Web design’s effect on user attention and information retention: an eye tracking study

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Overview

- Advertisements are everywhere
- How do they influence the reader while reading on a webpage?
- Consulting performances between two groups of subjects
- Seeking differences
- Results show that ads play a noticeable role in performances

Content

1. Introduction

Relation to cognitive psychology

Research-motivated questions

Hypothesis

- Anderson (2009)
- Wojdynski, B. W., & Bang, H. (2016)

Relation to Cognitive Psychology

Attention

- Highest level cognition determines where to focus
- Serial bottlenecks when focusing attention on more than one parallel processes at the same time
- Stimulus-driven vs goal-oriented factors when choosing on what to focus
- Shift of attention represented by corresponding eye-movement

Working memory

- Articulatory loop through which an ‘inner voice’ rehearses information
- Phonological loop which is the ‘inner ear’, that ‘hears’ the inner voice and then stores the information in a phonological form
- Ability to rehearse items from the short-term memory decays over a very short period of time

Research-motivated questions

Q1. To what extent do ads on a webpage distract a user who is reading an informative text on a page?

Q2. Does the distraction of ads on a webpage lower the users ability to retain the information they just read in the short term?

Hypothesis (I/II)

H1. Visual attention to the text will be greater when the text is presented without any distractions (ads) than when presented with distractions (ads)

H2. Visual attention to the text will be lesser when the text is presented with distractions (ads) than when presented without distraction (ads)

Hypothesis (II/II)

H3. The performance on the questionnaire will be higher when the text is presented without any distractions (ads) than when presented with distractions (ads)

H4. The performance on the questionnaire will be lower when the text is presented with distractions (ads) than when presented without any distractions (ads)

2. Methodology

Definitions of Variables

Procedure

Design

Definition of variables

Dependent variable

Ability to retain information in relation to level of attention/distraction.

Independent variables

Distraction on the webpage.

Control variables

Same text, physical environment, noise levels…

Procedure

- Pre-experiment
- Experiment
- Post-experiment

Design (I/III)

```
(base) ioannis@ioanniss-MBP downloads % python3 fextrack.py

-----FeX-track3.2 - Facial Expression Tracker-----
github.com/m-west/fex-track | License: MIT

Config from file: settings.cfg


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Face the screen like normal, then...
Press any key to initialize
Creating data file: |██████████████████████████████████████████████████| 100.0% Successful
Data file "FeX 2023-10-06 16:50:40.xml" created

Analyzing: |████████████████████████████████████████████████| 100.0% Successful
Starting tracker: |████████████████████████████████████████████████| 100.0% Successful
Tracking active...

Press any key to stop tracking
```
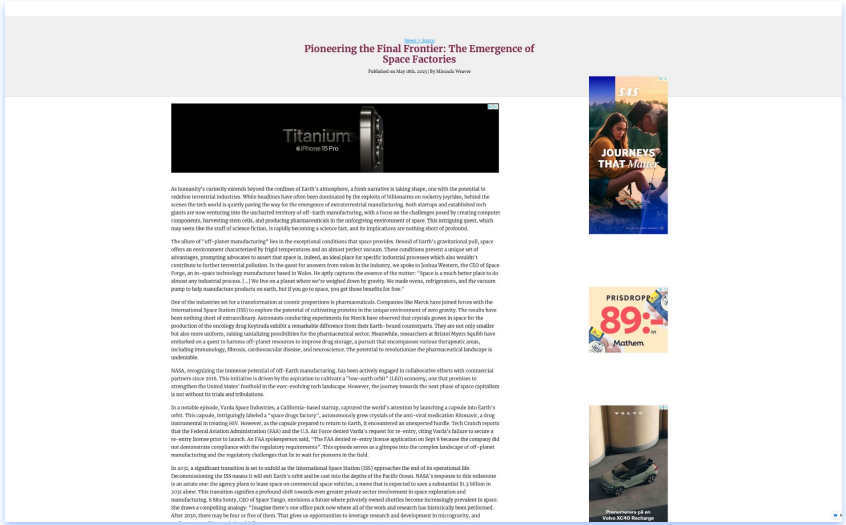
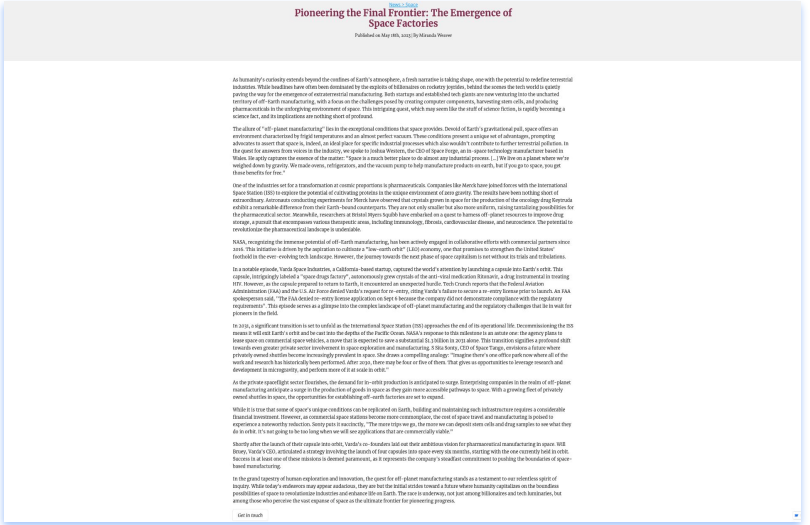

