Visual (mis)information for older adults

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Outline

Introduction

Older adults' deployment of 'Distrust'

Falling for fake news: investigating the consumption of news via social media

Surfacing Visualization Mirages

Discussion

Designing for Visual (mis)Information in Older Adults

Introduction

Misinformation

- Spreading false information is harmful, especially in the pandemic
  - Rejecting the governmental virus containment orders
  - Vaccine hesitations
- Factors lead to falling for misinformation
  - Such as cultural background, information literacy
- Many fact-checking algorithms and services are available
  - Not as effective as they are expected to be

Visual Misinformation

- Visual misinformation vary on intentions
  - To mislead the public
  - Due to lack of experience in data science
- The infodemic led to a wide spread of false and true visual information

Older adults

- By 2030, older adults are expected to comprise 20% of the U.S. population

- Older adults have a different experience with technology

  - Age-related cognitive decline, social changes, and information and digital literacy

  - More vulnerable to misinformation

- Older adults are among the most vulnerable to COVID-19

  - The most critical audience to COVID-19 information

Visual (mis)information for older adults

HCI Research on older adults

Knowles, Bran and Vicki L Hanson (2018). **"Older adults' deployment of 'distrust'"**. In: ACM Transactions on Computer-Human Interaction (TOCHI) 25.4, pp. 1–25.

Research on Misinformation

Flintham, Martin et al. (2018). **"Falling for fake news: investigating the consumption of news via social media"**. In: Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems, pp. 1–10.

Research on Vulnerability of Visualizations

McNutt, Andrew, Gordon Kindlmann, and Michael Correll (2020). **"Surfacing visualization mirages"**. In: Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems, pp. 1–16.

Older adults' deployment of Distrust

Knowles, Bran and Vicki L Hanson (2018). "Older adults' deployment of 'distrust'". In: ACM Transactions on Computer-Human Interaction (TOCHI) 25.4, pp. 1–25.

Overview

Older adults' interactions with technology through the lens of distrust

Distrust is:

- **Not** a **determinant** of technology **non-use**

- An expression of **feeling**

- A way **to protest**

- A way to **avoid feeling old**

Study

- **3 sets of focus groups** to understand **factors** of technology **adoption** in **older adults**

- **Inductive** approach to design focus groups

- 14 participants over the age of 65

  - 8 females

  - Different technical abilities

  - Some participants withdrew

  - Received a £10

Focus Group Set 1

Focus Groups	Five 60-minute sessions
Format	Semi-structured conversation using antinomy
Theme	To understand the notions of trust and distrust in older adults

Focus Group Set 2

Focus Groups	Three 90-minute sessions
Condition	Attended the first set of focus groups
Format	A survey, group conversation, and group activities
Theme	Understanding technology adoption behaviors

Focus Group Set 3

Focus Groups	Three 60-minute sessions
Condition	Attended both the first and the second sets
Format	Less structured format with open-ended questions and free discussions
Theme	Understanding how technology affects everyday activities

Analysis

Recorded and manually transcribed

Constructivist grounded theory method (loosely)

Themes identified spontaneously

Scripts were sent to the participants for feedback

Results

Expressing Trust and Distrust	Doing Distrust	Designing for older adults
As a **feeling** and as a **tool** Distrust **to communicate** important **concerns** • Privacy • Confidence • A stance on political or economic power	Distrust ≠ Non-Use Technology adoption actions are **not consciously rationalized** Technology adoption actions were **not an option or a choice**	Older adults will **always** require **careful design** decisions **Technology acceptance models** might not appropriately fit when designing for adoption in older adults

Contributions

Older adults **do not associate distrust** and **non-use**

Older adults use distrust to **express objection**

Older adults' **adoption** behavior is influenced by **perceived usefulness**

Insights on **Technology Acceptance Models** when designing **for older adults**

Strengths

Optimal number of focus groups to uncover necessary themes [1]

Use of **inductive approach** supports **better findings** [2]

Use of **constructivist grounded theory method** enhanced the **meaningfulness** of the results [3]

Limitations

Small, non-representative **population**

In focus groups sets 1 and 2, conversations might be **biased**

Little information given on the **process of qualitative analysis**

Improvements and Future Work

- Inclusion of participants with different **socioeconomic** status

- In focus group set 2, consider factors such as **curiosity**, **social identity** and **social desirability**

- Explore associations of distrust and **misinformation**

- A follow-up study related to the technology practices imposed due to **the pandemic**

Falling for Fake News: Investigating the Consumption of News via Social Media

Flintham, Martin et al. (2018). "Falling for fake news: investigating the consumption of news via social media". In: Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems, pp. 1–10.

