PART ONE

INTRODUCTION

ONE

TRAVELLING FACTS

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1. The Lives of Travelling Facts

Travelling Fact 1

What a clever idea to stick black silhouettes of birds-of-prey on windows to stop small birds flying into the glass! When Niko Tinbergen and Konrad Lorenz (Nobel Prize winners for their work on animal behaviour) originally showed that certain species of birds on the ground instinctively take cover in the presence of overhead moving silhouettes of such predators, they had no reason to imagine those window stickers as an outcome. Yet, their facts travelled well enough to prompt owners of glass walls around the world to take their own evasive action by sticking these birds-of-prey shapes on their walls. Years of experience later, according to other facts sent out into the public domain by reputable authorities (such as the Audubon Society), it turns out that those silhouettes don't work. Stationary "flying" predators do not scare away genuinely flying birds. (Separating the original scientific facts from their experimental context and reversing that situation subverted that instinctual behaviour.) So even while those scientific facts – still suitably qualified – have travelled well in the scientific communities (albeit with debates about how to interpret them), the efficacy of those black silhouettes turns out to be the scientific equivalent of an "urban legend." The facts travelled far, but not entirely well (Burkhardt, this volume).

Travelling Fact 2

St. Paul's Cathedral dominates the City of London skyline and epitomises the arrival in England of a new aesthetic style from Italy, and we might reasonably assume that construction methods just travelled alongside the new style. Both the extraordinary construction of the building and the career of its architect, Christopher Wren, are well studied, yet the details of how the

technical facts required for its construction travelled to England and from where they came (if indeed they travelled from abroad) remain opaque. So, the historian wonders: Did the details of the construction design come through architectural treatises, or through travelling craftsmen, or through Wren's own visual inspections of such buildings elsewhere? And how do the clues left by carpenters in roof beams, joists and joints tell stories about the facts of construction itself? Was the roof built and assembled off-site and reassembled on-site like a giant IKEA flat-pack; or was it built in situ? This is the stuff of history, but a history dependent on the study of real stuff to reveal what facts travelled, raising interesting questions about the nature of facts that travel embedded in artefacts and technologies, and just what it means for such facts to travel well. The building stands – but do we yet understand the travelling facts of how it came to do so (Valeriani, this volume)?

Travelling Fact 3

We all know about climate change from the scientists, but these facts did not travel easily to us. We all know now that the world's climate is getting warmer, but for a long time, we were not very sure what facts we knew: how certain it was, how serious it was, how fast the change was happening, how different bits of evidence fitted together to form a consistent account and how far different scientists were in agreement about it. And we still don't know much about how it will affect different parts of the globe. The facts did not travel easily, perhaps because the information did not form itself into the kinds of definite, separable pieces of knowledge we think of as facts; perhaps because the implications of its human causes and its uncomfortable consequences were too severe to be accepted and perhaps because climate change itself became the subject of fictions in novels and films during this same period. But this is only part of the story, for climate scientists found their facts fiercely resisted by the interests of certain political and business circles, and even countered by facts produced by scientists in other fields. While it is tempting to imagine there is a free market in facts and that good facts will somehow travel freely of their own accord, maybe, just as "bad money drives out good money," bad facts (poorly attested, dubious, fictional) can drive good (well-evidenced) facts out of circulation. Facts require a variety of charismatic companions and good authorities to travel well, and those faced by competition, as in recent climate science, may fail to do so (Oreskes, this volume).

Travelling Fact 4

When several young men in New York consulted their doctors with an unusual coalition of symptoms in 1979, it was not clear what disease they had. But quite soon their condition came to be recognised as an early case of a new disease, the HIV-AIDS syndrome. Their facts travelled effectively through a system of medical case reporting that gives first notice of unusual combinations of facts about symptoms in conjunction with patient characteristics. By packaging the facts together, the case provided the means to recognise and define a new disease, and gave early warning of a disease that would create a major world epidemic (Ankeny, this volume). Another system of medical case reporting exists to carry facts about well-known, and highly infectious, diseases such as measles or flu. Like the "bills of mortality" of earlier times, which kept a head count of plague deaths, the individual cases of our current pandemics are gathered together and repackaged into statistical and mathematical facts that nowadays travel around communities of modellers and systems of simulations. From these, epidemiologists map and predict the spread and outcomes of such diseases and public health authorities decide the best control, treatment or vaccination procedures. Our life expectancy depends on the careful packaging of such facts and their chaperoned travels around a variety of medical establishments (Mansnerus, this volume).

