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MASTER 2 DESIGN
2018



RESEARCH PAPERS

ACCESSIBLE DESIGN

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INTRODUCTION

By definition, a good graphist has to do an accessible work. Indeed, we can also say that design promote accessibility, as a graphist must reach the greatest number. For example, a hard copy should be easily readable and informations must be obvious and reachable. Regarding a website conception, one of the main current issue is the user experiment, which emphasize the significance of a browsing's simplification in order to turn the experiment into a playful activity.

Intrinsically, graphism is a good tool to facilitate access to informations and ideas, by executing an important combinations of technicals, aimed to reach the target on its whole.

However, even if a target definition is the result of lots of thoughts, should we only take care of this sample of population? Are we really concerned about what makes the differences between all humen beings, and their abilities to get informations?

I realised this dissertation for my last year of studies in computer graphics / design. In the same time, I achived a part time internship in Nino Robotics, a company specialised in the production of motorized wheels aimed to improve the disabled persons's mobility.

I hold the position of graphist, webdesigner and has been faced to all the issues of this industry. Thus, I had the opportunity to learn about the requirements of this job in a realistic situation, especially in this particular industry where the respect of many codes is significant.

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PREFACE

Throughout my experience at Nino Robotics, I had to talk to my peers and people with disabilities for a long time to get into industry codes.

There are no good books of good practice, and there are few books on how to communicate with this target. Above all, it is essential to understand people's feelings about current communication techniques so that we can adapt our decisions accordingly.

People with disabilities are in some ways the «forgotten» of the current communication, which often targets the greatest number to the detriment of a minority.

Because of the costly investment often associated with making a project accessible, policymakers often choose to focus on their «typical target» at the expense of people with disabilities, representing too low a percentage of potential clients.

However, it should not be forgotten that, as the interdepartmental definition of accessibility specifies, «society, by becoming part of this accessibility process, also advances the quality of life of all its members».



INTRODUCTION

INTRODUCTION

A communication, whether visual, verbal or vocal, must be adapted to its target. We will see here what are the reflections to have in this particular context.

It would be irrelevant to draw up a list of rules of do's and don'ts, as these would be quickly refuted. The goal here is to make the realities of this target more aware of the communication professionals and to make them aware of the major issues.

When initiating a project, should not we ask ourselves some essential questions instead of assuming that it will be accessible to all? Are there real methods that can be used to make a project accessible (eg colors used, paragraph size, typography style)?

The principle of widespread accessibility applies to all types of disabilities, whether permanent or temporary. This work will highlight techniques related to sensory disabilities, ie related to visual and / or hearing impairment. This type of disability is closely linked to visual work, both in graphic design and in the web and space design.

My master in Computer Graphics / Design has allowed me to train in many areas such as Print and Web graphics, motion design, web-marketing, web-design or 3D.

These disciplines, often complementary, have been useful to me during the duration of my contract at Nino Robotics, whose projects realized within it allowed me to have quite specific approaches of these, and to put back in question some techniques.

DEVELOPMENT

1- Graphism

« Communicating with everyone is also about making their message clear and understandable for all categories of people. »

Thomas Lazzaroni

Color

In France an estimated 2 million people are visually impaired and blind, and older people should be added.

Different factors can affect the perception of colors in the individual. Color blindness is often referred to as dyschromatopsia, which is often hereditary, but can also be rooted in trauma, illness, or after taking medication. The forms of daltonism are numerous, among them the dichromate, deuteranope, tritanope, abnormal trichromate, protanomalous, deuteranomalous or tritanomalous.

In 2018, 8% of men and 0.5% of women are affected.

In addition, there are other factors, visual impairment, such as the effects of age, an eye injury or a polluted environment.

Thus, in terms of use of color, the best contrast is a black text on a light background, cream-white type, or the opposite. It is still advisable to use colors, because they not only make text attractive, but also facilitate the understanding and architecture of the document, using for example color titrations or color tabs for differentiate the parts.

Indeed, these uses of brightness and contrast between colors affect this type of population, preventing them from properly perceiving a printed graphic design, hindering the reception of the information as a whole, or distorting it.

