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Origins and Endings

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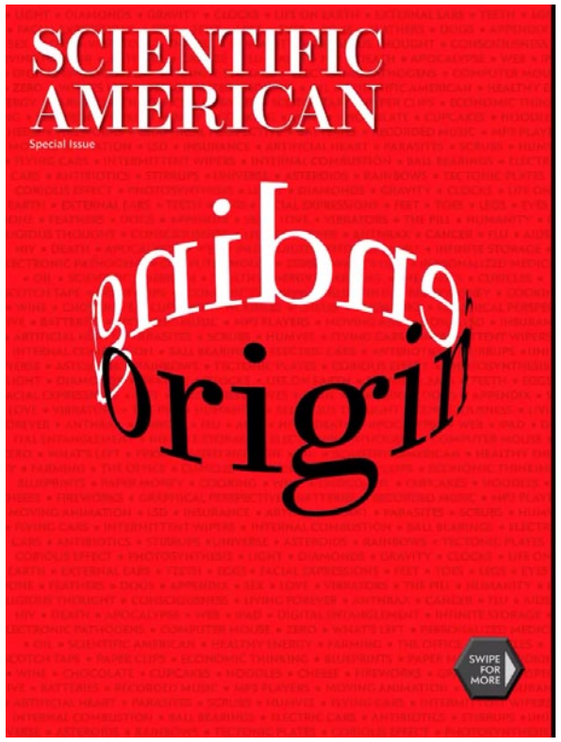


Imagine that you're handed scores of magazine pages in the form of multiple InDesign files. Your task is to reconceptualize that content into a publication that not only looks like it was designed for the iPad, but adds audio and video. And the tools you're using are so new that they're evolving as you work with them. Now imagine that you have only three weeks to complete the entire project.

While I think I'd react with a four-letter word, the small team faced with this very real challenge handled it like the pros they are. Scott Citron, Mordy Golding, and Bob Levine created *Scientific American*'s "Origins and Endings" app using InDesign CS5 and Adobe's Digital Publishing Suite, which was in beta.

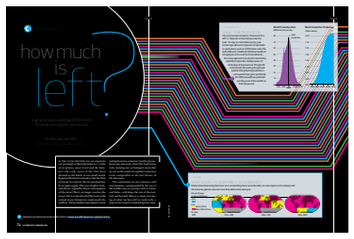
They do admit that it was a challenge. "Just because content fits on a magazine page doesn't mean it fits on an iPad 'page,'" notes Scott Citron. "When you shrink down a page of the magazine to the iPad's 1024 by 768 pixels, you end up with so much text. In the first few prototypes, the text and margins were way too small. We settled on 17.5-point body type and 22-point leading. The print magazine body text is 9.5 points."

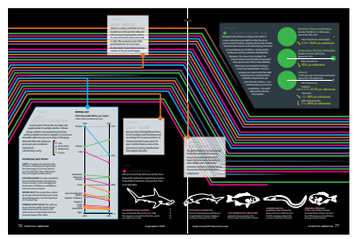
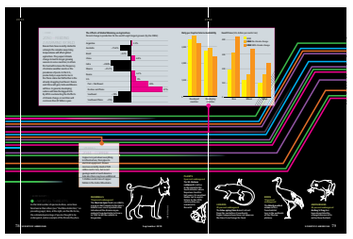
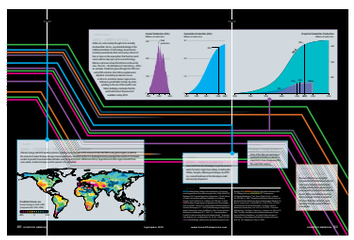
Another design difficulty to overcome was source material that was heavy on text and light on images. "Compared to, say, *Martha Stewart Living* with its white space," admits Citron, "this was like a doctoral dissertation."

