



Creativity + Innovation & Technology

O-CITY PROJECT



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Topic 1 - Lesson 2. Visual language and principles

This lesson has been prepared to improve the knowledge and skills about the creation of visual contents in UX. The principles presented are a basic tool for developing beautiful and usable designs, both the user interfaces and the static or interactive infographics.

The language of images

Everything that is visual, from a photo or information plaque to a user interface element or an infographic, visually communicates a message by conveying information or ideas through the language of images.

In detail, the visual language is made up of visual items (such as line, shape, colour, pattern, scale, angle, space, proportion, etc.) that put together construct graphic elements or images.

These signs, or group of signs, represent concepts by being placed in a spatial context, according to visual principles.

Even in the User Interfaces and information visualizations these signs, i.e. graphical elements, images and symbols like icons, are largely used to convey meanings and information.

As well as in the design of interactive systems, in the design and creation of a graphic project, too, it is fundamental to know what message you want to send and what target you want to communicate with through a shared code.

The sign

The sign is everything that conveys meaning and can be used to represent something else.

According to Ferdinand De Saussure, the sign is made up of two components: the signified (the plane of content, i.e. the meaning or concept the sign represents) and the signifier (the plane of expression, i.e. the form that the sign takes and by which the meaning is expressed).

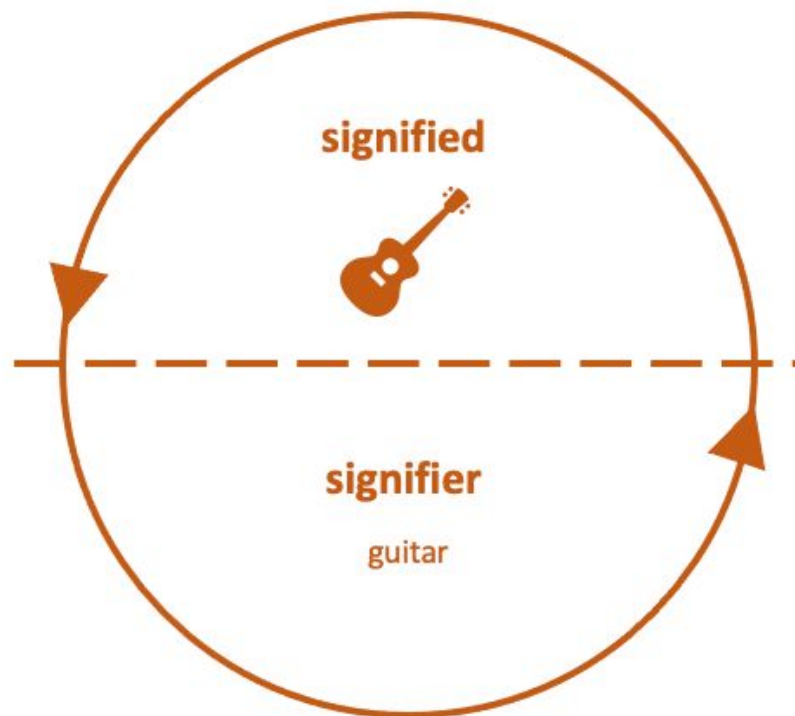


Fig. 1 - De Saussure's model of the sign. The sign is composed by the signified, i.e. the content, that, based on the experience, is combined with a sound-image (i.e. signifier) expressing that content. Image created by the author of the Lesson.

The index

We have an index when the signs are linked by cause-and-effect in space and time. In this case, the sign does not represent the idea itself, but something, a piece of evidence, referring to it. In the photo below, the smoke indicates that probably, in the building, there is a fire.



Fig. 2 - Example of index. Photo credits by Dan Calderwood, Unsplash

The symbol

A symbol is a sign that is usually meaningful by convention and is often abstract. Generally, it has no resemblance between the signifier and the signified. It is used to represent information commonly understood. In the picture below we can see something that is culturally learned: numbers and alphabet letters.



Fig. 3 - Example of symbol. Photo credits by Amador Loureiro, Unsplash

The icon

An icon is a sign that describes the idea without any convention applied to it. It has a physical resemblance to the signified.

In User Interfaces, as well in infographics, the icon can be considered as a small picture that represents an object or content category allowing to quickly find the needed content zone or function.



Fig. 4 - Example of icon. Photo credits by Joearthcon, NounProject

Pictograms

Pictograms are images (icons or sometimes symbols) that have clear pictorial similarities with some objects.

Some pictograms have the same meaning at the international level and help in sharing clear information and ideas.



Fig. 5 - Example of pictogram. Photo credits by Parkjisun, NounProject

Visual Design Principles in UX

There are several design principles that impact the User Experience of User Interfaces and infographics. Following are a few examples.

5 Visual-Design Principles in UX

Visual-design principles inform us how design elements go together to create well-rounded and thoughtful visuals. Graphics that take advantage of the principles of good visual design can drive engagement and increase usability.

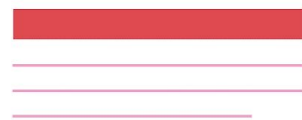
SCALE

The principle of scale refers to using relative size to signal importance and rank in a composition.



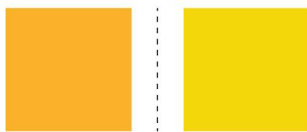
VISUAL HIERARCHY

The principle of visual hierarchy refers to guiding the eye on the page so that it attends to design elements in the order of their importance.



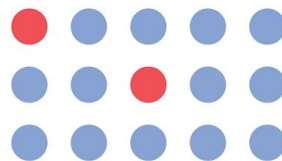
BALANCE

Balance occurs when there is an equally distributed amount of visual signal on both sides of an imaginary axis.



CONTRAST

The principle of contrast refers to the juxtaposition of visually dissimilar elements in order to convey the fact that these elements are different.



GESTALT PRINCIPLES

Gestalt principles capture our tendency to perceive the whole as opposed to the individual elements.



NNGROUP.COM NN/g

Fig. 6 - Five visual-design principles that can drive engagement and increase usability by Kelley Gordon from Nielsen Norman Group. Source: <https://www.nngroup.com/articles/principles-visual-design/>

In this lesson, we will focus on the Gestalt principles since they are psychological principles about the perception that explain how humans make sense of images. As a consequence, they allow the design of user interfaces and information visualizations easy to understand or use.

A theory of perception: Gestalt principles

Gestalt is a German word meaning “form” or “shape” that in this context is interpreted as “pattern” or “configuration”.

Generally, it refers to a set of principles defined by a school of psychology in the early 20th Century. Borrowing the famous adage, “the whole is more than the sum of their parts”, we can state that in the same way, the Gestalt theory focuses on how humans perceive the whole image as opposed to its individual elements.

Seven principles (but not the only) govern perception phenomena. Visual design and UX professionals use these principles extensively, for example in creating user interfaces, as they believe their application helps users learn faster.

Among the most known:

- Similarity
- Proximity
- Closure
- Common region or Enclosure
- Continuity
- Symmetry or Pregnanz
- Past experience

Let's give a look at each of these deeply, through the help of some examples.

1. Similarity

The definition of this Gestalt law states that elements that share a visual characteristic are perceived as more related than elements that are dissimilar.

