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How daylight representation in architectural competitions images can lead to an erroneous interpretation of projects

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Abstract. The digital world we are living in today offers viewers an experience of buildings before they even exist. This experience is no longer just geometric or descriptive, but also sensory. It generates emotions through fixed or animated images of 3 dimensional objects inserted in an urban context. These images are produced by specialized agencies with specific tools allowing them to generate visual artefacts with a striking impression of realism. The light that bathes these scenes is carefully worked out in order to capture our gaze. We believe that, in some cases, this may generate errors of appreciation and that these representations can lead to questionable choices when they are used in architectural competitions. This paper proposes some keys to analyse these sublimated images and aims to give the reader the possibility to interpret architectural projects in a more realistic way.

1. Introduction

Architectural production is nowadays largely impacted by the generation of hyper-realistic images. These are intended to communicate on the projects and have a predominant influence on the way it will be perceived. During architectural competitions, the representations delivered by the participants propose an idealized vision of the future buildings. A detailed observation of these images leads us to believe that they almost systematically contain certain biases that may lead to a misleading interpretation of the intrinsic qualities of the projects, particularly about daylight.

In order to introduce the subject, we first propose to quickly analyze a few streams of images proposed by search engines in association with some common keywords.

Then, we will try to identify the main biases of representation contained in the images that are proposed in the usual architectural competitions. We will conclude this study by giving some recommendations to the receivers of these images in order to allow them to better analyze them and to be able to identify the possible inconsistencies that they may contain.

2. Word/image association

When typing a word in one of the available search engines and selecting the "display images" option associated with this search, we can notice that the proposals displayed are relatively homogeneous and, to a certain extent, rather caricatural. The images shown in this chapter are from searches performed with the "Ecosia" search engine [1] on June 20, 2020. For each keyword or group of keywords, we have displayed the first 6 images proposed by the engine. The searches were performed in French and the English translation is displayed in parenthesis: *"Architecture"* (architecture).

Figure 1: First 6 images related to the keyword "architecture". Pictures from Ecosia search engine.

The proposed images in Fig. 1 show us rather imposing buildings. The vision is in low angle, no human being is visible. Most of the pictures are real photographs. The vision of architecture given by these images is relatively archetypal and mainly refers to large-scale buildings.

2.1. *"Architecture durable" (sustainable architecture)*

Figure 2: First 6 images related to the keywords "Architecture durable". Pictures from Ecosia search engine.

The proposed images in Fig. 2 give a very large place to the vegetation. No human being is visible. The materiality of the facades is entirely hidden by vegetation. All the images are computer generated images. The word "sustainable" is here materialized by the green color and does not really inform on the intrinsic sustainability of the projects.

2.2. *"Architecture intérieure" (interior architecture)*

Figure 3: First 6 images related to the keywords "architecture intérieure". Pictures from Ecosia search engine

The proposed images shown in Fig. 3 have a relatively limited color register: white, gray, light wood. White is used to affirm the clarity of the interior spaces and/or to expand the spaces. Some images combine drawn elements with computer-generated images. The point of view corresponds to that of a standing person and the vanishing point is located in the center of the images. Artificial light is absent. No human being is visible. Only the first and the last images are photographs.

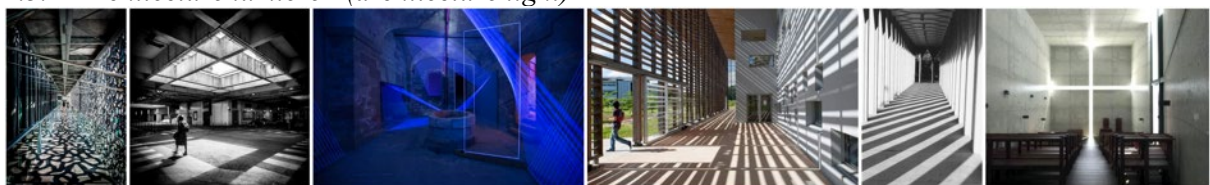### 2.3. *"Architecture lumière" (architecture light)*

Figure 4: First 6 images related to the keywords "architecture lumière". Pictures from Ecosia search engine.

The proposed images in Fig. 4 are very contrasted. None of these spaces concern a place of common use (home, office, school, etc.) All the pictures are real photographs. Two of the images include a person with their back to the lens. The light is valued here as a spectacle.

