



From Postcards to Virtual Reality & Back

(Without ever leaving)!

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Headspace

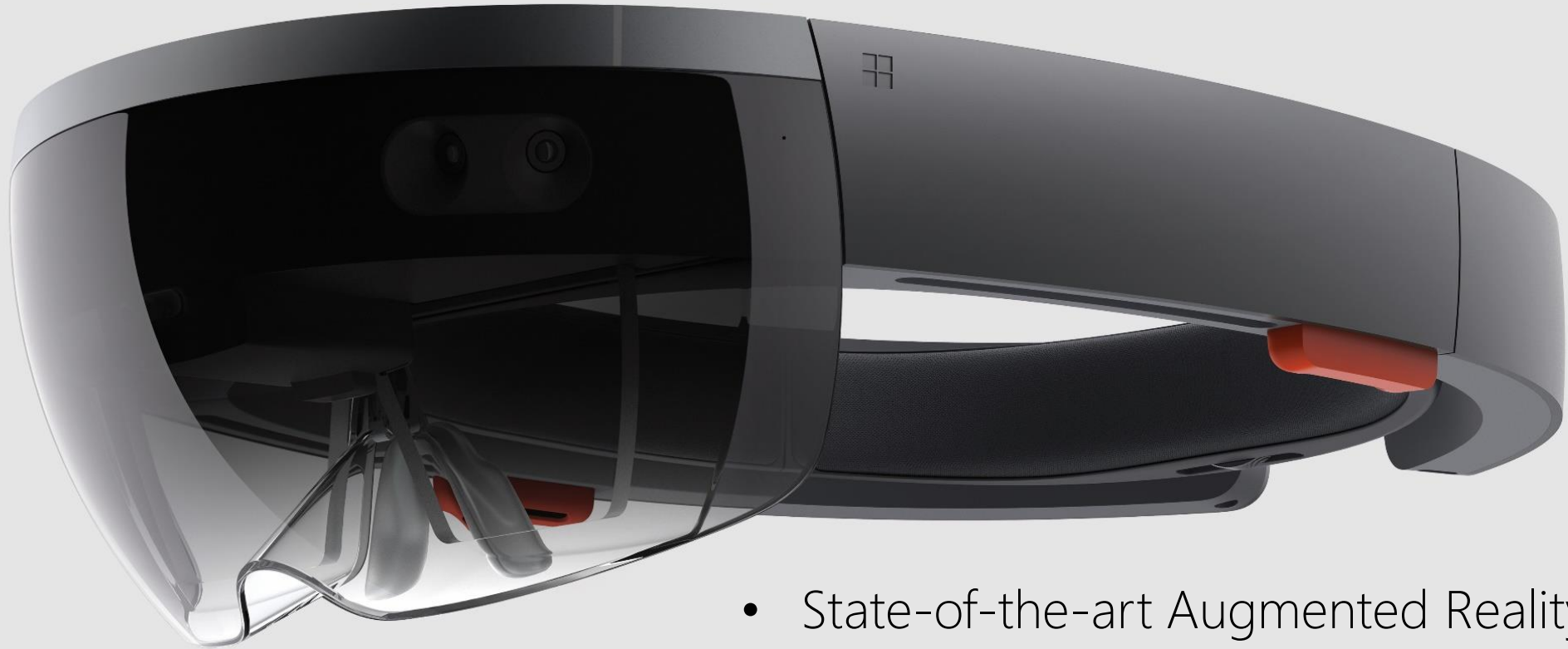
AR / VR / MR

Selections from the Buxton-Microsoft Collection

Caveat

The purpose here is *not* to provide a comprehensive history of headsets; rather, to use selected objects from the collection to illustrate the value of history in shedding light upon the nature of technological evolution and design - from the technological, social, and cultural perspectives. That, *and* to tell an engaging story.

Microsoft HoloLens (March 2016)



- State-of-the-art Augmented Reality
- Distinguished in that it is self-contained
- Integrated Windows 10 computer
- Untethered. Mobile.



Avegant GLYPH (2015)

- Personal media player (audio and video)
- Can be worn as conventional over the head audio earphones
- Or rotated 90° for personal wide-screen video playback
- Including stereo viewing
- Content can be downloaded to headset or streamed wirelessly from companion device, such as mobile phone, etc.



Oculus Rift DK1 (2013)

- A key entry in the current wave of Virtual Reality devices.
- Their first available development kit (hence DK1)
- Like most headsets, a peripheral - requires a companion computer with a powerful GPU
- Much of the impact of the Oculus is due to their acquisition by Facebook

Mark Zuckerberg reveals that Facebook paid more than we thought for Oculus VR



Alex Heath

Jan. 17, 2017, 4:30 PM 20,264



Mark Zuckerberg

March 25, 2014 · Palo Alto

Follow

I'm excited to announce that we've agreed to acquire Oculus VR, the leader in virtual reality technology.

Facebook CEO Mark Zuckerberg revealed new details about his 2014 deal to acquire the VR company Oculus during a public appearance in court on Tuesday.

Zuckerberg visited the Dallas courtroom to testify in the ongoing lawsuit against Oculus by video game publisher Zenimax, which claims that the Oculus Rift VR headset is partially based on stolen technology.

