

This essay discusses implications for three perceptual mechanisms in relation to the design of icons in graphical user interfaces (GUIs). In particular, the effectiveness of a set of icons can be explained with regards to the complimentary processes of object perception, visual attention, and perceptual organization.

5 Consider a typical set of icons in a GUI. Many are likely to be simplified caricatures of objects in the real world, contain little fine detail, and are composed of a combination of a small number of simple shapes and colours ¹. McCloud explains the speed and ease at which the observer interprets such icons from a top-down perspective: “amplification through simplification” [2]. This is complemented by Ware’s description of
10 the bottom-up mechanisms involved in object perception [5]. Theories of structure-based image recognition posit that even simple line drawings or silhouettes of objects still result in correct object identification. On one hand, images of objects are often deconstructed and reassembled from several simple *geons*, ignoring any fine surface detail [1]. Simple objects contain less geons, taking less time to assemble and recognize.
15 Imagine your typical icon; it is likely composed of a small number geons. On the other hand, simple line drawing silhouettes of objects from canonical viewpoints also elicit a rapid correct identification [5]. Many well-designed icons fit either of these descriptions: a small arrangement of geons or an object silhouette with an appropriately-chosen viewpoint.

20 Once again, picture your preferred GUI of choice. How large are the icons? How far apart are they? Is the set of icons cluttered? An understanding of visual attention can serve to answer these questions. (1) It’s likely that any individual icon fits inside of the *useful field of view* [5], the attentional spotlight of foveal vision spanning only a few degrees of visual angle. (2) A well-designed GUI will likely space the icons far enough
25 apart such that a single icon fits within the spotlight, so they are perceived serially and independently. (3) A poorly-designed set of icons may appear to be cluttered if the perceptual distance between icons is small. Rosenholtz’s definition of clutter would suggest that icons using multiple channels of communication (colour, texture, line orientation, etc.) be well-spaced in the constrained multidimensional perceptual space
30 [4]. Adhering to these properties of visual attention should, in theory, improve the saliency of each individual icon.

In your GUI, it’s likely that some icons may be static while others signify interactive controls (i.e. buttons and notification). Some of the controls may be in different states: enabled, disabled, active, or responding to the user hovering with the cursor. The user
35 relies on Gestalt principles of perceptual organization to group these icons according to their various states and functions. Mullet & Sano’s example (Figure 1-a) icons are perceptually grouped by their identical enclosures, line weights, and colour combinations

¹My discussion focuses on the representational side of the abstract-to-representational icon design spectrum

[3]. Icons in a GUI may be additionally grouped by common fate as the user changes states in the application (Figure 1-b); their colours, line weights, or enclosures may change as they become enabled or disabled, or when the cursor is placed above them. Therefore, unlike static visual displays, many interactive GUIs make use of additional Gestalt cues for grouping sets of icons.

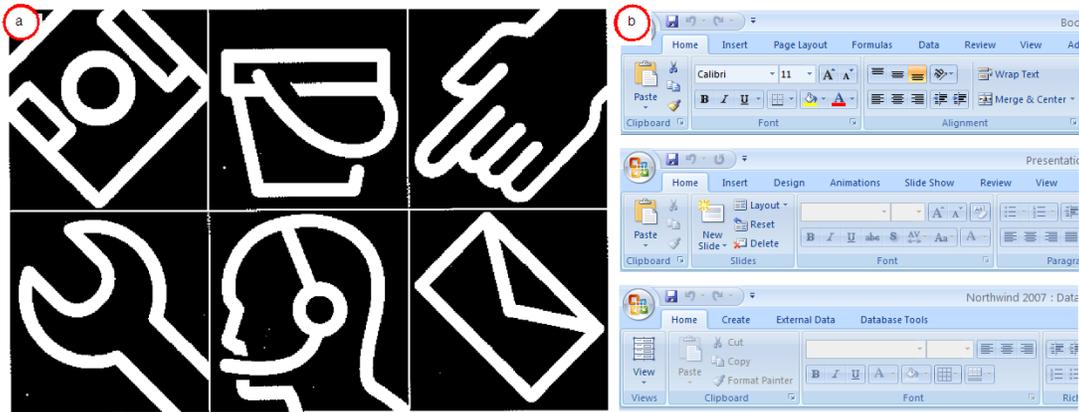


Figure 1: Icons grouped perceptually on multiple dimensions (a) in [3] (b) in Office's "ribbon"

The three perceptual mechanisms discussed here serve to explain well-designed icons are perceived and understood. Along with lower-level mechanisms (colour perception, edge detection, etc.), perceptual organization, visual attention, and object perception play important and complimentary roles in the process of understanding and icon.

References

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PSYC 579

7.2 – Cartoons & Icon Design

Implications for Perceptual Mechanisms

Word Count: 592

Author: *Romulan*

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