

Navigation Techniques For Dual-Display E-Book Readers

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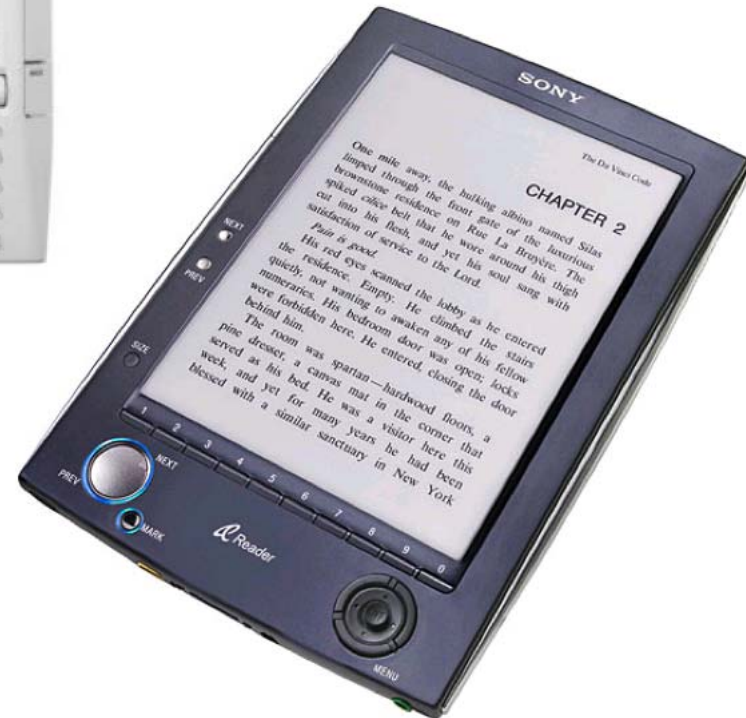
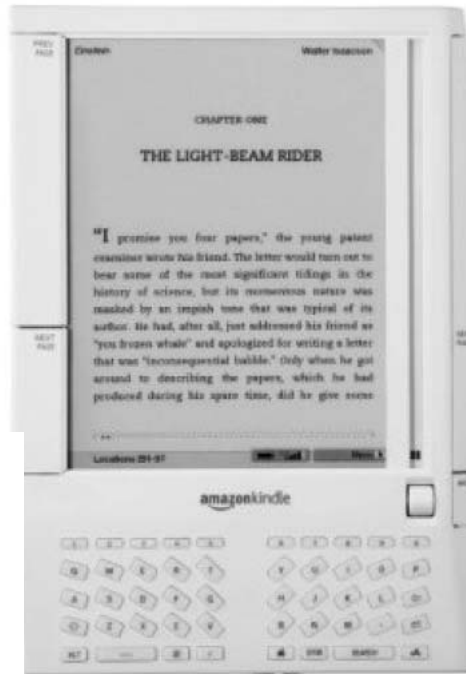
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E-book Readers





Marshall



Adler et al. (1998), O'Hara and Sellen (1997)

