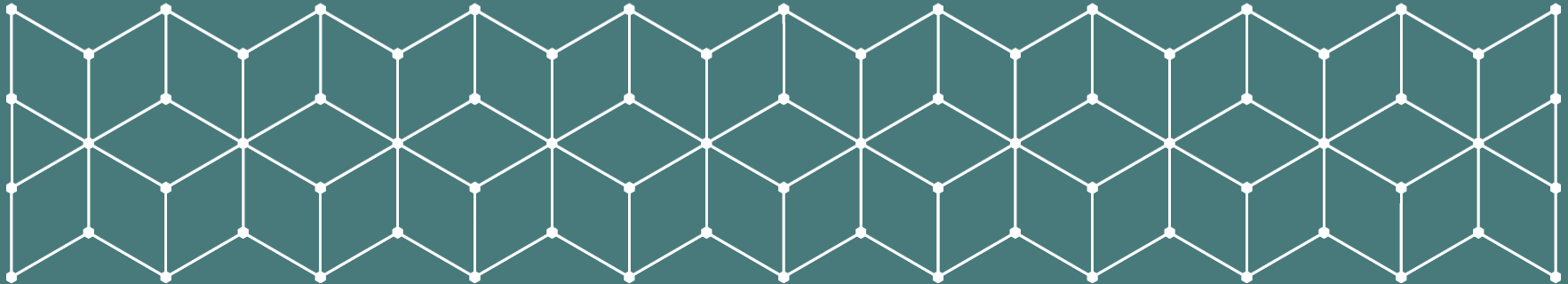# Investigating the Impact of Website Menu Presentation Style on User Performance

Knut Ole Kvilhaug Magnussen, Kasper Iversen,
Georgios Marentakis
Høgskolen i Østfold (Halden, Norway)
Contact email: komagnus@hiof.no

Knut Ole Kvilhaug Magnussen

❯ Completed Bachelor in Informations Systems; Information Security and Web in 2023

❯ Currently a Masters student in Applied Computer Science with specialization in Interaction design

❯ Research interests; Human-Computer Interaction, User Experience

❯ Paper to be presented in HCI International later this year on capturing «Guttastemning» moments and degenderizing the term.

Aims of Our Paper

› Gather insights into best practices and theoretical frameworks in relation to web menu navigation.

› Investigate the impact of menu presentation styles to determine if a given presentation style results in enhanced performance and hedonic user experience.

How This Was Investigated

› We conducted a comprehensive literature review on practices and theories in navigation menu design.

› We conducted a experiment where different menu presentation styles were compared in task completion time and error rate.

› We connected discovered practices and theories to results from the experiment.

Our Main Findings in the Literature

❯ Menu Design and Structure
  ❯ Influence on user experience and performance
  ❯ Balance between breadth (options) and depth (levels)

❯ Menu Placement and Adaptation
  ❯ First level on the left side improves performance
  ❯ Dynamic adjustment of content can increase performance but may increase learning time

❯ Menu Ordering and Type
  ❯ Categorical or alphabetical ordering affects interaction
  ❯ Comparison of hierarchical, fisheye, and radial menus for efficiency and accuracy

❯ User Comprehension and Navigation
  ❯ Crucial aspects of menu design
  ❯ User experience extends beyond comprehension to interpretation and assessment of learning experiences

Experiment Design

> **Independent variables (Both repeated measures):**
>> Menu styles (Vertical, Horizontal and Radial)
>> Trial (1-3)

> **Dependent variables:**
>> Average task completion time
>> Variance in task completion time

> **14 Participants, University college students**
>> Some with bachelor-level computer science experience, others with unrelated subjects.
>> All familiar with computers and web-based navigation.

Experiment Design: Menu Design
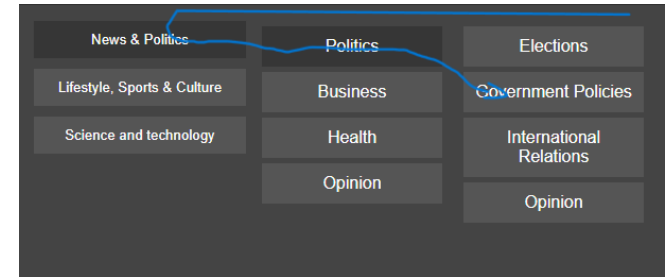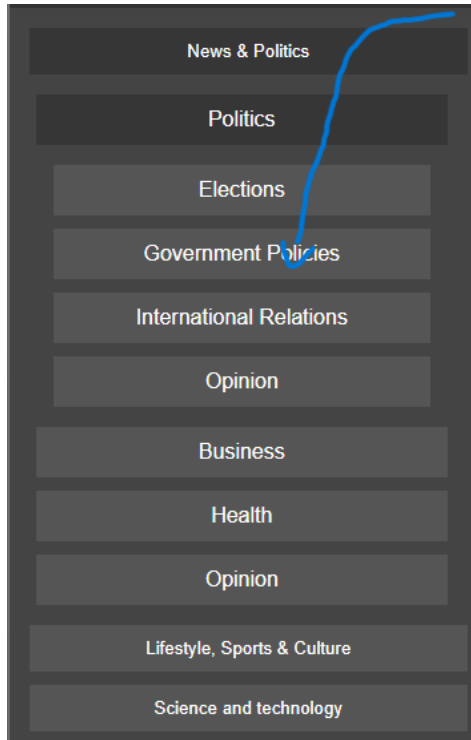
Experiment Design: Tasks & Procedure