Mock terminal program for ‘tracking facial expressions’

Actual eye-tracking calibration

Design (II/III)



‘Distracting’ website



‘Non-Distracting’ website

Design (III/III)

Questionnaire

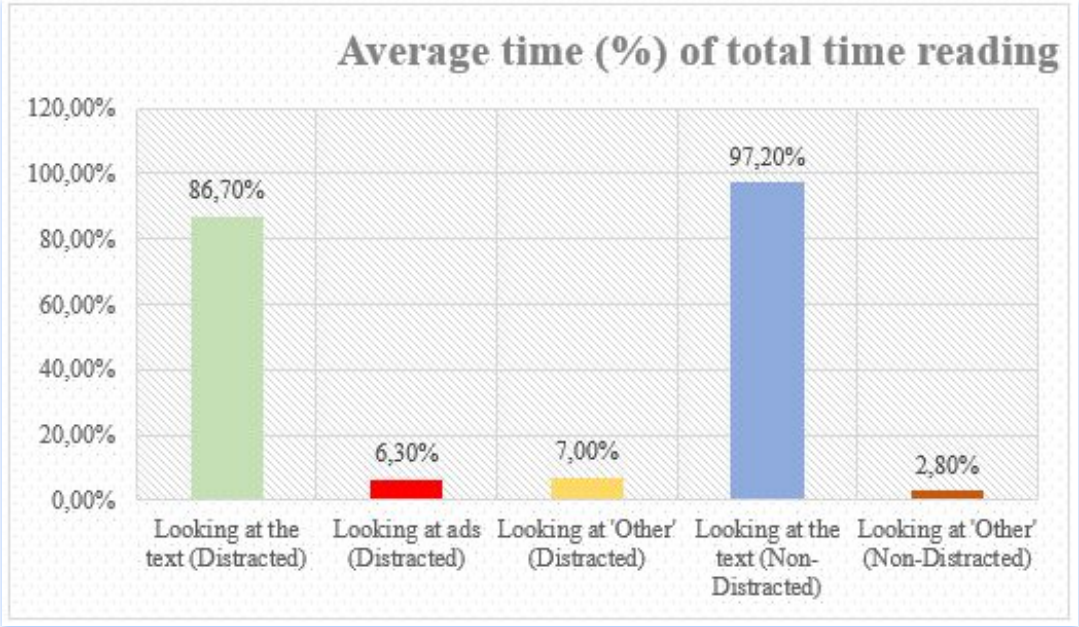
- 8 closed-format questions
- ChatGPT generated
- Varying difficulty questions

