Ticking off

Telling Time: Clocks, Diaries, and English Diurnal Form, 1660–1785
by Stuart Sherman
University of Chicago Press: 1997. Pp. 323. $60, £47.95 (hbk); $19.95, £15.95 (pbk)

Kristen Lippincott

For the benefit of the unwary who might find themselves seduced by the intriguing title, it should be pointed out that Stuart Sherman's book is essentially a work of literary criticism. The purpose of this warning is twofold: to save horologers, eager for another box-office hit like Dava Sobel's *Longitude*, from the spectre of false hope; and to alert those who might not be *au fait* with or sympathetic to current, post-Foucaultian theories of how literary texts ought to be read that they may find much of the rhetoric of this book impenetrable. For those willing to make the effort, however, there is one final warning — the central thesis of the book seems to be somewhat flawed.

Sherman argues that developments in clock and watch manufacture and decoration in England between 1660 and 1785 affected literary form during the period. At its simplest, it is a claim that has been made before and, in many ways, it is probably more-or-less true. Problems arise from the fact that the prompt for Sherman's particular point of view is a violent reaction to Frank Kermode's elegant formulation in *The Sense of Ending: Studies in the Theory of Fiction* (Oxford University Press, 1966). Kermode uses the analogy of the 'tick-tock' of a clock to illuminate the structure of a narrative where the anticipatory 'tick' of an unresolved situation is successfully brought to closure by the succeeding 'tock'.

To counter Kermode's poetry, Sherman calls three witnesses: the *Oxford English Dictionary*, John Aubrey's *Brief Lives* (1680) and the pendulum clock invented by Christiaan Huygens in 1656–57. From the first we learn that 'tick' is a word that has been known in England since 1440, whereas 'tock' was unrecorded until its appearance in 1848 in William Makepeace Thackeray's *Vanity Fair*. From the second, we note that a seventeenth-century watch is described as making a "tick-tick-tick" noise. And the third is cited as the "single, decisive" moment in the history of timekeeping, when the introduction of the pendulum as a constant driving force introduced synchronicity. "Huygensian time" was a new time because of "its capacity to track and report newly small durations — minutes and seconds — in regular, perceptible, continuous succession".

For Sherman, this "Huygensian time" is not "tick-tock time", which he claims did not exist until the nineteenth century. It is "tick-tick-tick time" which encapsulates "a *temporality* [his italics], a way of reckoning time that includes but goes beyond counting, a way of conceiving it and experiencing it". Time for the English living during the second half of the seventeenth and first half of the eighteenth century was palpably different — even, constant, unending, unresolved. Pepys's *Diary*, the development of the daily newspaper and Daniel Defoe's travel writings all partake of this new "tick-tick-tick Huygensian time".

Sherman presents an interesting thesis, but it rests on one fundamentally erroneous assumption about clock mechanisms and their sounds. The "tick-tock" of a clock is caused by contact between the two pallets and the escape wheel. As the construction of these two pallets is never identical, the striking sound they make will always be different. And regardless of the driving force — whether by weight or spring — the "tick-tock" noise made by the alternating contact of the pallets has remained a constant feature of most public and domestic mechanical clocks and watches from the late thirteenth century to the present day. To my knowledge, there is only one type of escapement that could be claimed to make a "tick-tick" noise and that is the single-beat escapement first used around 1750 (although, in all honesty, the clocks with a detent escapement tend to make more of a "tock-pause, tock-pause" sound).

Furthermore, it seems somewhat ironic that many of the more sophisticated precision timekeepers of the seventeenth and eighteenth centuries — those whose supposed post-Huygensian "tick-tick" constancy should serve best to support Sherman's thesis — tend to reflect the complex structure of their movements in the sound they make. John Arnold's version of the single-beat escapement, for example, when closely analysed is, in fact, a delightful three-beat drum roll followed by a tiny click. And John Harrison's H-1 timekeeper veritably babbles with a "kerchunkety-kerchunkety-twang" — the twang being the expansion and contraction of the springs linking the interconnected balances.