70% difference in brightness

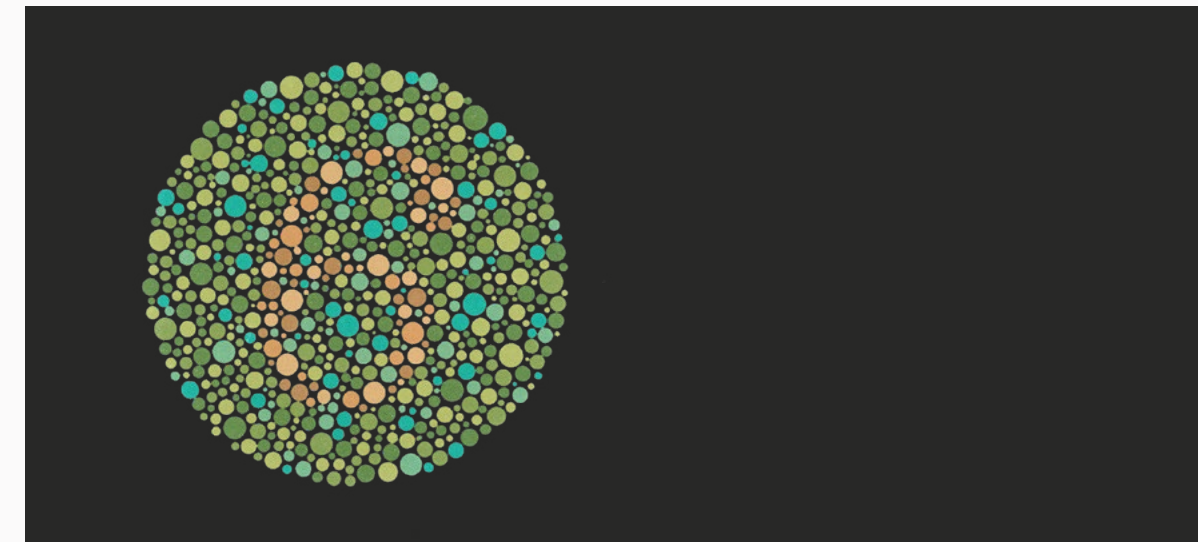
This is the necessary difference between the color of a text and its background so that it is visible correctly and for everyone.

COLOR

Some tools are available online to quickly test this type of rule, such as a grayscale monitor. It is also possible to quickly evaluate the readability of a document by printing it in grayscale.

Get an ideal contrast

Ideal contrast can be achieved with tools such as the color wheel featured by Adobe and available at color.adobe.com, or many other online tools such as pigment.shapefactory.co, colorhunt.co, colourco.de, paletton.com or colors.co.



The use of fluorescent or too bright colors is to be avoided because they can dazzle. It is relevant in this case not to over emphasize the saturation, the brightness and the intensity to avoid the effects of simultaneous contrasts that can create an optical illusion and make the image vibrate. This technique avoids fatigue of the eye by offering an easier reading. There is a very effective tool for choosing a suitable contrast between the colors of a document. Initially designed for interior design, this table is quite usable when designing a printed communication medium.

This table provides the contrast difference between two colors according to the formula: difference in luminance between the lightest and darkest, divided by the luminance of the lightest multiplied by 100.

	Beige	Blanc	Gris	Noir	Brun	Rose	Violet	Vert	Orange	Bleu	Jaune	Rouge
Rouge	78	84	32	38	7	57	33	24	62	13	82	
Jaune	14	16	73	89	80	58	75	76	52	79		
Bleu	75	82	21	47	7	50	17	12	34			
Orange	44	60	44	76	59	12	47	50				
Vert	72	80	11	53	18	43	8					
Violet	70	79	5	56	22	40						
Rose	51	65	37	73	53							
Brun	77	84	26	43								
Noir	87	91	58									
Gris	69	78										
Blanc	28											
Beige												

16 to 24 points for the body of the text

For people with central vision, peripheral vision, or blurred vision, increasing the font size makes it easy to increase the readability of a document.

Textual content

In terms of content, compared to a text intended for the general public, there are no real changes to operate.

We can still take care to add descriptions when using diagrams, tables or drawings that are difficult to read.

We will also avoid long sentences and difficult turns, so as not to tire the reader unnecessarily.