These few examples illustrate the fact that the images that are proposed to us are, in a way, formatted and present a strong homogeneity for each keyword. Of course, these pictures reflect a punctual trend partially linked to current events. Thus, the same association of keywords will give different answers if it is repeated a few days or, even more, a few weeks apart.

However, although each browser has its own specificities, we notice a great similarity in the answers given by 2 distinct browsers, namely Ecosia and Qwant [2].

For reasons of space, we have only shown here the first 6 images proposed by Ecosia for each keyword, but a closer examination carried out with the keyword "architecture" shows that out of the first 24 images proposed by Ecosia and Qwant, 18 were similar and that the first 3 were identical and displayed in the same order in both browsers.

In our view, this shows how architectural representations are subject to trends associated with very marked pictorial repertoires. Later, we will see that the same observations are still valid for images produced during architectural competitions.

3. Images of architecture competition

In this chapter, a comparison was made between the images submitted to an architectural competition with actual photos of these buildings once constructed. To do so, we relied in particular on an examination of the numerous data available on the Confluence district in Lyon, France [3]. This urban sector, which has been undergoing continuous development over the last twenty years, has an interesting documentary base with many images of architectural projects in the competition phase. The exterior views of the actual projects are taken from the information available on the "Street View" feature of Google Maps [4]. These images are clearly not an absolute reference as they are linked to specific climatic conditions, viewpoints, camera settings etc. Nevertheless, they are representative of real conditions and it is interesting to compare them with virtual images.

3.1. External views

Figure 5 : Ciné-Cité / Lyon Confluence : Arch. Jean-Paul Viguier (Credits: left: ©détrois sa / right: ©Google Street View).

Figure 5 shows some significant differences between the image produced during the competition and the image of reality. In particular, there are some discrepancies in the representation of the roof superstructure, the transparency of the glazing and the vegetation.

Figure 6: Ilôt P / Lyon Confluence. Arch. K. Kuma (Credits: left: ©Cyril Thomas; right: ©Google Street View).

In Figure 6, the materiality of the facades is very different between the competition image and the real image. On the central building the glazings are represented as "light" surfaces alternating between reflections and transparency. In reality, these glazings have a much darker aspect and constitute an impenetrable visual barrier. On the building on the right, we see that the use of solar protections results in a heterogeneity in the appearance of glazing (checkerboard effect) which produces a visual aspect quite different from the image of the competition. The point of view used for the image of the

competition corresponds to an aerial view and is therefore very different from the one that passers-by or residents of the building may have.

In Figure 7, the main representational bias is the transparency of the glazing. In the competition image (left), the glazed facade of the atrium is completely erased, giving the impression of great fluidity between the interior and exterior of the building. The interior of the atrium appears as bright as the sunny exterior. Observation of the real image (right) shows that this same façade constitutes a completely impenetrable visual barrier. In this case, we can really talk about a misleading image.
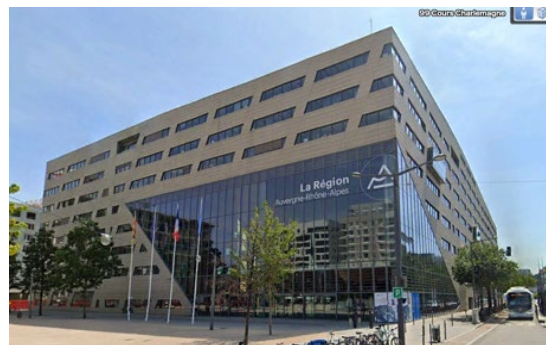

Figure 7: Hôtel de Région / Lyon confluence. Arch.: Ch. de Portzamparc. (Credits: left: ©www.lyon-confluence.fr/fr/chronologie-du-projet-urbain / right: ©Google Street View).

3.2. Interior views

Virtual images are also produced to visualize the interior ambiences. In this case too, there are significant differences with real pictures taken once the building is constructed.
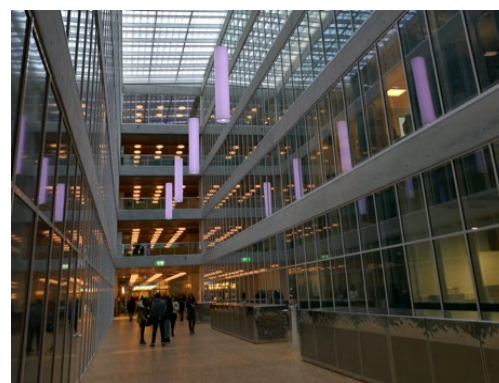

Figure 8: Lausanne University: Geopolis building, Arch. Itten & Brechbühl (Credits: left: ©IttenBrechbühl / right: ©Estia).

