Visual Narrative Flow: Exploring Factors Shaping Data Visualization Story Reading Experiences

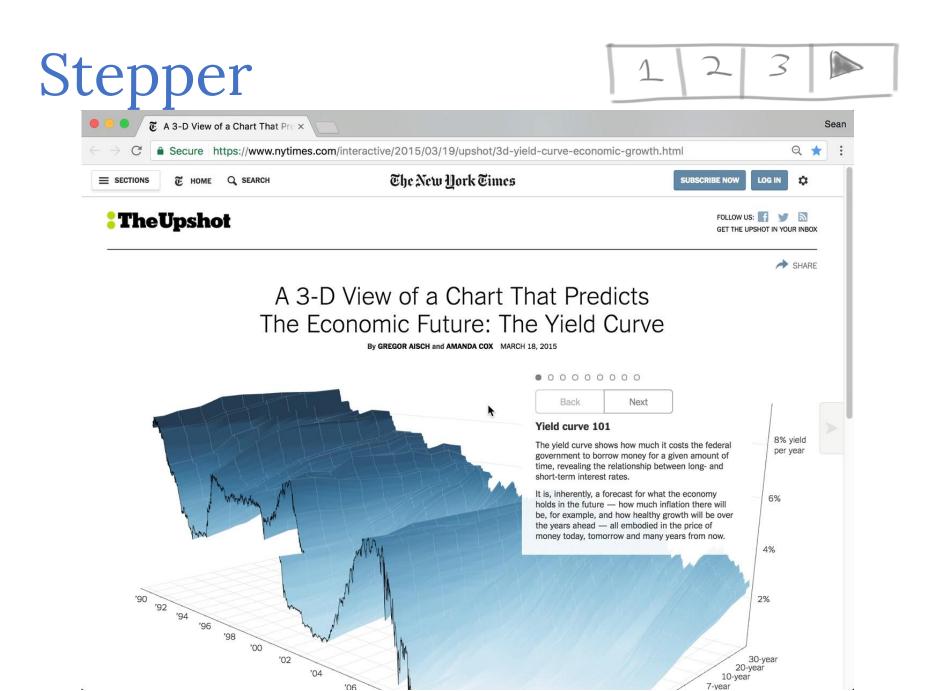
Sean McKenna^{1,2}, Nathalie Henry Riche¹, Bongshin Lee¹, Jeremy Boy³, Miriah Meyer²

¹ Microsoft Research

² University of Utah

³ United Nations Global Pulse

Visual Narrative Flow



Scroller A visual introduction to machin × Sean C () www.r2d3.us/visual-intro-to-machine-learning-part-1/ 🍖 ★ R2 D3 A visual introduction to k machine learning (A: English In machine learning, computers apply statistical learning techniques to automatically identify patterns in data. These techniques can be used to make highly accurate predictions.

Discrete Scroller

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(A) The dark side of Guardian com ×

Sean

Secure https://www.theguardian.com/technology/2016/apr/12/the-dark-side-of-guardian-comments



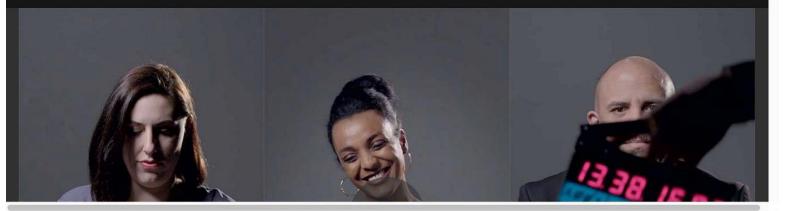
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The web we want