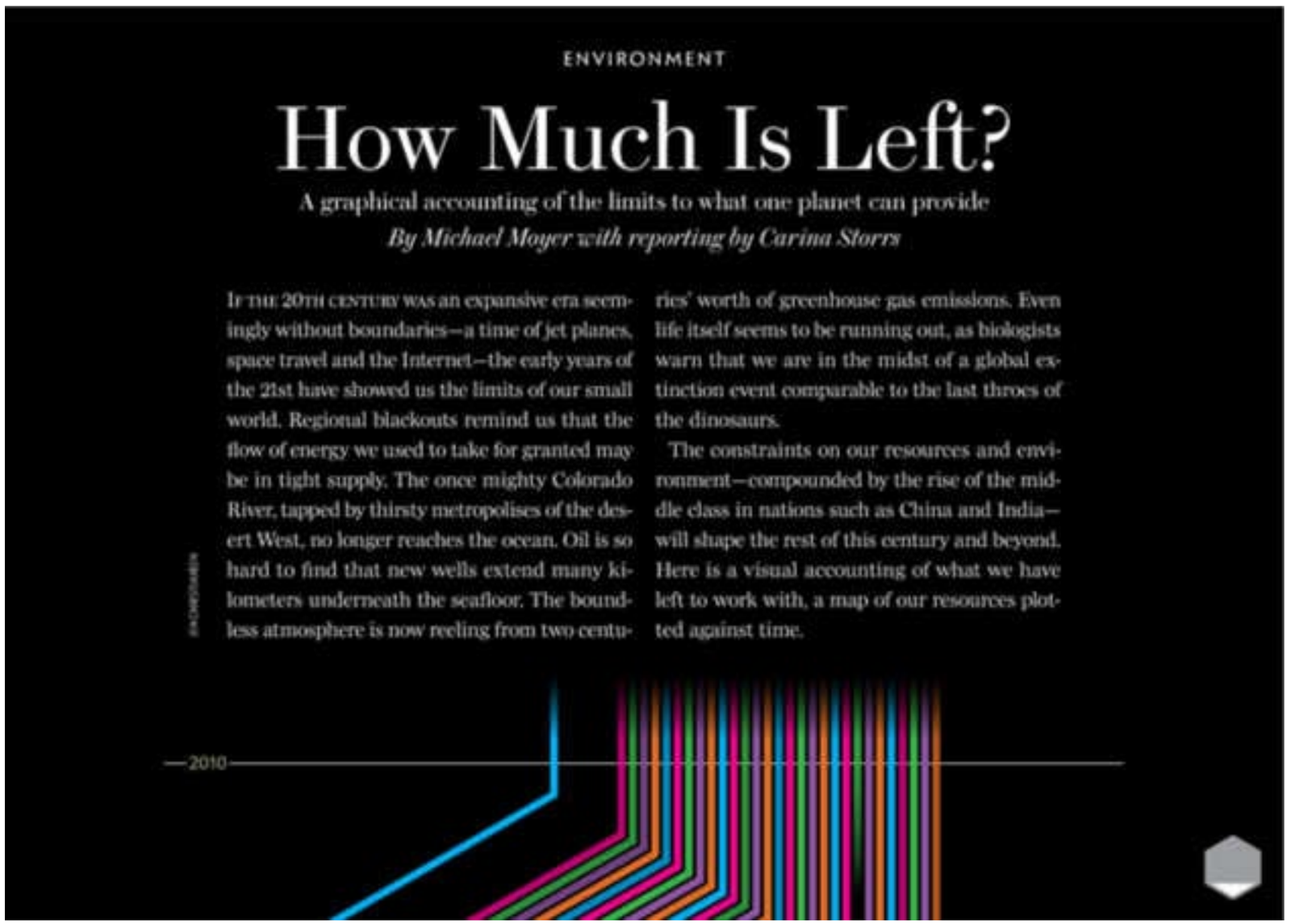
There were also plenty of technical challenges. As Bob Levine notes, the hardware and software are so new that "there's no experience to call on. You don't know which rules you can break and still have it function."

"You can't just look at it on your computer screen," agrees Mordy Golding. "You really need to put it on the iPad to test it out."