Considering that the human brain perceives as one group some elements that appear similar in some way - in colour, shape, or size - in UX design, the use of similarity is used to tie together elements that might not be close to each other in a design.

The principle obviously works in reverse as well. You can make things dissimilar if you want to make one element stand out from the group. Figure 7 shows that our mind automatically groups the square by colour, even though they share the same space among them and also the same shape.

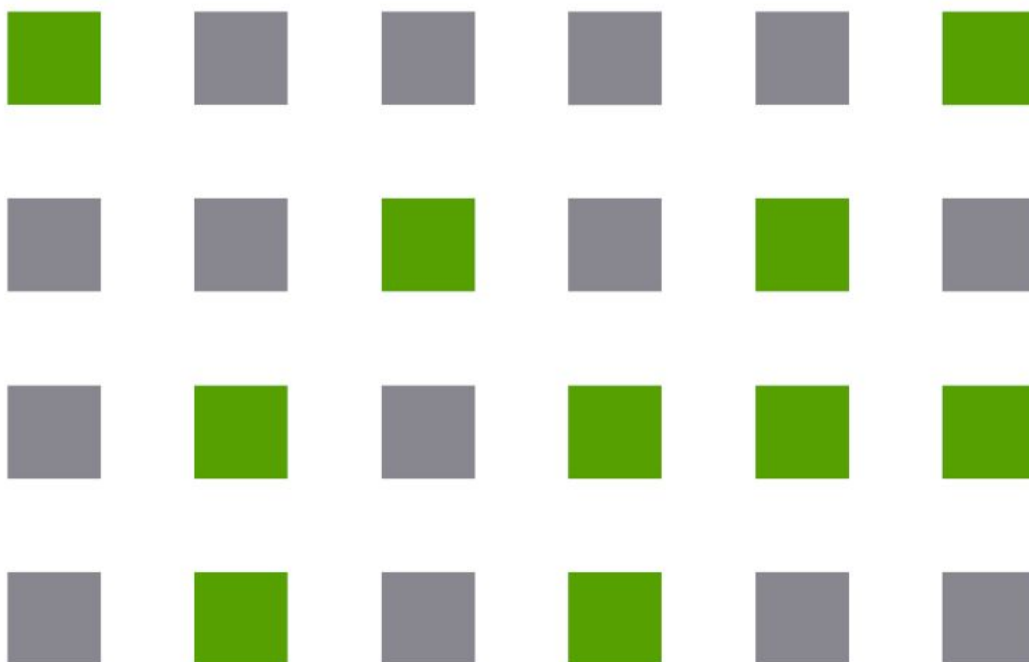


Fig. 7 - "Principle of Similarity" based on colour, by Cameron Chapman on Toptal Designers. Source: <https://www.toptal.com/designers/ui/gestalt-principles-of-design>

Following the same principle, this time based on shape. In Figure 8 we perceive four columns formed by either triangles or circles and not a mixed group of geometric figures.

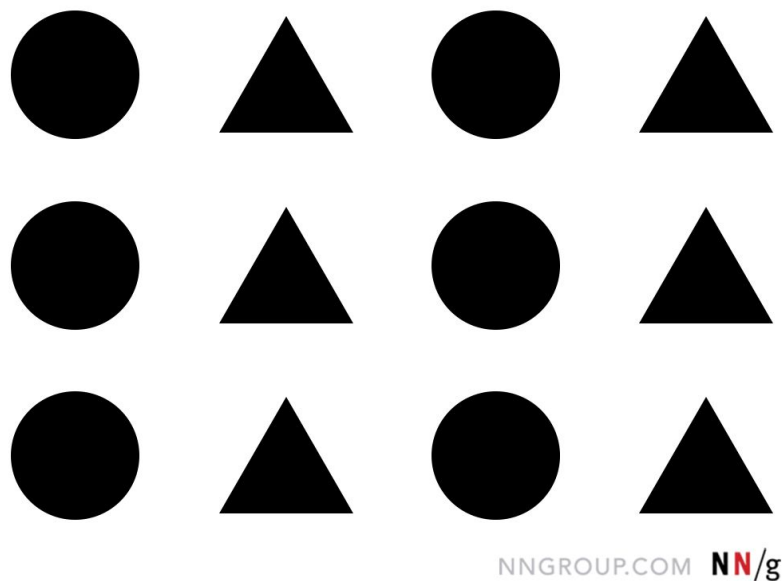


Fig. 8 - "Principle of Similarity" based on shape, by Aurora Harley from Nielsen Norman Group. Source: <https://www.nngroup.com/articles/gestalt-similarity/>

2. Proximity

The proximity law suggests that the human eye tends to perceive objects that are placed together to be more related than the ones far apart, even when there are multiple objects. Proximity is so essential to our perception that it is stronger than other features such as shape or colour. In other words, when individual elements in a project are grouped into an area or group, users will recognize it as a single entity distinct from anything else.

The opposite is also true! So, if you want to separate objects that share some characteristics you can put some space between the elements.

In Figure 9, we can notice that the only thing that differentiates the group on the left from those on the right is the proximity of the lines. Nonetheless, our brain interprets the image on the right as three different groups.

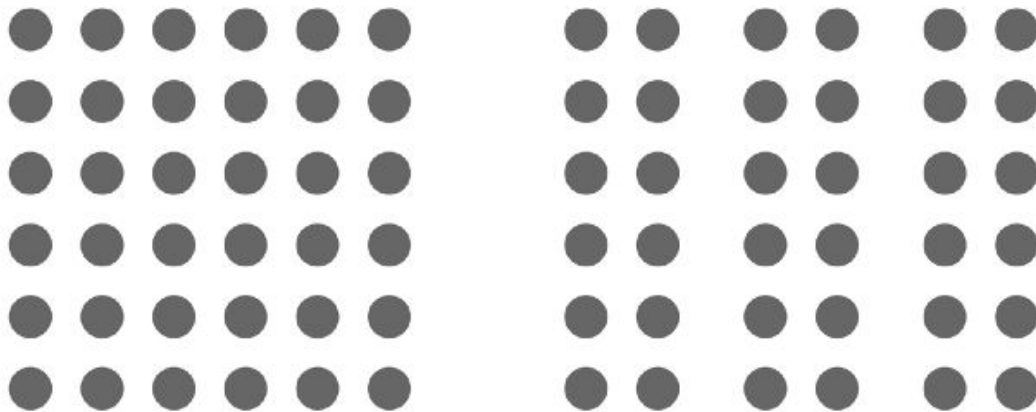


Fig. 9 - “Principle of Proximity”, by Cameron Chapman on Toptal Designers. Source: <https://www.toptal.com/designers/ui/gestalt-principles-of-design>

In Figure 10 we notice how groups of text (or neighbouring bars) are related according to proximity: even without focusing on the text, groups are immediately distinguishable. Proximity increases the relationships between elements and allows to create content and images that are more comfortable for users to perceive. This happens not only in the creation of user interface controls, such as buttons or inputs, but also with the written content and typography. As a consequence, white space between elements also plays an important role.



Fig. 10 - “Principle of Proximity” applied to text content, by Aurora Harley from Nielsen Norman Group. Source: <https://www.nngroup.com/articles/gestalt-proximity/>

In the following screen of the website of Casa Grotta nei Sassi (Cave house in the stones), contents are organized and grouped according to the proximity principle that allows users to quickly define which text is referred to a specific image.