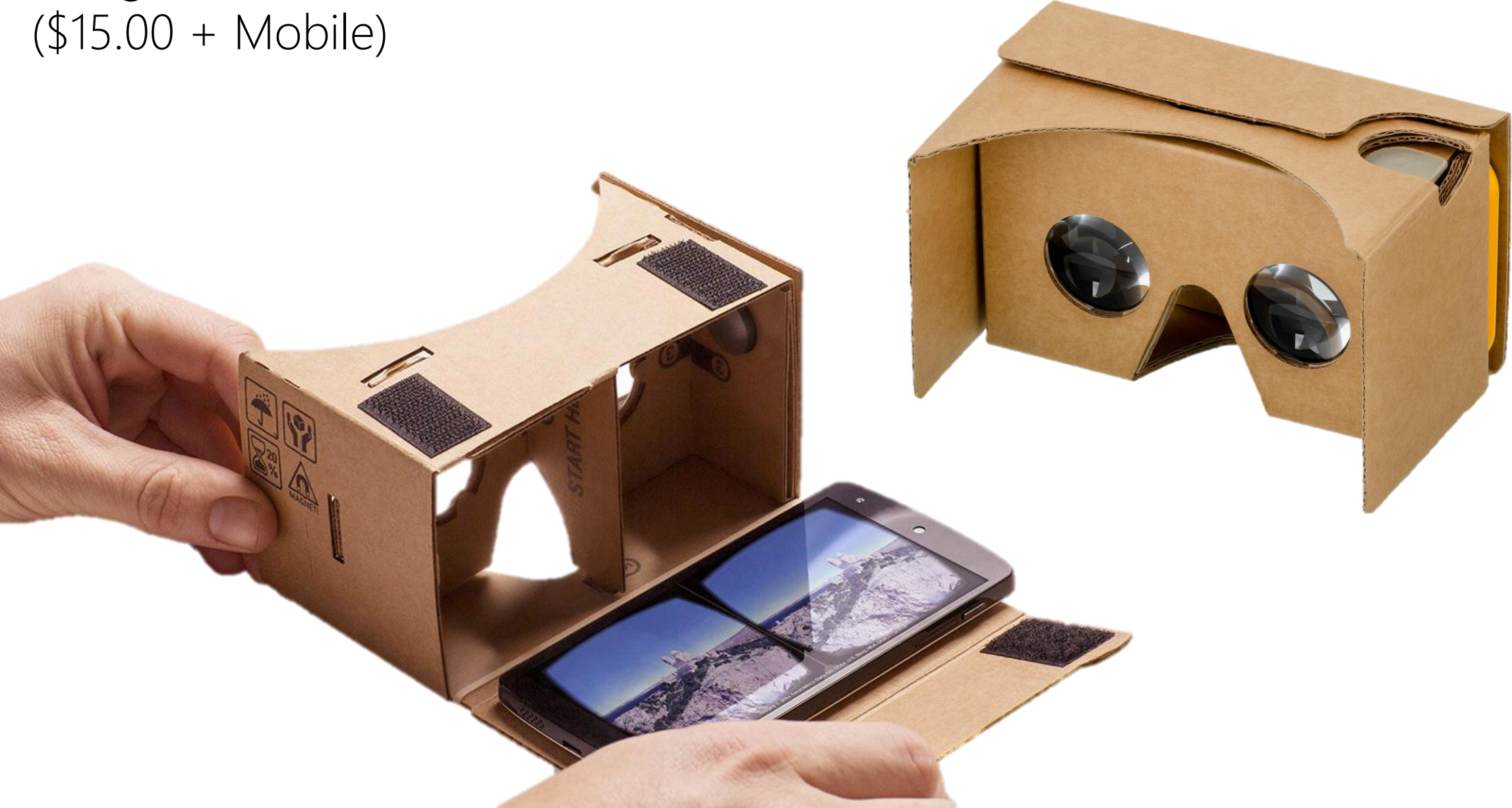
During his testimony, Zuckerberg revealed that Facebook paid an additional \$1 billion for Oculus in employee retention packages and goal targets, according to a court transcript seen by Business Insider.

Facebook said that it paid \$2 billion for Oculus when the deal was announced in 2014.



Mark Zuckerberg tries on an Oculus Rift headset with touch controllers. Facebook

Google Cardboard (2014)
(\$15.00 + Mobile)



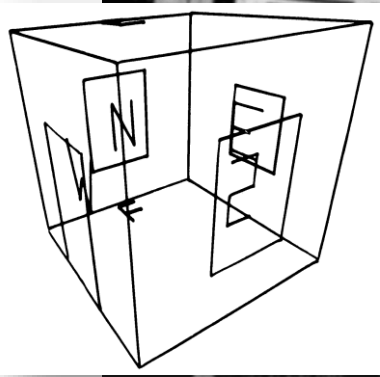
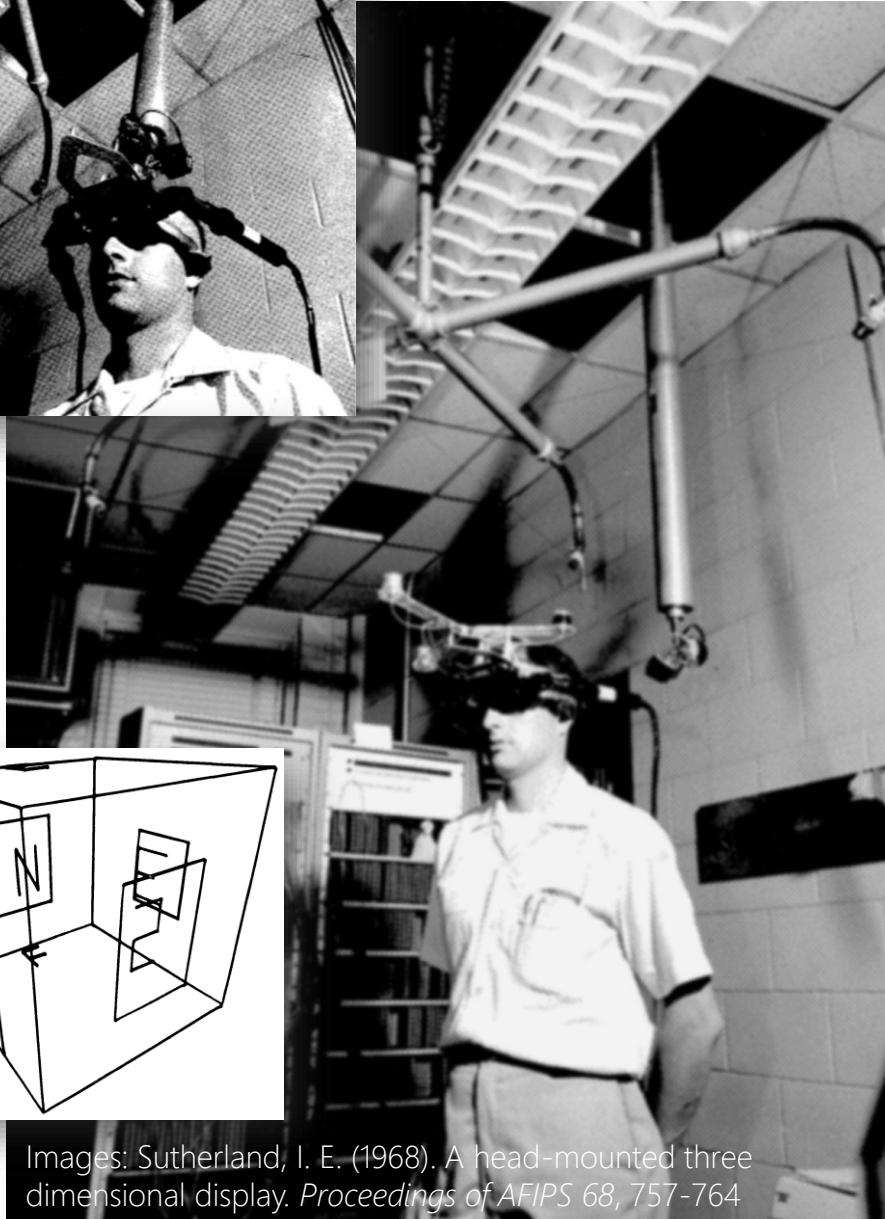
Forte VFX1 Headgear (1995)

