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## **Historical evidence and confirmation**

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April 2007

It is not only students of human history who reason about the past from evidence. The palaeontologist trying to reconstruct an extinct animal from fossil fragments; the engineer charged with determining why a bridge collapsed; the teacher who suspects that a student may have cheated on an exam: all of these form ideas about what happened and seek to evaluate those ideas in the light of the evidence. Accordingly, philosophers interested in understanding historiographic evidence have tended to align their analyses with more general models of evidential reasoning. After a brief survey of different kinds of historiographic evidence and different approaches to understanding it, we provide an overview of the two models of evidential reasoning invoked most frequently by philosophers of historiography, the Bayesian and the explanationist models. We conclude with suggestions as to how these models can aid the formulation and understanding of two central issues in the philosophy of historiography, scepticism and underdetermination.

### **What is historiographic evidence?**

Historiographic evidence is extraordinarily varied. Bones, pots and foundations are unearthed. Field boundaries, path routes and architectural features are examined. The living are questioned orally. Data on economic activity are accumulated and exhibited in the form of lists or tables. At the heart of most historians' reconstructive efforts are written works: memoirs, chronicles, letters, orders, minutes, legal records and more. The class of historiographic evidence is larger still, extending to past facts, no longer open to direct inspection. If yesterday's murder was committed in the kitchen, then the fact that the Professor spent the whole of yesterday in the library is evidence of the Professor's innocence. Similarly, it is plausible that the German reaction to the Archduke Ferdinand's 1914 assassination is evidence that, well before that event, the Germans harboured bellicose intentions.

For all this diversity, when it comes to understanding what makes historiographic evidence *evidential*, in the most general and abstract sense, there are two major options. An *epistemically internal* understanding of evidence directs us to connections internal to a set of beliefs. Those beliefs whose empirical support is under scrutiny are typically called "hypotheses." Those beliefs that provide or fail to provide empirical support to hypotheses – that "confirm" the hypotheses or "disconfirm" them – are the evidence. The position can be defined more precisely as follows:

*Internalism = E is evidence for H if and only if H is more confirmed given E & B than given B alone*

where E, H and B all stand for beliefs: E is the evidential belief, H the hypothesis, and B the set of background beliefs relevant to judging the probability of H. Some

terminological variety is to be expected. “Justified” can be used in place of “confirmed.” One may “infer” H from E to the extent that E is evidence for H. For the limiting cases of perfectly good and perfectly bad confirmation, there are special terms: “verification” or “proof” for the former, “falsification” for the latter. We develop the internal understanding of evidence below, with specific reference to its dominant variant, Bayesianism, and to the main competitor, explanationism.

An *epistemically external* understanding of evidence is couched not in terms of beliefs and their relations, but in terms of the world of effects and causes about which those beliefs are formed. On the externalist view, a lit match is evidence for the presence of oxygen, the microwave background radiation is evidence for the Big Bang, and a certain quantity of carbon-14 in unearthed bones is evidence for a process of radioactive decay over a certain period (and hence for those bones having been part of an organism that died a certain number of years ago). Such connections obtain whether or not any beliefs are formed about them. More precisely:

*Externalism = E is evidence for C if and only if there is a reliable connection between C and E*

where E and C are properties or events, with E the effect of the cause C. One must understand “reliable connection” here in the right way. The claim is not that C always leads to E, but that E only follows from C. Other things being equal, a lit match is evidence for oxygen, even though placing a match in oxygen does not always lead to the match’s being lit.

Although the internalist and externalist accounts point in opposite directions, and the internalist picture has attracted far more philosophical attention of late, there are clear relations between the two pictures. It is precisely the connections between the internal and external pictures of historical evidence that supply the underlying rationale for our evidential practices: correct historiographic reasoning leads us to true knowledge about the past. Where the set of background beliefs B referred to by the internalist is correct and complete, then all of the relevant reliable connections referred to by the externalist can be objects of belief and so available to confirm or disconfirm any given H. In this imaginary omniscient state, any true hypothesis could be confirmed in many different ways.