Golding cautions other designers creating for the iPad that the experience is "like exploring the Wild West. It is a completely different medium, one that doesn't fit into the rules of Web design or print design." — *Terri Stone*



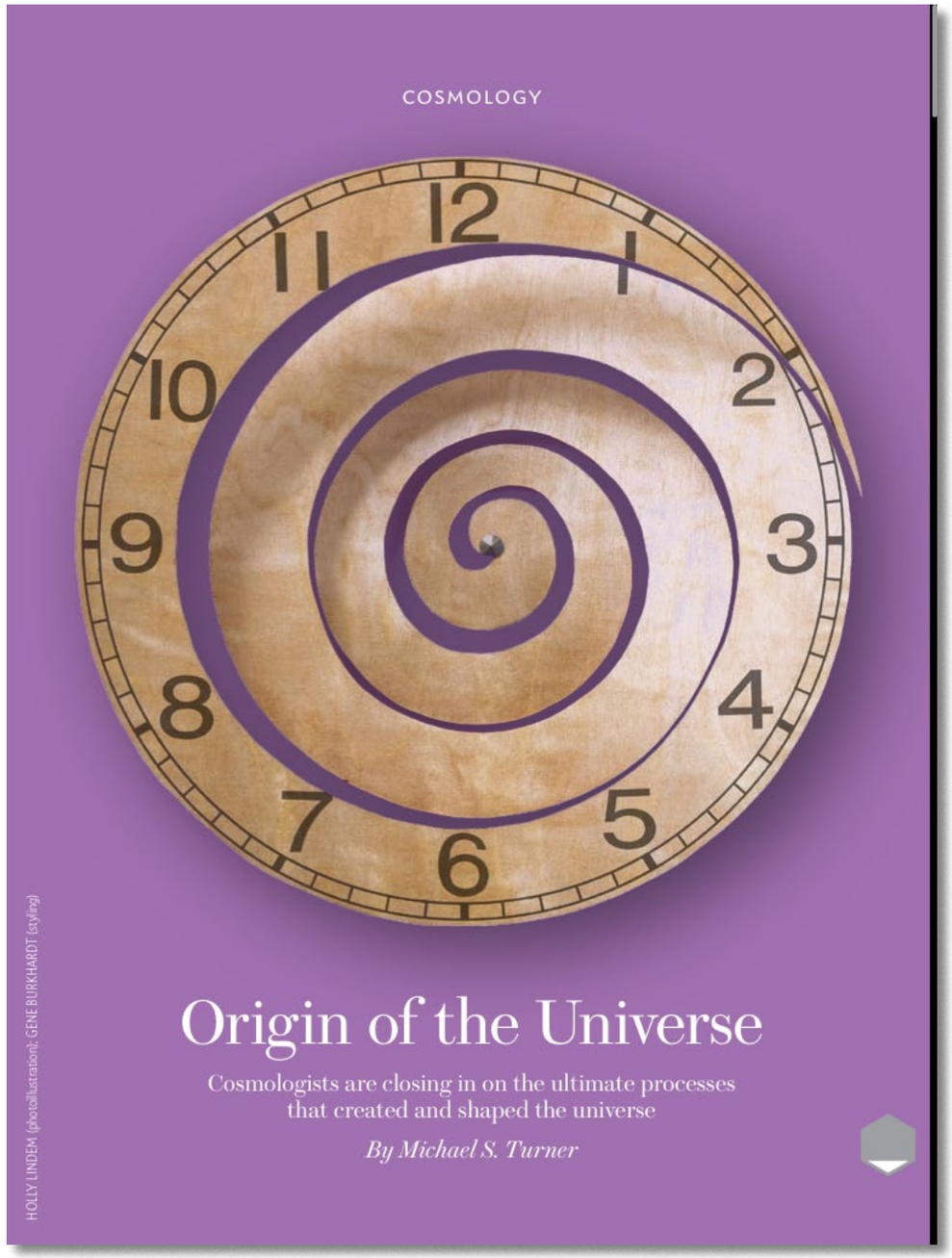


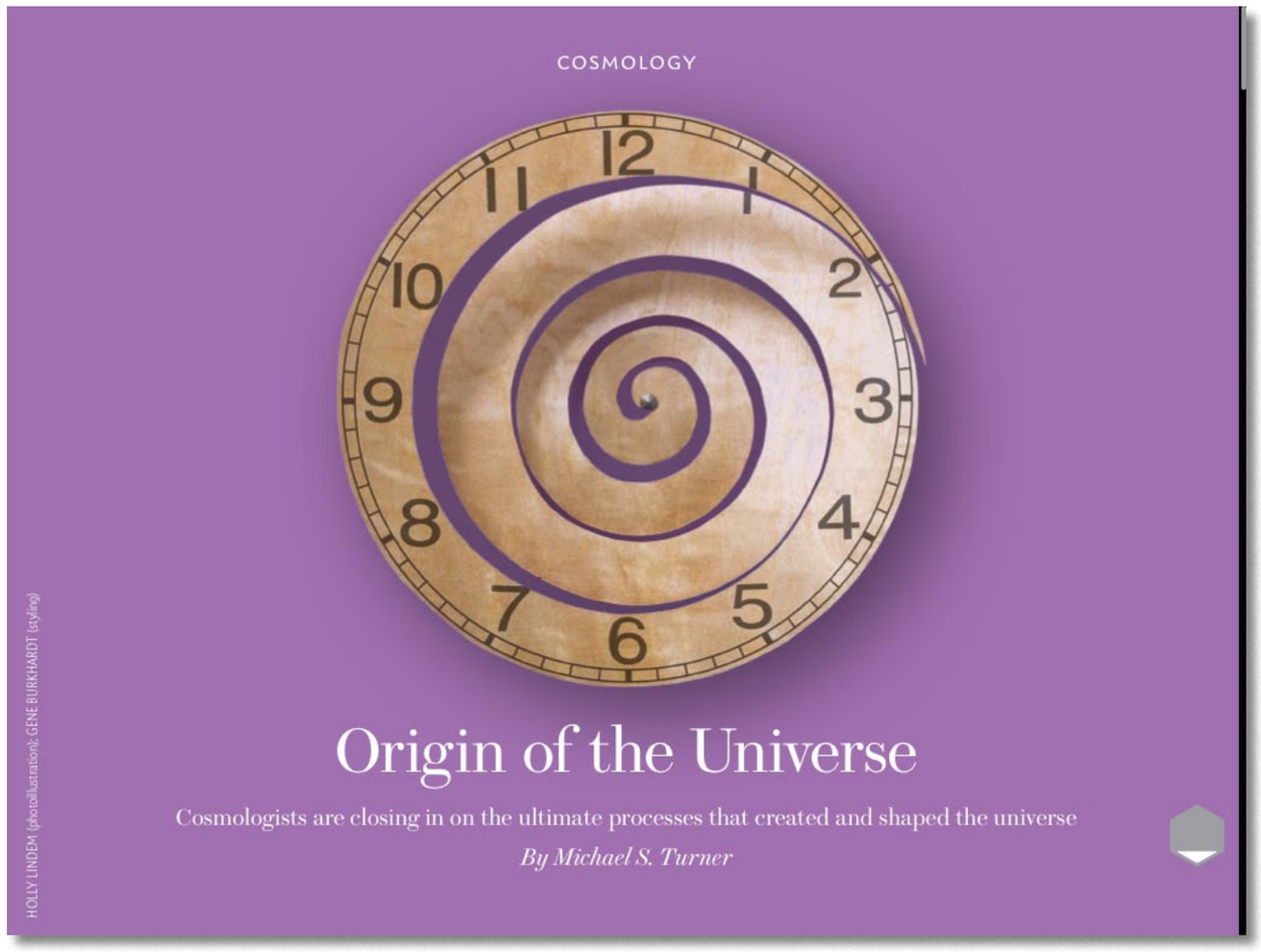
The original print version of the article "How Much Is Left?" consists entirely of a horizontal timeline that spans four spreads (left). Without ripping the magazine apart, the reader can view only two pages at once.

In the iPad version of this article (below left), the reader can scroll through the timeline in one fluid motion or stop to examine any segment more closely.

While only the horizontal orientation is to the left, the experience is similar in the vertical version.

Click on the large image to the left to simulate the iPad scrolling experience. To return to the top of the timeline, move your mouse off of the image.





As these screenshots from the iPad app show, the team created two versions of every article: one horizontal, one vertical. "The vertical version was more difficult," says Citron. "It was easier to take a page from the print magazine files, which were of course vertical, make their margins fatter, and run with it as the beginning of an iPad horizontal design. The vertical version of the iPad design was really hard because we didn't have as much real estate to work with, but we had to preserve original feel."