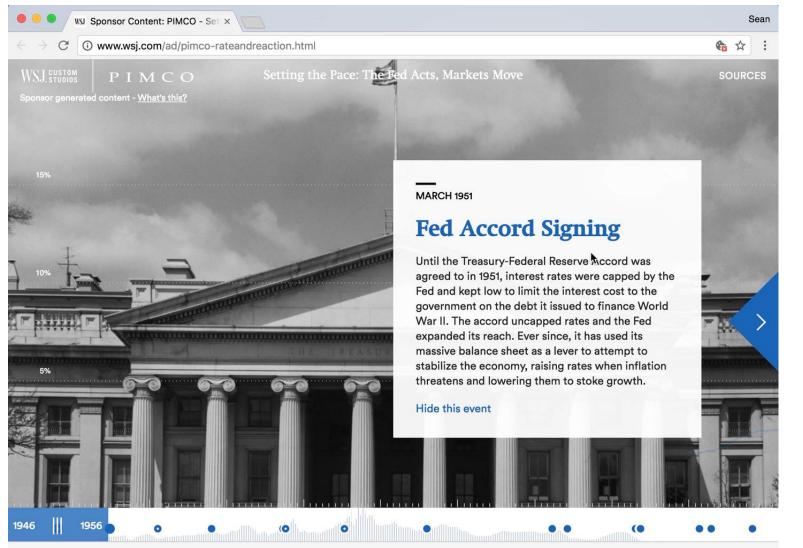
The dark side of Guardian comments

As part of a series on the rising global phenomenon of online harassment, the ³² Guardian commissioned research into the 70m comments left on its site since 2006 and discovered that of the 10 most abused writers eight are women, and the two men are black. Hear from three of those writers, explore the data and help us host better conversations online

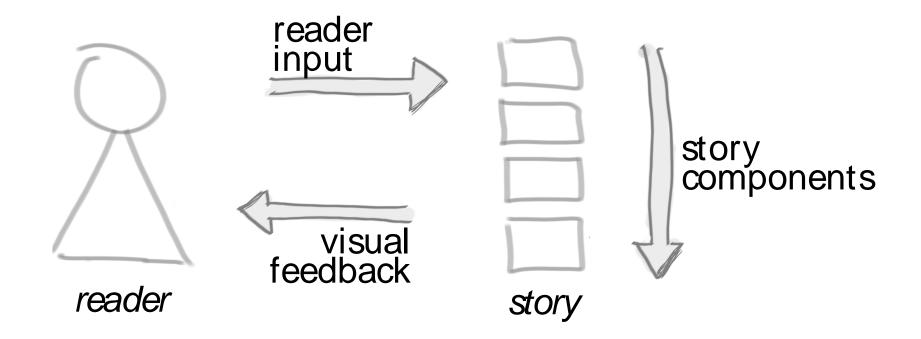
by Becky Gardiner, Mahana Mansfield, Ian Anderson, Josh Holder, Daan Louter and Monica Ulmanu