In Fig. 8, the comparison of the images shows some relevant inconsistencies. This includes the fact that the top canopy is much dimmer than the windows at the back of the space, which is clearly impossible. In addition, the lateral glass walls appear much clearer than in reality (right image). In the end, the visual impression given by the virtual image is misleading and is not representative of the lighting environment provided. In particular, we note that, in reality, artificial lighting is omnipresent, which indicates that the contribution of natural light is actually quite low. In this case, only the spatial (geometric) impression constitutes information that could be called credible.In Fig. 9, both images are virtual. On the left is the one that was submitted during the architectural competition, while on the right, we have modified the position of the points in the tonal range of the image to increase the contrast. In practice, we have reduced the brightness of the dark parts. This results in a more balanced distribution of brightness and a lower median value (see histograms). We believe that the real perception of space will be closer to that of the second image.

These two figures are representative of the current trend that consists in increasing the brightness of the images produced. This trend, which consists in putting a white veil on the images, has the effect of

giving an ethereal substance to the spaces and gives the illusion that the interior volumes benefit from abundant daylighting.

Figure 9: Blue-Factory competition, LOMA. Credits: ©LOMA. On the left, the image is as submitted for the competition, on the right the tone mapping has been modified using Adobe Photoshop [5].

4. Discussion

The comparison of real images with virtual images is a complex topic that has been the subject of many publications [6, 7]. In particular, the question of tone-mapping, which has given rise to various models, shows that it is illusory to generate images that perfectly reflect reality (cf. Fig. 10). However, we believe it is important to be aware that some of the representations offered are misleading and that it is prudent to step back from them.

Figure 10: Photograph of a real space taken from the participant's viewpoint (left) and the corresponding virtual environment (right) [6].

We can note in particular:

- The materiality of the glazed elements: The glazings are systematically treated as clear surfaces and the computer-generated images overvalue the transparency (cf. Fig. 7). In reality, a glazing seen from the outside most often appears as an impenetrable visual barrier (except at night when the interior space is lit with electric lighting).
- The point of view: projects can be shown from angles to which the user will never have access (see Fig. 6).
- The consideration of vegetation: vegetation, which is an essential element of the projects, can constitute an obstacle disturbing the vision of the facades. It is therefore often treated with a pseudo transparency (cf. Fig. 5).
- Taking into account the uses: The virtual images show most often buildings without occupants. The shading devices are always raised and the buildings are shown as "perfect" volumes with facades presenting a smooth and uniform aspect (cf. Fig. 6).
- The exposure of the images: The images are almost always overexposed and have a whitish appearance. For the interior views (Fig. 8-9 & 10) this treatment is in our opinion misleading insofar as it clearly overestimates the light contribution in the areas far from the openings and induces a false perception of reality.

5. Conclusions

Figure 11: The Adoration of the Shepherds, by Philippe de Champaigne, c. 1640. Portland Art Museum, Portland, Oregon, United States

Any representation of a so-called "realistic" scene relies on the bias of its creator. Figure 11 shows a famous example in which the light that illuminates the characters is also the focal point of the scene, towards which all eyes are directed, namely the location of newborn's face. This composition that defies reality is not, however, perceived at first glance as an aberration. It is necessary to take a step back and analyze it to understand its construction and its symbolism.

Regarding the jury experts it is precisely this distance and this critical look that we recommend carrying on the images which are proposed to them within the framework of architectural competitions. To avoid possible disillusionment, we particularly recommend relativizing the clarity that bathes the representations of interior spaces and to be wary of the effects of transparency used to represent the glazing of the exterior.

We can also turn the question around and ask why competitors think that these artefactual, shiny, whitewashed images can better "sell" their project. Wouldn't it make more sense to take a step towards the users and promote images that are closer to their point of view and feeling?

If the future users are often represented in the jury, would it not be wise to find some empathy with their day-to-day concerns (workplaces, visual comfort, point of view, etc.) rather than considering them as spectators of a rather "flashy" staging?

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