E
INK
PAPER
DISPLAY

ENABLING
TECHNOLOGY

EASY-TO-READ

REVOLUTIONARY

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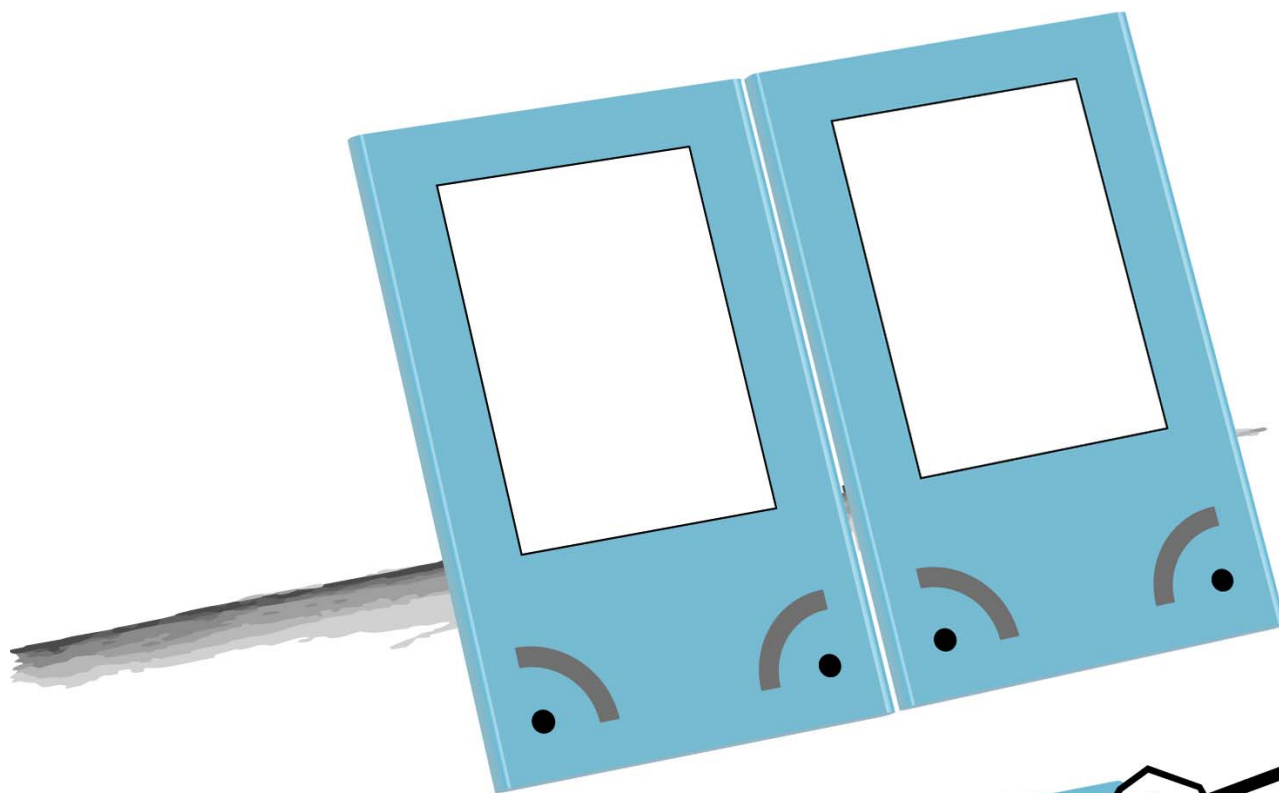
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Navigation Techniques for Dual-Display E-Book Readers

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ABSTRACT

E-Readership depicts the often-much-ignored frequency and time with which people interact with their e-reader devices. In this paper we design a portable dual-display e-book reader and explore how it can be used to interact with electronic documents. Our prototype supports various textual interactions including folding, flipping, and zooming for its e-ink/monochrome navigation. We also show how mechanisms like Space Folding Thumbnails can take advantage of the increased display space to assist global navigation. Lastly, to accommodate the need for cross-document operations and flexible layout of documents in the workspace, our prototype provides detachable pages that can operate independently. We report our design requirements and initial user feedback from users.

ACM Classification: H.1.2 Devices and interfaces and personalization; H.1.2.3 Systems - Integrated user interfaces.

Keywords:

Supporting E-Book readers, multiple display devices, integrated interfaces, device settings.

INTRODUCTION

Although electronic versions of books, magazines, journal papers, and newspapers are ubiquitous, people currently face much frustration in order to read, annotate, and interact with them. While desktop, laptop and tablet systems are continuously growing in size and resolution, they suffer from increasing significant amounts of errors can be difficult to read in bright sunlight and their size and weight make them difficult to hold in portable environments for reading and annotation.



Figure 1: Two prototype e-book readers with form in the standard dual-display configuration (top), and the folded configuration (bottom).

Electronic paper or paper (EEP) is a technology that is widely being developed that is well adapted to reading activities. It does not require any power to display an image like the current and therefore requires much less power than LCD displays. In addition, it is easy to refresh and can therefore be used in bright sunlight. The current generation of e-book readers—currently known as digital paper—includes the Sony PRS-505 (16), the Sony Text (17) and the Barnes & Noble Nook (18) and the

most noteworthy and often responsive display resolution as well as a very long battery life.