HOME	LA CASA GROTTA	ORARI E TARIFFE	PRENOTA	REGOLAMENTO	DOVE SIAMO	NEWS	CONTATTI
------	----------------	-----------------	---------	-------------	------------	------	----------

Storica Casa Grotta di Vico Solitario

Antica abitazione tipicamente arredata. Per meglio comprendere usi e costumi degli abitanti degli antichi Rioni Sassi di Matera, prima del loro abbandono, Vi invitiamo a visitare nel Sasso Caveoso, in vico Solitario, la Storica Casa Grotta arredata con i mobili e gli attrezzi autentici del periodo in cui era abitata. La Storica Casa Grotta dispone all'interno di una descrizione multilingue. Aperto tutto l'anno.



NELLO SPLENDIDO SCENARIO DEI SASSI DI MATERA, NEI PRESSI DI PIAZZA SAN PIETRO CAVEOSO, SI APRE UNO DEI PIÙ SUGGERITIVI VICINATI, QUELLO DI VICO SOLITARIO, DOVE È SITA L'OMONIMA CASA GROTTA.

Una visita alla Casa Grotta di vico Solitario è l'unica autentica opportunità per rendersi conto di quella che era la vita nelle case scavate del Sasso Caveoso prima del loro abbandono, avvenuto in seguito alla legge di risanamento dei Sassi voluta dal presidente del consiglio Alcide De Gasperi nel 1952. Una grande cavità rocciosa fa da cornice all'arco d'ingresso della Casa Grotta, unico elemento costruito che si addossa alla grotta nella quale è stata ricavata l'abitazione; le ultime modifiche del prospetto sono risalenti al 1700.



NELL'UNICO AMBIENTE, IN PARTE SCAVATO E IN PARTE COSTRUITO, SONO PROPRIO GLI ARREDI A CREARE UNA DIVISIONE VIRTUALE DEGLI SPAZI.

Il focolare con la cucina, al centro della casa un piccolo tavolo con l'unico grande piatto dal quale tutti mangiavano, il letto composto da due cavalletti in ferro, sui quali poggiavano delle assi di legno e il giaciglio costituito da un materasso ripieno di foglie di granturco; di fronte al letto, la stalla con la mangiatoia che ospitava il mulo; oltre un piccolo tramezzo l'altra stalla dove sono ben visibili la mangiatoia, la cava tufacea dalla quale si ricavano i blocchi di tufo ed una cavità circolare usata come letamaio o come deposito per la paglia. Di particolare interesse è il sistema di raccolta delle acque piovane dall'esterno; ben visibili sono la canalizzazione e la cisterna.



LA CASA GROTTA DI VICO SOLITARIO È UN MUSEO RICONOSCIUTO E PATROCINATO DAL COMUNE DI MATERA.

La gestione è a cura dell'associazione culturale Gruppo Teatro Matera, che grazie alla passione e alla costanza dei suoi operatori, è divenuta nel corso degli anni meta obbligata per molti visitatori italiani ed esteri, riscuotendo numerosi consensi e riconoscimenti dalle principali testate giornalistiche ed emittenti televisive nazionali e internazionali.

Fig. 11 - "Principle of Proximity" applied to contents on the website of Casa Grotta nei Sassi (Cave house in the stones) in Matera, Italy (<http://www.casagrotta.it>)

3. Closure

This law of Gestalt tells us that our mind prefers complete shapes and tends to create familiar images. Our brain automatically fills in the gaps between elements to perceive them as a whole (of course within certain limits beyond which it fails to fill in the missing information). This is why we see a peacock in Figure 12, instead of simply a with space and separated colored forms.



Fig. 12 - "Principle of Closure", by Kelley Gordon from Nielsen Norman Group. Source: <https://www.nngroup.com/articles/principles-visual-design/>

Many iconic logos take advantage of this principle. For example, the WWF one (see Fig. 13) that consists of a group of black shapes arranged on a white background, where large pieces of the outline are missing, but our brain is ready to see the familiar shape of a panda.



Fig. 13 - "Principle of Closure", by Cameron Chapman on Toptal Designers. Source: <https://www.toptal.com/designers/ui/gestalt-principles-of-design>

According to the law, it is easy to understand why our brain can perceive two figures kissing in Picasso's painting, as it is shown in Figure 14.



Fig. 14 - "Principle of Closure" applied in the artwork "The kiss" by Picasso. Example proposed by Kelley Gordon from Nielsen Norman Group. Source: <https://www.nngroup.com/articles/principles-visual-design/>

For the same reason, closed forms are preferred to open ones as they better convey proximity among elements that help in visually perceiving them as a whole.

4. Common Region or Enclosure

According to the general definition, “The common region principle says that objects within a boundary are perceived as a group and are assumed to share some common features or functionality”.

In Figure 15 you can see how the border around the three central circles makes them appear as a distinct group.

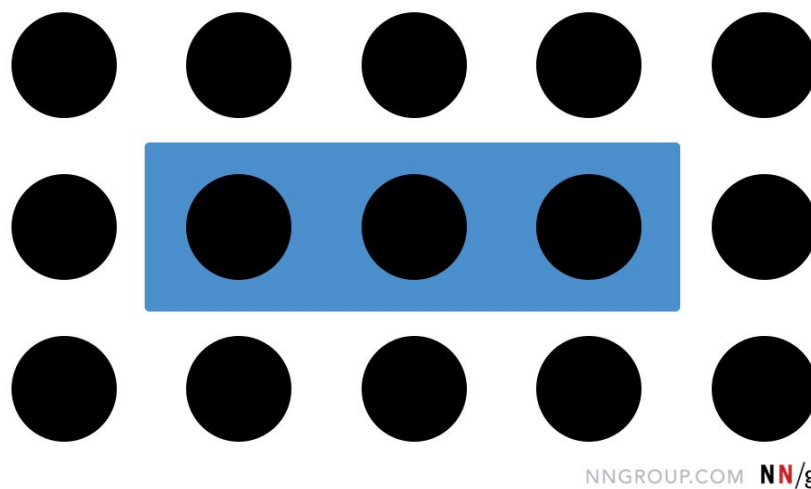


Fig. 15 - “Principle of Common Region”, by Aurora Harley from Nielsen Norman Group. Source: <https://www.nngroup.com/articles/common-region/>

In the same way, you can notice this principle applied to Facebook posts, where related likes, comments and other interactions, appear all together in a defined space, as Figure 16 reveals.

