

History and the natural sciences

With the professionalisation of history in the nineteenth century, together with the impressive results achieved by the natural sciences, the study of history was also thought to be synonymous with the scientific pursuit of knowledge. The discipline of history was increasingly expected to simulate science to the extent of developing rigorous research techniques. Historical judgements were now to be based on a careful examination of the source material. A key issue in the study and writing of history was whether the discipline could ever be regarded as a scientific endeavour which adhered to rigorous methods of logical analysis and absolute objectivity. In an inaugural address to the Royal Historical Society in 1879, the following comments were made by the chairman of Council: 'If anatomy, physiology and psychology are sciences, why not history, which is but a systematised record of man's individual and collective development? If man in his isolation as savage or prehistoric man, in anthropology and archaeology, may be treated scientifically, why not the whole of humanity in history?'¹ But the objects of study in history were clearly not necessarily identical to those studied by scientists, and neither were the concepts which were used to describe change in the external world.

History is primarily concerned with the study of human beings, their actions and the consequences of these actions for other individuals and for society. In contrast to this, the object of study in science is natural phenomena. Moreover, the techniques and instruments used in scientific enquiry are not identical to those used in historical research: historians

have no microscope or telescope with which to view society. The actions of human beings simply cannot be predicted with the same degree of accuracy as events in the natural world. Moreover, the functioning of societies cannot be inferred by merely examining the actions of individuals in isolation from their relationships with one another. In the social world the whole cannot be understood merely by examining the individual parts. Historians cannot travel back in time to observe the past directly. G.R. Elton once said that ‘the problem of whether the past can be known at all – since it is not now here in the presence of the observer and cannot be brought back for study – arises from the attempt to make history seem a science, comparable in purpose and method to the natural sciences.’² The social world is very complex and most events are never repeated. It could be said that the scientist is expected to focus on the features which individual events share in common and so produce a less complex picture, whereas the historian is more interested in relating individual events to more complex events. Scientists and historians look at individual or unique events from a different perspective: the former searches for causal laws or generalisations, the latter is more interested in connections.

The significance of those events which historians describe highlights their different approach when compared with the tasks facing scientists. Historians cannot claim to operate from a wholly objective position by merely recording historical facts: these facts have to be interpreted. Scientists are expected to establish precise facts which may give rise to the formulation of laws which have a wider application. Some historians also believe that it is possible to contrast the greater detachment between researcher and subject of those who work in the sciences from those who work in the humanities. However, the pursuit of scientific knowledge cannot always be said to be value-free, but the procedures and training adopted in scientific studies aim to achieve this objective. Perhaps this is because the greater degree of control which scientists have over events in the natural world is more obvious than the control which their counterparts in the humanities and social sciences have over events in the social world. This enables scientists to take a more detached and autonomous view of the events which they describe. As Norbert Elias has stated, ‘for while one need not know, in order to understand the structure of molecules, what it feels like to be one of its atoms, in order to understand

the functioning of human groups one needs to know, as it were, from inside how human beings experience their own and other groups, and one cannot know without active participation and involvement.³

Historical research does not enable us to discover the past in its entirety. It can only cover those topics which historians have decided to write about, based on the evidence which they have access to. This process is clearly also governed by the time and resources at their disposal. No historian is in a position to reconstruct the past totally, but it is possible to offer a penetrating insight into snapshots of past events. A total and objective record of the past is rarely possible. The observations of historians are influenced by hindsight. If historians are aware of the outcome of past events then it is difficult to envisage how this knowledge will not somehow influence their assessment of the factors which preceded those events. John Tosh summarises the dilemma as follows: 'We can never recapture the authentic flavour of a historical moment as it was experienced by people at the time because we, unlike them, know what happened next; and the significance which we accord to a particular incident is inescapably conditioned by that knowledge.'⁴ But if we wish to illuminate the causes and repercussions of a sequence of events which were unknown at the time they took place, then obviously hindsight does offer some advantages. After all, the actual repercussions may differ substantially from what was intended at the time.