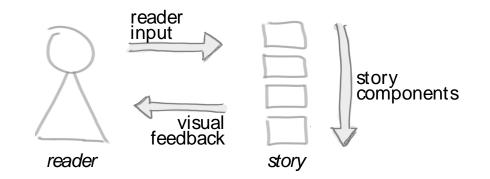
Slider



Visual Narrative Flow

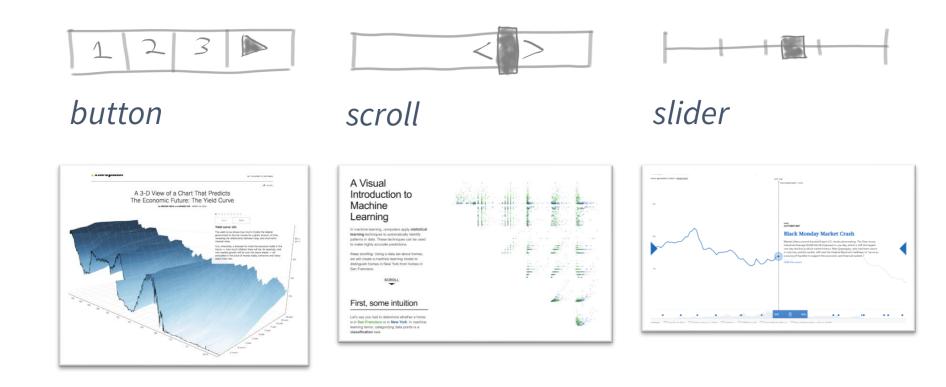


Outline

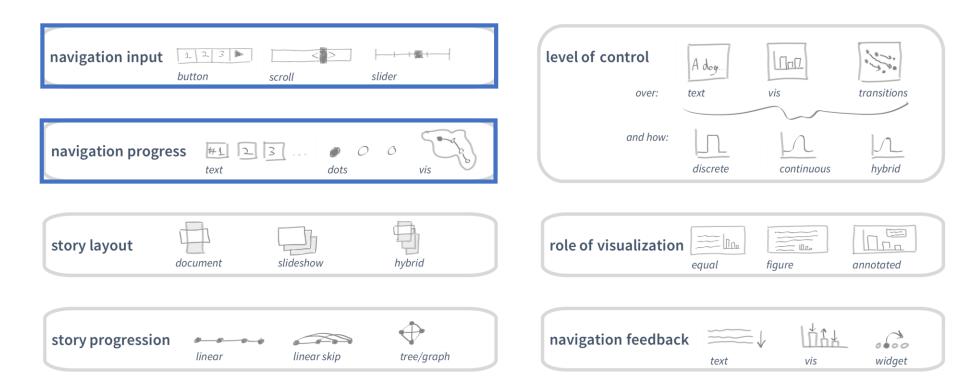


- 7 factors of visual narrative flow
- analysis of 80 stories & authoring prototype
- 3 studies on preference, usability, and engagement

Navigation Input



Design Space



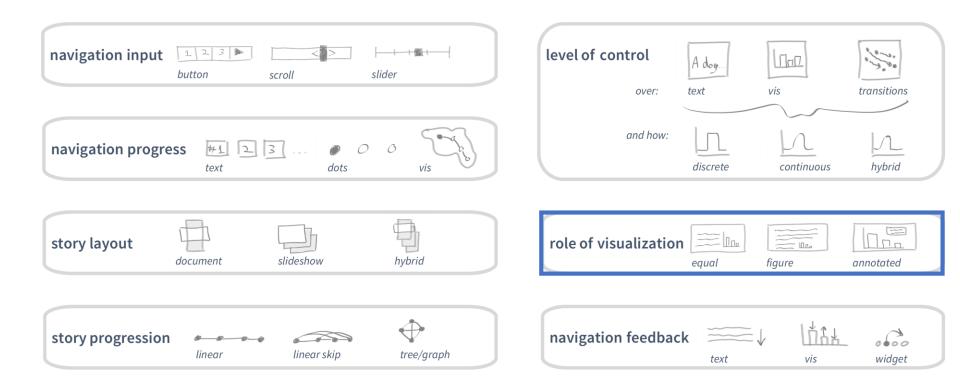
Corpus of Stories

- 80 stories
- iterative coding
- mapped out 7 factors

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Design Space



Role of Visualization



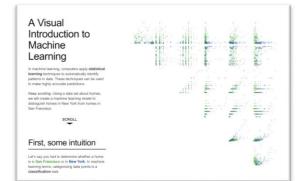
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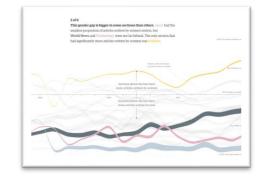