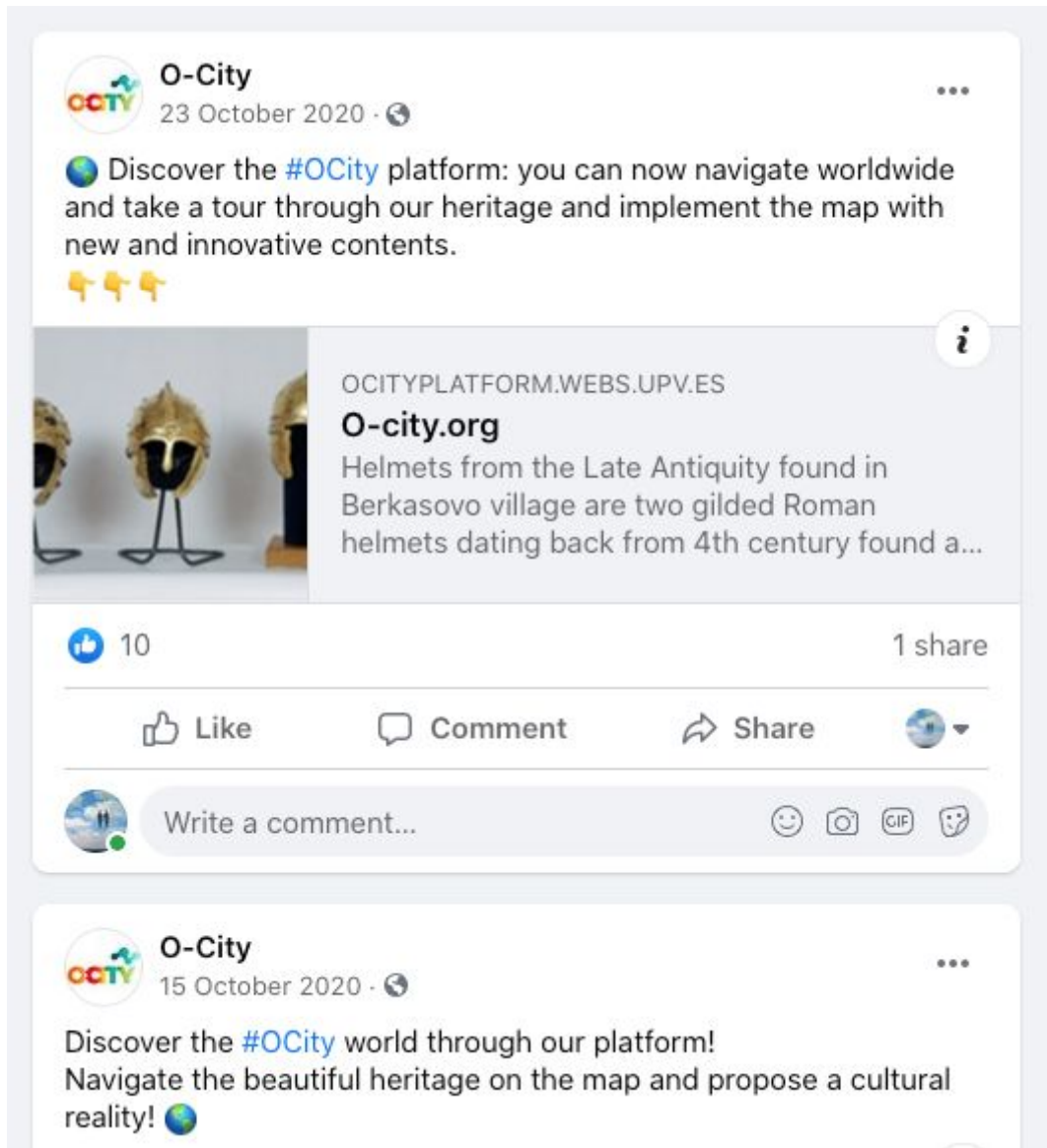


Fig. 16 - Example of how the “Principle of Common Region” is applied on Facebook.

When users open a web page, they are generally looking for quick answers. The common region principle tells us that User Interfaces with distinct and well-organized sections make it easier for people to recognize the basic structure of the page and to interact with its elements. For example, the homepage of “Galleria Nazionale d’Arte Antica Barberini-Corsini” has been organized by using squares to group different contents, helping us in understanding which elements are connected and what we can find in each section.

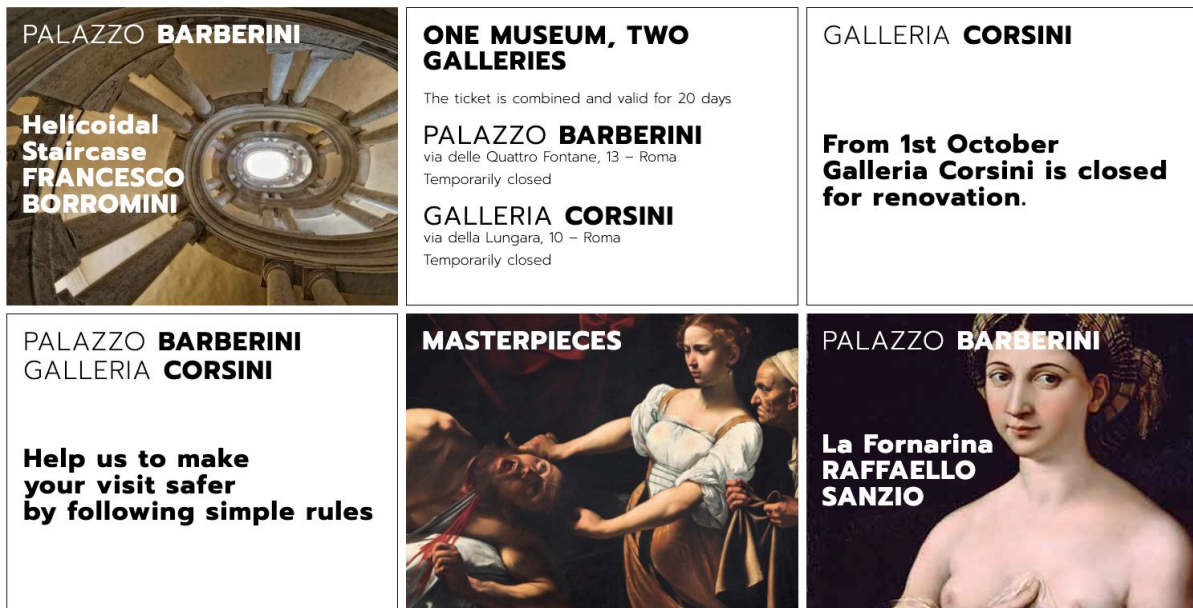


Fig. 17 - Example of how the “Principle of Common Region” is applied in the homepage of Galleria Nazionale d’Arte Antica Barberini-Corsini, one of the most famous museums in Rome. Source: <https://www.barberinicorsini.org/en/>.

5. Continuity

The law of continuity states that the human eye tends to follow a continuous path. More precisely, it postulates that our perception is naturally inclined to consider objects arranged in lines or curves as more related or being part of the same group. Similarly, elements going in the same direction, or representing a "good curve" are considered more likely joined than others. This concept is well represented by Figure 18, where we first perceive the relation among the dots as based on being part of the same line or curve, rather than their relation based on color.

In visual design, we can apply this principle to guide the visitor's gaze in a certain direction, so that the eye naturally follows the simplest path on the page. Specific elements can be placed on a line to attract the user's attention to them, too. For example, in Figure 19, the eye tends to follow the line perceived across the letters. In this way, the line connects the main shape with another one, the eagle, bringing the attention on it. However, the logo is perceived as a whole, since all the elements are well-connected and readable in a specific order.



