

Object Perception; Shape

1 Each visual object is inherently the combination of multiple basic visual features. While such
2 objects can be very useful in visualizations, there are basic challenges in understanding how people
3 perceive objects and shapes. Only by accommodating such challenges can visualizations become
4 successful.

5 The first challenge is segmentation. People need to separate the target objects from other
6 objects in the scene and the background. Figure 1 demonstrates a simple and successful example. In
7 Figure 1, blue circles are the target objects, as they label the critical information of the coupon: items
8 with bonus airmiles. Such shapes stand out from the white background because of colour differences.
9 The target objects stand out from other objects in the image because of curvature and texture
10 differences. These differences employ pre-attentive visual features (Wolfe & Horowitz, 2017),
11 making the circles easily segmented and quickly noticed from the rest of the image.

12 The objects used in visualizations cannot always be simple shapes. With more complex
13 objects, recognition becomes a challenge. Imagine the map of a zoo. The main purpose of such a
14 visualization is for the users to know the locations of various animals. Putting veridical images of
15 these animals on the map seems to be a straightforward solution. Nevertheless, the richness of visual
16 features in such a design can result in visual crowding, making recognition of the animals difficult
17 (Whitney & Levi, 2011). Putting texts on the map may help recognition, yet many zoo-goers are kids
18 and foreign tourists, who may not be able to recognize the names of numerous unique animals.
19 Therefore, a typical solution is to have cartoon sketches of animals on the map. When simplifying
20 real-world objects to sketches, it's important to preserve critical features for recognition. These can
21 be basic visual features such as colour and size, or more abstract features such as form and pattern
22 (Riesenhuber & Poggio, 1999).

23 Once a design overcomes the challenges, the benefits of using shapes and objects in the
24 visualization can be fully exploited. Visual objects, or even simple shapes are a combination of
25 multiple basic visual features. Thus, they can be effectively used to represent different dimensions in
26 a data set. For example, in a simple bar graph, the height of the bars can represent the values of the
27 variables, and the colour of the bars can represent the different experimental conditions. Visual
28 objects are also very useful in representing instructions. For example, cooking instructions written in
29 words can be lengthy and hard to follow, especially if the reader of the instructions is busy handling
30 the food. Using simple objects to illustrate the steps (Figure 2) can quickly familiarize the reader with
31 the procedure, and can be helpful when the text instructions are ambiguous and confusing.
32 Furthermore, visual objects can be used as mnemonic cues and identifiers of a successful franchise.
33 For example, the unique light saber in a poster quickly informs the viewer of a Star Wars movie, and
34 a lightning shaped scar on the forehead quickly informs the viewer of a Harry Potter impersonator.

35 Like many other decisions, someone using visual objects and shapes in a design needs to
36 weigh the costs and benefits. Successful inclusion of such elements, such as a vivid artistic rendition
37 of objects can almost always benefit the efficacy of the visualization. However, in many cases, it
38 costs money to hire professional artists to manage such a job. While the gains can be tremendous if
39 this were a poster for a hit Hollywood movie, spending the same amount of money for a high school
40 theatre class performance is unwise.

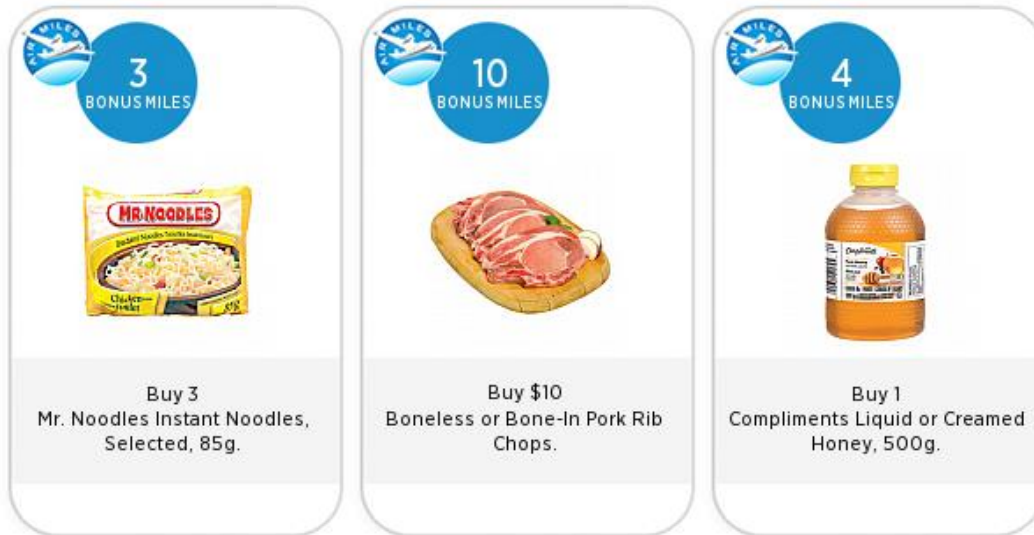


Figure 1. Safeway coupons.

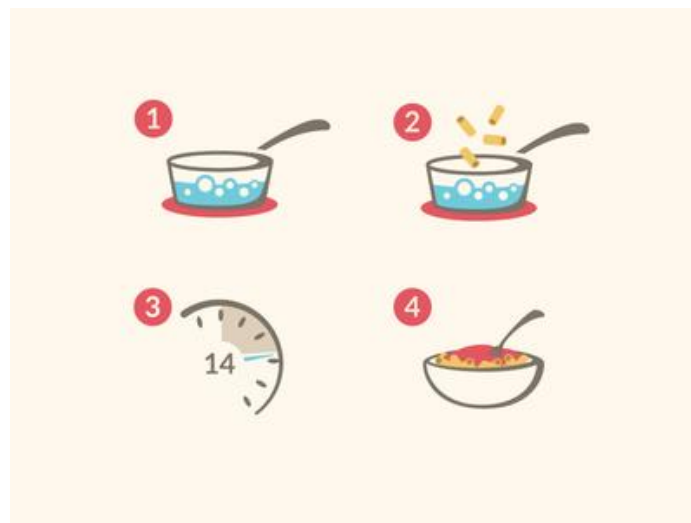


Figure 2. Simple cooking instruction for spaghetti.

References

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