Of course, in our epistemic predicament, we are very far from omniscience, especially about the past. Much of the background information is unknown, including both relevant historical facts and knowledge of the general regularities that would enable correct inference. Much of the evidence is likewise unavailable – evidence that may one day be discovered, or may remain always hidden. Finally, there is a suspicion that certain beliefs in the historians’ background sets will not find a place in the external picture of the world. In the jargon, these beliefs will turn out not to be “truth-apt.” We return to these concerns in the final section.

## Bayesianism

On the confirmation theory most widely accepted today, to confirm is to render and be rendered more probable. This is the essence of “Bayesianism,” a family of doctrines taking its name from the eighteenth-century British clergyman and mathematician Thomas Bayes. Specifically, Bayesian confirmation theory is founded upon two claims. First, the degree to which the belief E is evidence for the hypothesis H depends upon the initial plausibility of H and the degree to which H makes E more likely than it would otherwise have been. Second, to the extent that one accepts that E is evidence for H, one should as a rational enquirer accordingly update one’s strength of belief in H.

It is uncontroversial that the Bayesian position captures important elements of our inferential practices, historiographic reasoning included. What is more controversial is the claim that Bayesianism provides a full description and justification of those practices. We shall argue that Bayesianism provides a useful framework for understanding some, though not all, instances and aspects of historiographic reasoning; and that, while it permits a precise statement of core problems for the philosophy of historiography, it does not necessarily provide the solutions.

Bayesianism tends to be formulated in terms of equations linking beliefs with a certain quantitative probability, with 1 the value of a verified belief and 0 the value of a falsified belief. In order to understand these equations, some brief definitions of typical Bayesian terminology are required. The “prior” is the value representing the probability of the hypothesis H before the evidence is in, and is written  $(H|B)$ , where the symbol “|” stands for “conditional upon,” and “B”, as before, is the set of background beliefs. The “posterior” represents the probability of the hypothesis once the evidence has been considered, and is written  $(H|E\&B)$ . The “likelihood” represents the probability of the evidence, given the assumption that the hypothesis is true, and is written  $(E|H\&B)$ . Likelihood can be regarded as a measure of how well the hypothesis predicts the evidence. Finally, “expectancy” is the prior probability of the evidence itself,  $(E|B)$ .

Combining these definitions with the basic axioms of probability theory, one can derive the following two equations. The first is applicable to the assessment of a single hypothesis, and says that the hypothesis posterior equals the product of the hypothesis prior and the evidential likelihood, divided by the expectancy. In symbolic terms,

$$B1: \quad (H|E\&B) = (H\&B).(E|H\&B)/(E|B)$$

The second equation applies to the comparison of two hypotheses, H and H\*

$$B2: \quad \frac{(H|E\&B)}{(H^*|E\&B)} = \frac{(E|H\&B)}{(E|H^*\&B)}$$

B2 has certain advantages, and so will provide the focus for the remaining discussion. For one thing, it dispenses with the expectancy  $(E|B)$ , and so relieves us of having to estimate the prior probability of the evidence. More importantly, the focus on contrastive confirmation – H versus H\* – brings Bayesianism into line with certain intuitions about evidential reasoning. Consider that, although the death of the former dictator Slobodan Milosevic (the evidence) raises the probability that he committed suicide (the hypothesis), the belief that Milosevic died does not seem in itself to do anything to confirm the suicide hypothesis. The Bayesian who takes hypothesis

competition into account can respond by holding that confirmation requires not simply an increase in the probability of a hypothesis, but a comparative raise in probability with respect to contextually appropriate competing hypotheses. In the Milosevic case, we would do well to consider such competitors as that Milosevic died by another's hand, or from natural causes. Given that the probability of the suicide hypothesis is not raised relative to these competitors, the suicide hypothesis is not confirmed, and Bayesianism falls into line with the original intuition.

