face of disconfirming evidence a theory that alters to make it less testable is a poor theory. Popper's scheme is often described as the norm for good science. Scientists in their professional pronouncements sound like good Popperians, although as a study by Gilbert and Mulkay (1984) shows, scientists may well talk very differently amongst themselves.

There are a number of points to be made at this stage. The first is that many psychologists still talk like logical-positivists rather than good Popperians. For example, some still talk of finding empirical laws of human behaviour. This may explain the well-recorded publication bias in journals, that journals are more likely to report significant results than results that reject the experimental hypothesis, despite the fact that those well-designed studies that reject a hypothesis are more informative under Popper's scheme than those studies that confirm an experimental hypothesis.

The second is that Popper's philosophy had a direct impact on a psychologist called Peter Watson, who developed a number of experimental tasks to test whether or not people reasoned according to Popper's logic. Summarizing a very dense literature it appears that people suffer from a number of biases when reasoning. One of these, a confirmation bias, suggests that most people look for confirmatory evidence rather than evidence that may refute a hypothesis. This work has developed into a Psychology of scientists, which attempts to model the cognitive processes of science; while it may be interesting it is an approach far removed from the one we are taking in this book.

The third, and most important from our perspective, is that neither of these views of science, even in their more complex formulations, will suit our purposes within this book.

In the logical-positivist version incorrect past theories would be incorrect because of either errors or biases by previous generations of scientists, or because previous scientists had no (technological) way of making the necessary observations. Under this scheme our book would be a cautionary tale, cataloguing errors and discussing biases, with the occasional lauding of new

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