However, current e-book devices generally offer a single screen and therefore lack many important features of efficient reading and navigation. In particular, integrated navigation in the form of zooming, flipping and folding pages is impossible. Moreover, the limited screen real estate of a single display e-book reader makes it difficult to configure the display to dual-



1. Local Navigation

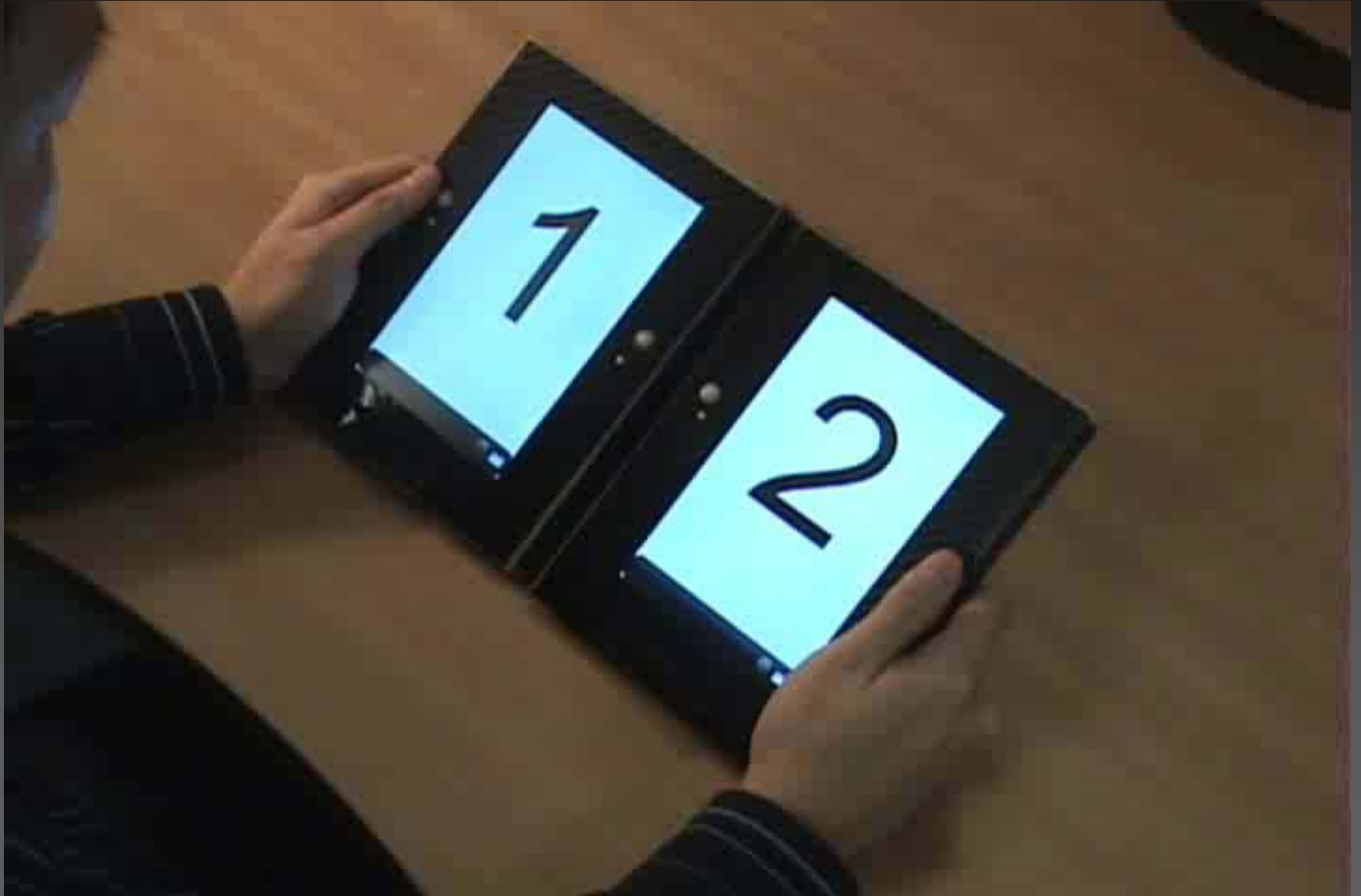


2. Global Navigation



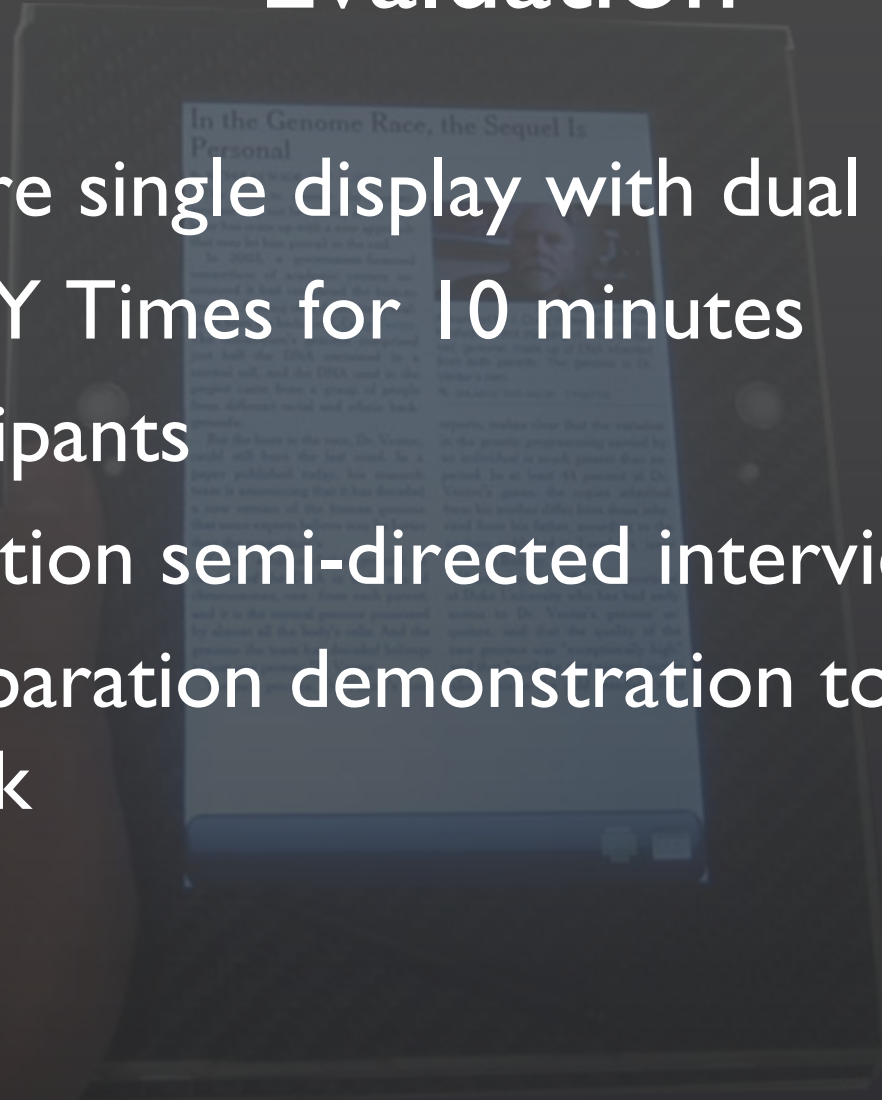
3. Inter-Document Navigation