### **Bayesianism as a model of historiographic reasoning**

Given its quantitative thrust, Bayesianism applies most straightforwardly to historiographic reasoning in which the evidence is explicitly probabilistic, as when a jury weighs the evidence provided by a match between a suspect's DNA and the DNA extracted from the blood on a murder weapon (example taken from Dawid 2002). Such clear quantitative examples are common in natural historiography and comparative historical linguistics, but are unusual in historiographies of the human past. But even where reasoning about the past is entirely qualitative, it often involves judgments of comparative probability; and the norms governing such reasoning can often be modelled well using Bayesian resources.

Some of these norms are obvious and hence usually implicit, for instance, the doctrine of "evidence against interest": the notion that the probability of the truth of the propositional content of testimonies is higher if those claims do not serve the testifiers' interests. But whether the norms are implicit or explicit, intuitive or technical, general or specific to a particular area of study, the Bayesian understands them in a common way: as guides for the judging of probabilities of hypotheses and evidence in the light of each other.

A good example of a technical norm which Bayesianism captures well is discussed by Aviezer Tucker (2004: 113). Those Europeans who, from the sixteenth century, puzzled over the origins of the Central American pyramids tended to contemplate two hypotheses. One hypothesis supposed that the pyramids were basically copies of the Egyptian pyramids – in which case the American and Mediterranean civilizations must have had contact before Columbus. The other hypothesis supposed that there was no pre-Columbian contact, but that the Americans had nevertheless built pyramids like the Egyptian ones because pyramids are a unique solution to the problem of building large structures without advanced engineering techniques. Here, the relevant norm in play amounts to the view that the possibility of two innovations being the result of a generic solution to a general problem undermines the claim that those innovations are evidence of particular influence. Tucker (2004, chapter three) goes on to note that this first stage – the comparison of common cause hypotheses to separate causes hypotheses – precedes the detailed specification of information bearing causal chains. Finally, if the evidence is significantly more likely given a common cause, then the historian can compare competing common cause hypotheses; if more likely given separate causes, then competing separate causes hypotheses can be compared.

For all its successes, Bayesianism as a model of historiographic reasoning has its limitations. Consider the large gap between the way that the Bayesian represents belief, as a state continuously varying between 0 and 1, and our usual experience of belief as a discrete state, something held or not. Typically, we halt the weighing of

evidence when we have made up our minds on whether to accept or reject a hypothesis. Continuing to weigh evidence thereafter implies not having truly decided on the matter one way or the other. Can the Bayesian account for such definitive, even closed-minded attitudes? Any attempt on the Bayesian's part to provide numerical thresholds beyond which hypotheses should be conclusively accepted or rejected is implausible. There are other responses that look more promising, however. A concessionary response would be to permit a pragmatic element to belief acceptance, such that whether one holds a belief depends upon both Bayesian confirmation and on the value of being committed or remaining agnostic on this particular issue. But taking that option would be to admit that Bayesianism does not provide sufficient resources for hypothesis acceptance and rejection. An alternative, non-concessionary response would be to deny that the discrete-state view of belief offers a correct description of our epistemic experience, and that closer scrutiny of that experience will yield a description more closely conforming to the Bayesian model (see, for example, Jeffrey 2004).

Whether Bayesianism can provide a sufficient model for understanding historiographic reasoning depends on what kind of understanding we want, and what precisely we want to understand. Perhaps no Bayesian has claimed that all aspects of historiographic reasoning are comprehensible in those terms, although Tucker comes close: "Bayesian analysis can explain most of what historians do and how they reach a ... consensus on determined historiography" (2004: 139). Our claim is that we must supplement Bayesianism with explanatory considerations.