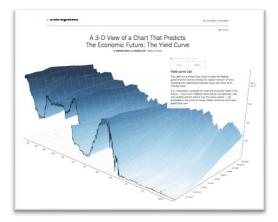
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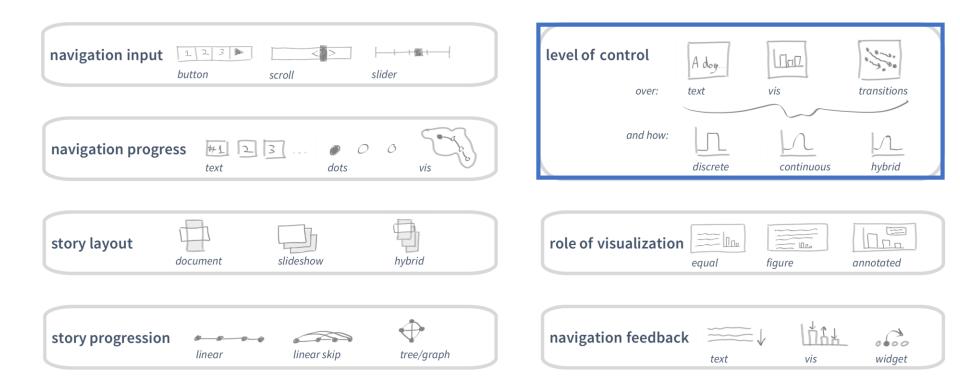
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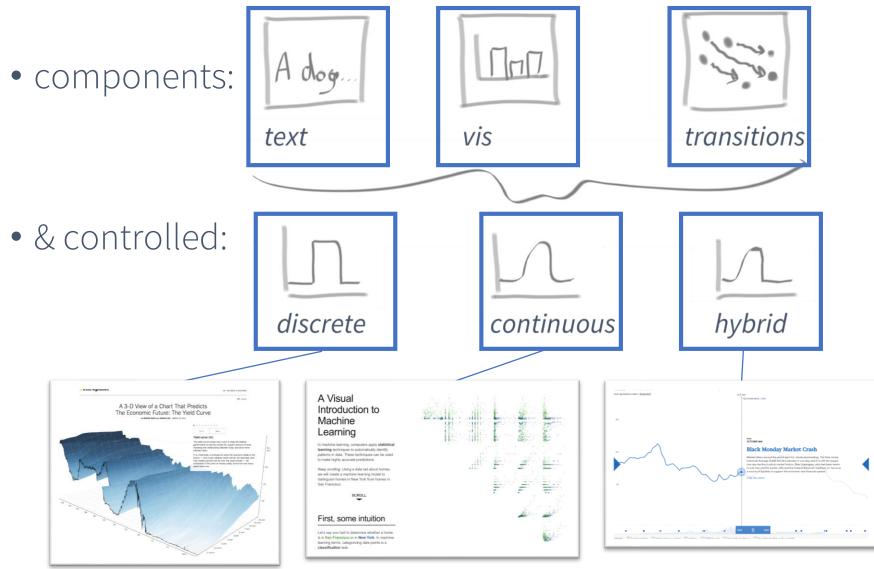




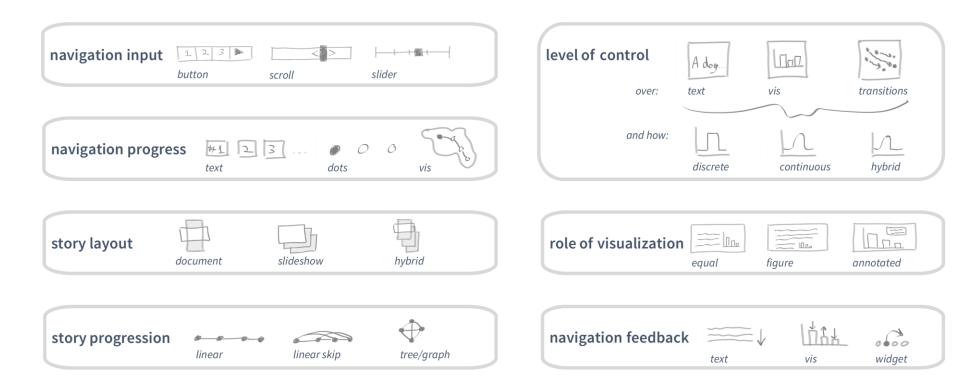
Design Space



Level of Control



Design Space



Authoring Prototype

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Teaching Bar Charts through Data Visualization

showing the raw data

Data enables us to better understand the world around us.

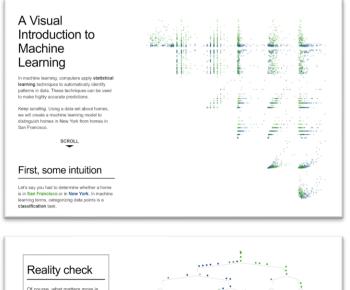
Take this list of a few characters from the TV show, The Simpsons. It includes their names, genders, and their ages.

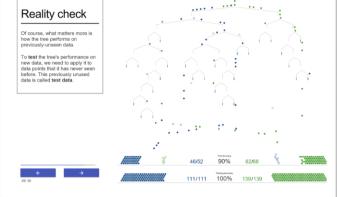
Let's start with just the 5 main Simpson family characters.