- Given the current buzz around AR and VR, it is important to keep in mind that (high end) consumer-level VR products were on the market more than 20 years before the Oculus, for example
- The VFX1 had good optics, especially for its time
- As is often the case, gaming helped drive rich interactive technologies.
- Price was \$695.00 USD



Ivan Sutherland & Robert Sproull (1968)

- The first head-mounted computer display system
- The beginnings of digital Virtual Reality (VR)
- Graphics were simple wire-frames, i.e., line art
- Due to weight and need for head tracking, was suspended from the ceiling by mechanical arm
- Hence referred to – somewhat prophetically – as “The Sword of Damocles”
- i.e., “With great fortune and power comes also great danger.”



Images: Sutherland, I. E. (1968). A head-mounted three dimensional display. *Proceedings of AFIPS 68*, 757-764

The Long Nose of Technology

From Sutherland & Sproul (1968) to Microsoft Hololens (2016)



Difference (Years)		48
Difference (months)	12	576
Difference in # of Moores Laws	18	32
Difference (Available Compute Power)		4,294,967,296

Before Sutherland & Sproull?
(And lessons therefrom ...)

Reflective Stereoscope (1838)



Wheatstone, Sir Charles (1838). On Some Remarkable, and Hitherto Unobserved, Phenomena of Binocular Vision. *Philosophical Transactions of the Royal Society of London*, Vol. 128, pp. 371 - 394.

Sir Charles Wheatstone (1802-1875)
By London Stereoscopic & Photographic Company
Albumen carte-de-visite, late 1860s
3 1/2 in. x 2 3/8 in. (89 mm x 61 mm)
acquired Clive Holland, 1959
National Portrait Gallery, London, x15440