It is useful to plan in advance the wording of paragraphs to be able to play on font sizes, by putting words or passages in large characters.

We must think about completing the fields of contact by organizations specialized in visual impairment.

Montserrat
CINZEL
Gill sans

Space

Space is a determining factor for good readability.

Indeed, the space between each letter like the one around a paragraph and in a paragraph are decisive.

Indeed, so that the reader can assimilate quickly and well understand the gaps, the respect of certain parameters will have a decisive impact.

- It is important to think about kerning. If the space is too big the reader will not understand where each word begins and ends, if conversely it is too small the text will be unreadable.

- Adjusting the approach (space between two letters, lines or paragraphs) in a thoughtful way will help promote readability by avoiding words from overlapping or floating.

- In the same way, the line spacing (vertical distance between each line of a paragraph) should be considered. If it is too wide we will not distinguish the beginning of each line, and if it is too tight stems and jambs may overlap, or get too close and also disturb legibility.

The ideal line spacing is 120%

120% leading in relation to the size of the characters allows a good readability. This figure is still to adapt according to the target and the support.

**« We are not disabled, it
is society that handicaps
us »**

Bernard Mottez

2-
Web

Perceptibility

The elements relating to the construction of a website, such as the tree structure, the site plan, and the elements related to the content of the site, such as textual content, images, videos, etc., must be perceived easily by the user. Transparency is therefore essential.

Textual content is essential

No visual element should be placed on the website without a textual comment. There must be text equivalents for each element of the page, for people who might not have access to these visual elements. The alternatives are varied, many software or plugins have been developed to overcome the possible disabilities: large characters, speech synthesis, braille content, symbols or simplified language.

For example, a blind person must be able to rely on a screen reader that «reads» the page as a whole. For the reading of an image by this type of software it is appropriate for example to add an «alt» field, allowing a textual alternative.

Braille tracks are tools that can retranscribe in Braille everything that is readable on a website, allowing for example a blind to understand the content of an image.

In the case of a user with a weak view, there are different alternatives. Attention should be paid to the contrast, colors and font types used as we saw in the first part.

PERCEPTIBILITÉ

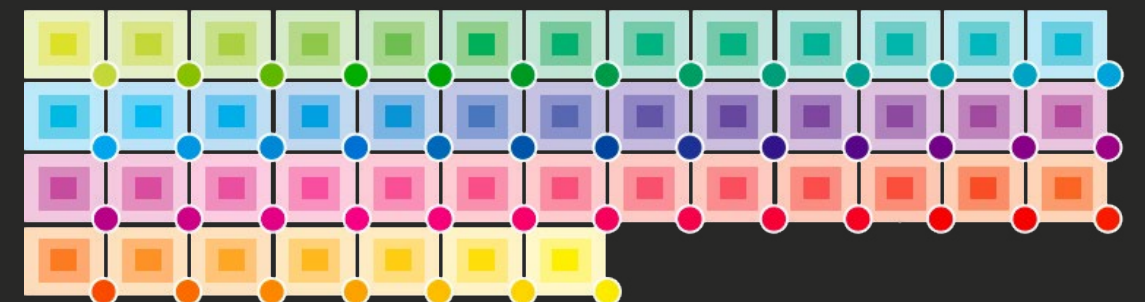
Remove audio content

For people with hearing impairments, it is necessary to provide an alternative to audio or video content by providing alternative text content.

Oracle Color plugin screenshot



Extended color palette: should only be used for complex icons that need to be realistic.



Limited color palette: should be used for icons that require a full palette, Mono color and Achromatic.



It is advisable to choose gray or neutral tones. We have included a limited set of shades that you can add. We recommend that you stay in clear tones as much as possible.

Usability

The usability of a website lies in the ability of users to navigate this site, using the technical means they have available, such as keyboard, mouse, voice recognition software, or any other device that can improve their experience on the web.

Various disabilities may interfere with navigation when the user has a mobility or dexterity deficiency, such as paraplegia, cerebral palsy or multiple sclerosis.

The effects of age can also be a source of complication, in case of Parkinson's, arthritis or simply pain and fatigue.

Composing with the inaptitudes

It is important to keep in mind that not all users have the ability to use the various tools that are thought to be essential.