› Navigate to a specified randomly generated section

  › *Find the section for Music under the Lifestyle, Sports & Culture part of the page"*

› 90 second familiarization period per style

› Alphabetical categorization

› Start button which initiated sequence of tasks

› Questionnaire after sequence

Experiment Design: Questionnaire

Post sequence:

› How would you rate your overall experience with the website navigation on a scale from 1-10, where 10 is the best?

› What made you not rate it higher/ lower?

› Were there any aspects of the navigation that you found particularly frustrating or confusing?

› What did you like about the menu navigation on the website?

› Were there any specific design elements or features that you felt made navigation more straightforward?

Post Experiment:

› Which menu presentation style did you find the easiest to use, and why?

› Opposed to the others, were there any specific design elements or features that you felt made navigation more straightforward?

Result Analysis

> Analyzed task completion time and error rate using Two-way (Trial x Type) repeated measures ANOVAs.

> > **Dependent variable**: Task completion time per participant

> > **Independent variable**: Menu presentation style

> Analyzed variance in task completion times using one-way ANOVA

> > **Dependent variable**: Variance in Task completion time per participant,

> > **Independent variable**: Menu presentation style

> Thematic analysis of questionnaire responses

Task Completion Time

> Small variation between styles and trials

> Neither effect of trial, style, interaction between or error rate was significant.
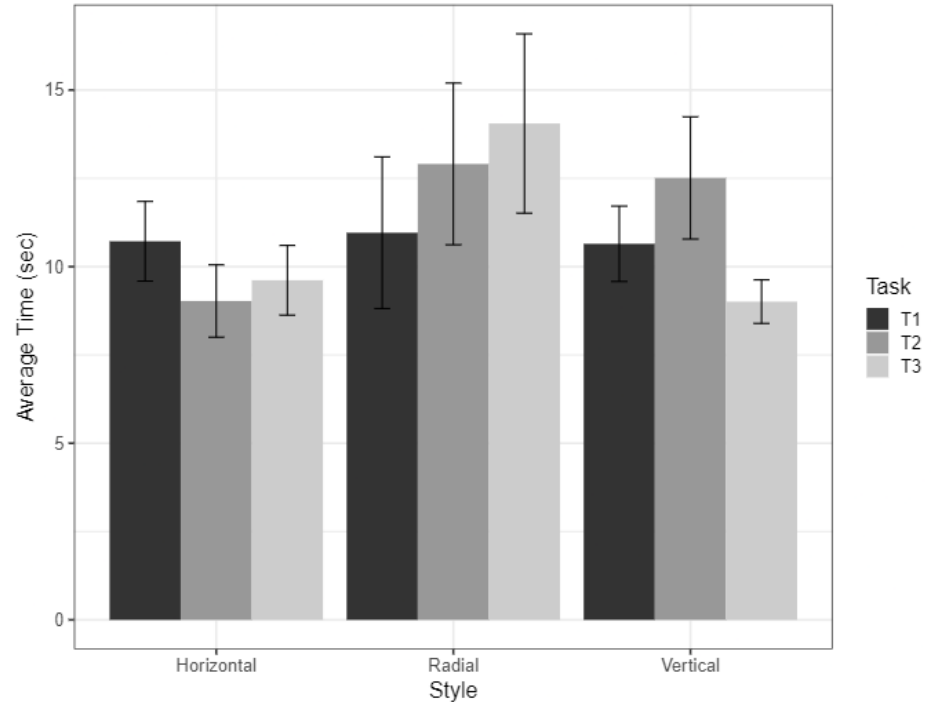
Task Completion Error Rate