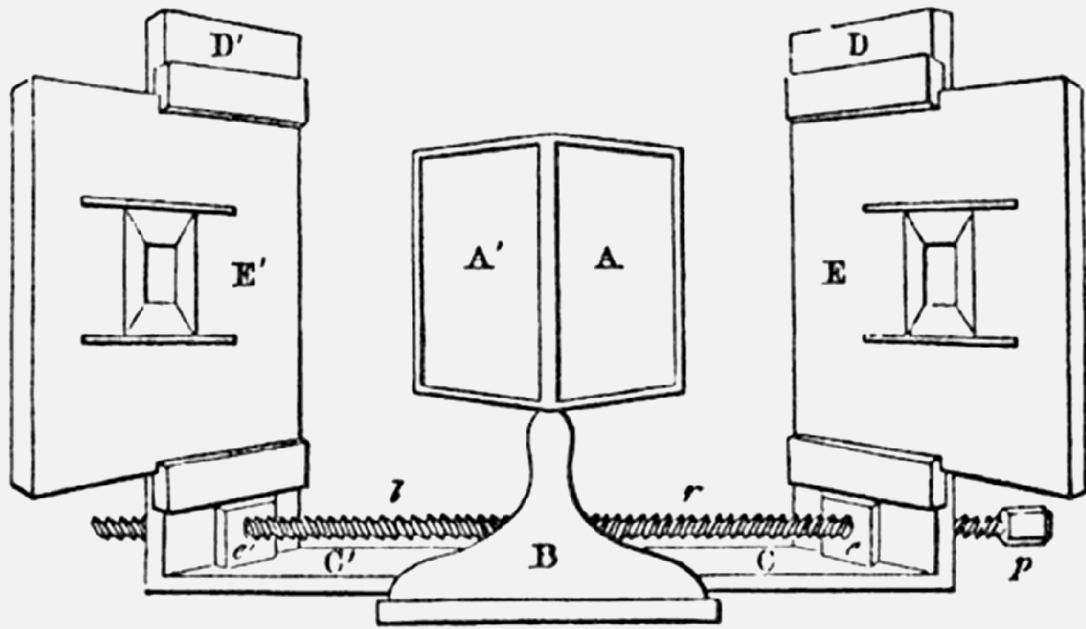


Fig. 8

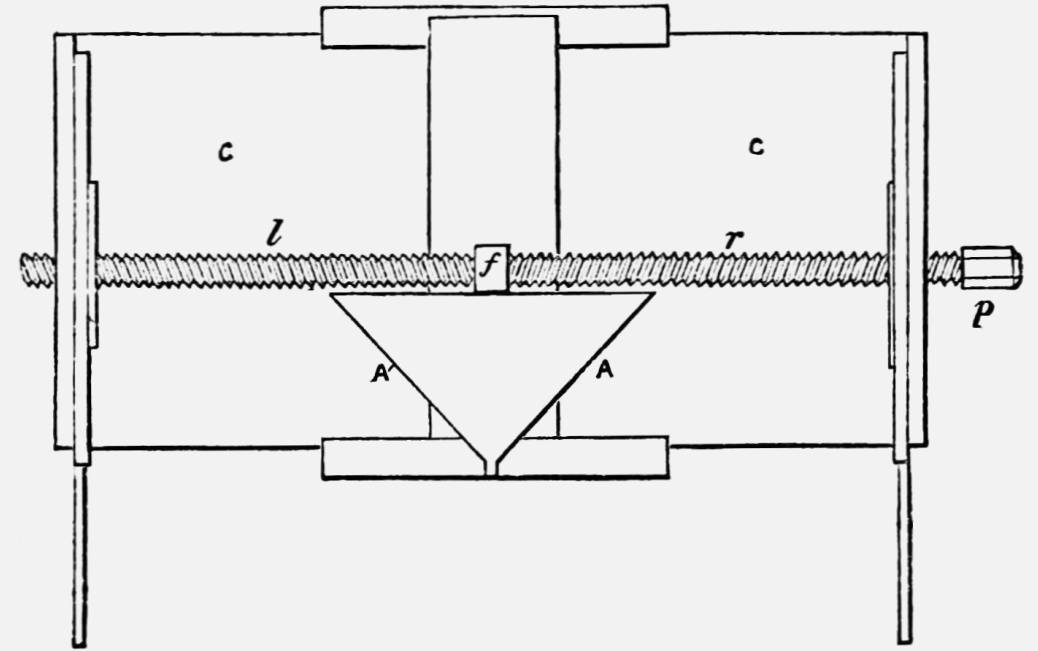
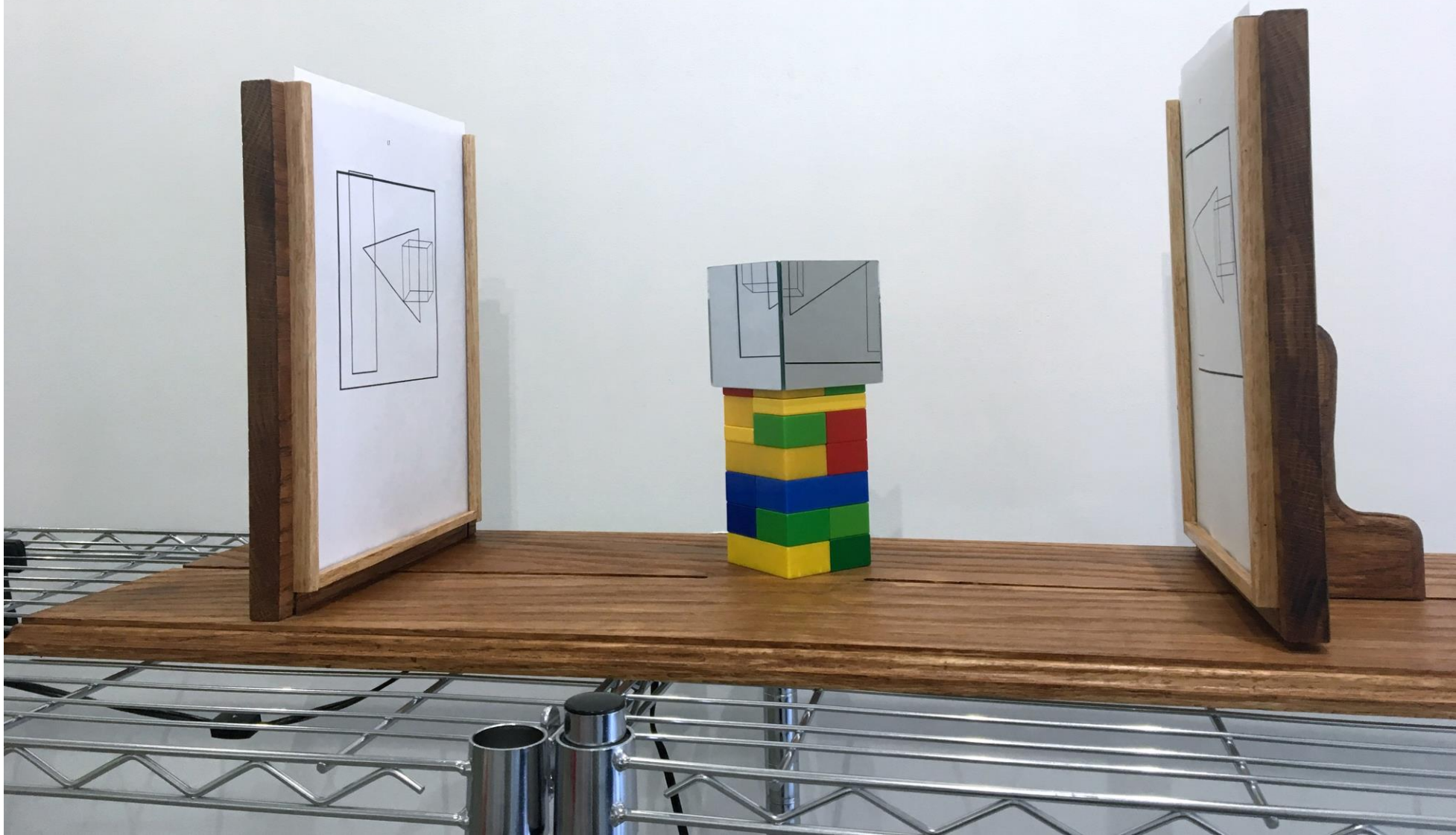


Fig. 9.

- Front (Fig 8.) and Top (Fig. 9) view
- Employed 2 mirrors (A', A), 1 for each eye, at 45° from median plane
- Left and right eye views were mounted vertically at E' and E, respectively
- Mirrors directed each eye to its respective image
- Awkward and bulky, but effective

Reflective Stereoscope (Buxton, 2018)
After Wheatstone (1838).



So what images did Wheatstone use?

- Not Photographs.
- Practical photography was not disclosed until the following year.