Video



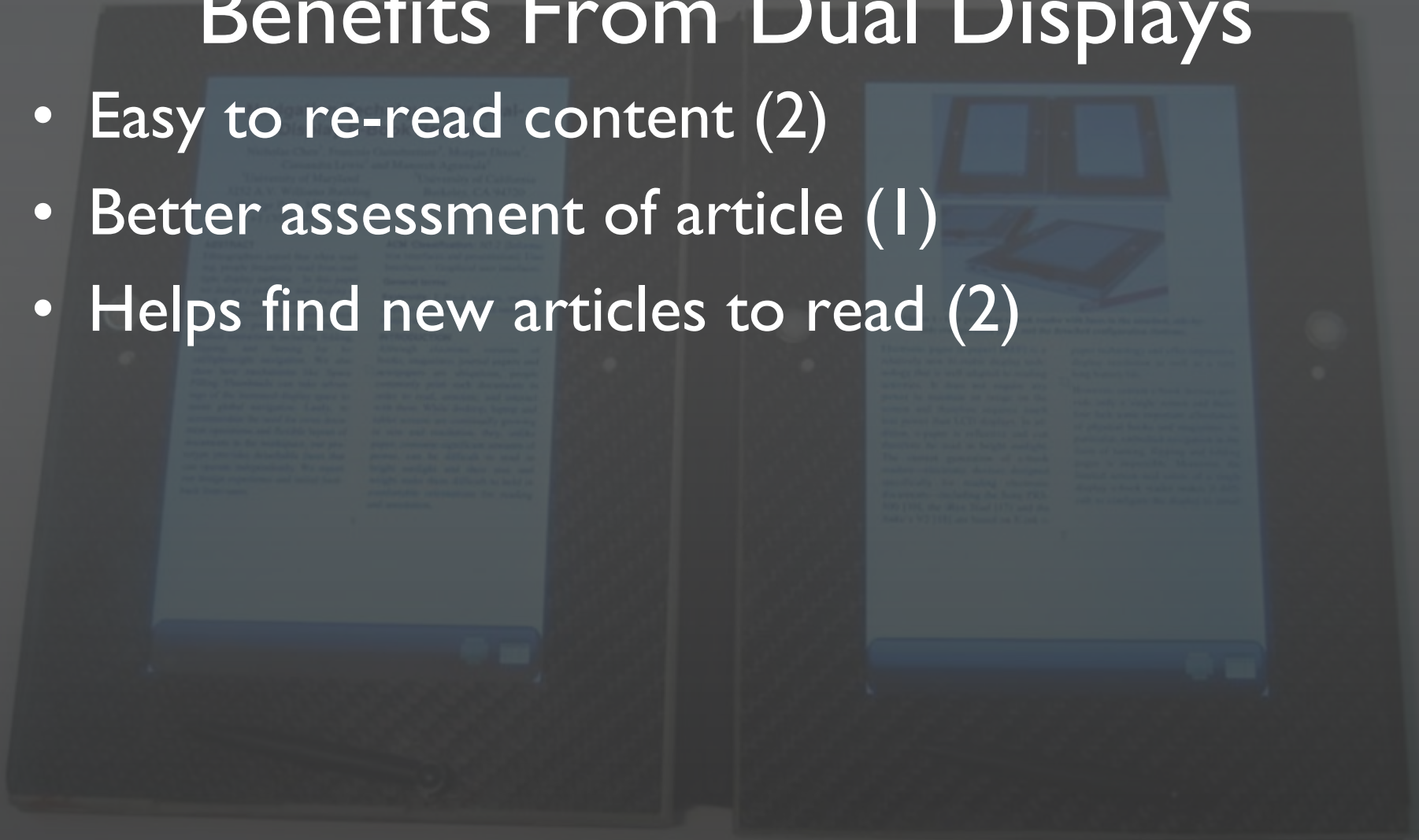
Evaluation

- Compare single display with dual display
- Read NY Times for 10 minutes
- 7 participants
- 41-question semi-directed interview for each
- Face separation demonstration to solicit feedback