### **Explanationism**

As we have seen, evidence for the Bayesian is what renders hypotheses more or less probable and what is rendered more or less probable by hypotheses. For the explanationist evidence is what hypotheses explain more or less well. Specifically, the explanationist position – or at least the modest version to be examined here – holds that explanation of evidence E by hypothesis H is a guide to inference of H from E. To confirm on this view is to be explained.

It is worth noting at the outset that a good deal of twentieth-century debate in the philosophy of historiography proceeded on the view that inference comes first and explanation follows. First historians discover the facts, then they weave these facts into a narrative, with some of the facts turning out to explain the rest. It is a widely acknowledged advantage of the explanationist approach that this naïve picture is undermined. On the explanationist view, historians are on the lookout for explanatory facts throughout their inquiries, and attempt to infer those facts according to their power to explain.

For any number of instances of historiographic reasoning, the explanationist model is as good a fit as the Bayesian model; and this very applicability might be a source of concern, for it makes it hard to see what explanationism adds to the understanding provided by Bayesianism. Consider, for instance, the example cited earlier in support of the Bayesian approach, involving competing hypotheses and the Central American pyramids. One might, in a Bayesian spirit, ask: on which hypothesis is the existence of the pyramids more probable? But one might equally, in an explanationist spirit, ask: on which hypothesis is the existence of the pyramids explained? Both questions lead to the same answer. Bayesians like Salmon and Sober and philosophers of

historiography like Dray noted that likelihood and explanation and complimentary symmetrical moves in the same type of inference.

There are two important replies to the concern that explanationism adds nothing to Bayesianism. First, even if Bayesianism and explanationism fit examples of historiographic reasoning equally well, they may not be equally appropriate as accounts of *how* historians actually and typically reason. Bayesianism is not illuminating if we wish to understand, in particular, how certain hypotheses and not others come to be tested, how new hypotheses are arrived at, and why certain evidence but not other evidence come to be considered. To use the distinction familiar to philosophers of science, Bayesianism tells us much about the context of justification, but not much about the context of discovery. Those philosophers who believe philosophical theories are concerned with rational justification would consider this situation quite satisfactory. We, however, take it to be an advantage of explanationism that it permits a general understanding of the process of historiographic reasoning, including discovery. The central explanationist claim will be that those hypotheses which *would* explain the evidence are those which are formulated and tested.

Explanationism also yields understanding of the structure of historiographic controversies. Historians often challenge reigning hypotheses by emphasizing, re-interpreting or searching out evidence which those hypotheses appear powerless to explain. In the well-known debate between Gananath Obeyesekere (1992) and Marshall Sahlins (1995) over the alleged apotheosis of Captain James Cook, the arguments turn on requests for the explanation of certain pieces of evidence. If, as Sahlins advocated, the Hawaiians thought of Captain Cook as a god, then why, asks the sceptical Obeyesekere, did the Hawaiian priests not prostrate themselves before him? To take another, more politically urgent example, consider the controversies surrounding “Holocaust denial.” One of the reflections that keeps Holocaust denial a fringe position is that it so conspicuously fails to explain so much – such as why so many Jews and members of other groups such as homosexuals and Roma from Germany and occupied Europe were missing after the war, or how the testimony of those who survived came to be so consistent, and durably so, about German atrocities.

A second point in favour of taking the explanationist approach into account is that explanatory and probabilistic considerations can come apart. To see how this can happen, we need first to clarify the central notion of a “best explanation.” Peter Lipton’s work on this point is invaluable, in particular his distinction between the “likeliest explanation” and the “loveliest explanation” (Lipton 1991: chapter 4). The likeliest explanation of E is that which is most probably true, the loveliest explanation of E is that which would, if true, provide the most understanding of E. If the explanationist jumps straight to the former notion, it will indeed be difficult to claim any substantial addition to straightforward Bayesianism. Instead, the explanationist needs to show that loveliness is a guide to, and justification of, likelihood.

