CS449 - Human Computer Interaction
## Assignment-3 Cognitive Modeling in HCI
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This report aims to compare the efficiency of shopping procedures on the Amazon and eBay mobile apps by using CogTool. The chosen task involves purchasing a Nike Air Force 1 White with Women's size 7, and the analysis focuses on time differences in task completion. To perform this analysis, at first, the designs of both apps were implemented in CogTool. Then, the chosen task is simulated on those designs. The results generated by CogTool demonstrated that eBay outperformed Amazon, completing the task in 23.9 seconds compared to Amazon's 39.7 seconds.

Tasks	Amazon App	Ebay App
Buying a shoe	39.7 s	23.9 s

Figure 1: Total times

The critical factor contributing to this difference was the search process. Amazon's requirement for users to input 'Nike Air Force' before relevant suggestions appeared added a considerable delay of 17 seconds, comparing with eBay's more efficient search that provided relevant suggestions with just the entry of the word 'Nike'. This distinction corresponds to the cognitive process of information filtering, as discussed in Benyon's "Memory Attention" (2019). In this context, eBay's interface reduces cognitive effort in contrast to the greater search demand of Amazon.

Figure 2: Total durations of searching
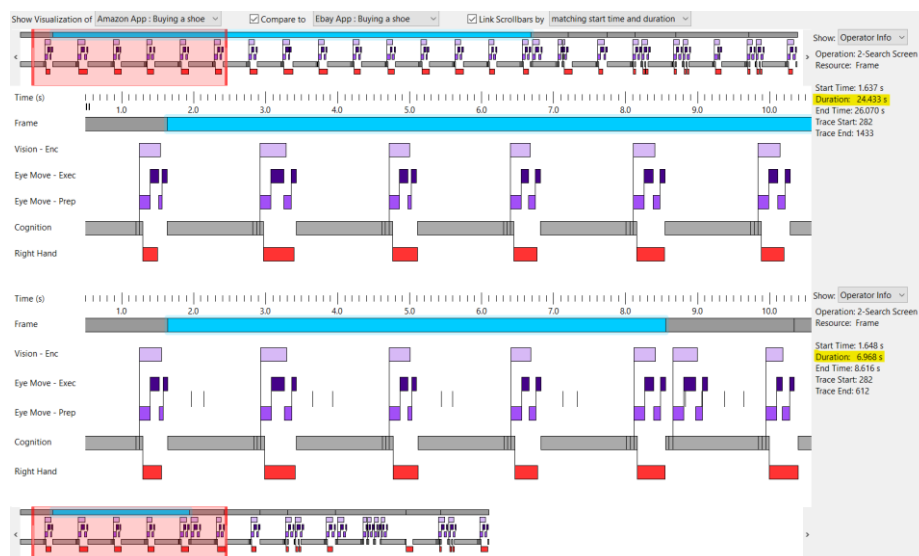
Furthermore, considering Benyon's "Visual Interface Design and Psychology" (2019), efficient searching mechanisms and user-friendly interfaces significantly reduce cognitive load and task execution time. The quicker search on eBay resonates with these principles, showing the impact of interface design on user experience. However, despite Amazon's slower search process, the analysis revealed that Amazon manages to close the time gap a little in subsequent phases of the task. Specifically, in the size selection phase, Amazon's approach of allowing users to scroll horizontally for size choice, without navigating to another screen, proves to be approximately 2 seconds faster than eBay's method that involves a button click, a new screen, and a vertical list. This result was reached by calculating the time from the end of the part of viewing the shoe to the beginning of the buying phase in both applications, as shown below.

Difference in total time spent choosing shoe size:
$$(21.467 - 13.650) - (37.234 - 31.394) \cong 2\ seconds$$

Anticipatedly, this outcome aligns with intuition. In the Amazon app, users easily select a shoe size by scrolling through a straightforward horizontal list, providing an intuitive and user-friendly experience. On the other hand, the eBay app requires users to click a button, leading to a new screen where they must choose a size from a vertical list. This process is more time-consuming and demands greater cognitive effort as it involves navigating to a completely different screen. This finding highlights the significance of design choices in influencing task completion time, offering valuable insights for optimizing user interfaces in practical terms. This finding is quite related with cognitive processing cycles, particularly actions involving

Long-Term Memory, which demand more cognitive effort than those relying on Working Memory or Short-Term Memory (Card, 2008). This aligns with the observed faster selection of shoe size on Amazon, where users simply scroll through a horizontal list, in contrast to eBay's process involving a button click, a new screen, and a vertical list. These actions tied to Long-Term Memory highlight the cognitive resource management aspect emphasized by Card (2008), suggesting that efficient processes, exemplified by Amazon's size selection, enhance the overall user experience.

In conclusion, the searching part makes the Amazon app slower by 17 seconds, but the subsequent efficiency in choosing a size closes this gap by 2 seconds. Consequently, users can complete the entire task approximately 15 seconds faster on the eBay app. This detailed analysis gives us useful insights into how users interact with apps and how the design of the app affects their experience. CogTool simulations and the results generated by them, along with the academic perspectives helped us to understand the different factors that affect how efficient shopping is on these mobile shopping apps.

To enhance the efficiency of the slower procedure on the Amazon app, a key improvement would be optimizing the search algorithm to provide more accurate and relevant suggestions with fewer input characters. By refining the algorithm to generate pertinent results with minimal user input, such as recognizing the term "Nike" alone, users would experience a significant reduction in the time spent on the search phase. By implementing this solution, not only will the 17-second difference in the searching phase is eliminated, but it can also outpace the eBay app in terms of overall task completion time, considering the efficiency gains observed in the subsequent stages, particularly the 2-second advantage in choosing the shoe size on Amazon, the combined effect of these improvements could position the Amazon app as the faster and more user-friendly option for completing the specified task.

References

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Card, S. K., Moran, T. P., & Newell, A. (2008). *In The psychology of human-computer interaction (pp. 23–44).* CRC Press.