The keyboard is a central element with which one must be able to browse the entire website. It is therefore necessary to avoid javascript ranges that necessarily require clicks.

Some users browse internets only using voice commands, voice recognition software, or word prediction software, which saves them a lot of time.

Others will prefer tools such as the monoclavier, an interregulator instead of the mouse, a trackball or a touchpad.

Comprehensibility

One of the essential principles for creating an accessible site is comprehensibility.

The target here is focused mainly on people with cognitive impairment, ie with dyslexia, reading and numeracy difficulties, or cultural and linguistic differences. However, principles can improve the experience of any other type of people.

The interface needs to be clear and understandable as much as possible.

Expected and uniform interfaces

Be careful not to be too inventive, or at least to keep in mind that the interface must work predictably and the elements should appear intuitively.

It is important to keep a site fairly uniform, so that the user can quickly understand where the site is, how to interact with the features that are offered and how to reach the place he wants to go.

The textual content must be simplified to the maximum, especially when it is a complex subject. Organizing your text in short paragraphs and with a visible plan is also recommended. It is relevant to add additional definitions and to explain all abbreviations and acronyms.

Robustness

When talking about robust content, it means that it must be able to be read by different users and work with the assistive devices they use.

To do this, one must first respect the W3C rules of web accessibility, international standards that allow interpretation by devices and assistive technologies.

Building your site in semantic html

In terms of technique, it is not useful to list all the standards to be respected since this has already been done by the W3C. However, it is relevant to build a site in semantic html: thus, for the presentation, use cascading style sheets and Javascript to improve the user experience and make it more fun.

Given that the web is constantly evolving, and that standards and techniques evolve on a daily basis, it is necessary to continually adapt the technology of its site and constantly question it.

The best-built websites are those capable of processing existing technologies, those that are obsolete and those that are still in the development phase. As a result, sites are accessible to any user, regardless of the machine, browser and software versions they use.

3-

Space design

«Workplaces must be accessible to everyone, including people with disabilities, regardless of the type of disability»

Clément Grangé

Signalling

In terms of space design and interior architecture, the term «signage» has taken on a real meaning in recent years. It is only used to indicate signs that are found on the road, but more generally represents all the aids that a person uses to find his way.

When a person with a disability chooses to travel from point A to point B, they will have to make a series of decisions along the way that will define their journey. These decisions are motivated by habits, a mechanism for recognizing architectures or spatial planning elements, and the different markers it will encounter along the way.

To convey information

To facilitate this process, posters and other graphic elements are placed to convey information about the journey to be made.

Recently, new methods are being developed, such as auditory or tactile means, which make it possible to target new handicaps.

It is after a thorough analysis of the existing that it is possible to adapt a course and add appropriate help. The graphic elements must be carefully considered in their design as in their positioning to have maximum impact. The dosage is important because too much information can tire the person.

Panels

The panels themselves must be designed intelligently, they must not present too much information otherwise it makes understanding difficult.

Graphic elements

Graphic elements play a big role in signage, but their creation requires real reflection. They have the advantage of being able to pass a lot of information in a few words. However, it is a matter of paying attention to their design because a too complex or too design sign can be difficult to interpret, and can easily lose all meaning.

Repeating many graphic themes discussed in the first part, the design of panels must take into account not only the contrast, colors, typography used, their size and style, but also the materials used, their location, including placement at a distance necessary for their readability.

As each entity has its own rules for panel design, it is important to know how to adapt its approach accordingly. Some major axes that can be found regularly can be extracted.

A contrast of at least 70%

In terms of graphics here too, the minimum contrast between text and background is 70%. However, in terms of panels it is mainly the materials that condition the readability.

Types of panels

The place where you choose to place the panels has a vital role in its accessibility. We are used to finding this type of information on the wall to the left of the door. Panels that are bound to be present permanently (not just over the duration of an event) must offer textual alternatives in Braille or tactile lettering.

In the case of temporary information, such as the name and position of a person occupying an office, it does not necessarily have to provide a textual alternative but must still meet the standards of contrast between colors, text size...