### **Towards an explanationist Bayesianism**

The value of explanatory considerations is clearest in connection with difficulties that arise when judging the Bayesian likelihood value – the probability of the evidence on the assumption that the hypothesis is true. Consider two ways in which such judgements may be reached. One may, in certain cases, reason about evidential

likelihood in a straightforwardly deductive manner. If, for example, one's background knowledge contains the law "all corrupt regimes lead to revolutions," one can deduce the likelihood of revolution given the hypothesis of there having been a corrupt regime at 1. And, more generally, where there is a statistical law stating that E follows H in x% of cases, one may assign the likelihood  $E|H$  as  $x/100$ .

Yet this approach to likelihood is inadequate in two ways. First, deduction is not an infallible guide to inference. The simplest way to appreciate this point is by way of a standard lesson from logic, regarding hypotheses formed of arbitrary conjunctions; say, "Henry XIII had six wives and Louis XVI was beheaded." It is a trivial entailment of this hypothesis that "Louis XVI was beheaded." On the Bayesian scheme, Louis' beheading given the Henry-Louis hypothesis has a likelihood value of 1, making the beheading a verification of the hypothesis – an absurd result. On the explanationist view, by contrast, no such absurdities lurk, since the Henry-Louis conjunction is not remotely explanatory of the Louis part of the conjunction. The second reason why a deductive approach to likelihood is inadequate, particularly with respect to historiographic judgements, is that we are usually in possession neither of clear and exceptionless regularities, nor of well-founded statistical relationships. Again, our suggestion is that one applies the more readily available criterion that the value  $E|H$  depends upon how well H would explain E.

Explanationism does not assume any particularly contentious or restrictive notion of explanation. We need only focus on two elements which would feature in any decent theory of explanation: First, explanations of E trace the causal history of E, using a combination of specific knowledge of that history, general regularities and appropriate analogies. The historian Marc Bloch once described the tracing of the history of how the evidence under scrutiny came into being as "unwinding the film spool": "... in the film which he is examining, only the last picture remains quite clear. In order to reconstruct the faded features of the others, it behoves him first to unwind the spool in the opposite direction from that in which the pictures were taken" (2004: 46). Much historiographic reasoning is directed towards this end, including the set of practices taught to every history student under the name "source criticism." Should the pious self-portrayals in volumes of testimony now held in the Vatican be accepted at face value, as true accounts of how it was? Facts about the history of these testimonials – in particular, that they were collected during the Inquisition, from people who had a lot to lose by being thought impious – might well lead the judicious historian to doubt their veracity (see Boyle 1981). Far from being add-ons in historiographic reasoning, such explanatory considerations are ubiquitous.

Just as theories of explanation are bound to acknowledge our epistemic stake in knowing the causal history of the evidence we contemplate, they are also bound to identify the things that make for better and worse explanations – the explanatory virtues and vices. A second way to demonstrate the relevance of explanatory considerations for evaluating evidential likelihood involves these explanatory virtues, one such being accuracy. Compare, for example, the more specific and accurate hypothesis "there were four Cathars in Montailou in 1310" with the more general "there were a few Cathars in Montailou in 1310." In terms purely of statistical likelihood, there is no evidence that is more likely given the former than the latter, but plenty of potential evidence that is more likely given the latter than the former. Yet, intuitively, we could imagine evidence which would make us prefer the former over the latter. To account for that preference, we must recognise the necessity of the

virtue of accurate explanation – and a Bayesianism unaffected by considerations of explanatory virtue would be unable to account for this preference.

### **Applications: scepticism**

We conclude by applying the Bayesian and explanationist models of historiographic reasoning to two central issues in the philosophy of historiography, scepticism and underdetermination. The following suggestions are intended to demonstrate how these issues can be formulated in a perspicuous manner and to suggest fruitful avenues for further thinking.