Steve Mirsky interviews *Scientific American* editor George Musser in this Science Talk podcast. [35:30]

George Musser is a staff editor for *Scientific American*.

IN OUR EXPERIENCE, NOTHING EVER REALLY ENDS. When we die, our bodies decay and the material in them returns to the earth and the air, allowing for the creation of new life. We live on in what comes after. But will that always be the case? Might there come a point sometime in the future when there is no "after"? Depressingly, modern physics suggests the answer is yes. Time itself could end. All activity would cease, and there would be no renewal or recovery. The end of time would be the end of endings.

This grisly prospect was an unanticipated prediction of Einstein's general theory of relativity, which provides our modern understanding of gravity. Before that theory, most physicists and philosophers thought time was a universal drumbeat, a steady rhythm that the cosmos marches to, never varying, wavering or stopping. Einstein showed that the universe is more like a big polyrhythmic jam session. Time can slow down, or stretch out, or let it rip. When we feel the force of gravity, we are feeling time's rhythmic improvisation; falling objects are drawn to places where time passes more slowly. Time not only affects what matter does but also responds to what matter is doing, like drummers and dancers firing one another up into a rhythmic frenzy. When things get out of hand, though, time can go up in smoke like an overexcited drummer who spontaneously combusts.

The moments when that happens are known as singularities. The term actually refers to any boundary of time, be it beginning or end. The best known is the big bang, the instant 13.7 billion years ago when our universe—and, with it, time—burst into existence and began expanding. If the universe ever stops expanding and starts contracting again, it will go into something like the big bang in reverse—the big crunch—and bring time crashing to a halt.

KEY CONCEPTS

Einstein's general theory of relativity predicts that time ends at moments called singularities, such as when matter reaches the center of a black hole or the universe collapses in a "big crunch." Yet the theory also predicts that singularities are physically impossible.

A way to resolve this paradox is to consider time's death as gradual rather than abrupt. Time might lose its many attributes one by one: its directionality, its notion of duration and its role in ordering events causally. Finally, time might give way to deeper, timeless physics.

—The Editors

sic properties of the cosmos as its general uniformity and the lumpiness that seeded galaxies and other structures in the universe. As the inflaton field decayed away, it released its remaining energy into quarks and other particles, thus creating the heat of the big bang and the quark soup itself.

Inflation leads to a profound connection between the quarks and the cosmos: quantum fluctuations in the inflaton field on the subatomic scale get blown up to astrophysical size by the rapid expansion and become the seeds for all the structure we see today. In other words, the pattern seen on the CMB sky is a giant image of the subatomic world. Observations of the CMB agree with this prediction, providing the strongest evidence that inflation or something like it occurred very early in the history of the universe.

BIRTH OF THE UNIVERSE

AS COSMOLOGISTS TRY to go even further to understand the beginning of the universe itself, our ideas become less firm. Einstein's general theory of relativity has provided the theoretical foundation for a century of progress in our understanding of the evolution of the universe. Yet it is inconsistent with the other pillar of contemporary physics, quantum theory, and the discipline's greatest challenge is to recon-