The extent and reliability of historical evidence will determine to what degree past events can be reconstructed. Historians face greater difficulties than scientists in reconstructing the past because of the need to consider not simply what events did occur, but also how they believe those events were regarded by those who were present at the time they occurred. Historians are expected to move beyond the description of events: they also have to explain why they occurred. The significance of historical events may not appear obvious from the factual evidence which survives. The memory of other people has a role to play in reconstructing more recent events, but there is still the possibility that human memory will provide a distorted account of past events.⁵ Moreover, it is also sometimes necessary for us to separate factors which are important in assisting our understanding of the past from those factors which appear to be important but are merely incidental.

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The process of reconstructing the past is not so straightforward because we have to venture beyond the outward appearance of events to discover their hidden meaning or significance. The historian Wilhelm von Humboldt, writing over a century and a half ago, put it like this:

The historian, like the draftsman, will produce only caricatures if he merely depicts the specific circumstances of an event by connecting them with each other as they seemingly present themselves. He must render strict account of their inner nexus, must establish for himself a picture of the active forces, must recognise their trends at a given moment, must inquire into the relationship of both forces and trends to the existing state of affairs and to the changes that have preceded it.⁶

These inner forces do not operate like scientific laws. Scientific laws can be used to assist us to reconstruct events in the natural world, but there are no laws which offer the same opportunities for historians to reconstruct events in the social world. Science can, of course, come to the assistance of historians by offering techniques to date evidence, such as that relating to material objects or handwritten documents. Statistical analysis can also be valuable in assisting our understanding of changes in population size or in price movements. Even film or audio tapes provide information which may prove to be very useful and give us a new perspective on the past. But the process of reconstructing history is clearly not identical to the process of reconstruction as it occurs in the physical sciences. Historians attempt to rediscover the past, but they can never be certain about the accuracy of this reconstruction, since there is no absolute and scientific method for comparing their reconstruction with how the past actually was.

This problem with reconstructing events forms part of a wider issue about the relative status of historical and scientific knowledge. Since the eighteenth century, science has generated a significant amount of reliable knowledge about the natural world, and there has been widespread acceptance of the results of most scientific experiments. Progress in the natural sciences has been cumulative because previous discoveries have provided the foundation for later scientific research, from which practical benefits have materialised. Scientific knowledge is normally assumed to be based on careful observation of the same phenomena over a period of time. From these observations, laws are formulated to predict the

occurrence of events. Scientific knowledge advances through the assimilation of new theories and factual evidence which are found to be consistent with our observations and with our experience. But the study of human beings cannot be analysed according to the same criteria and produce predictable results. Scientific knowledge therefore appears to be based on a solid foundation in comparison with historical knowledge, but we must not forget that it is humans who perform scientific experiments, make observations and interpret the results. We cannot assume that scientists never adhere to preconceived ideas. Students of the history of science are well aware that some scientists can be as selective as some historians in what they observe and in what they are willing to accept as representing a credible hypothesis.

Historians do claim to approach their subject with a degree of impartiality, but unfortunately no scientific laws are likely to emerge from a study of human societies. We can analyse historical trends but these do not provide the basis for reliable predictions. A study of history may reveal the reasons why some societies can experience periods of progress followed by periods of stagnation or decline. Historical events are not always so unique that they cannot be classified and reveal such underlying causes and common factors, but it can also be said that neither can classifications give rise to predictions. In both science and history it is possible systematically to organise and classify knowledge but historians do not attempt to formulate laws which enable reliable predictions to be made. This perhaps helps to explain why scientific knowledge appears to enjoy a higher status than historical knowledge. Even where concepts are used in historical studies, such as democracy and dictatorship, they take on different meanings in different societies over a period of time. The beliefs, expectations and values of historians may influence, to some extent, the sources they choose to examine, their selection of facts and the interpretation which they place on the data available. Neither the historian nor the scientist can be wholly objective in their pursuit of knowledge, but equally this pursuit of knowledge cannot be entirely subjective. It may simply be that there exists a greater subjective element in historical work, and this should be viewed positively. The variety of themes and approaches to the study of history deepens and enriches our understanding of individuals and of the society in which they lived. It is

this aspect, rather than any attempt to discover whether historical knowledge can be equated with scientific knowledge, which can make historical work such a worthwhile and often fascinating endeavour.

