7.2 Icon Design

1 Introduction

In this essay, I am going to discuss some aspects of visual perceptual mechanisms carefult application of which can support effective icon design and assist visual search in Graphical User Interfaces: simplicity principle to facilitate visual attention, Gestalt principles for perceptual organization and usage of color as preattentive feature.

2 Perceptual Mechanisms

2.1 Visual Attention: Simplicity

The graphical user interface includes many situations where the user’s attention must be guided [7]. One of these situations would be visual search in icons, which may take essential time in tasks on different visual displays. Therefore, factors that may possibly slow down visual search should be taken into consideration [6].

One of these factors was found to be icon complexity: “the more complex icons are the longer search times on an interface is likely to be” [5]. Icons are regarded as complex if they contain a lot of details, and simple if only few elements are used [8]. Reducing its formal and conceptual elements to minimum supports simplicity principle of design. Thus, in addition to aesthetic advantages of applying this principle for icons, the functional benefit would be optimizing search time [7]. For example, there are two styles for the “previous” button design in Figure 1. If the goal is to improve visual search performance, and the target group is not children that do not mind spending time exploring the system, then it is advised to use type of design such as the one on the right. [3]

Figure 1: The left icon is more complicate than the right. [3]
2.2 Perceptual Organization: Gestalt Principles

Perceptual organization is effectively described by Gestalt principles [12] [10]. The principles identify many different factors that regulate which visual elements are perceived as going together in groups [10]. In visual search, if perceptually grouped items are accepted together, the search can be performed within the group. In other words, the grouping of items reduces the number of items to be searched [9].

In addition to the powerful proximity principle, that states that things that are close together are perceptually grouped together, similarity principle applied to icons provides consistent visual appearance to the icons of the same nature and users would naturally group them together. [2]. Features such as color, line thickness and structure can be used to keep icons consistently within the same icon group. See Figure 2 for an example of grouping of icons using Gestalt laws.

**Figure 2:** Grouping of icons through Proximity and Similarity principles in Grasshopper software [1]. There are three groups: “Boolean”, “Domain” and “Operators”; the last two have subgroups. All three groups use different designs elements and positioned in groups of 3-4 icons. Color is used in icons of the “Domain” group.

2.3 Color Perception: Preattentive feature

It has been concluded by numerous researchers, that all the components of a Graphical User Interface, including icons, should be designed in monochrome first, and then the color can be applied. Strong color with high saturation may be effective in small regions (up to 2 mm in diameter), but should be avoided in large regions [4]. Design of an effective icon within the limitations of a small area of pixels requires clarity, simplicity, and careful consideration of what the user will see at the usual viewing distance. [4]

Color is an element that is preattentively processed and “pops out” [12] when used as “unique feature” [11]. Thus, color should be the last element added to
icons design, and then used only minimally to reinforce symbolism and guide users’ attention [4]. Figure 2 provides an example of effective color application.

3 Conclusion

Knowledge of human visual perceptual mechanisms can provide an effective implementation in the field of icon design. In this essay, I have presented how understanding of visual attention, perceptual organization and color perception and careful application of some related principles can improve visual search for icons in Graphical User Interfaces.

References


