

## Assignment 3

### Task 1 - Lie Factor

#### 1.1

$$\begin{aligned}\text{Lie Factor} &= \frac{\text{Size of effect in graphic}}{\text{Size of actual effect in data}} \\ \text{ratio} &= 590px / 275px = 2.145 \\ \text{Area}_{Poland} &= 590px * 275px = 162,250px \\ \text{Area}_{Italy} &= 405px * (405px / 2.145) = 405px * 189px = 76,545px \\ \text{Area}_{Spain} &= 200px * (200px / 2.145) = 200px * 93px = 18,600px \\ \text{Lie Factor}_{Poland, Italy} &= \frac{\frac{162,250px - 76,545px}{76,545px}}{\frac{4431 - 3480}{3480}} = 4.097 \\ \text{Lie Factor}_{Poland, Spain} &= \frac{\frac{162,250px - 18,600px}{18,600px}}{\frac{4431 - 2468}{2468}} = 9.71 \\ \text{Lie Factor}_{Italy, Spain} &= \frac{\frac{76,545px - 18,600px}{18,600px}}{\frac{3480 - 2468}{2468}} = 7.597\end{aligned}$$

lie factor should have a value between 0.95 and 1.05, otherwise a great distortion is detected.

#### 1.2

The lie factor is for both exactly the same, because the used doors have the same dimensions. In the first picture there is no background and therefore the lie factor can easily be spotted. In the second one the background adds perspective, which in turn makes the actual values blur.

### Task 2 - Gestalt Principles

- Law of Continuity: it is possible to read the two words "Coca" and "Cola", even though they overlap. Law of Connectedness: the two words are connected with lines and therefore it is obvious which letters from the word.
- Law of Closure: there is no outline in this logo, but we can read the letters IBM. The vertical lines are ending where the outline of the letter would be and therefore it seems as if the contours are closed.
- Law of Similarity: the rectangle is perceived as one group since it is made of the same objects which share the same features. It is also possible to read the word "SUN" on the edges of the rectangle, even though it consists only of the letter "U".
- Law of Proximity: the U is composed of different shapes and smaller objects, but it is still clear, that this forms the letter U.

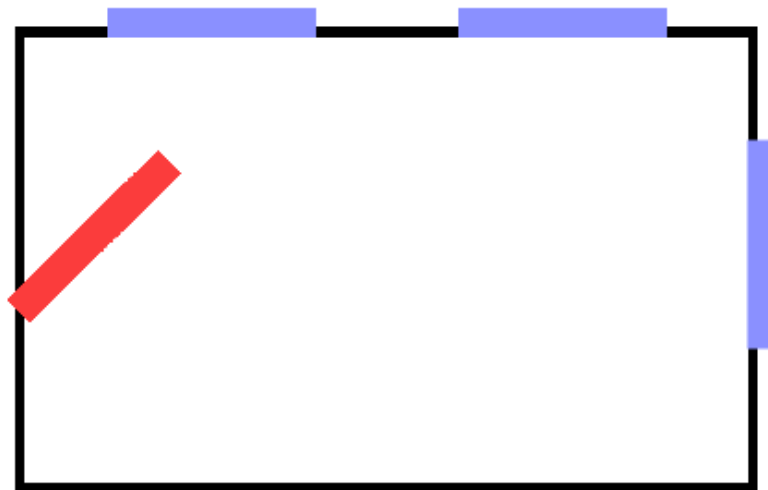
## Task 3 - Pre-Attentive Processing

- 1) Pre-attentive processing can be utilized by highlighting the sought-after word in a different color. This will make it instantly recognizable among the black and white text.

process certain visual properties subconsciously and instantly. Have a look at the following scenarios and imagine that you want to implement a system using visualization that supports solving the task. State and explain for each scenario whether you could exploit pre-attentive processing to improve the performance of the task at hand and if this is the case, how you would achieve this *exactly*. You can also provide sketches to make your point.

1. A text document is shown on screen and you want to search for a **word**.
2. The windows of your smart home report whether they are open or closed. On leaving the premises you want to check whether all windows are closed.
3. You have a static (heat-)map of Germany that visualizes the average income per region. You want to write a report about the economical well-being of the population in each state.
4. You monitor a dynamic dashboard displaying the current temperature of each machine in your factory and you have to quickly intervene if a machine gets too hot.

- 2) Pre-attentive processing can be utilized by displaying an open window with a different color and orientation. This way, an open window is instantly recognizable



- 3) For this task, exploiting pre-attentive processing is more difficult than for the previous tasks. One example could be to make every region above a certain income threshold visually distinct by coloring them in a noticeably different color. This, however, would lose some information compared to a coloring based on a spectrum.
- 4) By having each machine represented by a colored icon, it is possible to exploit pre-attentive processing to enhance performance in this task. Once a machine is close to overheating, the corresponding symbol turns from green/blue to yellow. When it starts to overheat, the icon turns red. Additional visual highlights such as a box around it or a flashing effect could be imagined as well.
- 5) For each test result that is outside of normal values, the number describing it is highlighted by being

written in bold or underlined numbers. For extreme cases, these values could even be shown in a different color.