		Gender	Adult
	Lisa	F	N
-	Bart	м	Ν
	Homer	м	Y
	Marge	F	Y
3	Maggie	F	N

Overview of Studies

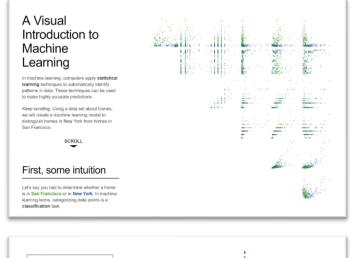
- mimic real-world stories
 - scrollers and steppers
 - machine learning story
- 3 studies to measure:
 - preference
 - usability [Brooke 1986]
 - engagement [O'Brien, Toms 2010]

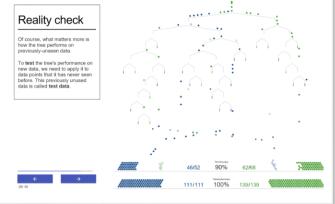




Web Survey

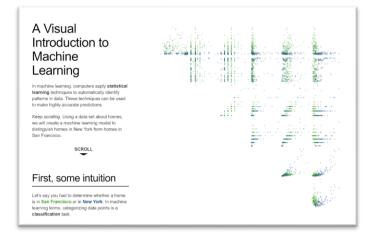
- methodology
 - 8 participants, free to explore
 - measured usability & preference
- mixed preferences
 - 3 stepper, 5 scroller
- similarly usable
- qualitatively
 - stepper: progress bar, arrow keys
 - scroller: less effort to scroll

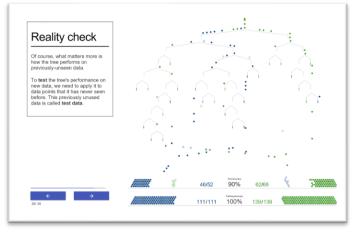




Observations & Interviews

- methodology
 - 10 participants, 3 chapters, tablet
 - measured usability & preference
- results
 - above average usability [Sauro 2011]
 - 2/10 steppers
- "scrolling allowed me to see the transformations more fluidly"
- "scrolling is sexier in some ways, it is unique ... and just more fun"





Crowdsourced Study

• 4 conditions:

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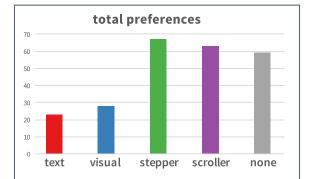
stepper

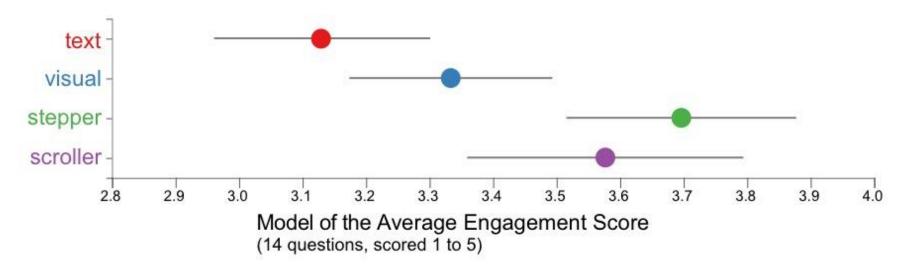
scroller

• which conditions are most engaging?

Crowdsourced Study Results

- linear mixed effects analysis
- visualizations & animations engage
- no significance: steppers & scrollers



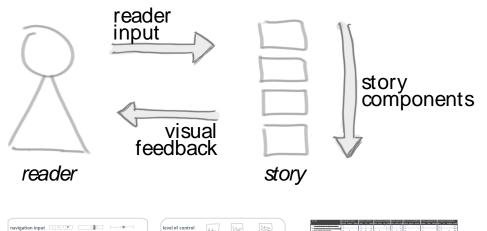


Discussion & Future Work

- choice of flow factors may need to vary
- results of study may not generalize
- explore other metrics for engagement
- compare against comprehension, time, completion, or attention

Visual Narrative Flow

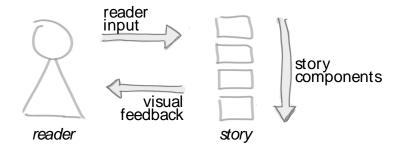
- reader input, story components, visual feedback
- design space of 7 flow-factors
- corpus of 80 stories & authoring prototype
- 3 studies on usability, preference, and engagement