In historiography as in other domains of epistemic life, scepticism is a good thing that one can nevertheless have too much of. As R. G. Collingwood insisted as part of his broadside against “Scissors-and-Paste history” (Collingwood 1994), the historian’s attitude to testimony should be sceptical not only in terms of accepting some elements of testimony and rejecting others, but also in being ready to use that testimonial evidence in ways unrelated to the testifiers’ purposes. The same attitude should be evident when dealing with other historical accounts: the historian goes beyond the dichotomy of “accept or reject,” instead deploying innovative explanations that better account for the evidence than does previous historiography.

In today’s debates, the phenomenon of Holocaust denial, already discussed briefly, has become the paradigmatic example of the vice of unreasonable, even wicked scepticism masquerading as the virtue of reasonable scepticism. For nearly two centuries, however, another, less emotionally wrenching case has been the standard one for thinking through the relevant conceptual issues: an 1819 pamphlet by the English logician and theologian Richard Whately casting doubt on the existence of the (then living) Napoleon Bonaparte. After all, Whately pointed out, very few of those who talked so confidently of Napoleon had actually *seen* him. And when one considered as well the extraordinary feats with which he was credited, and the vested interest of the tax-dependent British government in promoting the idea of him... The rationale for Whately’s polemic was complex; but the upshot was a devastating demonstration of how consensual knowledge of even the recent past can come to seem fragile when subjected to intense sceptical pressure.

Global scepticism has proved as hard to banish in the epistemology of historiography as in other domains of knowledge. One variety of sceptical argument maintains that since historiographic knowledge is of something necessarily absent, genuine knowledge of history is impossible. One purpose of developing inferential accounts of historiographical evidence, in particular Bayesianism and explanationism, is to lessen the grip of that concern. Other varieties of global historiographical scepticism have proved more stimulating, one such being the claim that intuitively bizarre hypotheses are as justified by the evidence as are the hypotheses we usually take to be true. This variant of Cartesian scepticism finds expression in Bertrand Russell’s “five minute hypothesis” (Russell 2004: 160). One could logically maintain the hypothesis that the world came into existence five minutes ago, complete with “fossils” under the ground, grey hairs on the “aged,” and “memories” seeming to point to the distant past. Bayesianism by itself serves as an inadequate tool to rebut the five minute hypothesis: given that that hypothesis makes the evidence just as likely as our usual hypotheses about the past, any difference will depend upon subjective evaluation of the respective priors or the addition of other epistemic virtues to likelihood. But

explanationism may fare somewhat better. For while both the bizarre hypothesis and our usual hypotheses can offer some sort of an explanation for present evidence, there is good reason to suppose that our usual hypotheses offer a *better* explanation. Not only is the five minute hypothesis itself unexplained, but it offers only an ad hoc accuracy. In short, the bizarre hypothesis is logically consistent with the evidence, but does not best explain the evidence.

### **Applications: underdetermination**

Whether or not the evidence determines only one correct historiography is a central question in contemporary philosophy of historiography, just as the corresponding question has for some time been central in the philosophy of science. A benefit of the Bayesian model is that it permits clear specification of the different varieties of underdetermination that historiographic reasoning may suffer. What Bayesians call the “problem of the priors” – the difficulty of assessing the probability of hypotheses in advance of the relevant evidence being consulted – suggests one way that historiographic hypotheses might be underdetermined by the evidence. The historian’s background provides a second potential type of underdetermination. Underdeterminationist critique could emphasize the role of a historian’s culturally specific “world view” or “conceptual framework” in that historian’s interpretations of the evidence. The clearest and best known analysis along these lines can be found in the work of Hayden White (1973), who emphasizes the underdetermination by evidence of historians’ rhetorical strategies, explanatory strategies and modes of “plotment.”

