

## RESEARCH ARTICLE

# Architectural graphics and the experience of space. Freehand drawing and photograph to deepen on communicative qualities in linear perspective



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**Abstract** Architecture communication on photo-sharing social networking services like Instagram focuses on photorealism. Meanwhile, the conceptual intention or the experience of the architectural space has less impact in these media. Some architectural graphics techniques are closer to this purpose due to their nature. The main objective is to identify the visual qualities of the architectural space experience from a linear perspective. To do this, the research proposes the design of a visual pattern recognition tool and applies it to pairs of images (photography and drawing) from the same place. The results provide the strategy design based on five variables: the level of human presence, the distortion of perspective, the chromatic distortion, the overlay realism and the emphasis. Finally, the visual summaries lead to values that help to understand the communicative qualities of the experience of space due to their ability to compare main milestones of visual information.

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## 1. Introduction

Architectural drawing dissemination in the mass media is lacking presence despite its need to design architecture. Instead, social networks spread a highly distorted

framework of architectural graphics based on realistic images. It is probably no coincidence that people may prefer to see them instead of a CAD orthogonal view, an axonometric collage, or a linear perspective freehand drawing. But some visual characteristics have evidenced a direct

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correlation with better attention attraction results, such as adjusting the perspective to the screen format in which users browse the social network (López-Chao and López-Pena, 2020). For this reason, this gap between architecture representation and society is an opportunity to promote drawing values such as its capacity for analysis, communication and thought.

In this scenario, photography and highly detailed digital renders are the leading means to convey a visual message of architecture in social networks. Their characteristics lead to a sense of realism for its visual resemblance to reality and its resemblance to documentary evidence of facts. However, the degree of credibility of a render is not a matter of discussion in this manuscript, but the typology of photorealistic representation is. Its overwhelming use in image-based social networks leads us to think about the message of the broad experience of architecture and its graphic communication, whether it is coherent to focus on the representation of ideas of a conceptual nature (architecture) through photorealism.

Architectural drawing, particularly freehand drawing, whether derived from a physical site or conceptualization, entails the identification and selection of valuable information. In other words, the author conveys a subjective essence in the message of architecture or the urban environment. This visual process can seek to document (annotations), analyze and communicate in both traditional and digital hardware (Amado Lorenzo and Fraga López, 2015). The results are intuitive images that focus on a concept under the author's view, while the origin of the photorealistic typology was to capture reality or, in the case of computer-generated images, to resemble it. In any case, accuracy and realism-focused techniques and freehand drawing are complementary techniques, but their visibility in social networks is not.

The drawing techniques receive different categories according to their purpose, the projection system, the tool, the level of fidelity to reality or the degree of abstraction among others. This research framework focuses on the representation of architecture on the experience of space. Freehand drawing involves a perceptual component that captures the individual's record and serves as a "medium of exploring design ideas" for artists (Herbert, 1988). Furthermore, it fosters the expression of personal and subjective views, called the experience of presence (Heeter, 1992). Freehand perspective drawing can also effectively communicate the illusion of a three-dimensional object or space, intangible otherwise and difficult to express with more restrictive, standardized techniques like multi-view orthographic projection. Practicing freehand drawing to communicate and think about architecture helps creatives during the design process (Herbert, 1988).

Regarding linear perspective, the research framework refers to Alberti theories published in *De pictura* (Alberti, 1435) to represent the illusion of human vision and the depth of space on a flat surface. This discovery, previously attributed to Filippo Brunelleschi without published evidence (early 1400s), would become the western graphic representation of objects in three-dimensional space since the Renaissance (Bao et al., 2016) and was subsequently tested in numerous treatises (Barbaro, 1568; Malton, 1776; Niceron, 1638; Noble, 1805; Taylor, 1715; Viator, 1505).

The final goal is to understand the qualities of these media and, consequently, to draft a set of patterns and values that enhance their communicative abilities. The intentional comparison of the visual message between drawings and their reference photographs will determine how they modify the way one interacts with the built environment.

With the objective of defining a framework and understanding the previous contributions to the topic, the literature review focuses on graphic techniques for the representation of architecture, particularly on freehand linear-perspective drawing and photography. For this reason, the variables of the visual language that convey this message, such as chromatic or perspective variations, are of great interest.

The novelty of this research lies in gathering communicative features in linear perspective representations, determining their values concerning the experience of space, and describing their implications for the visual message.

## 2. Literature background

Previous research in this field has focused on the relationship of photography and rendering realism and the freehand drawing's subjective nature. The first seek to fulfil high expectations of realism and are understood as a faithful representation of reality (Franco Taboada, 2011) and credibility (Bates-Brkljac, 2009). With their limitations, they achieve a more accurate representation than freehand drawings. This standard has transitioned to architectural perspective drawings, which communicate the complexity of three-dimensional space in rich detail (Llopis Verdú, 2018). This approach to architectural perspective drawings fails to understand the nature and aim of the technique that seeks "the experience" in any spatial environment (Ching, 1975). The dichotomy of geometric space and lived space (Schaeffer et al., 2015) perhaps properly introduces the approach of capturing the experience of space in architecture.