Fig. 18 - "Principle of Continuity", by Cameron Chapman on Toptal Designers. Source <https://www.toptal.com/designers/ui/gestalt-principles-of-design>



Fig. 19 - "Principle of Continuity" applied to a logo. Source <https://www.nekobrandstudio.com/blog-logo-design-brand/gestalt-principles-theory-logo-design>

6. Symmetry or Pregnanz

The law of symmetry and order, also known as "prägnanz", the German word for "good figure", is one of the most complex to understand, because it includes two different but connected aspects. On the one hand, it states that a good shape is simple, regular, defined, symmetric, and as a consequence "stable". Since human nature prefers order over chaos, people tend to perceive objects as symmetrical shapes whenever possible. Moreover, according to the same organizing principle, objects that are balanced and symmetrical are seen as a whole.

Example in Figure 20 shows a total of six eyes, but considering that our minds tend to perceive symmetry whenever possible, most of us will immediately recognize three sets of eyes.

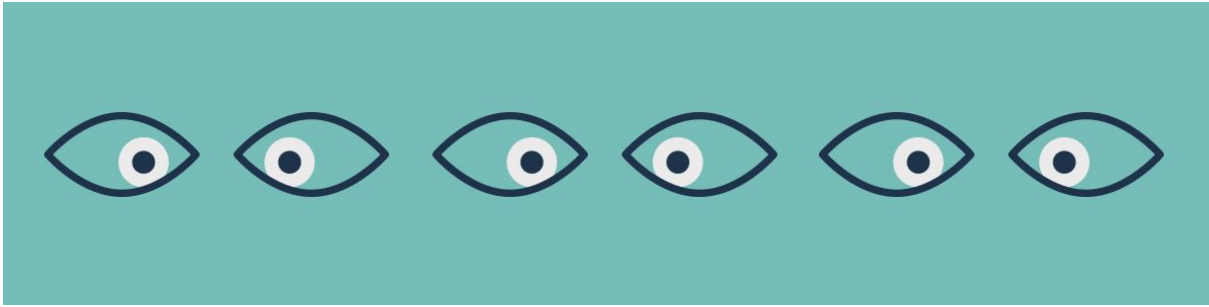


Fig. 20 - "Principle of Symmetry". Source: <https://visme.co/blog/gestalt-design-principles/>

On the other hand, a good shape is also one that, because of its singularity, attracts attention, becoming in this way a reference for the other shapes of the same type, which instead are considered as its deviation. For example, the ellipse is generally considered to be a flattened circle.

In any case, our brain tends to reduce what we see to the simplest shape possible, rather than perceiving complicated forms. In other words, a good shape is considered the one that needs less information to be understood. Therefore, the monochromatic version of the Olympic logo, represented in Figure 21, doesn't suggest to the human eye a collection of curved lines but a series of overlapping circles.

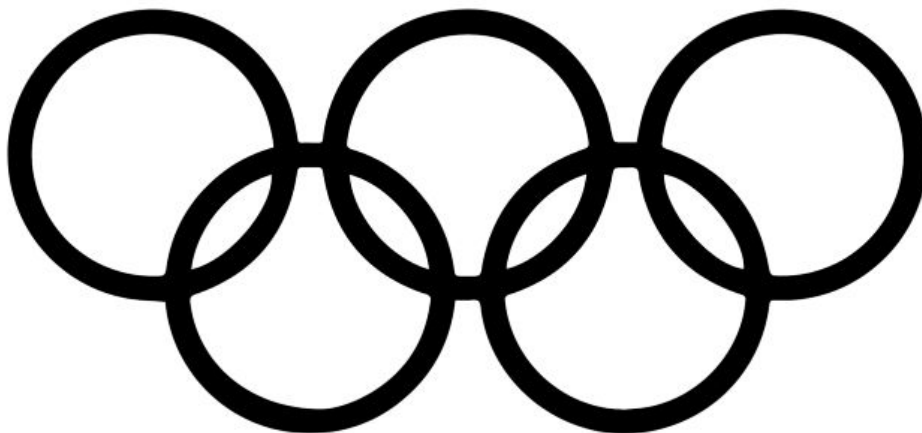


Fig. 21 - "Principle of Symmetry", by Cameron Chapman on Toptal Designers. Source <https://www.toptal.com/designers/ui/gestalt-principles-of-design>

For the same reason, in Figure 22a we probably see a hexagon with diagonals, while in Figure 22b we see a cube. Indeed, although they are both two-dimensional figures, the first hexagon respects the law of "good figure" by being simple, regular, symmetrical and stable. On the contrary, the second hexagon does not fulfill the mentioned requirements, letting us perceive it as a different shape.

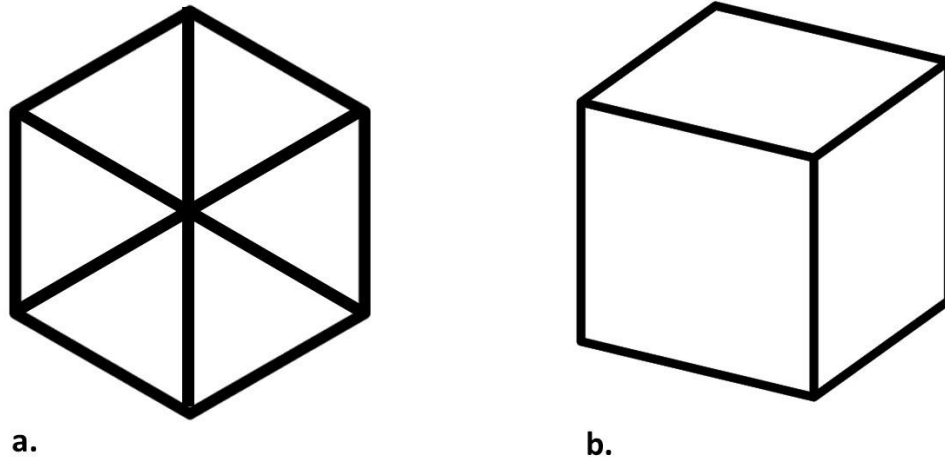


Fig. 22 - "Principle of Symmetry" applied on bidimensional figures

7. Past experience

Past experience is an important (despite mainly cultural based) factor in perception, since our brain attempts to understand forms by associating them to what is considered familiar. For example, look at the sequence "18HM". Likely, your mind naturally separates numbers from letters to create two distinct groups, but it only happens because you know the Latin alphabet and the Arabic numerals, i.e. something that is familiar in your mind. The same does not apply if we use an unknown code. It is possible to recognize the same process in the example shown in Figures 23a and 23b. In both pictures graphical elements are exactly the same, although they are grouped differently. However, based on past experience, our mind naturally sees a smiley face only in Figure 23b, as in that one the disposition of those elements is associated with how eyes and mouth are placed on a face, according to a well-known pattern.

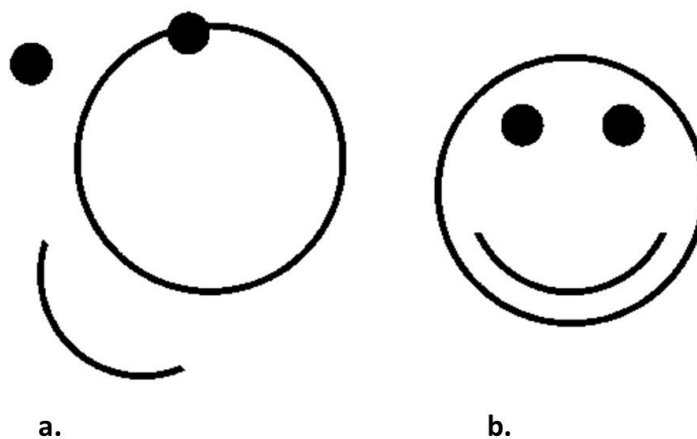


Fig. 23 - "Principle of Past Experience", applied on a smiley face. Source <https://www.designdune.com/inspiration/the-best-photos-to-illustrate-gestalt-theory/>

In the same way, in Figure 24 we can recognise a traffic light and not three coloured balls on a black background.