Overview

People's attitudes to news and fake news on social media

Social media news verification behaviors

Survey and Think-aloud task study

Main outcomes:

- Many **get** their news through **social media**
- Many **fell for fake news**
- Social media news verification is based on **soundness**, the **source** posting news, and writing **style**

Survey

- To understand news consumption through social media
- N = 309 UK participants
  - 55.7% females
  - 70.4% between 18-25 years old
  - 71% of the participants were students
  - Some older adults participated

Results

News consumption on social media is a blend of **coincidental** consumption and **conscious** consumption

Participants are **aware** of **fake news** on social media

Participants reasoned about the **soundness of news** on social media by prior knowledge about **the source** and by speculating **the post, the title, or the full article**

Think-aloud Task-based Study

- To understand interactions with fake news through Facebook

- Scrolling through a Facebook feed that has a blend of fake news, real news, and everyday posts while talking about thoughts, feelings, judgments, etc.

- Followed by semi-structured interview

- 9 participants
  - 5 females
  - Age between 19 and 40 years old (mean 27)
  - Different levels of education and occupations
  - similar socioeconomic status
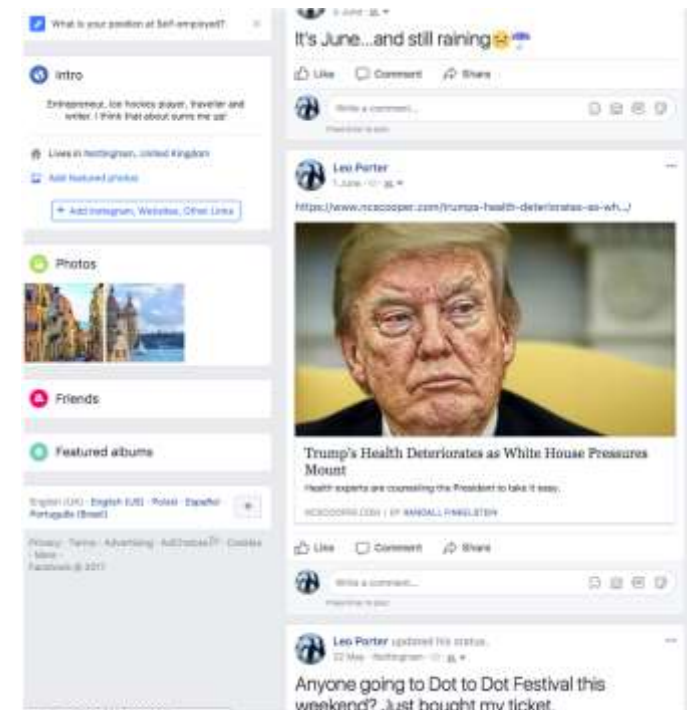
Analysis

Audio-recorded and transcribed
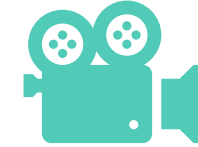
Recorded the screen

Grounded theory approach

Two rounds of coding to identify main themes

Results

Factors for judging the credibility of a news article:

- Source

- Content

- Interest in the topic and the person who shared it

No attention paid to non-interesting news articles

Fact-checking tools should augment the user's judgement of credibility

Contributions

People rely on **social media** to get **news**

Everyday people **encounter fake news** on social media

People **fact-check** news on social media based on **news source**, news **content**, and **interest**

People **do not favor** using **fact-checking tools**

To consider **augmenting people's judgment** when **designing** for fact checking

Strengths

Think-aloud **task choice** was adequate and not overwhelming for participants [4]

The use of **triangulation** improves the validity of the study findings [5]

Limitations

Small, non-representative **population**

Retrospective questions in the survey

Think-aloud **task choice** might have affected the participants

Improvements and Future Work

Use an **eye tracker** during the think-aloud study

Two **tasks** for the think-aloud study: **explore** the Facebook timeline and **evaluate** the posts or the news articles

Study fake news consumption "**in-the-wild**"

Surfacing Visualization Mirages

McNutt, Andrew, Gordon Kindlmann, and Michael Correll (2020). "Surfacing visualization mirages". In: Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems, pp. 1–16.

