The Image of the Interface: How People Use Landmarks to Develop Spatial Memory of Commands in Graphical Interfaces

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Graphical User Interfaces present commands at particular locations, arranged in menus, toolbars, and ribbons. One hallmark of expertise with a GUI is that experts know the locations of commonly-used commands, such that they can find them quickly and without searching. Although GUIs have been studied for many years, however, there is still little known about how this spatial location memory develops, or how designers can make interfaces more memorable. One of the main ways that people remember locations in the real world is landmarks – so we carried out a study to investigate how users remember commands and navigate in four common applications (Word, Facebook, Reader, and Photoshop). Our study revealed that people strongly rely on landmarks that are readily available in the interface (e.g., layout, corners, and edges) to orient themselves and remember commands. We provide new evidence that landmarks can aid spatial memory and expertise development with an interface, and guidelines for designers to improve the memorability of future GUIs.

CCS CONCEPTS • Human-centered computing~Graphical user interfaces  
Additional Keywords and Phrases: Spatial memory, Commands, Landmarks, GUI, Memorability.

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Implications:

• Implication 1: Include landmarks in GUIs to support better recall.

This implication appears to contradict a widely practiced usability heuristic – ‘recognition rather than recall’ [51,91]. We acknowledge that recognition is a vital part of spatial memory development [53,69], and particularly novice users rely on recognition (i.e., visual search) to find the location of a command. However, when novices begin transitioning to experts, they tend to recall locations from memory. After becoming experts, the goal is a quick recall than a slow recognition [11]. Therefore, interfaces should be designed in a way that would facilitate both recognition and recall, so that they can support the user’s transition from novice to expert [12,60].

• Implication 2: Interfaces should facilitate both recognition and recall.

In addition, results indicate four different types of landmarks that help users learn and recall the locations of commands in GUIs. Interestingly, the landmarks we identified (e.g., GUI layout, command group, and corners) are already present in the GUI environment, and designers include them in GUIs as a part of standard design (e.g., Gestalt principles) [71,88] and usability practices such as Nielsen’s design heuristics [51,52,91], but not as landmarks. The novelty of our findings is that we have discovered an additional value of these already-existing design elements – i.e., their value as landmarks. Therefore, designers can consider using those GUI elements and features (e.g., the visuals of icons) as potential landmarks in order to design more easily memorable GUIs, and incorporate the idea of landmarks in current design practices.

• Implication 3: Incorporate the ‘idea of landmarks’ in existing design practices.

Another interesting finding is the use of icons’ visuals as landmarks to remember commands. Although the value of visual appearance to differentiate and remember commands is known [5,8], no other work has provided evidence of using visuals as a promising spatial referencing mechanism (i.e., landmark) that can help users to develop spatial memory for commands and later enable memory-based recall. However, further research is needed to understand more about how the appearance of an icon can represent spatial information or how designers can exploit it to design more memorable GUIs. Besides these four landmarks, designers can consider other useful landmarks [65,75,78] (e.g., images, colour blocks), but care should be taken so that they do not become distracting [54].

• Implication 4: GUI layout, command group, corners and edges, and visuals of icons can be useful landmarks.