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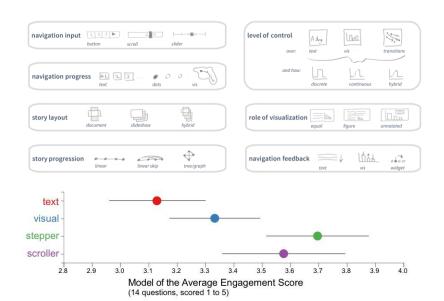


<u>http://narrative-flow.github.io</u> <u>sean@cs.utah.edu</u> @mckennapsean (.com)



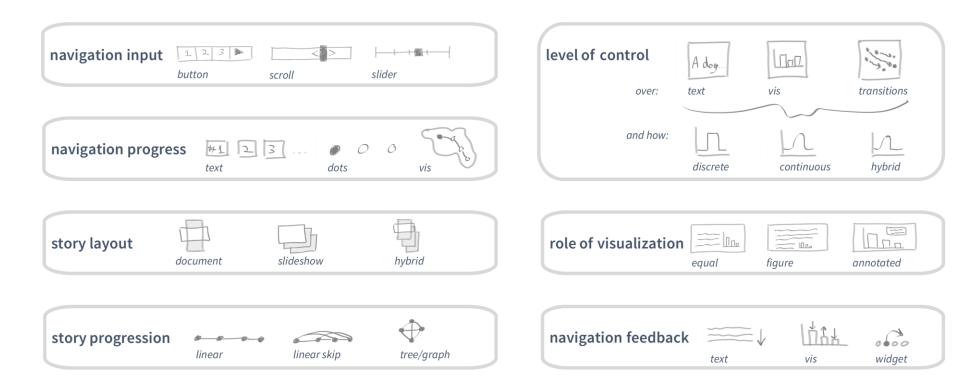


visualization design lab



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Design Space



Navigation Progress



Story Layout



document





Story Progression



linear



linear skip



tree/graph

Navigation Feedback

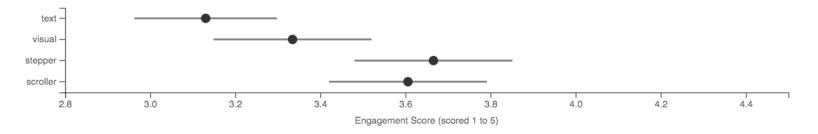


Crowdsourced Study Analysis

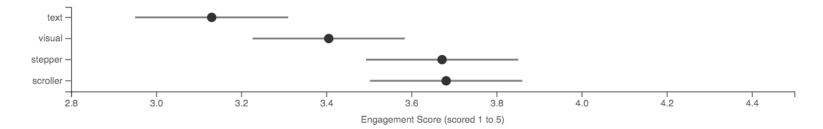
- linear mixed effects model
- fixed effects
 - four narrative flows
 - two chapters used
- random effects: intercepts and slopes
 - participants
 - engagement questions

Engagement Models

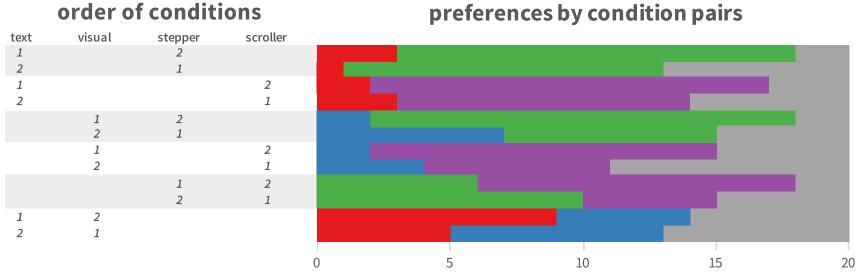
1. I was absorbed in reading the story.



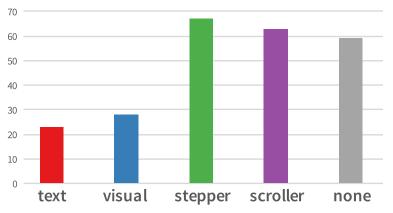
2. I forgot about my immediate surroundings while reading through this story.



Crowdsourced Preferences







Hybrid Example

(video)