In both history and the natural sciences evidence can be used to support different, and often mutually conflicting, hypotheses. This seems more obvious in historical studies where a debate may develop over the significance of events or the techniques used. For example, historians who prefer structural history in contrast to descriptive history are more likely to be interested in the extent to which the techniques of science can be applied to the study of historical problems. The availability of evidence also highlights some differences between history and the sciences. It is a fallacy for any historian to believe that there is a finite volume of evidence available on any subject which somehow only needs to be discovered to facilitate a thorough historical examination. The evidence may be incomplete or perhaps too large to handle. Indeed, it has been argued that it is the fragmentary nature of historical source material which distinguishes history from the natural sciences.⁷ Gaps in the evidence are more likely to occur in historical research and do seem to provide opportunities for historians to place their own interpretations on the evidence to a much greater extent than is possible in the natural sciences.

Some people believe that there is a greater subjective element to historical study in comparison with scientific study, but this does not make historical research less rigorous than scientific research. The writing of history is based on a mixture of factual evidence and interpretation. It is impossible for historians to step outside their own timeframe and environment to look at history objectively. E.H. Carr believed that the facts of history could not be wholly objective because they become facts of history as a result of the significance which historians attach to them.⁸ However, G.R. Elton took the opposite view because he argued that the past, or facts about the past, exist independently of the historian's views about them, and so they have an objective reality. In his book *The Practice of History*, Elton argued that if history merely consisted of the interpretations of historians then history itself would be unknowable. Yet historians can never be totally objective when they analyse the actions of individuals: there must be an element of subjectivity because

historians have to possess some knowledge of human nature to write about historical events.

The pursuit of total objectivity is constrained by the fact that all historians work with preconceived ideas, knowledge and values which are based on their own observations and experiences. Moreover, they invariably do not have the opportunity to come directly in contact with the facts surrounding the subjects which they investigate. As J.A. Passmore noted: 'The scientist confronts the world as it nakedly is, whereas the historian sees it, always, through the medium of someone else's testimony – a testimony he can never by the nature of the case penetrate beyond, because the events the testimony describes are gone forever.'⁹ Scientists can repeat an experiment if the testimony of others is in doubt, whereas historians cannot directly observe or confirm the testimony of those no longer alive. The most they can achieve is to examine the historical evidence and look for consensus in the written or oral testimony left by previous generations. Historical events are, in any case, written from different perspectives. A social historian will focus on different themes and arguments to those an economic historian might choose, but it may be difficult to determine which of these historical analyses is the most accurate. The most we can hope for is that any reconstruction of past events corresponds as closely as possible with the known facts. It may be that scientific results are expected to be objective for all observers, whereas historical results cannot be objective from all perspectives. In most historical studies, not all factors will be regarded as of equal importance to all historians. On this basis it follows that historical judgements will essentially be subjective.

Many historians would accept that a fundamental distinction between history and the natural sciences relates to the procedure by which knowledge is generated. Experimental knowledge in the sciences accumulates in a stage-by-stage process. It is shared by most scientists until new evidence generates new hypotheses, new experiments, new facts and new laws. Historians cannot conduct experiments; they can only study what remains of the past. It seems to make the study of history more of an art than a science. But this description may not be so straightforward because it assumes that knowledge in the natural sciences only advances as a result of repeated experiments which confirm or refute scientific

hypotheses. It also assumes that any scientist who repeats an experiment will obtain the same results. Scientific hypotheses must be based to some extent on inference, not merely on existing facts. Perhaps it is because historians study human beings, whose motivations and intentions are so varied and unpredictable, that leads us to make the distinction between experimental knowledge in the sciences and knowledge derived from historical analysis. A significant amount of historical analysis is involved in explaining the motives which influence individual actions, as opposed to the occurrence of historical events which were the outcome of those actions. Motives cannot be deduced from experimental procedures or from personal experience. We cannot predict actions by assuming how individuals in the past would have acted in a given situation, because human actions may be the product of routine or impulsive behaviour. Historical events may perhaps have to be rewritten by succeeding generations if new evidence becomes available or more persuasive arguments are used.