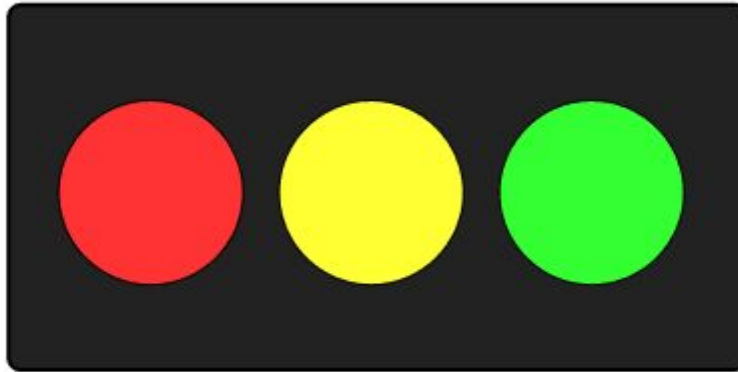


Fig. 24 - "Principle of Past Experience", applied on a traffic light. Source:

<https://www.smashingmagazine.com/2014/03/design-principles-visual-perception-and-the-principles-of-gestalt/>

The Gestalt principles applied to the UI design of websites and applications

Understanding how the human brain works and then following people's natural tendencies, helps in creating a smoother interaction that makes the users feel comfortable on a website, even if it is their first visit. Indeed, knowing the Gestalt principles and the mental processes they describe, allow designers to make more conscious decisions by predicting how people will use and interpret the User Interfaces.

Of course, the various Gestalt principles heavily influence the visual hierarchy, since they attempt to explain how human perception is influenced and relations are created by the arrangement or placement of different graphic elements based on visual cues, such as proximity, similarity, and closeness.

These three principles are especially important for UI and UX design, as they are used to separate or unify the visualized elements, such as contents or controls that are conceptually similar in a website or application. On the contrary, misuse of these principles can create confusion, especially when elements that have nothing in common appear as grouped together.

In the following examples, some of the Gestalt principles are applied to the User Interface design of websites and applications:

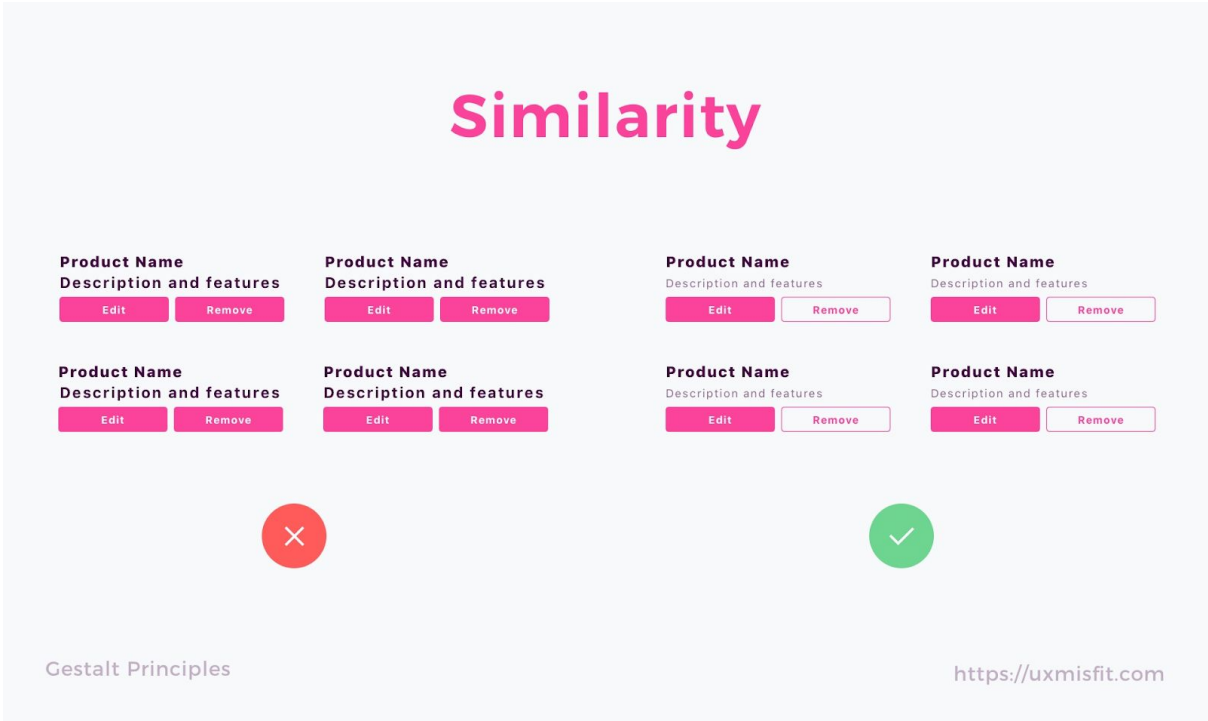


Fig. 25 - Example of the “Similarity principle” applied the UI design of websites and applications. Source: <https://uxmisfit.com/2019/04/23/ui-design-in-practice-gestalt-principles/>