Overview

Visualization mirages are errors in visualizations that are not immediately noticeable

Causes of Mirages:
Data
The visualization settings
Assumptions

Main Outcomes:
A set of visualization mirages
The metamorphic testing for visualization to test for some mirages

Visualization Mirages
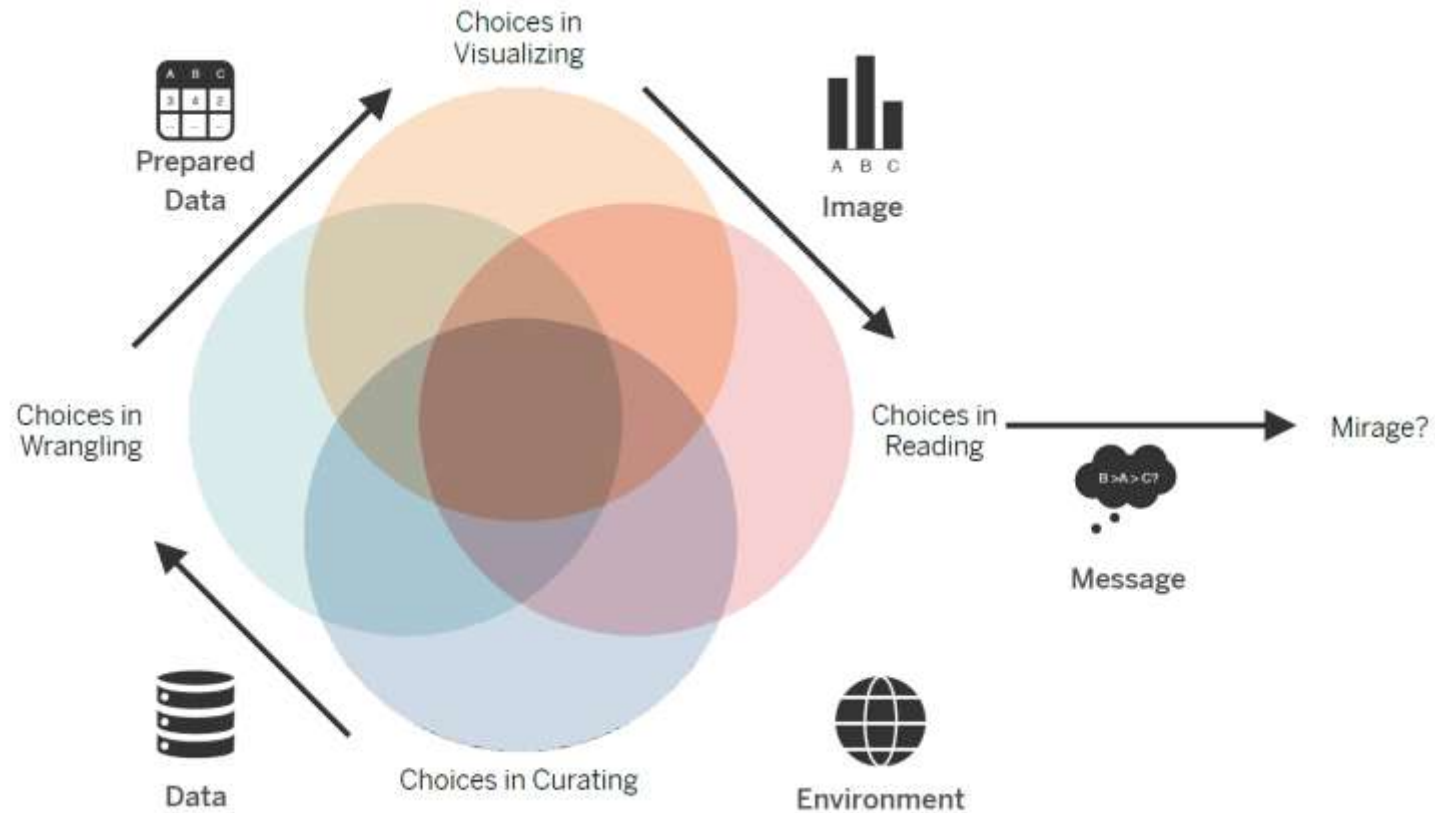
Where mirages are created in the visual analytics process

Readers' Mirages

Reification	Assumptions of Causality	Base Rate Bias
Inaccessible Charts	Anchoring Effect	Biases in Interpretation

