**Task 1a) Aside from the already implemented visual variables (position, size & color hue) in Figure 1, what are two further visual variables that could be used to encode more information in the scatterplot? Give two examples on which data dimension could be encoded by which visual variable. (The dataset contains the following dimensions: "species", "island", "culmen\_length\_mm", "culmen\_depth\_mm", "flipper\_length\_mm", "body\_mass\_g", and "sex". You can inspect the data under data.js.)**

We could use shape to encode sex and texture for the island.

**Task 1b) Which problems could arise in Figure 1 when using size to encode i) "body\_mass\_g"? ii) "sex"?**

Depending on the distribution of the values of body mass, different problems could arise. If the differences are very subtle, the visual comparison could result very difficult for the viewers. If observations are cluttered together or if there are very large values, there could be problems with overlapping, making it hard to visualize data points.

Size is appropriate for continuous or ordinal data. Encoding sex with size would be misleading, since viewers would potentially assume there is a quantitative relationship were there is not. It would be very unclear and hard to understand that size represents sex.

**Task 1c) Explain the principle of pre-attentive processing and its relevance in selecting appropriate visual variables for effective data communication.**

Pre-attentive processing refers to the fast detection and processing of visual information the human visual system that happens before the conscious attention is fully engaged (done by the low-level visual system). By understanding this principle we can select visual variables that can be processed quicker and without much effort by the viewers, specially for the most important tasks of the visualization, and avoid distractions that could interfere with the comprehension.

**Task 1d) Argue which Gestalt Law(s) contribute most to the perception of clusters in Figure 1? Set them in relationship to the implemented visual variables (position, size & color hue)**

The Gestalt laws that contribute the most are proximity and similarity. We would argue that both have an equal contribution, since items close to each other and perceived as a cluster but also the color of the items strengthen this effect and makes it more clear.