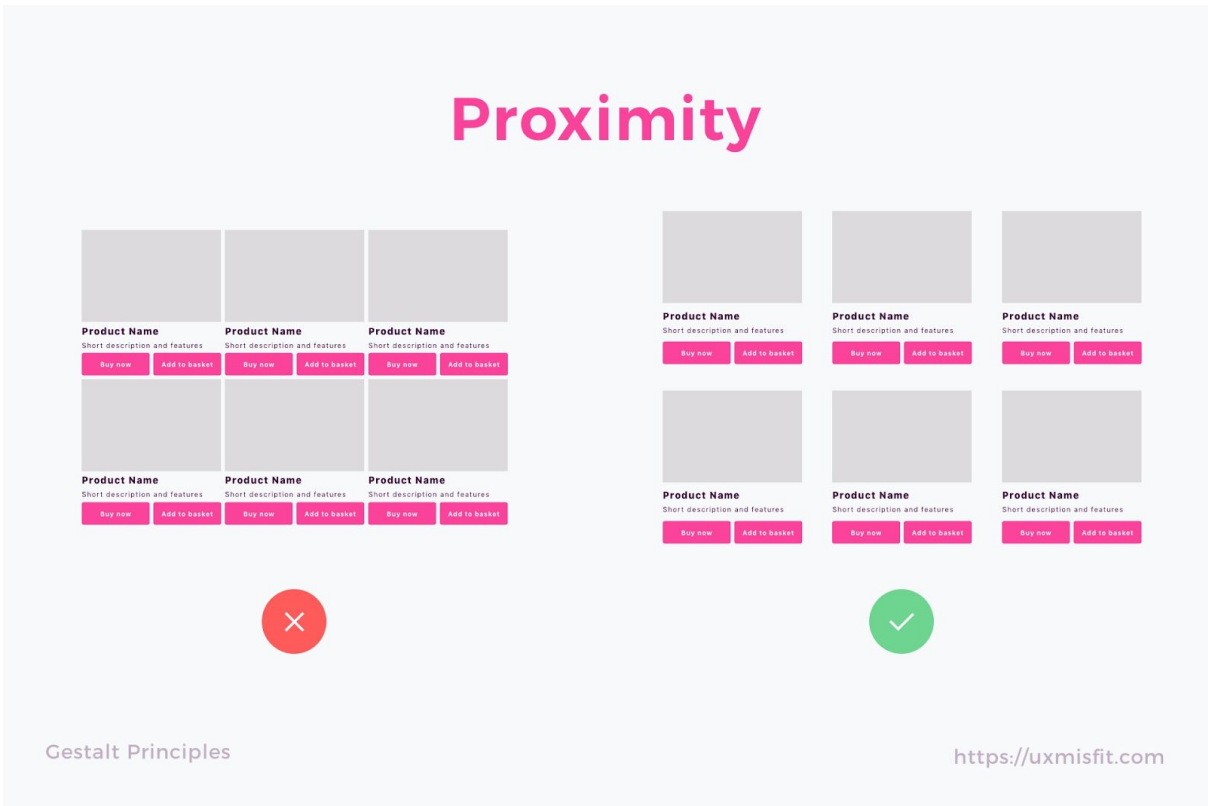


Fig. 26 - Example of the “Proximity principle” applied the UI design of websites and applications. Source: <https://uxmisfit.com/2019/04/23/ui-design-in-practice-gestalt-principles/>

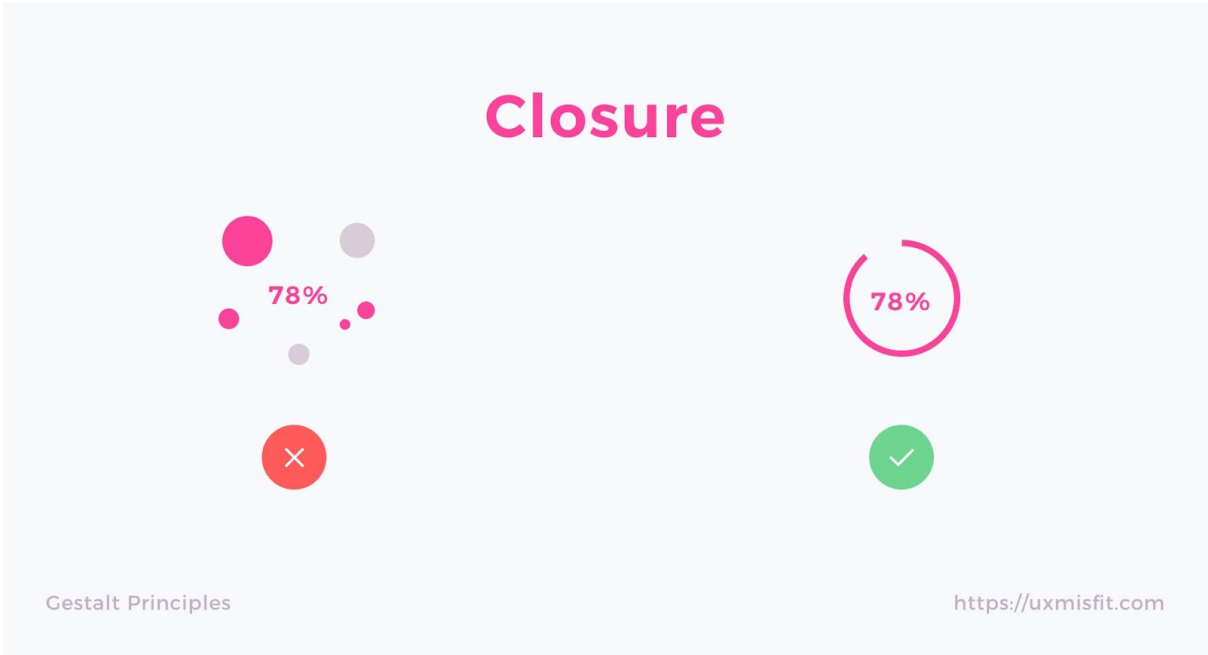


Fig. 27 - Example of the “Closure principle” applied the UI design of websites and applications. Source: <https://uxmisfit.com/2019/04/23/ui-design-in-practice-gestalt-principles/>

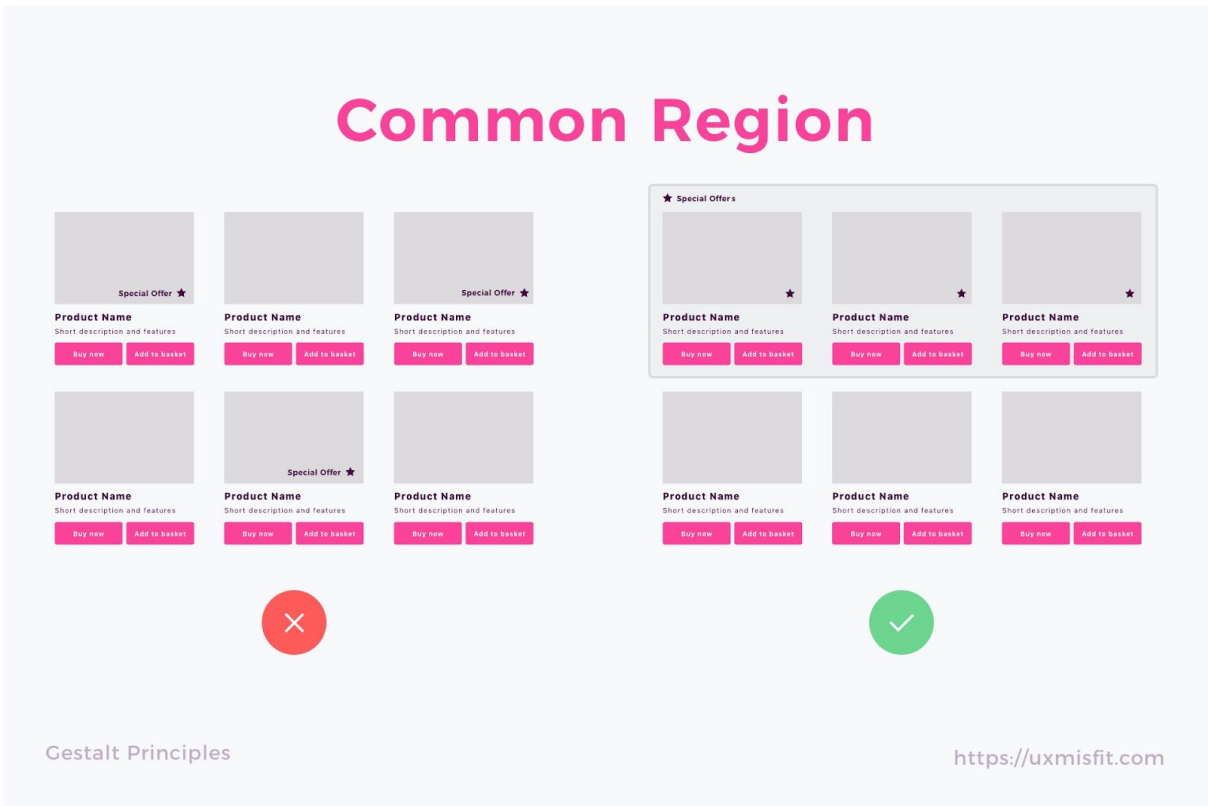


Fig. 28 - Example of the “Common Region principle” applied the UI design of websites and applications. Source: <https://uxmisfit.com/2019/04/23/ui-design-in-practice-gestalt-principles/>