Metamorphic Test for Visualization

- Detecting possible mirages in visualization based on the relationship between data and its visualization

$$f_1(\text{■}) = f_2(\text{■})$$
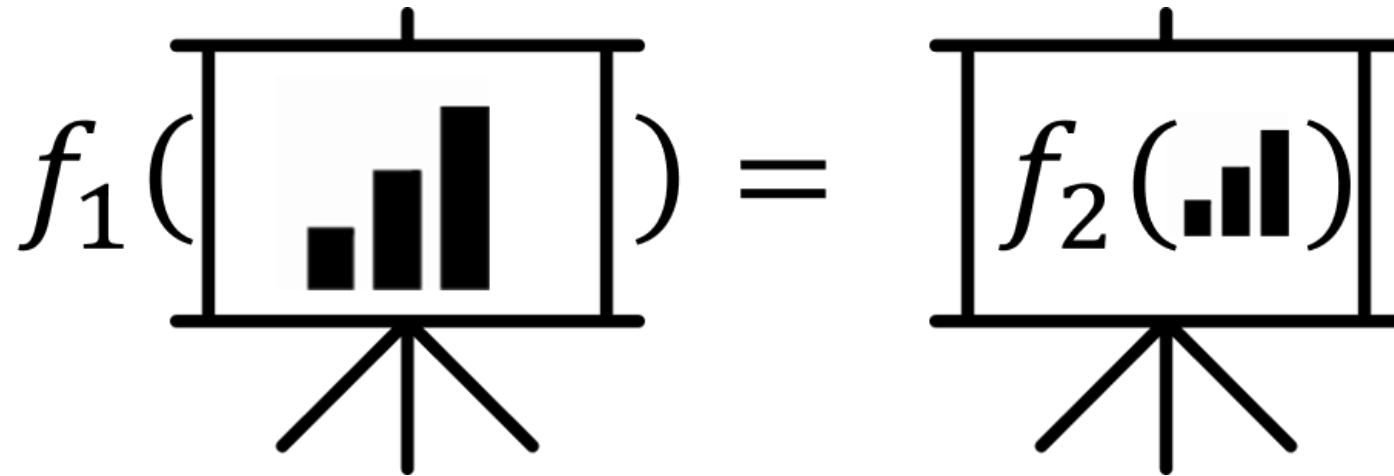
Proof of Concept

- Implemented using Vega-Lite [6]

- Tested 3 data modifications: **randomizing**, **contracting**, and **bootstrapping** data points

- Tested for mirages by examining **bar heights**

- **Toy datasets** by sampling Gaussian distributions while changing variables and effect sizes

- Ran the tests 100 times

- The test resulted of severe visualization when the severe of data modification was applied

Contributions

A list of visualization **mirages**

The **metamorphic test for visualization** to detect visualization mirages

Strengths

Thorough synthesis of visualization mirages

Adequate use of **proof-of-concept methodology** to add validity [7]

Limitations

The **complexity** of the metamorphic test for visualization

No connection between the metamorphic test for visualizations and the mirages

The paper has **inconsistency**

Improvements and Future Work

Testing the metamorphic test for visualization on **a real-world dataset**

Study mirages from **a reader's point-of-view**

Discussion

Designing For Older Adults

- Focus on **perceived usefulness**

- Create Designs by **recycling** what older adults already know about technology or consider **technology training** for them