One exaggerates to make a point, but it does seem somewhat precipitous for a scholar whose work is characterized by an extremely close reading of a given text to be so bold as to use analogies from other disciplines about which he is not sufficiently informed. His presentation of the history of chronometry and its relation to prose form simply does not stand up to scrutiny because his understanding of how clocks work and how timekeeping conventions changed during the seventeenth and eighteenth centuries is exceedingly patchy. The descriptions of the lunar-distance method of navigation are riddled with small inaccuracies and misunderstandings. And the account lacks an appreciation of some of the problems involved in time-reckoning between John Flamsteed's formulation of the equation of time and the introduction of standard time in Britain in 1850.

Literary critics may be convinced by Sherman's arguments, but from the perspective of a historian of science there is more than a little worry generated by claims such as "Pepys' ignorance is the crucial datum" because "...at Greenwich, Huygensian temporality will achieve hegemony, but not yet and not inevitably". One can only envy Pepys's ability to be so lucky in his ignorance. □

Kristen Lippincott is at the Old Royal Observatory, Greenwich, London SE10 9NF, UK.

Number crunching

Mathematics from the Birth of Numbers
by Jan Gullberg
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Peter Saunders

Most mathematicians find it very difficult to explain to other people what mathematics is and why we find it so absorbing. Even our students generally take some time to see the picture. They spend three or four years studying different parts of it in detail. While this is going on, we point out some of the connections and common features; others they become aware of by themselves. If all goes well, by the end of the course they have not only learned about the parts they have studied, they have also learned about mathematics as a whole.

Much of the skill in designing a good mathematics course consists of choosing and arranging the material in a way that will encourage this to happen, and much of the reason that many mathematicians are not especially enthusiastic about modular degrees is that they can seriously impede the process.

But what about people who do not have so much time to study the subject? How can they see how the different pieces are intertwined if they have not learned about them separately? How can they appreciate the way a theme recurs if they meet it only once? In short, how can they comprehend the unity of mathematics if they do not know enough about the subject? Yet it is the unity that is the real essence of mathematics, which makes it so much more than a collection of puzzles somehow combined with a set of clever methods for solving scientific problems.

Fortunately, one does not have to take a degree in mathematics to get a reasonably good idea of what the subject is about. One can manage with far less, but the material must be very carefully chosen to illustrate the key areas and to allow the connections to be made. That is easy to say, but difficult to put into practice. Authors have to think very hard about what to put in and how deeply it should be covered if they have only a few

Space can't wait

Sir — We applaud Alexander Harcourt (*Nature* **387**, 340; 1997) for emphasizing the value of exploring the world around us. Pressure abounds to devote all our resources toward investigations that promise quick technological pay-offs. It is refreshing to read an exhortation for support of discovery and understanding of the biological sphere.

In recent years, our understanding of biota has grown significantly from an unexpected vantage point — the "lifeless void" of space. Only in space can the influence of gravity and other earthly physical phenomena be separated from the organisms and biological processes we want to understand.

By conducting biological research on orbital platforms, scientists have been able to make tremendous gains in basic understanding of human physiology, protein structure, signal transduction, developmental biology and immunology.

Exciting developments in the area of exobiology may signal present or past life on our neighbouring planet Mars, and have also sparked the search for life in extreme environments on Earth. Space research ignites our curiosity and goads us on to new levels of understanding.

We therefore disagree with Harcourt's contention that "space can wait" for the attention of future generations. It is also a mistake to pit one area of science against another in the guise of bolstering funding of earthbound exploration, when contributions to our understanding come from every discipline.

Scientists should instead strive to foster an awareness that scientific inquiry and discovery are intrinsically valuable and worthy of increased support. To borrow a slogan from the International Space Station: "Great nations dare to explore."

Mary E. Musgrave
(President, American Society for Gravitational and Space Biology)
Department of Plant Pathology & Crop Physiology, Louisiana State University, Baton Rouge, Louisiana 70803, USA
e-mail: xp3031a@lsuvm.sncc.lsu.edu

Sir — I was disappointed to read your leading article "Martian life to be avoided" (*Nature* **388**, 211; 1997). I strongly believe that it is appropriate to plan, and to achieve, the human exploration of Mars.