Daguerreotype 1839

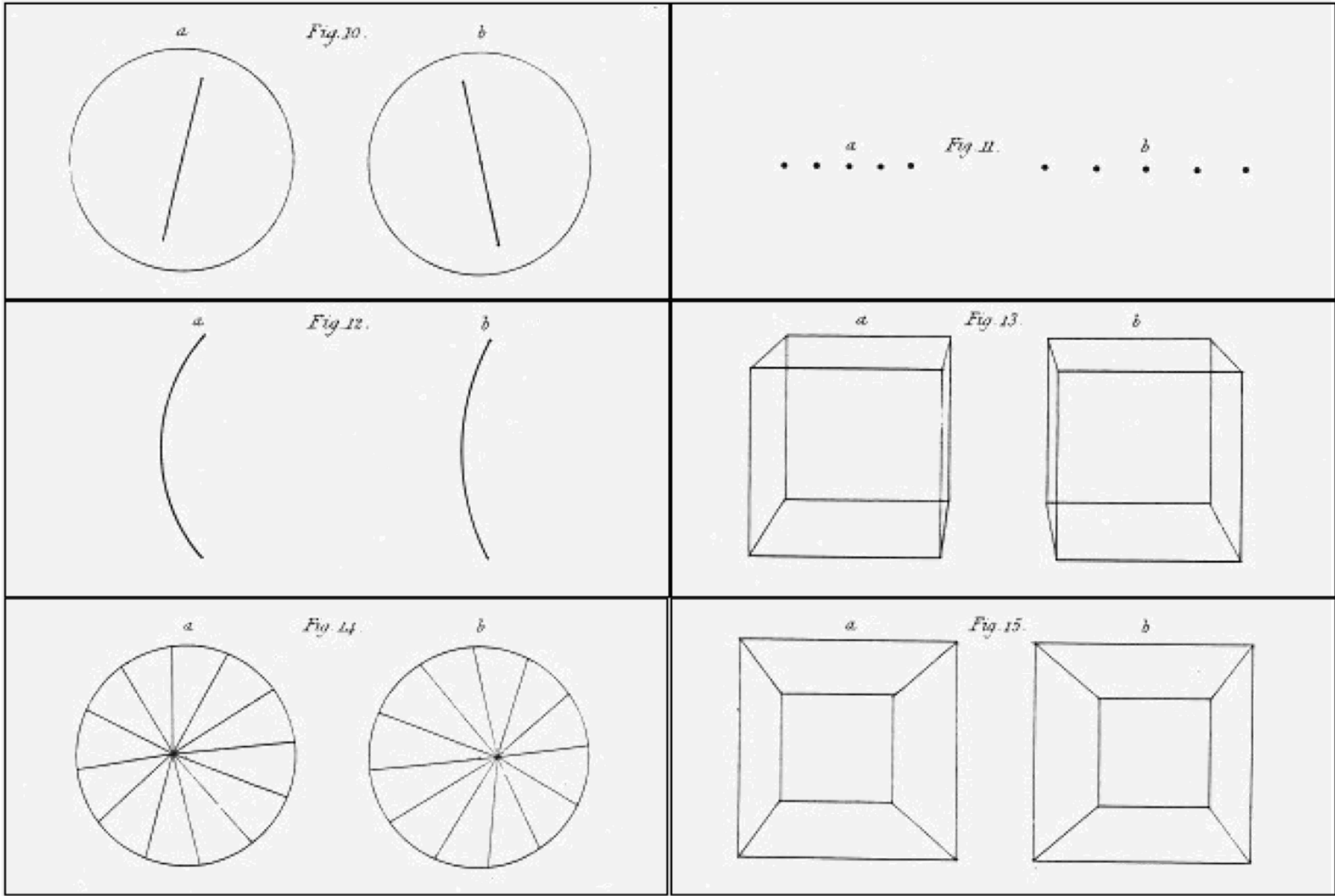


Louis Daguerre

Calotype 1839



William Henry Fox Talbot



Images: Wheatstone, 1838

Stereo Pairs Used by Wheatstone

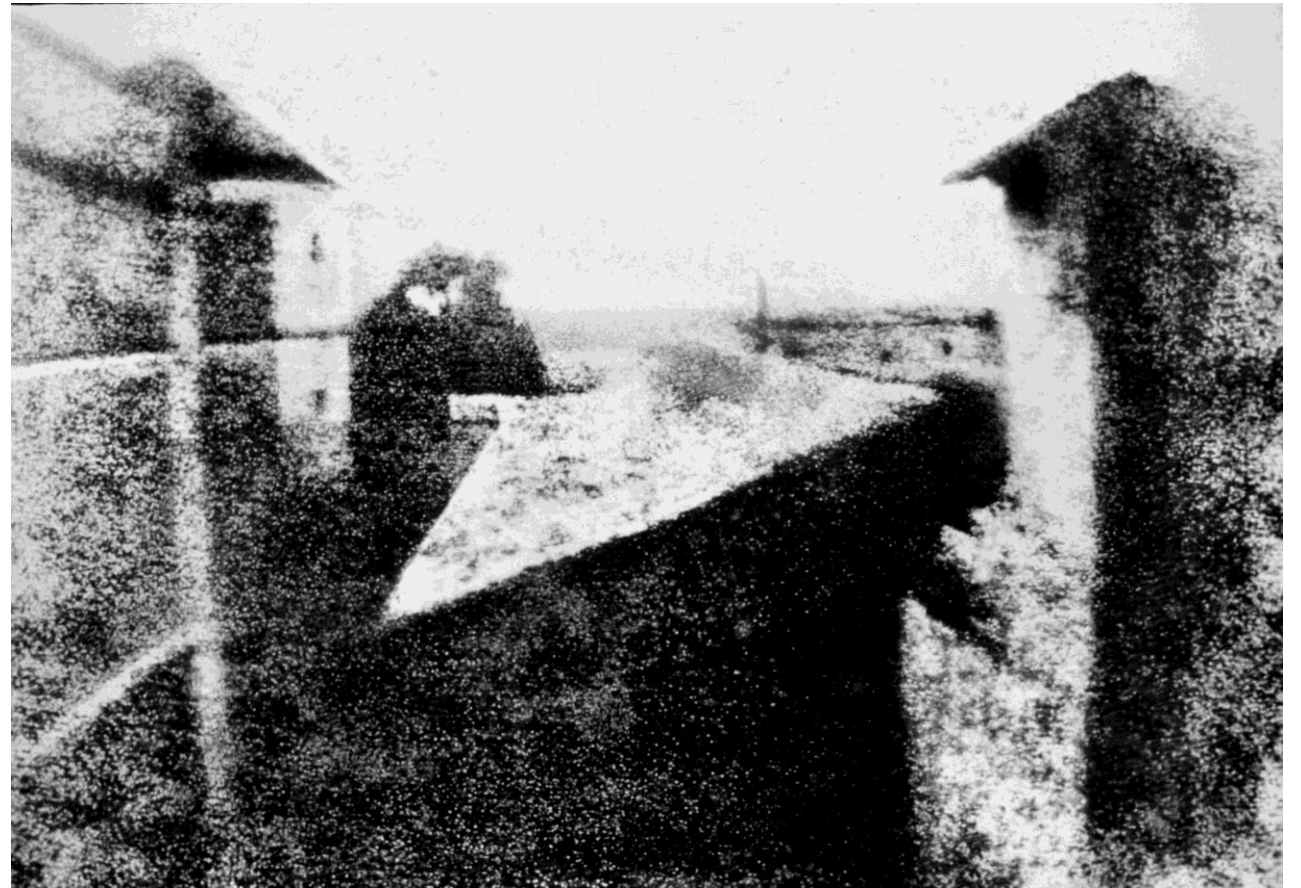
This is history repeated by Sutherland & Sproull at the outset of the digital VR: practical digital photo-like images did not exist for them any more than practical chemistry-based photography existed for Wheatstone. Hence both relied on stereographic line-art.

By virtue of using synthesized renderings, stereo viewing was VR from the very beginning!

And, just to add another example of the Long Nose of Innovation, note ...



Joseph Nicéphore Niépce



View from the Window at Le Gras (1826 or 1827)
The first known – albeit not practical - photograph

Following Wheatstone ...



Lenticular Stereoscope (1849)

- Sir David Brewster
- First practical portable stereoscope
- Used lenses rather than mirrors
- Manufactured in France by Jules Duboscq.
- Shown at Crystal Palace Exhibition, 1851
- Queen Victoria's enthusiasm drove interest (celebrity endorsement!)
- By 1856, over ½ Million viewers sold.
- Stereographs became 1st mass purchased photographs.

