Refuse the Hour **explores the unshakable anxiety of disappearing forever.**

JOHN HODGKISS

Q&A Peter Galison
Time transformer

Next week, Refuse the Hour, *a chamber opera about time, opens at the Brooklyn Academy of Music in New York City. The work is a collaboration between physics historian Peter Galison and South African multimedia artist William Kentridge. Galison talks about the nexus of technology and imperial conquest, the 'twin paradox' associated with Einstein's special theory of relativity and the metaphorical resonance between black holes and mortality.*

How did this collaboration begin?
I met William Kentridge through a mutual friend who was interested in fostering collaboration between science and art. What struck me was the probing psychological insight that William brought to the history of empire, how he depicted colonialism and its technical culture, surrounded by the terror of the historical moment. We began to focus on time. Early on, William said, "I don't want to make an illustrated science lecture." I said, "That's great, because I don't want to be the science adviser to an art project." Instead, we kept returning to scientific arguments about the nature of time and using them as jumping-off points — trying to capture, in affect and aesthetics, a sense of what gave them force.

What will audiences see in *Refuse the Hour*?
We originally had in mind an elaborate combination of installation and performance, but we then split the project into a five-channel video installation called *The Refusal of Time*, and an 80-minute chamber opera, *Refuse the Hour*. The opera is about the transformations that we have witnessed in our cultural and scientific ideas of time: Isaac Newton's absolute time, Albert Einstein's relative time and the threatened end to time and space as one approaches the centre of a black hole. When the opera makes its North American premiere, the audience will see projections of giant metronomes, African singers with megaphones, a giant accordion-like 'breathing machine' and William lecturing on procrastination, entropy and empire.

Refuse the Hour
22–25 October 2015. Brooklyn Academy of Music, New York City.

How were you inspired by historical timekeeping?
At the turn of the twentieth century, to measure longitude well enough to map the world's coastlines, colonial powers such as Britain needed to coordinate timekeeping across the globe. In a period when most countries lacked electric light, these powers were stringing telegraph cables under the ocean from Europe to Africa and South America. It was an extraordinary moment of scientific ambition and brute imperialism.

Was there a backlash against the standardization of time?
The opera shows both hope and resistance associated with advances in timekeeping. In the 1870s, authorities in Paris and Vienna tried to align the cities' clocks by sending pulses of air in copper tubes beneath the streets. Many people resisted. New York City mayor Franklin Edson argued for the conventionality of time, pushing back against those who fulminated against the loss of Sun-borne time. In Paris, the poet Georges de Porto-Riche sued the city because he believed the mechanical pulses had destroyed his creativity. The opera includes a filmed melodrama about Martial Bourdin, a French anarchist who, in 1894, tried to blow up the Royal Observatory in Greenwich, London, where the global standard time was kept.

How does Einstein fit in?
The fury was even greater when the young Einstein proposed the radical idea that time is not absolute. His 1905 special theory of relativity implied that every person in motion carries a private time. This is encapsulated in the twin paradox that quickly emerged from Einstein's theory, in which a space traveller returns to Earth after a high-speed journey to find that his stay-at-home twin is older than he is. In the opera, we allude to these imagined twins, as well as time slowed and accelerated, reversed and put back forward.

How does your forthcoming film *Containment* take on the topic of time?
Made with film-maker Robb Moss, *Containment* is a feature documentary about an extraordinary assignment demanded by the US government. To safely store nuclear waste underground, the Department of Energy has to decide how to warn future populations that the waste is there for a period not less than 10,000 years. That is a long span to consider: 10,000 years ago, prehistoric monument Stonehenge was science-fiction far in the future.

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What did you learn from working with Kentridge?
One of the great pleasures of the collaboration has been starting with the science but following chains of association far beyond what I do as a physicist, historian or even film-maker. At one point, we began with a question that divides scientists today: if you throw an encyclopaedia into a black hole, is the information gone forever or does it somehow survive? One day, inspired by a player-piano in William's studio, we realized that we could project light through rolls of perforated paper to invoke information falling into a black hole. We also made a parade of silhouettes marching into darkness, including two men struggling over a clock. Time is about physics, of course, but it is also, even for the most hardboiled scientist, about mortality, and the unshakable anxiety about disappearing forever. ■

INTERVIEW BY JASCHA HOFFMAN

This interview has been edited for length and clarity.