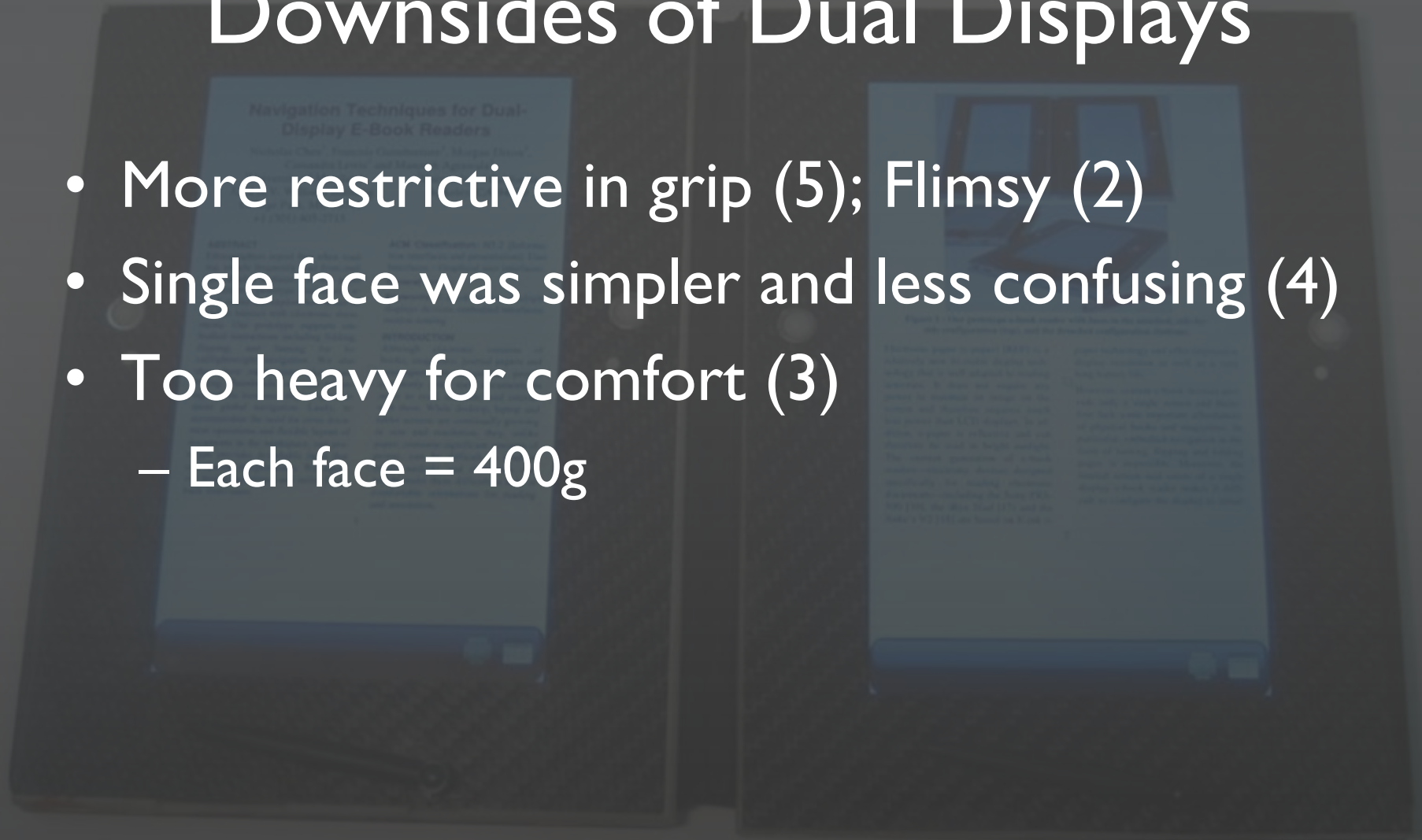
Benefits From Dual Displays

- Easy to re-read content (2)
- Better assessment of article (1)
- Helps find new articles to read (2)