ASTRONOMY

TOGGLE

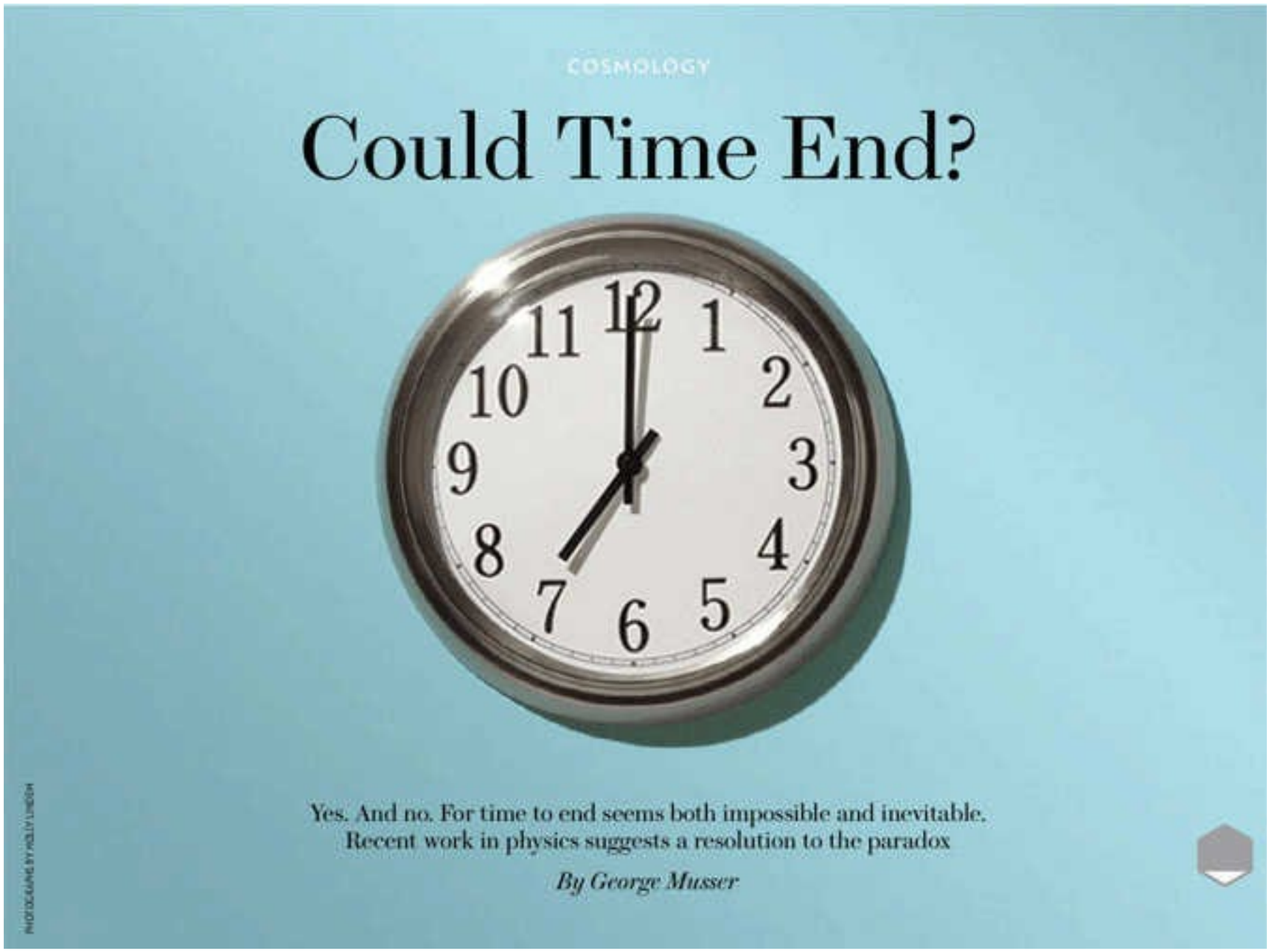
Ten Telescopes That Changed Our View of the Universe

Historic telescopes through the ages, from Galileo to the 21st century.

HUBBLE SPACE TELESCOPE

The first of NASA's Great Observatories, the Hubble Space Telescope was carried into orbit in 1990 by the space shuttle. Hubble was originally designed to observe in the visible and ultraviolet parts of the spectrum, but a 1997 mission added an infrared observing capability. Because it orbits hundreds of miles above Earth, Hubble does not suffer from the atmospheric distortions encountered by Earthbound observatories and has been our clearest eye into space, vastly expanding our knowledge of the cosmos and its origins.

These screenshots from the vertical and horizontal orientations of the iPad app show two elements that are impossible to include in print publications: audio and slideshows. The red arrows (added for *InDesign Magazine*, not in the actual app) point out supplementary audio in the article on the left, and a slideshow in the article on the right. The slideshow is an example of multi-state objects in action.



The thumbnail above is the original opening spread of the print version of the article "Could Time End?"

The animation on the left simulates what happens when you begin reading the same article in the iPad app.

Viva InDesign!

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