Excellent science is indeed possible without humans, as the robotic explorations of the Moon by the Ranger, Surveyor and Luna probes, and of course Mars by the Viking probes, has proved. However, there is no substitute 'in the field' for the flexibility of the human hand and mind; ask Harrison Schmidt, Apollo 17 astronaut and the first geologist to study, first hand, another world.

Apart from the vast increase in our knowledge of our nearest neighbour, we have in fact been bequeathed a huge legacy by the US and Soviet space programmes in the 1960s and 1970s; computer miniaturization, the development of new materials for engineering and improvements in satellites and communications were all accelerated by the space race. And almost as important as the technological advances is the powerful sense of awe and wonder still engendered by seeing films and pictures of men actually walking on and orbiting the surface of the Moon.

I therefore believe it is crucial for the advancement of our knowledge of Mars, the Solar System and our own planet that we plan to make direct human involvement an important part of space exploration, complementing the use of robot probes. Not to do so would be misguided and shortsighted in the extreme, and the NASA administrator's recent challenge to his engineers is to be welcomed, as would be a strong commitment to a return to the Moon. Let's hope the present US president has the foresight to support this bold and inspirational voyage.

Richard Hopkin
Department of Biological Sciences, University of Durham, Durham DH1 3LE, UK
e-mail: r.s.hopkin@dur.ac.uk

Time and motion

Sir — In her review of my book *Telling Time: Clocks, Diaries, and the English Diurnal Form, 1660–1785* (*Nature* **387**, 468; 1997), Kristen Lippincott warns readers that my thesis "seems to be somewhat flawed". Her hesitancy is justified.

The flaw, she says, is this: I start from the observation that soon after Christiaan Huygens steadied clockwork's motion by inventing the pendulum regulator, the English language appears to have coined a phrase to describe the new clocks' sound: *tick, tick, tick* (not *tick-tock*, the onomatopoeia we have grown used to since its first appearance about 150 years ago).

Lippincott's objection is that clocks don't really sound like that. The escapement's alternate beats differ from each other more markedly than *tick, tick, tick* suggests.

That is true. I say so in the book: the "sameness" voiced by *tick, tick, tick* is "fictional", because "no successive impulses of the clock's escapement will actually sound identical" (page 8).

The phrase is the more striking because it is in part illusory; it emphasizes the new evenness of the intervals between the sounds over the quality of the sounds themselves. The first users of the phrase were (as Lippincott claims I am) "exaggerating to make a point": that this was the way they newly imagined time to move — in small, steady increments — and that the new clocks were prompting them to imagine time this way.

Such imaginings have much to do, I try to show, with subsequent shapes of narrative, with the incremental, open-ended ways in which writers told stories of themselves and others, in the diaries, daily newspapers and other periodic forms that developed during the decades after Huygens' innovation.

Perceptions are not the same thing as reality, but they have history and consequences of their own, worth chronicling.

Stuart Sherman
Department of English, Washington University, Campus Box 1122, One Brookings Drive, St Louis, Missouri 63130-4899, USA

Identity crisis

Sir — Joel E. Cohen's review of John Cairns' book *Matters of Life and Death* (*Nature* **387**, 565–566; 1997) refers to "seventeenth-century Breslau in Poland".

In the seventeenth century, Breslau was the capital of the duchy of Silesia, which was part of the kingdom of Bohemia (and thus part of the Austrian empire). During the first Silesian war (also known as the War of the Austrian Succession) between Prussia (under King Friedrich II) and Austria (under the Empress Maria-Theresa), the duchy of Silesia became part of Prussia and remained so until the end of the Second World War, when the German population of Silesia was either killed or forced to leave and was replaced by Poles who had also been forced to leave their homes in eastern Poland.

J.-H. Klemme
Institut für Mikrobiologie & Biotechnologie, Rheinische Friedrich-Wilhelms-Universität, Meckenheimer Allee 168, D-53115 Bonn, Germany

•The error was introduced in the *Nature* office. — Editor, *Nature*.