3. Results and discussion

Time allocated

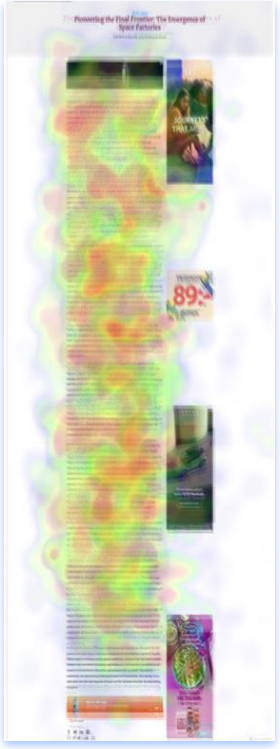
Questionnaire performance

Time allocated (I/III)



Statistic comparison of total reading time

Time allocated (II/III)



Group 1’s heatmap

Group 2’s heatmap

Time allocated (III/III)

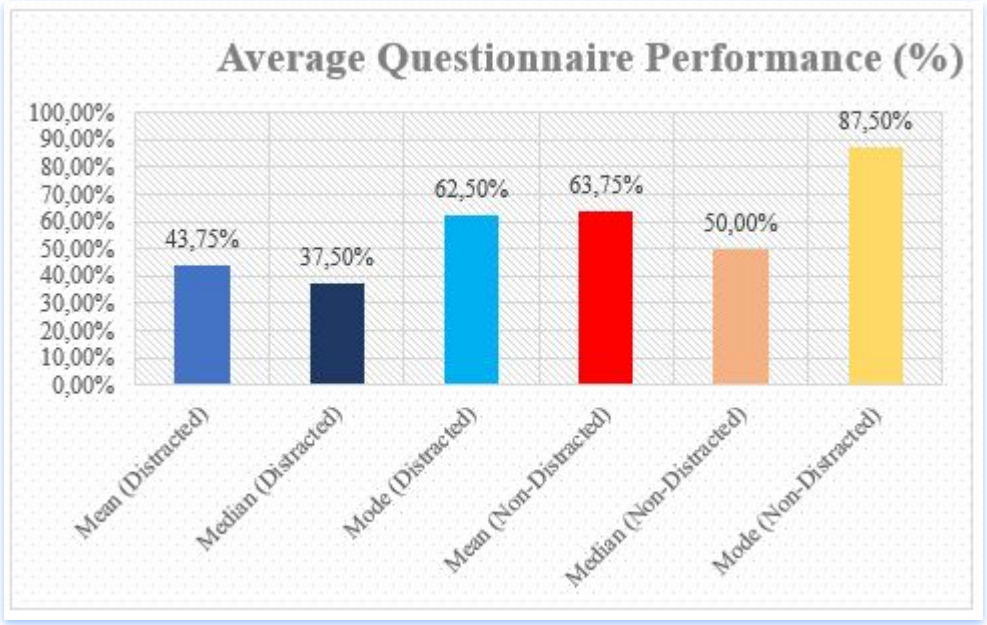
Discussion of the results

- Ads may influence, but cannot entirely distract the reader

Influencing Factors

- Eye-tracking awareness
- Ad-Blockers
- Subjects' age Group
- Subtle, unconscious eye-movement
- Group 2 through statistical analysis due to technical difficulties

Questionnaire performance (I/II)



Questionnaire performance statistics

Questionnaire performance (II/II)

Discussion of the results

- Ads influence reader's short-term information retention ability

Influencing Factors

- Short-term memory
- Language barrier
- Difficulty of the text & questionnaire
- Memory for meaning is retained

4. Conclusion

Summary

Limitations and future work

Summary

- Preconception
- Conclusion

Limitations and future work

Limitations

- Software
- Subjects

Future work

- Highly accurate eye-tracking techniques
- More groups & within-subject design
- Careful sample selection process
  - Age range
  - Subject’s knowledge

QUESTIONS?

THE END

GRACIÈS TACK **THANK YOU** GRACIAS ευχαριστούμε