1.1 The Lives of Facts

These brief accounts sketch the life stories of certain facts, life histories that are told in greater depth and detail elsewhere in this book. As they suggest, the possibilities for facts to travel well are important to our lives. We depend upon systems, conventions, authorities and all sorts of good companions to get facts to travel well – in various senses – and danger may lurk when these are subverted or fail to work. The fact that birds-of-prey silhouettes do not work to solve the problem of birds flying into glass windows tells us that a fact about the relationship between birds and their predators has not travelled intact, but it is not one (or at least, not so far as we know) that is dangerous in itself. But if our medical reporting system had not picked up and set travelling some early facts about HIV-AIDS, this could have exacerbated the dangers from the epidemic – as we see in countries that have refused to recognise the travelling facts of the disease as legitimate. Constraints on the travels of facts may be seriously detrimental to our well-being. Yet the free

market may be equally problematic. The Internet is such a free market, but one in which – as is well known – it is difficult to distinguish trustworthy facts from untrustworthy ones, an age-old problem of open (or free) product markets that has led to their habitual regulation, for example, to prevent the use of poisonous additives to make bread white, or, in the case of travelling facts, to regulate the claims made for the efficacy of medicines.

But this problem of getting facts to travel well should not be seen as only a question for the public domain of science. Humanists as much as scientists should beware the trickle-down theory that they merely need to supply facts of good character and those facts will find their way where they are needed, to new homes with honest and welcoming users, professional, amateur or public.[1] Historians and novelists, as much as sociologists and economists, or medics and climate scientists, should be careful of the ways that they package their facts for successful travel and, as much as possible, take care about the company they keep while these facts are in their charge. Once facts leave home, it is more difficult to keep them safe. Historians and archaeologists often find themselves rewriting the past by retrieving lost facts that have failed to travel in replacement for better-travelled, but false, facts. Thus, the original construction of St. Pancras Station in London did not have the useful side effect of clearing a slum, as earlier generations have maintained, but of demolishing a respectable working-class neighbourhood.[2]

The life histories of facts that turn out to be false, that become corrupted or that die out make good short stories, stories that often stick better in the memory than those accounts of facts that remain steadfast throughout successful careers.[3] This bias towards revealing falsehood in our histories of facts may be because we expect specific facts not to be forever facts, either through a natural scepticism about the category of fact or because, in our experience, some particular facts turn out not to be facts after all. Not all facts travel well, some travel only to be found out and many hardly travel at all.

[1] See Oreskes and Conway (2010).
[2] See Swenson (2006).
[3] For example, the BBC Radio 4 programme "More or Less" about numbers in the public domain is full of such stories of misleading or mangled facts that travel well precisely because their falsity has made them more dramatic than they really are, for example, a misquoted fact about the proportion of women whose life is cut short by domestic violence (15 May 2009: http://news.bbc.co.uk/2/hi/programmes/more_or_less/8051629.stm). The programme hardly mentions those straightforward stories of facts that travel with integrity, and also misses the kinds of extraordinary and successful stories that we find in this volume.

Yet, many facts do travel well, retaining their integrity when they do so, for we all regularly transfer and make use of facts – without subverting them – in new contexts, often without even noticing that we are doing so. The research project that created this book set out to look for those travelling facts that we do not normally notice. When we asked, "How well do facts travel?" and looked for answers in the travels of facts (rather than knowledge flows more generally) and focussed our attention on the facts themselves (rather than on the people and communities through which they pass), we found that many facts do indeed travel far and wide to new users and new uses.[4] And their trajectories were so extraordinarily varied and sometimes so completely unexpected that we feel justified in saying that, just like some experiments and models in science, some facts acquire an independent life of their own.[5]

Even so, as we found in our research, it is not always easy to figure out why those facts that travelled well did travel or, indeed, what exactly travelling well means in any particular context, for the extent of such travel raises its own puzzles. In travelling to other spheres and in being used to address other questions, we found that facts may grow in scope, sharpen or become more rounded; they may acquire new labels and fulfil new functions, even while they maintain a strong hold on their integrity. It is through these processes that facts produced in one locality come to speak with authority to other questions, even to other fields, times and places. By following these independent lives of facts, we not only found answers to the question, "How well do facts travel?" but we began to understand how it is that facts come to play foundational roles in situations beyond those of their production and original usage.

2. "A Fact is a Fact is a Fact"

Facts seem such obvious things: We think of them nowadays as settled pieces of knowledge that we can take for granted. And while individual or particular facts may be seen as important or striking within a particular field, considered as a general category of knowledge, facts seem less problematic than the elements of evidence, theories, hypotheses or causal claims that appear in both our humanities and sciences, and less colourful than the

[4] Information about the project funding is found in the Acknowledgements note. A full record of the research project can be found at http://www2.lse.ac.uk/economicHistory/Research/facts/AboutTheProject.aspx

[5] On the life of experiments, see Hacking (1983) and Shapin and Schaffer (1985); on the life of models, see Morgan (forthcoming).

characters or cases that appear in our narratives, histories and philosophies. But facts are not quite such straightforward things as they seem.