Brewster, Sir David (1856). *The Stereoscope; its History, Theory, and Construction, with its Application to the fine and useful Arts and to Education: With fifty wood Engravings*. London: John Murray. Fig. 14, p. 67

THE
ATLANTIC MONTHLY.

A MAGAZINE OF

LITERATURE, ART, AND POLITICS.



BOSTON:
PHILLIPS, SAMPSON AND COMPANY,
22 WESTER STREET.
—1859—
LONDON: TRUBNER AND COMPANY.

Form is henceforth divorced from matter. In fact, matter as a visible object is of no great use any longer, except as the mould on which form is shaped. Give us a few negatives of a thing worth seeing, taken from different points of view, and that is all we want of it.

Oliver Wendell Holmes Sr.*

*Page 747 in: Holmes, Oliver Wendell (1859). The Stereoscope and the Stereograph. *The Atlantic*, June, 3(20), 738-748.

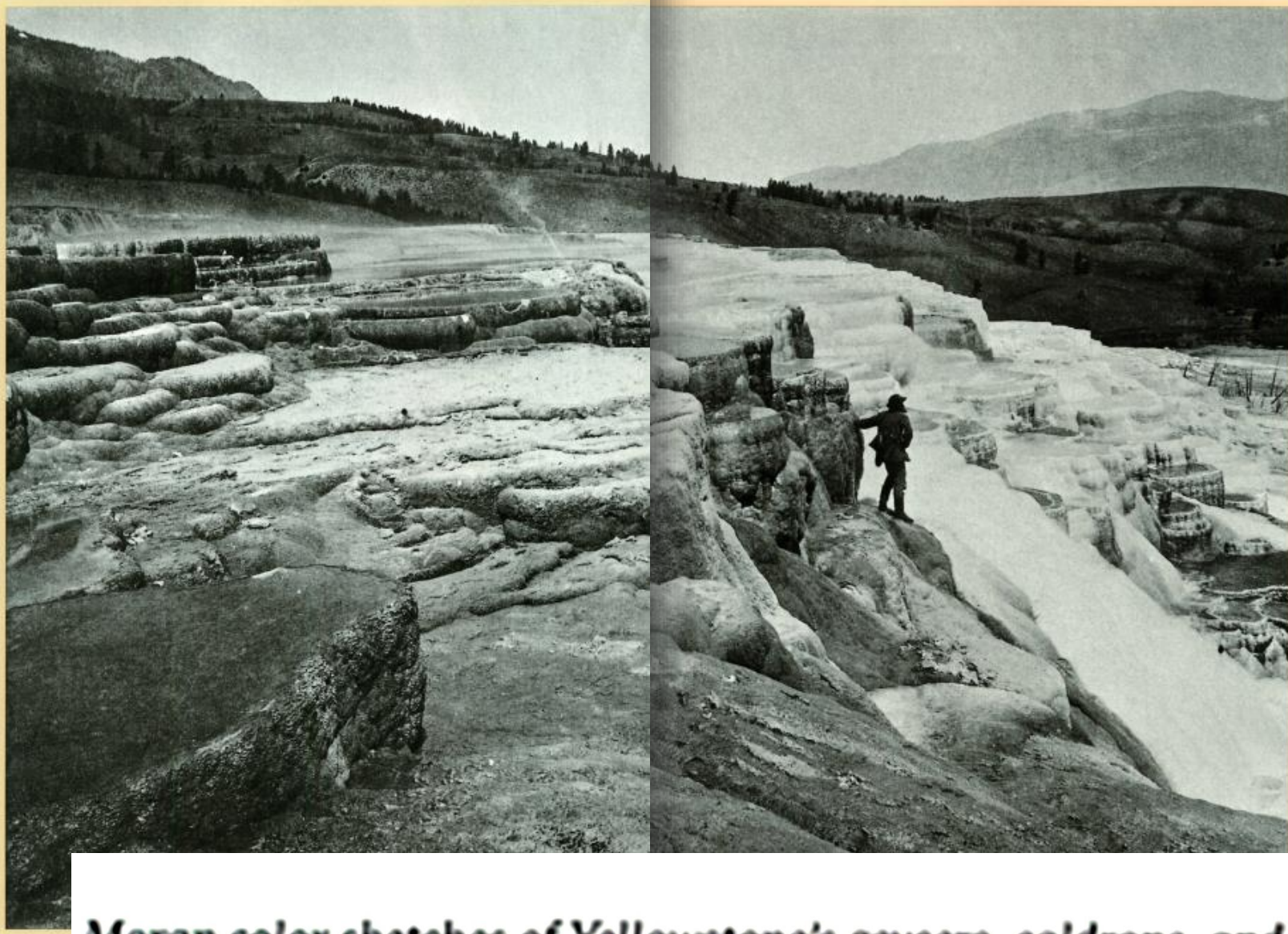
URL <https://www.theatlantic.com/magazine/archive/1859/06/the-stereoscope-and-the-stereograph/303361/>

Holmes-Bates Stereoscope

~1862



Designed by Oliver Wendell Holmes and Joseph Bates
Became most dominant stereoscope until early 1930's



National Geographic
Magazine, Feb. 1989,
175(2), 216- 251.

*Jackson photos and
Moran color sketches of Yellowstone's geysers, caldrons, and awesome gorge influenced
Congress to make the area the world's first national park in 1872.*



As part of Ferdinand Hayden's 1871 Geological Survey, William Henry Jackson (1843-1942) was the first to photograph what is now Yellowstone National Park.

Tru-Vue (1933 / 35)

- 35mm rather than 16mm
- Used 35 mm film strips of 14 stereo views
- Enabled smoother view sequences
- Thus better enabled story-telling sequences
- Black & white until 1950



Sawyers View-Master Model A, 1938-1944

- Integrated stereo pairs into cardboard reel
- 16-mm Kodachrome film which was first available in 1935, enabled 7 pairs per reel
- Colour, coupled with convenience, made View-Master competitive with Tru-Vue.
- This despite only ½ as many views/reel, lower resolution due to film frame being only ¼ the size of Tru-Vue's.