> Similar to time completion: Small variation between styles and trials

> Neither effect of trial, style, interaction between or error rate was significant.
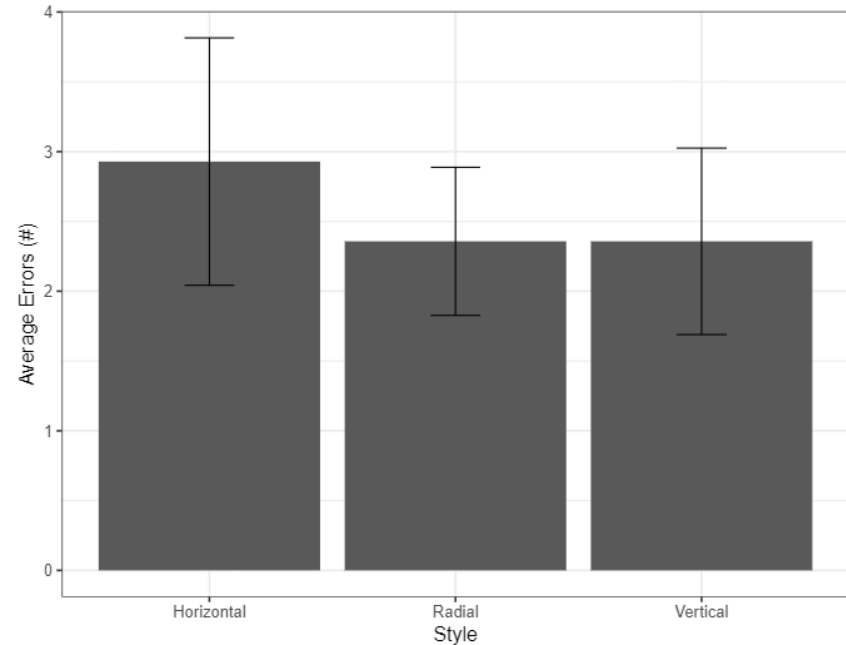
Result

> The calculated effect size of the tests was $\eta 2 = 0.1532115$ with a Greenhouse-Geisser correction value of $\varepsilon = 0.67$.

> The effect of menu presentation style on the variance in completion time was significant ($F(2,26)=4.26$, $p=0.025$.)

> Pairwise comparisons showed that the horizontal style led to smaller variance in completion time among trials compared to the radial style

> The difference in variance in completion time among trials was not significant when comparing vertical to radial or vertical to horizontal.
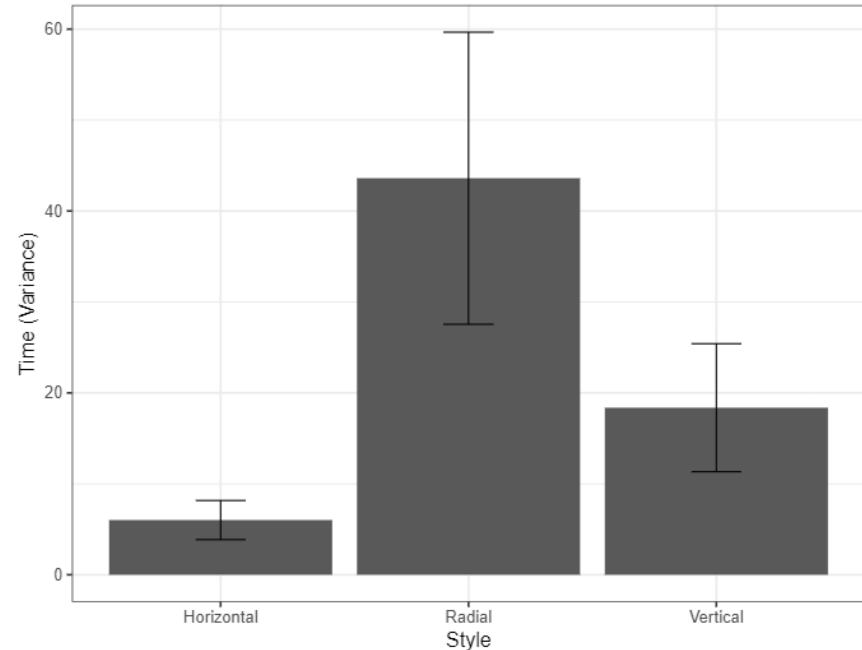
Questionnaire Results

➤ Average rating for user experience

    ➤ Vertical: 6.78

    ➤ Horizontal: 8.92

    ➤ Radial: 7.92

➤ Width over length

➤ Difference in level separation

➤ Commonness was preferred

Conclusion

› Menu presentation style (Radial, Vertical, Horizontal) did not significantly affect task completion time or error rate

› Radial menu showed the highest variance in task completion time

› Users expressed a preference for the horizontal style menu

Future work

❯ Investigate how participant characteristics, such as technology affinity and prior experience with menu styles, influence navigation performance.

❯ Explore a wider range of tasks to better represent the complexity and diversity of real-world user interactions.

❯ Consider other usability dimensions (e.g., learnability, efficiency, satisfaction) in menu design beyond task completion time and error rate

❯ Conduct further experimentation to understand the reasons behind the observed variance in completion times, particularly regarding the lack of familiarity with radial menus