First of all, our research led us to take a generous view of what facts are and where facts are found, for they come in a bewildering variety of forms in those various communities of scientists and humanists that use them. Facts may be expressed in linguistic statements or as bits of digitised information; they may appear in pictures, diagrams, models, maps, documents, biographies or novels; they may be found as material facts located in artefacts such as mediaeval swords, or expressed in the behavioural characteristics of crowded rats or the healthy growth of fertigated plants; they may be found in the fragments from ancient civilizations, in the fossils of long-dead nature or as numerical constructions about the future of our overheated planet. And we found that facts can be little (observations on the buds of a specific flowering plant, data points on a weather graph), big (the regularity of business cycles in modern economies), singular (the age of a particular person), come in crowds (infection rates) or be generic (the alpha male in romance fiction or the exit pattern of firms in declining industries).

Indeed, facts come in so many guises and sizes that it proves difficult to produce a sharp description about what counts as a fact, particularly one that would cover the many times, places and fields that we studied. Nor did the presence (or absence) of the word itself give us any natural starting point for our investigations. In some fields, scientists are profligate in their use of the term (as in parts of the life sciences), while in others (as in parts of economics and physics) the term "data" is preferred for something we might label small facts, while still other scientists might refer to a well-attested "phenomenon" for something that we might label a big fact or a generic fact.

Nevertheless, facts are a usable category, for, in our experience, all communities have some kinds of things that they take to be facts or fact-like: shared pieces of knowledge that hold the qualities of being autonomous, short, specific and reliable. These are the qualities that make us think "a fact is a fact is a fact" – wherever it is, for whatever purpose it is used. These are the qualities that enable settled pieces of knowledge to travel (assuming that they are communicable or transportable in some way or another) beyond their place of origin to be used in those new contexts.

These qualities of the things that are taken as facts have historical roots of course. The notion of fact began in legal circles in the mediaeval period according to the account by Barbara Shapiro: so that by the early modern period, the actions that occurred (the murders, frauds, etc.) were referred to as "matters of fact," drawn in contrast to "matters of law" and thus making

sense of the otherwise strange phrases "before/after the fact."[6] This sense of facts as deeds or actions seeped from law into history as the narration of well-evidenced facts – the deeds of history – in the sixteenth and seventeenth centuries, and thence into reports of newsworthy items. And this idea of facts continued to hold sway into the nineteenth century at least, as we see in the contrast drawn between facts as deeds versus words found in: "Gracious in fact if not in word" (Jane Austen: *Emma*, 1815).[7] From law and history, the notion of facts moved into natural philosophy and modern sciences where, as Steven Shapin and Simon Schaffer recount, "matters of fact" – properly witnessed, experimentally produced events – came to be distinguished from their interpretation.[8] Lorraine Daston takes up the story to recount how facts – as those noteworthy and particular "things" – grew in scientific circles into a "form of experience most sharply distinguished from 'hypothesis' or 'conjecture.'"[9]

These historically formed qualities invade the current sense of facts in ways that are important for our project of understanding why facts can travel well. Facts are "independent" of their explanations – a quality that goes back to their legal sense discussed by Shapiro, where "matters of fact" – deeds or actions – are established independently of their motivations. Just as in law and history, where facts were not to be conflated with the causes of those facts or with the evidence advanced for them, facts in science were, as Daston tells us, "in principle, strictly independent of this or that explanatory framework."[10] These historical roots tell us why facts – as pieces of knowledge in their various senses and guises – are understood to be independent of their explanations, causes and motivations, and so are free to travel without reference to them.

[6] Shapiro (2000) and her earlier shorter version of the argument (1994) argues for law as the field within which the notion of facts emerged into a mature idea. See also Poovey (1998) who grounds the notion in early accounting and the collection of essays on the history of facts in Cerutti and Pomata (2001).

[7] See p. 231 of 1971 edition published by Oxford University Press.

[8] See their, 1985, Chapter 2 ; see also Haycock (this volume).

[9] Daston, 2001 (English version p. 6).

[10] Daston goes on, "They can therefore be potentially mobilised in support of competing theories, and, again in principle, endure the demise of any particular way of explaining a phenomena" (Daston, 2001, English version, p. 6). There is an intimate relation between "fact" and "evidence," yet the distinctions and relation of facts and evidence seem to be a matter of local usage varying over time, country and disciplinary usage. Although Barbara Shapiro's (1994 and 2000) concentration on the legal framework in early modern times shows how evidence and witnesses were needed to attest to, and so establish, matters of fact, Lorraine Daston's (1991) writing about early modern sciences portrays facts as the jigsaw of pieces that create evidence for a hypothesis or conjecture.