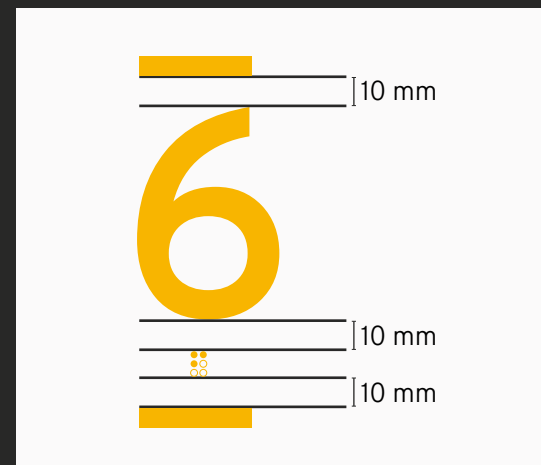
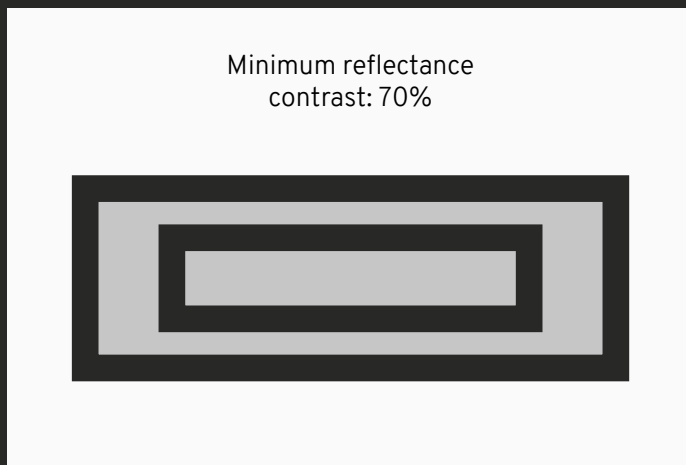
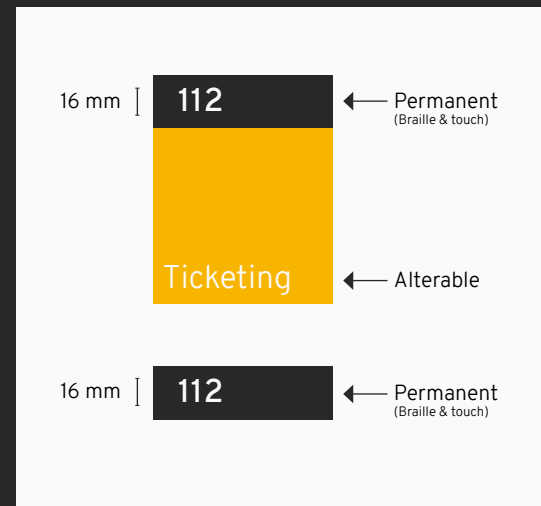
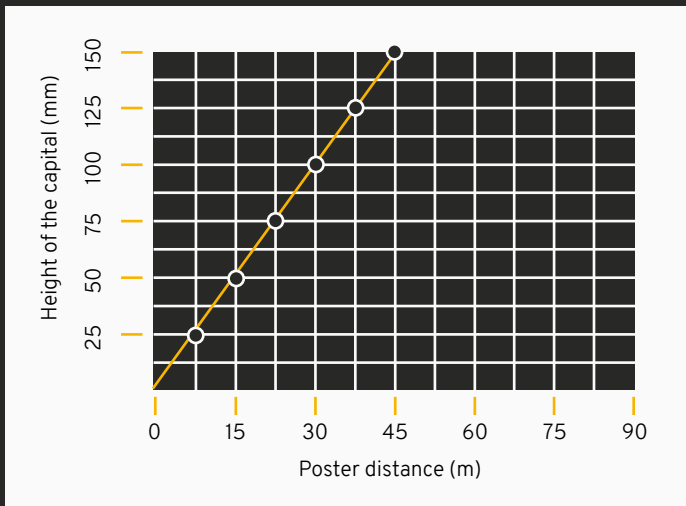
1.2 to 1.5m above the floor

To respect the needs of people with disabilities in terms of readability, the panels must be set between 1.2 and 1.5m above the ground.