- Create designs that **accommodate** older adults' **morals and beliefs**
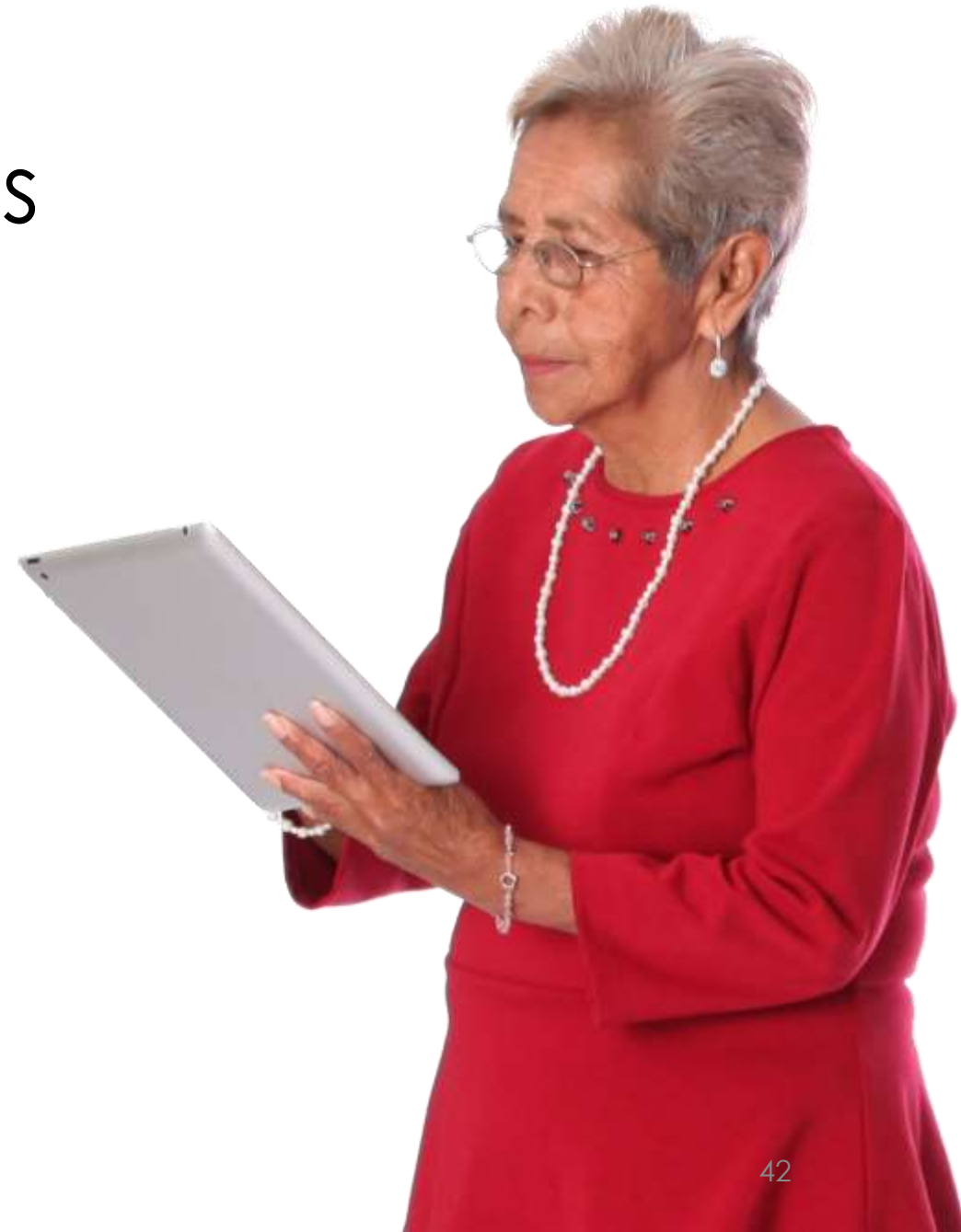
Designing for Fact Checking

- Design to **augment** the user's **judgment**

- Design to grab the user's **attention and interest**

- Think outside of the box

- Design to increase the **information literacy**

Designing for Better Visualization Reading Experience

- Design to **trigger** the user's **skepticism** and critical thinking

- Design to **prepare** the reader mentally and **remind** them with the **context**

- Showing the user **multiple narrations**

Visual Information Communication for older adults

Design Considerations

- Designing **ambient** tools

- Designing tools that **augment** the older adults' **credibility judgment without** adding **cognitive efforts**

- Designing to gradually and implicitly **increase the awareness and information literacy**

- Include technical **training**

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I Advocate For

Certification ...

Questions

References

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6. Satyanarayan, Arvind et al. (2016). "Vega-lite: A grammar of interactive graphics". In: IEEE transactions on visualization and computer graphics 23.1, pp. 341–350.

7. Kendig, Catherine Elizabeth (2016). "What is proof of concept research and how does it generate epistemic and ethical categories for future scientific practice?" In: Science and engineering ethics 22.3, pp. 735–753.

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- Slide 1: https://theconversation.com/older-people-can-feel-left-behind-by-new-technology-so-we-built-a-device-especially-for-them-112352

- Slide 4: https://www.axios.com/2020-rules-of-the-road-for-the-age-of-misinformation-87bc3f7e-b064-4b47-bc71-7639b9a82b8a.html

- Slide 7: https://eiuperspectives.economist.com/healthcare/covid-19-greatest-burden-will-fall-older-people-low-and-middle-income-countries

- Slide 47: https://theuxblog.com/blog/ux-for-elderly-seniors

- Slide 48: https://www.healthline.com/health/endometriosis/self-advocacy-expert-tips

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