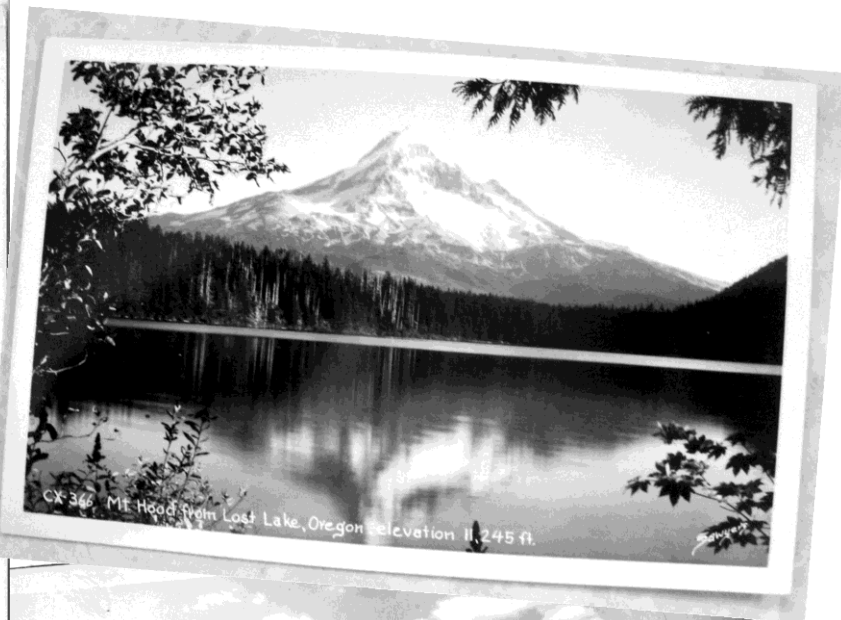
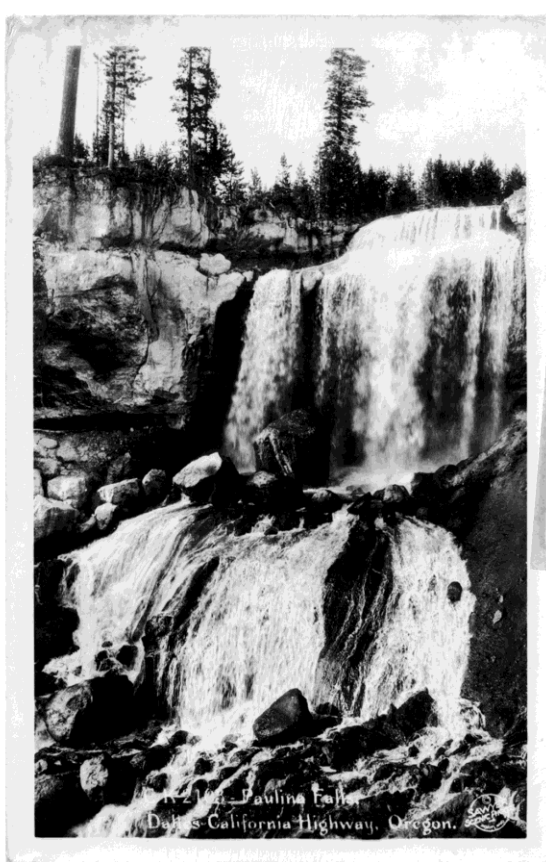




Loading Reels

- Front loading
- Reel fitted in position by fitting the hole in its centre over the registration pin on View-Master
- Thus, employed an existing skill – that used at time to place record on a turntable

Sawyers Photographic Scenic Postcards (1924 ...)



- The View-Master grew out of photographic picture post-cards
- Sawyers had been the largest US photographic travel post-card company since the 1920s
- Consider how H.W. Jackson's images enabled Congress to "experience" Yellowstone, and the impact that had on the creation of National Parks.
- Likewise, travel postcards and View-Master reels enable friends and family to better "experience" where one has visited.
- Socially and culturally, this ability to "be there" virtually, reinforces the role of travel postcards and stereo views in the evolution of VR



Sawyers View-Master Model B, 1944-1947

- Front loading like the Model A
- Aesthetic change in styling.
- Structural change in materials
- Model A was too fragile due to both materials used and how thin the plastic door and reel housing were
- An example of the need to improve product quality even if there is no difference in function or core interaction design



Sawyers View-Master Model C, 1944

- First top-loading model
- Significantly simplified changing reels
- The unavoidable card inserted in the device on shipping ensured that users easily learned how to load reels
- Reflects the need for design to not only improve the product, but also how users make the transition to that new design

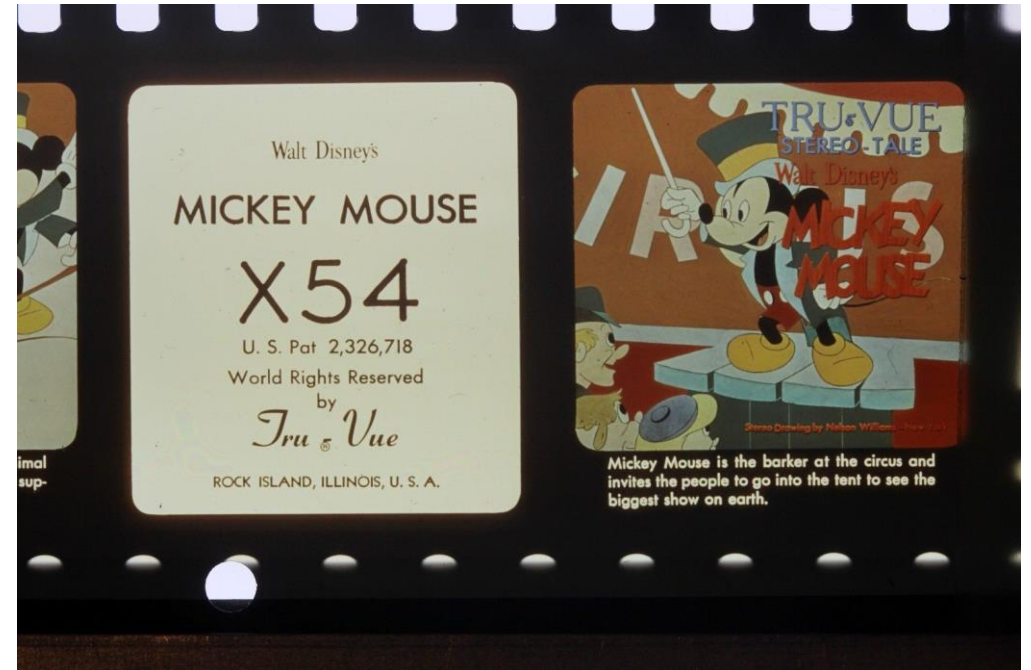


So Why the Hole?