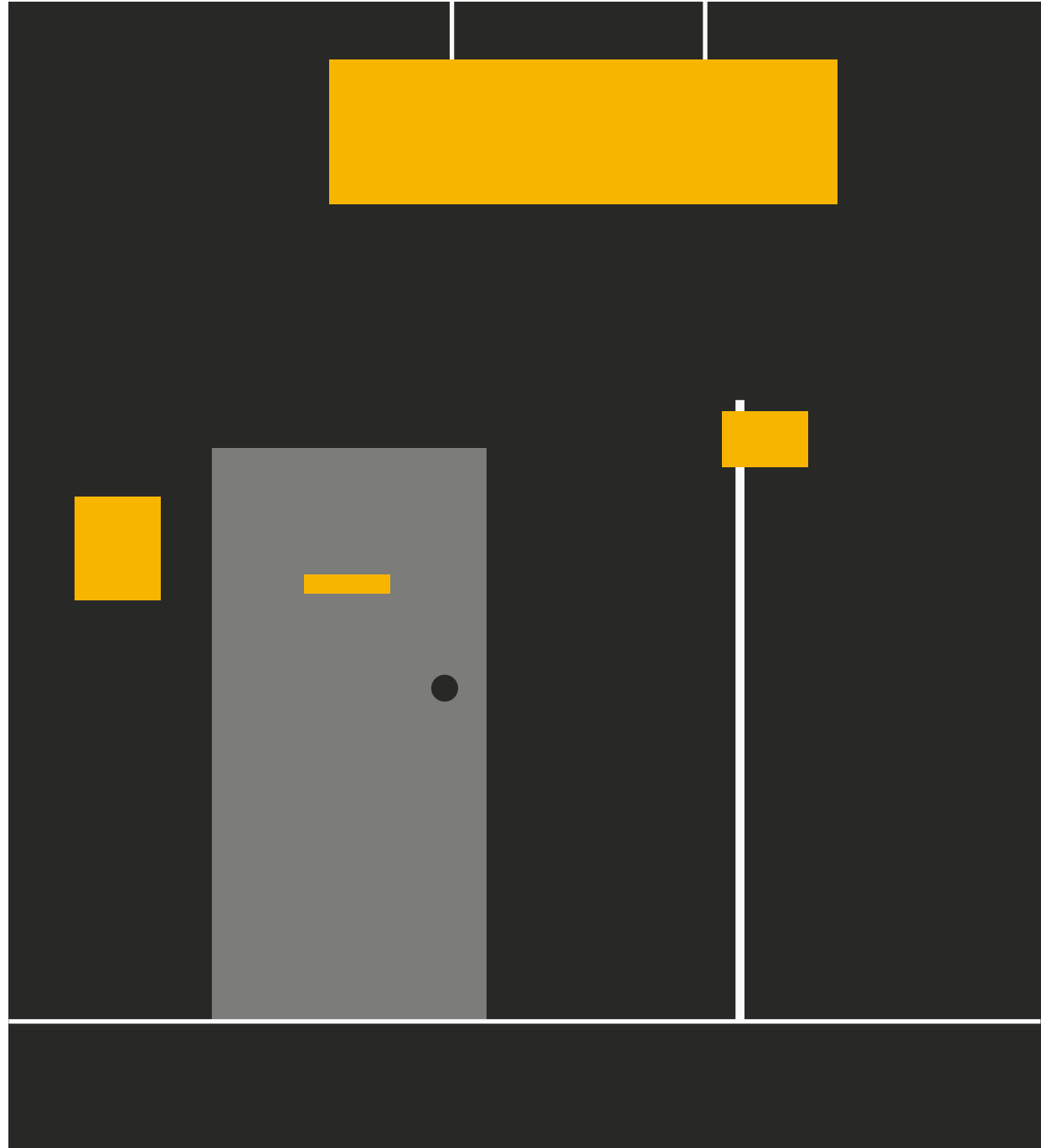
In the case of a building with many rooms, it is recommended to identify them with single numbers or letters, not with words. Indeed, people with visual impairments will be easier to analyze a simple character, and will do it in much less time.

When using pictograms or symbols, care should be taken to maintain a certain amount of contrast and space around the sign. We will choose to leave at least 150mm beyond the sign, and if possible, we will prefer tactile pictograms.