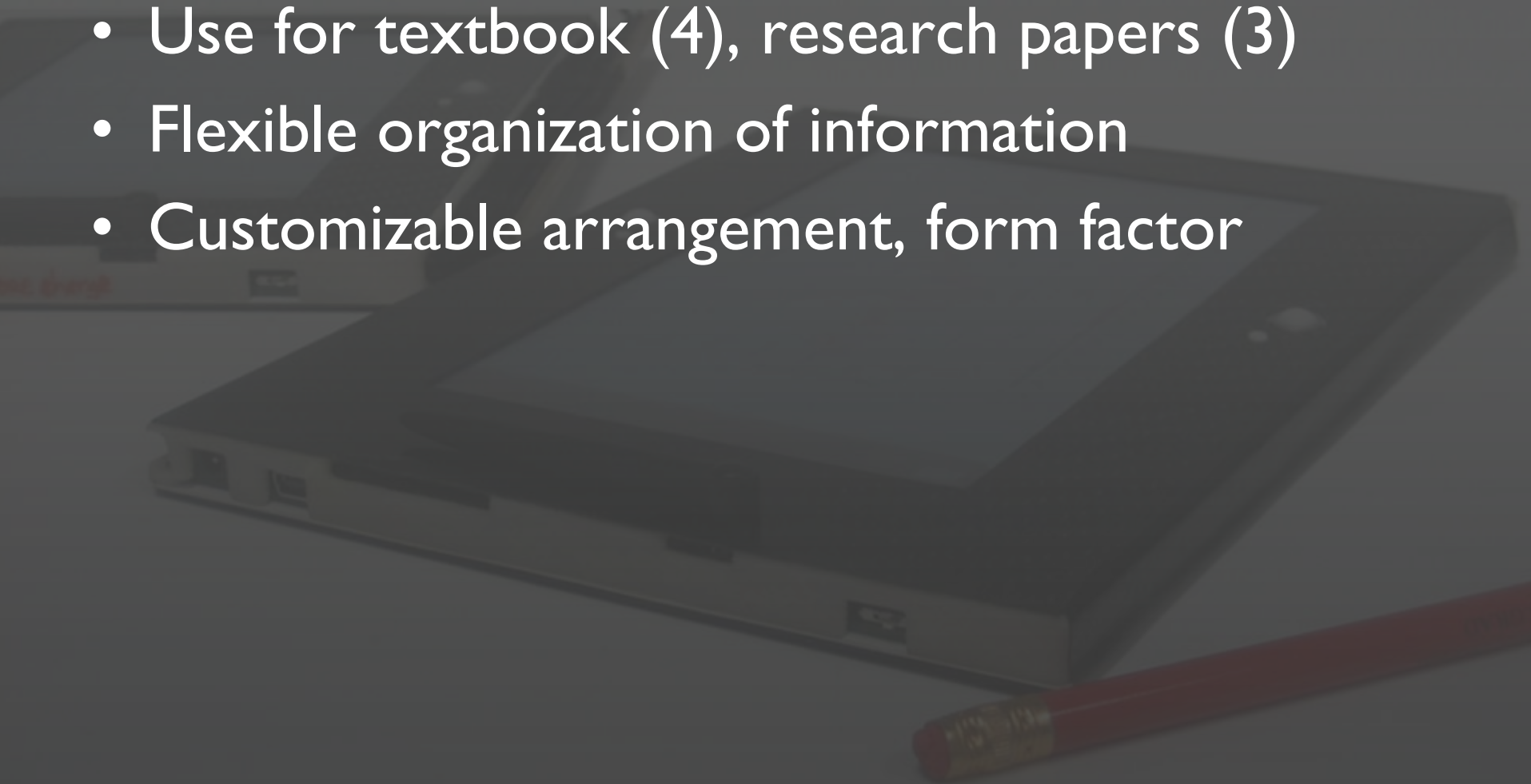
Downsides of Dual Displays

- More restrictive in grip (5); Flimsy (2)
- Single face was simpler and less confusing (4)
- Too heavy for comfort (3)
 - Each face = 400g



Detachable displays

- Use for textbook (4), research papers (3)
- Flexible organization of information
- Customizable arrangement, form factor