Concerns about underdetermination also cluster around likelihood judgements. We have argued that such judgements typically rest upon explanatory considerations. But to argue for this view is not to argue that those judgements are *determined* by explanatory considerations. Indeed, in some cases there seem to be interesting and persuasive reasons to suppose the opposite – reasons stemming from the application of background knowledge about historical regularities to the explanatory assessment of evidential likelihood. Three considerations in particular deserve mention here. First, historiographic regularities are typically vague in application to particular cases, so that concerns about whether the case under examination instances the regularity – and so whether the regularity is explanatory – are ever present. Second, historiographic regularities can conflict with one another, in ways that can be resolved only on a case-by-case basis (a memoir might be self-serving, and yet the memoirist was truthful in similar past cases). Finally, there may be no regularities available in this case, so that irreducibly case-specific judgement must suffice. Even a complete and correct understanding of the rational historian’s way with evidence will not preclude there being many cases for which an accurate assessment is that “there is no substitute for the brewmaster’s nose, adapted to the art of producing historical brew” (Martin 1989: 105).

## References

- Bayes, T. (1763). An Essay towards solving a Problem in the Doctrine of Chances. *Philosophical Transactions*, 53, 370–418.
- Bloch, M. (2004). *The Historian's Craft*. Manchester: Manchester University Press. (Original work published 1954).
- Boyle, L. (1981). Montaignou revisited: Mentalité and methodology. In J. A. Raftis (ed.) *Pathways to Medieval Peasants* (pp.119-140). Toronto: Pontifical Institute of Medieval Studies.
- Collingwood, R. G. (1994). Historical evidence. In the Epilegomena to *The Idea of History* (pp.249-282). Oxford: Oxford University Press. Original work published in 1946.
- Dawid, P. (2002). Bayes's theorem and weighing evidence by juries. In R. Swinburne (ed.) *Bayes's theorem: Proceedings of the British Academy* (pp.71-90). Oxford: Oxford University Press.
- Jeffrey, R. (2004). *Subjective probability: The real thing*. Cambridge: Cambridge University Press.
- Lipton, P. (1991). *Inference to the best explanation*. London: Routledge. Revised 2<sup>nd</sup> edition published in 2004; includes an important new chapter on Bayesianism and explanationism.
- Martin, R. (1989). *The past within us: An empirical approach to philosophy of history*. Princeton: Princeton University Press.
- Obeyeskere, G. (1992). *The apotheosis of Captain Cook*. Princeton: Princeton University Press.
- Russell, B. (2004). *The analysis of mind*. New York: Cosimo. Original work published 1921.
- Sahlins, M. (1995). *How "natives" think: About Captain Cook, for example*. Chicago: University of Chicago Press.
- Tucker, A. (2004). *Our knowledge of the past: A philosophy of historiography*. Cambridge: Cambridge University Press.
- Whately, R. (1819). *Historic doubts relative to Napoleon Buonaparte* [sic]. Available for free from Project Gutenberg and several other websites.
- White, H. (1973). *Metahistory: The historical imagination in nineteenth-century Europe*. Baltimore: John Hopkins University Press.

## Further reading

- Achinstein, P. (2001). *The book of evidence*. Oxford: Oxford University Press.
- Collingwood, R. G. (1994). The historical imagination. In the Epilegomena to *The Idea of History* (pp.249-282). Oxford: Oxford University Press. Original work published in 1946.

Earman, J. (1992). *Bayes or bust: a critical examination of Bayesian confirmation theory*. Cambridge, Mass: MIT Press.

Kosso, P. (1992). Observation of the Past. *History and Theory*, 31/1, 21-36

Milligan, J. D. (1979). The treatment of an historical source. *History and Theory*, 18/2, 177-196.

Owens, D. (2000). Parts 1 and 3 of *Reason without freedom: The problem of epistemic normativity*. London: Routledge.

Psillos, S. (2003). Inference to the best explanation and Bayesianism. In F. Stadler (ed.) *Institute of Vienna Circle Yearbook 10*. Dordrecht: Kluwer.

Swinburne, R. (ed.) *Bayes's theorem: Proceedings of the British Academy*. Oxford: Oxford University Press.