Historical and scientific analysis are both based on proof and inference. Any belief that there can be proof in historical analysis would appear to require some understanding of the nature of factual evidence in historical research. Some facts may be indisputable, whereas others are subject to doubt and disagreement. The greater the extent of this disagreement, the lower the probability that certain events will be classified as facts. If the facts are in dispute then we are left with a series of inferences, some of which may appear more credible than others. Historical events may follow in succession without any evident causal connection between them, whereas in the natural sciences a causal link is normally sought. Historians aim to provide a reliable account of historical events, whereas the goal for scientists often appears to be that of absolute truth. In practice, scientists do not necessarily aim to prove which statements are true and which are false, but rather determine which statements appear more reliable and consistent, based on the degree of congruence between theoretical models and observational data.

The predictive power of science appears to distinguish it more clearly from the study of history. However, it should be noted that the power of science to predict events occurs only under specific conditions, most notably in laboratory experiments where all the variables can be measured

and extraneous factors omitted. Also, in the physical sciences, predictions may sometimes be based on statistical probabilities, as they are in quantum physics. The extent to which scientific models can enhance historical knowledge depends on whether the regularities evident in the natural world can also be discerned in the social world. The interaction of specific factors which produce a given outcome seem to be more complex in social life than in the natural world. Unlike history, in science it is often possible to isolate factors, such as chemical reactions, and try to determine what the outcome of their interactions will be, based on repeated observation.¹⁰

Models which are developed to explain events in the physical world cannot be adopted to describe accurately a sequence of past events in human society. Human beings are not mechanical models whose behaviour can be programmed and predicted. In society it is rarely possible to identify all the relevant factors, isolate and test them, or offer precise knowledge about the likely outcome of their interactions. There are no laws or models which can predict events in history. The predictive power of science is based on the observation of uniform behaviour which leads to the formulation of general laws. The adoption of theories and the pronouncement of statements which purport to have universal validity are much less acceptable in historical studies. Indeed, the repetition of the same factors in different historical contexts may produce different outcomes. Interestingly, historians who focus exclusively on the use of theory in their research are sometimes accused of being too doctrinaire, but this is a claim which is rarely levelled at scientists.¹¹

Rational explanation in history can be based on our understanding of general and unique events. For example, the invention of steam power was unique but its general diffusion throughout different societies led to the formulation of general statements about the social and economic impact of its invention. Historical models have been devised to explain the growth of industrial output, demographic trends or changes in prices. However, these models were considerably less useful in understanding the psychological factors which influenced the behaviour of statesmen, intellectual or cultural developments in society, or aspects such as religious belief. Not all avenues of research are amenable to the application of mathematical models. In any case, by the late 1970s those historians

who were disillusioned with a scientific and analytical approach to history began to focus on local history and the psychology of individual behaviour, which were the domain of narrative history. The study of history at the individual or local level though did not necessarily throw light upon developments within the wider society. Quantitative methods were not rendered irrelevant but the limitations of these methods needed to be clearly defined so that they could be applied to areas where they would yield the most fruitful results. The predictive power of science could not be used to enhance historical knowledge, except in very specific areas where isolated events generated regular features which were observed or recorded in some detail. It could not be used to provide us with a complete understanding of unpredictable and unforeseen developments, such as the complex links between political structures, social and cultural change, and economic growth. As Sidney Pollard once noted, historians who focus entirely on quantitative considerations run the danger of measuring the waves and forgetting the tide.¹²