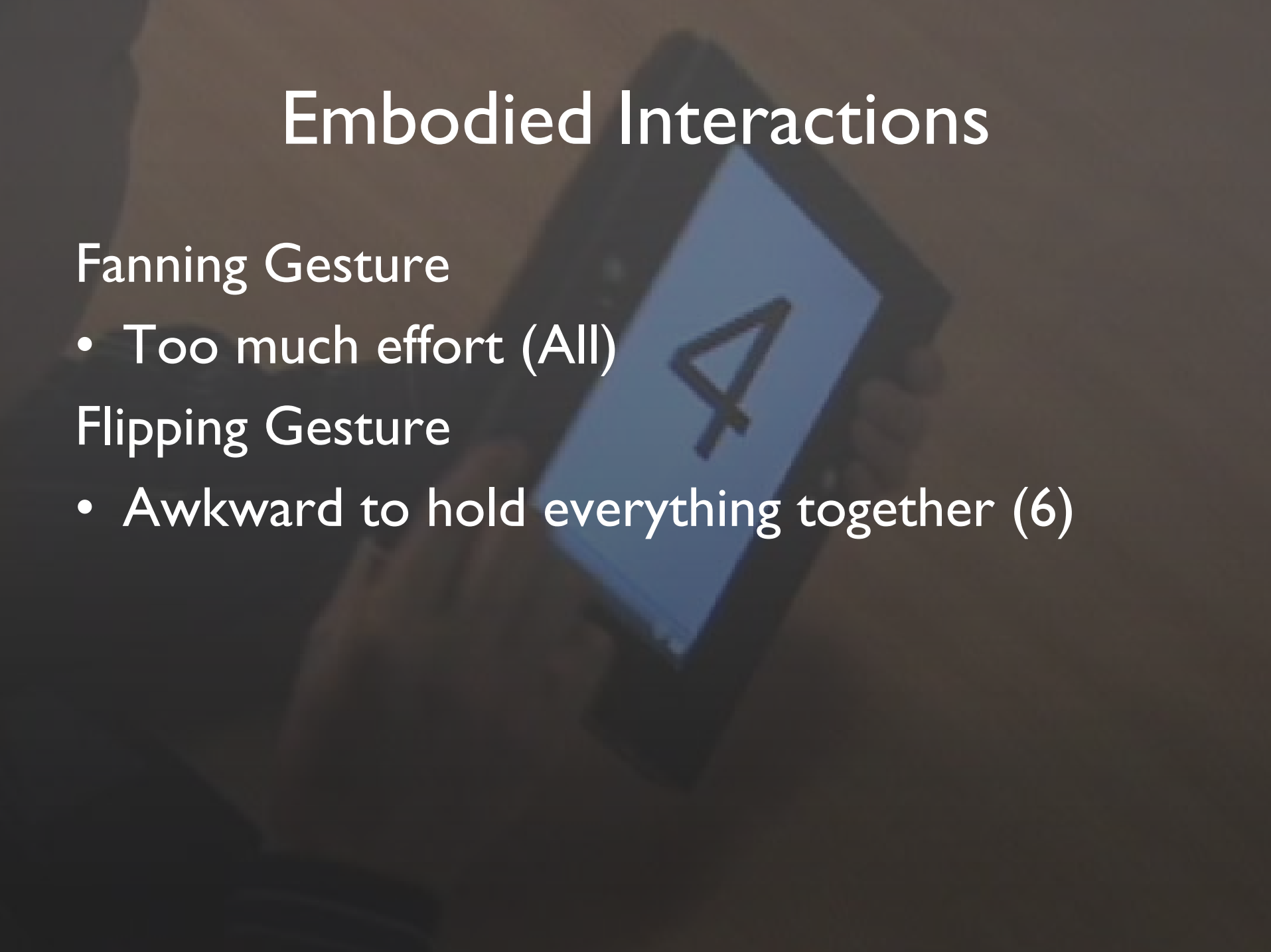
Embodied Interactions

Fanning Gesture

- Too much effort (All)

Flipping Gesture

- Awkward to hold everything together (6)





Future work: Longitudinal Studies

Lessons Learned

- Hardware research is important
- Prototyping hardware is far easier than before
- Embodied interactions dilemma
 - Look “cool”
 - Difficult to get right

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Project page: <http://www.cs.umd.edu/~nchen/reader>