Facts are also "short" – an epithet that Daston (2001) uses to capture the particularity of facts in early science in a way that is still shared not just across the sciences but into the humanities. This recognisable quality of facts from those earlier times is described more fully by Ernest Gellner when he observes that we use the term facts to refer to "concrete" and "specific" events, objects and findings rather than to those things we describe in "abstract" terms.[11] This particularity has implications for the way that facts travel to find new uses and the new uses to which they are put, but does not make them any less transferable than the abstract ideas, metaphors, stories or theories that also travel well between fields.

These historical notions of facts are clearly manifest in our modern views of facts, where current definitions rely on drawing definitional contrasts, but not necessarily opposites (as we shall see in what follows), just as earlier ones did.[12] Now we find:

- facts versus evidence and inference (in legal fields)
- facts versus fictions (in the humanities)
- facts versus hypotheses, theories or interpretations (in the sciences)
- facts versus the untrue and surmised (in both everyday life and in philosophy).

Common to all those contrasts is the non-conjectural quality of facts. Facts are *not* fictions, theories, inferences or the merely surmised. This non-conjectural sense that facts carry is captured more positively by describing them as "useful and reliable knowledge" (a phrase from historians of technology).[13] Of course, not all facts are especially useful, and not all useful and reliable knowledge has fact-like qualities (for such a phrase equally captures rule-of-thumb knowledge and more general or abstract knowledge). The point is rather that the sense of facts as "useful and reliable" not only helps to rule out both superstition and opinion, as well as the conjectural

[11] Gellner (1964), p. 255.

[12] Evidence from the Oxford English Dictionary, online version.

[13] The first usage of this phrase seems to date from Nathan Rosenberg (1974, p. 97) to describe scientific knowledge that could form the basis for technological knowledge. The term is used here in its current and more generally used form, dating from the 1990s' "Achievement Project" sponsored by the Renaissance Trust in which economic historians (particularly Patrick O'Brien and Ian Inkster) and historians and sociologists of science (amongst others) were engaged in figuring out why some technologies were developed in some countries and not in others. (See, e.g., Gouk 1995 and Inkster 2006.) In this context, the phrase "reliable" refers not necessarily to a scientific source but to the usefulness of a technology, where the addition of "reliable" seems to imply tested by patent or experience or the market in many conditions and circumstances.

aspects of knowledge, but also points to a certain steadiness, even sturdiness, in the quality of facts that makes them sufficient for people to act upon them or use them in support of their actions.[14]

Facts are a form of shared knowledge: They have a public or community aspect, as is evident also from their historical roots.[15] And we have relied on the communities we study – that send, receive and use facts – to reveal what counts to them as facts (even where the word itself is not used), that is, as pieces of knowledge established according to their standards of evidence of discipline, time and place. Such matters of facts should be understood then, *not* as an expression of that community's *belief*, or *opinion*, but rather that such a community has good reason to take those things as facts, and will be likely to have the confidence to act upon them as facts.

Given that we are taking a community's view of what their particular, well-evidenced facts are, we have not been (by and large) concerned with judging whether those community facts are facts according to any meta-standards beyond their own ones. That is, our project *as a whole* did not set out to determine the truth of any particular facts; indeed, we could not do so without sharing that same local field knowledge that would enable us, for example, to recognise the facts in the diagram of a worm's nervous system or in the statistics of death rates. (Of course, individual authors in this book do have field knowledge and may make such judgements.) Nor did we set out to discuss the meaning of facts as a general abstract category – the province of philosophical argument. Rather, we are interested in how facts – bits of knowledge taken by a community to be true – travel, and so our accounts of what makes some facts travel well cannot distinguish between those that are true facts and those that may later turn out to be false facts.

But this does not mean that we totally put aside all the interesting issues of true versus false facts. We recognise that in travelling freely from their original communities over time, space and discipline, there are many chances for facts to be challenged. Some of those facts that travelled well initially later turn out – on the judgement of their relevant communities – to be partly true facts, dubious facts, uncertain facts or even false facts, and this changing judgement of a fact's status can be an important part of what happens to travelling facts. Thus, we include narratives in which travelling facts have been strongly disputed by others in the community, as in the climate science case (Oreskes, this volume), or where facts established and carried along by one community turn out much later after successful travels

[14] See also Mansnerus (2009).
[15] As pointed out by Weirzbicka (2006).