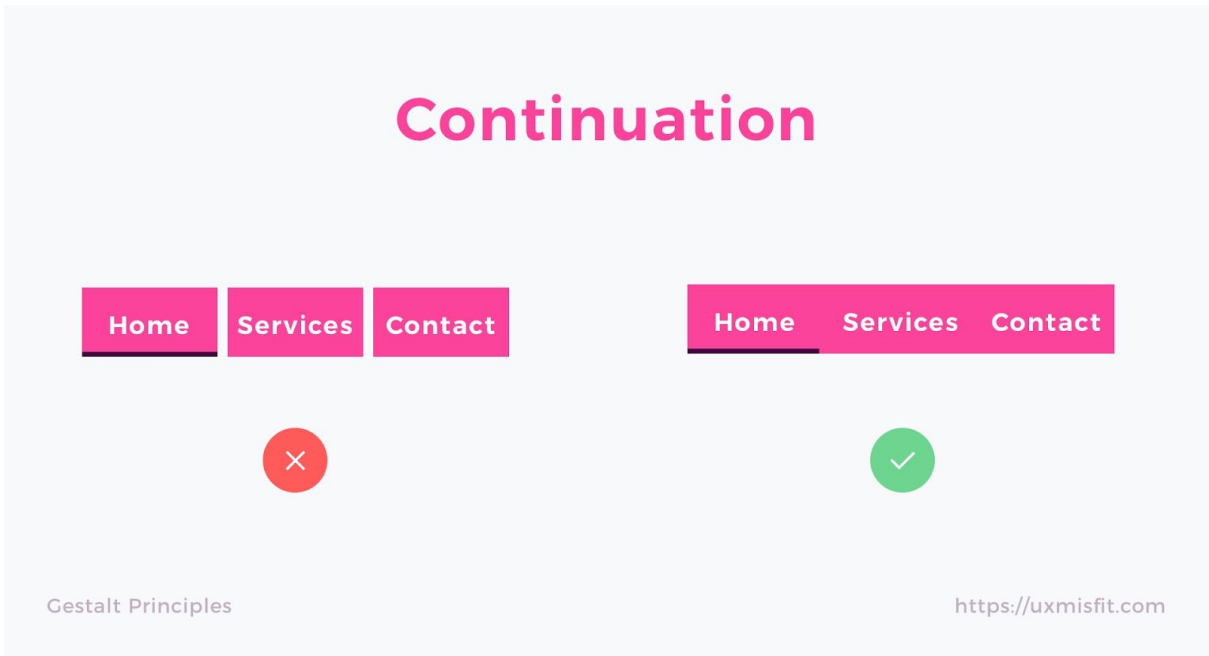


Fig. 29 - Example of the “Continuity principle” applied the UI design of websites and applications. Source: <https://uxmisfit.com/2019/04/23/ui-design-in-practice-gestalt-principles/>

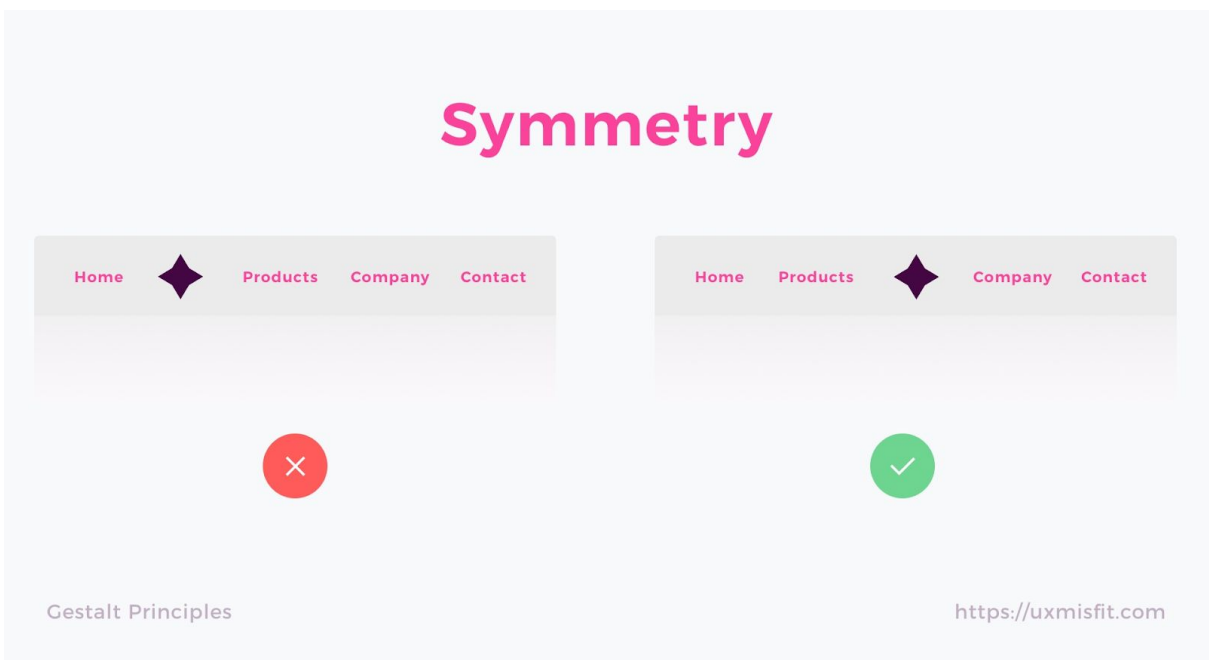


Fig. 30 - Example of the “Symmetry principle” applied the UI design of websites and applications. Source: <https://uxmisfit.com/2019/04/23/ui-design-in-practice-gestalt-principles/>

Gestalt principles are relatively easy to incorporate into any graphical project and can quickly elevate a design that looks cluttered to one that invites a natural interaction.

Specifically, the benefits derived from applying Gestalt principles are:

- **Increase usability**, because following these visual design principles often results in easy-to-use layouts.
- **Provoking emotion and pleasure**, because beautiful things arouse positive emotions.
- **Strengthen brand perception**, because a strong visual system builds user confidence and interest in the product or service (it can be also a natural or cultural heritage promoted through a website or other channels).

Following the same rules and tips, you can apply the Gestalt principles in infographics and other information visualizations as well, by considering how human brains make sense of images.

Conclusions

The principles and basics for creating visual contents in UX allows us to properly select and arrange the visual elements to be included in an infographic. Indeed, creating good visual designs effectively drives engagement and increases usability.