The study of history will clearly be distinguishable from the study of the natural sciences if we attempt to ascertain whether chance or determinism has a more significant role to play in historical events. The actions of individuals would suggest that chance plays a more significant role than causal laws. Historians who stress the role of contingency in history do place greater emphasis on the role of the individual in shaping historical events. But if the outcome of historical events was governed merely by chance it would represent a series of unconnected individual actions and events, which is contrary to human experience. The study of history would therefore provide no fundamental lessons for future generations. Clearly, human actions are neither totally determined nor totally free. Some historical events may be totally accidental but many others have causes which are simply not apparent to historians. Some historians believe that the facts which emerge from our study of the past could not be radically different because of the nature and arrangement of the factors involved, whether personal, social, economic or political. Nothing which occurs in history is inevitable, except in the sense that for events to have happened differently then the antecedent causes would also have had to be different.¹³ In history, similar causes have a certain probability that they will produce similar effects, based on past experience. The search

for historical patterns would suggest that the course of history is not purely governed by chance. Even unique events can form part of a larger and more complex pattern of historical events.

The study of history is not solely concerned with an analysis of specific, individual and unique events because it would therefore be unable to offer us general statements which could be applied with some degree of certainty to historical events. Equally, history cannot provide us with a science of society because of the unpredictability, complexity and uniqueness of events. Individuals are unique, therefore any historical study which focuses on the background, beliefs and actions of individuals will naturally develop into a history which emphasises the uniqueness of past events. Past events are unique because the combination of factors which interact to produce the characteristics of a particular event at a specific period in time cannot be repeated. Scientific experiments may be capable of being repeated, but in the study of history no such experiments can take place. This is why historians state that scientific study concentrates on similarities, patterns and common characteristics, whereas history focuses much more on differences and on the uniqueness of events.

A unique event does not necessarily have a unique cause. We may, for example, be able to specify the circumstances under which a social revolution is likely to take place but unable to predict that such an event will occur in the presence of a specified combination of circumstances. As John Tosh has remarked, the area of knowledge which can be said to be beyond dispute in history is smaller and a good deal less significant than it is in the natural sciences.¹⁴ At a basic level historical research involves the application of common sense to a number of carefully constructed propositions based on a careful and full assessment of the supporting evidence. In dealing with complex historical phenomena the application of scientific experimental procedures would be of limited use in comparison with the indispensable skilled judgement of historians. In historical work the validity of a clear set of propositions does not always follow logically from the evidence; as it often does in science. History is closer to the arts than to science because it cannot offer us a scientific study of the past. As L.B. Namier once put it, 'the function of the historian is akin to that of the painter and not of the photographic camera: to discover

and set forth, to single out and stress that which is of the nature of the thing, and not to reproduce indiscriminately all that meets the eye.¹⁵

Notes

- 1 Gustavus George Zerffi, 'The science of history', *Transactions of the Royal Historical Society*, 9 (1881), 2.
- 2 G.R. Elton, *The Practice of History* (London, 1987) p. 71.
- 3 Norbert Elias, 'Problems of involvement and detachment', *British Journal of Sociology*, 7 (1956), 237.
- 4 John Tosh, *The Pursuit of History*, 2nd edn (London, 1991) p. 147.
- 5 W.H. Walsh, *An Introduction to Philosophy of History* (Bristol, reprint 1992) p. 85.
- 6 Wilhelm von Humboldt, 'On the historian's task', *History and Theory*, 6 (1967), 64.
- 7 Arthur Marwick, *The Nature of History*, 3rd edn (Basingstoke, 1989) p. 301.
- 8 E.H. Carr, *What is History?*, 2nd edn (London, 1987) p. 120.
- 9 J.A. Passmore, 'The objectivity of history', *Philosophy*, 33 (1958), 100.
- 10 G. Kitson Clark, *The Critical Historian* (London, 1967) p. 22.
- 11 Isaiah Berlin, 'History and theory: the concept of scientific history', *History and Theory*, 1 (1960), 9.
- 12 Sidney Pollard, 'Economic history – a science of society?', *Past and Present*, no. 30 (April 1965), 8.
- 13 Carr, *What is History?*, p. 96.
- 14 Tosh, *The Pursuit of History*, p. 141.
- 15 L.B. Namier, 'History: its subject-matter and tasks', *History Today*, 2 (1952), 161.