In the case of suspended panels, it is necessary to respect a certain height so that it is legible. They must be fixed at least 2m high. In the case where they are located more than 3m above the ground, their textual content should be more than 75mm. If they are located less than 3m from the ground, the text should measure 50mm.



TYPES OF PANELS



The accessibility approach requires a real learning of standards and uses, as well as a real knowledge of the forms of disability.

The types of disabilities that are targeted in these areas are primarily visual and auditory, but also motor, psychic and mental. In reality, accessibility is not limited to these target, but allows society as a whole to have easier access to information, thanks to the use of techniques that benefit the greatest number of people.

This set of standards and practices allows everyone to save time, without requiring too much concentration and effort in the senses. Thus it improves the experience of people with all types of disabilities, permanent or not, the elderly.

A benefit for all

In addition, it should be kept in mind that if the experience of these audiences is improved, profits will be generated by the company that will implement this approach.

It is true that making an accessible project generates a certain cost, but the companies that will make this effort will be able to increase the size of their target, and enjoy the benefits not only of a clearer message, but of improved sympathy capital.

In terms of printed graphics, such as web or space design, any accessibility approach requires a specific procedure and access to distinct resources and knowledge.

It is important to know the specificities of each area to be able to conceive an adapted approach, and not to think itself omniscient.

THANKS

First of all, I would like to thank Pierre Bardina and Matthieu Verbeke for having accepted me as part of the Nino Robotics team, and for allowing me to live this rich experience in learning. Thank you also to the whole team of Nino Robotics with whom I had the opportunity to work, who immediately welcomed and accepted me on the team.

In addition, I would like to thank ESTEI's teaching team, as well as the trainers who accompanied us throughout the year and provided us with the necessary knowledge for the graphic design profession; Pauline BEAURY, Audrey PISTRE, Brigitte PONTET, Vincent PERILLAT, CURTI Florence, Anthony GUYON, Francois GIRAUD and Loïc HERMER.

I must also thank my comrades who have surrounded me throughout this year, and oriented on the choice of this issue of memory.

Many thanks also to Marie and Clément for their presence, their support and their warmth.

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Layout Essentials: 100 Design Principles for Using Grids

By Beth Tondreau

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Websites

Deficiency

Functioning and disability are multidimensional concepts that highlight the dynamic interaction between several components:

- the organic functions and anatomical structures of individuals
- the activities of the individuals and areas of life in which they participate
- the environmental factors that influence their participation
- personal factors

They can be classified into three types:

- the permanent
- temporary
- situational or contextual

Inclusive Design

Design method that considers different deficiencies as a source of inspiration and improvement.

Inclusive design does not mean making a universal design, but rather learning different disabilities to improve its interfaces and include as many people as possible.

Accessible Design

Attribute of a product focused around disabilities (physical and motor disabilities).

Feature

The line is the outer expanse around a letter.

Against form

The counterform is the interior space of a letter.

Shaft

Vertical part of some letters like the p or the d.

Jamb

Vertical line of certain letters like p, q, d.

Display font

Police with a decorative purpose, rather used for titrations, to give style.

Text font

Font used in a paragraph, more legible than a display font and easier to read.

Kerning

This is the adjustment of the horizontal space between the letters.

Approach

Space between two letters, lines or paragraphs.

Leading

Vertical distance between each line of a block of the same font.

Screen reader

Technical assistance software for people «prevented from reading» (blind, highly visually impaired, dyslexic, dyspraxic ...): it transcribes by voice synthesis and / or on a braille display what is displayed on the screen of a computer so much in terms of content than structure and allows to interact with the operating system and software applications.

Braille beach

Electro-mechanical device used by the blind to display Braille characters in real time, most often from a computer.

W3C

The World Wide Web Consortium (W3C) is an international organization that develops standards for the Web so that people can communicate effectively across the Internet, around open formats ensuring better interoperability (ie better understanding of heterogeneous systems through standardized

data and languages).

Deaf

This is the way to describe deafness as a cultural reality. These are people who belong to a community that speaks sign language (or not) and shares a vision of the world marked by the predominance of the visual.

Barrel

Body of a character, vertical part going from the bottom to the top of the letter.