- No spindle needed with new top-loading system
- Answer: in order to maintain backward media compatibility
- Any reel ever made will play on any mechanical View-Master, regardless of age
- While easy to miss, for a product that has been on the market for over 1/2 a century, this is nevertheless pretty impressive – especially given the age of planned obsolescence within which we live

Sawyers / View-Master Acquires Tru-Vue (1951)

- The awkwardness of Tru-Vue film-strips relative to View-Master reels hurt Tru-Vue
- Also, Tru-Vue didn't switch to colour until 1950, 12 years after View-Master, who had it from the start
- On the other hand, Tru-Vue was better suited to story-telling due to larger number of frames per reel
- Sawyers was more interested in Tru-Vue's market than technology – especially their exclusive on Disney Characters



Frames from 1951 Tru-Vue colour film strip



Mighty Mouse 3D #1 (1953)

- Representative of growth of 3D in print.
- Released July 3rd, 1953, the first 3D comic book.
- With the anaglyphic technique employed, the left-eye view is printed in blue, and the right-eye's in red.
- Only the blue lines intended for the left eye can pass through its red filter, while only the red lines and pass through its blue filter.



Halladay Realist ViewMailer (1954)

"Being there" virtually continued ...

Insert the stereo slide...

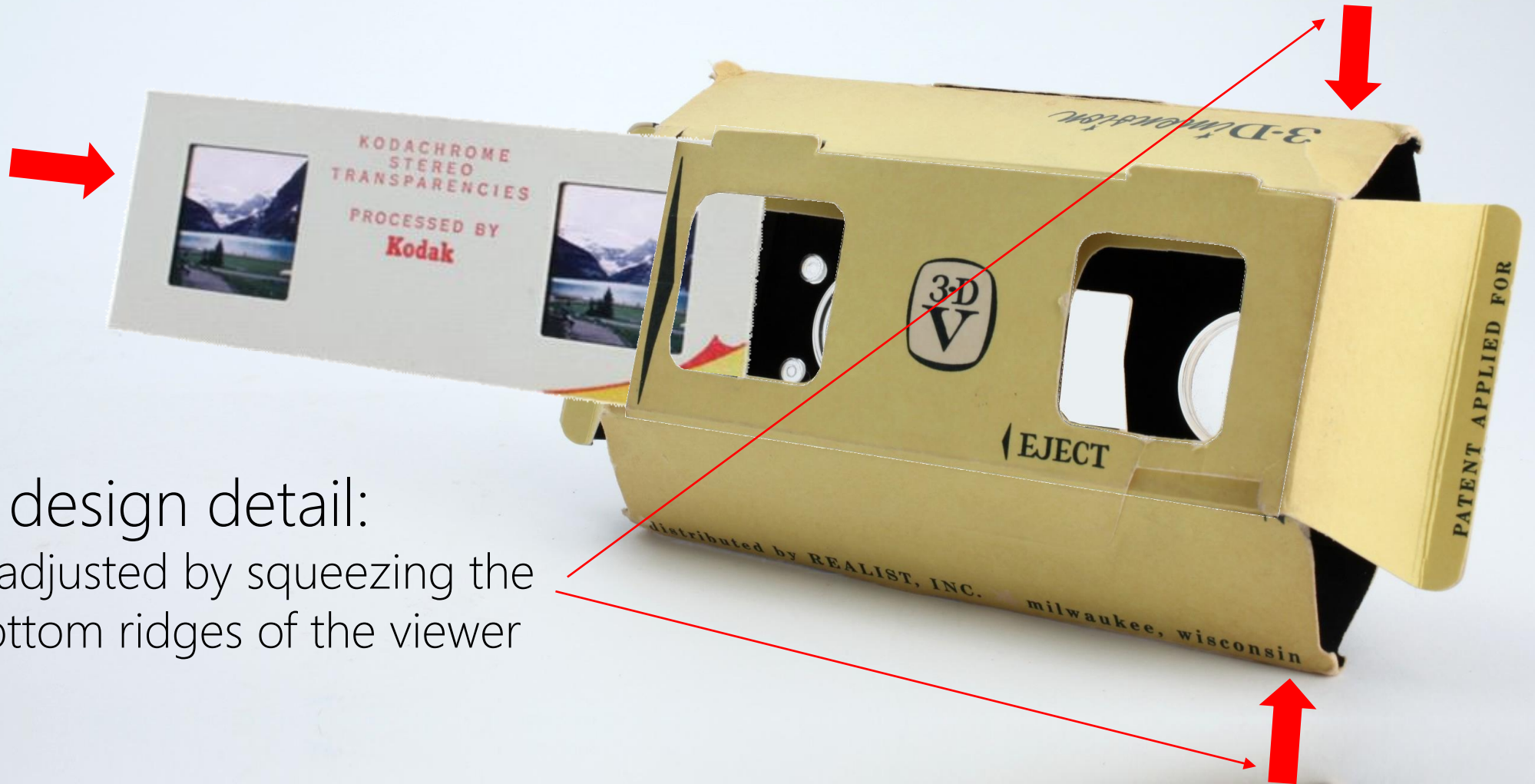
Flip over, address, and send





In true origami fashion, on opening, the mailer package itself opens up into a slide viewer

Stereo slide slips into slot at front



Subtle design detail:
Focus is adjusted by squeezing the
top & bottom ridges of the viewer

Is Google Cardboard the
1955 Halladay Realist
ViewMailer Redux?

Standing on the
shoulders of giants –
the path of virtually all
innovation.

In the past, and the future...



Mattel View-Master VR (2016)

- Stereo images from mobile replace the traditional story reel.
- The reel-like object below is used to control licensing of content
- The iconic imagery of the story reel is “simply” a means to retain connection with legacy of brand
- When closed the headset appears like a pair of ski goggles
- However, one simple-but -key element is missing: a strap which would free up the hands to engage in richer interaction with what is being viewed
- Sensing head turning enables change of view, but little – if any - interaction with it.



When is plastic cardboard?





Smartphone for those just starting out.



Google Cardboard for more focused viewing.



Daydream View or Samsung Gear VR for the ultimate experience.

Download on the App Store

GET IT ON Google play

GET IT FOR SAMSUNG Gear VR

Download the NYT VR app.

An indicator that the current generation of technology may be reaching a level capable of supporting content of both relevance and broad appeal is the NYT Magazine supplementing news stories with 3D imagery in order to – like Jackson and Sawyers – let us come closer to being there.

Ultimately, the quest is not about the technology; rather, having something worthwhile to see and experience, as well as an appropriate sustainable ecosystem within which to do so, and a way to get there from here.

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