However, the high-detail expectations is unfulfilled in the case of photography and render (Sealy, 2016). Historically, photographs have been one of the closest two-dimensional representations of reality. Achieving this facticity entailed perspective modifications and light or detail corrections in those photos, which reveal the distorted concept and perception of reality, inevitably subjective. The concept of realism when performing these corrections has prevailed for years and linked to the faithfulness of detail. Therefore, some effects caused by camera lenses are, to some extent, faults in a representation. Some such as radial or tangential distortion, loss of saturation, brightness and consequently, detail-toward the periphery of the frame, poor focus on background elements due to high apertures that allow a shallow depth of field.

Even more than photography, plein-air perspective drawings have not sought to be accurate and faithful because perceptive realities vary from subject to subject, and the information collected by the artist's senses needs to be selected. This approach to accuracy contradicts the purpose of freehand drawings. Understanding that these

architectural representations are inevitably biased and partial will help both designers and readers to communicate the value of their experience of space. However, the level of detail is an issue of concern in methods that are not accuracy-focused, as is the case with perspective freehand drawings of architecture. Detail is essential to convey specific information, but even more important to catch the viewer's attention through the contrast between different levels of detail that focuses areas of interest in the images. These cognitive processes of visual abstraction mean making decisions and choosing information instead of copying (Ruppel, 2021) and relate to analogical reasoning (Ozkan and Dogan, 2013).

Thus, previous literature compared physical response to architecture photography versus freehand drawing using eye-tracking technology to determine the value of line drawing and photography in terms of attention inducement in the viewer. The areas that attract the most interest in the drawings is those where the artist includes greater detail and information. This fact demonstrates that a conscious selection and depiction of information draw the viewer's eye to the correct hierarchical order (Park et al., 2019).

The presence of the human figure is another characteristic that brings closer faithfulness to the real world in architectural representations (Saló Samarán, 2019). The term "Still-life architecture" refers to the immobility inherent to photography. This quality makes architecture photography untrue to reality by nature, being spaces inherently dynamic. The human figure is a key factor in architectural imagery because it conveys a more dynamic and therefore true representation since they capture movement, action. This contribution is extremely valuable because it conveys the true purpose of the space: to be used by people.

Architectural drawing can communicate the experience of spaces that do not exist yet. Even though photography cannot, it can similarly highlight communicative values, approaching the space through the experiential and the subjective instead of conveying a homogeneous, meticulously detailed image. The mentioned effects of the tools used in photography can enhance a message and convey an experience like freehand drawing.

Previous literature studied the relationship between perspective drawings of architecture and other means of representation, such as computer-generated imagery and photography, to show how they support and complement each other. The strength of architectural freehand drawing is the analytical process that the artist goes through to produce it. It is an exercise of synthesis, selection and representation of valuable information, making freehand drawing a complement to more accuracy-focused methods (Cabezos-Bernal et al., 2019).

### 3. Materials and methods

#### 3.1. Research design

The research is non-experimental under a comparative design methodology (Groat and Wang, 2013) and examines the experience of space in linear perspective and searches

for potential patterns in the visual solution that allow establishing values and meanings to communicate architecture. The exploratory nature of this research entails the inclusion of data collection processes and analysis strategies. Thus, this study compares several visual variables between pairs of photographs and freehand sketching of the same place and point of view. Regarding the architectural graphics research framework (López-Chao et al., 2022), this proposal increases the knowledge by the application of the proposed classification to the sampled cases.

The graphic analysis of this research applies qualitative methodology procedures focused on meaning, using visual sources instead of oral or textual data. This scientific approach consists of data reduction, information processing and drawing conclusions and encompasses four stages (Silverman, 1993): content analysis, encoding of meaning, meaning condensation and interpretation of the meaning.

First, the content analysis required to identify the meaning units of the sample's visual information, procedure described in Section 3.4. Second, regarding coding of meaning, the information of each image was graphically reduced by means of diagrammatic codes in order to isolate the visual content of each variable. The image files also contained written annotations of the analysis process (i.e., Fig. 2). Third, a matrix of the image pair diagrams was developed for each variable to condense the meanings and compare the different types of deviation between the original image and the draftsman's proposal. Finally, the interpretation of the meaning consisted of defining categories within each variable that grouped the empirical results.

The methods chosen to understand communicative characteristics of the space experience from freehand drawings do not imply that the chosen graphic technique is better than technical drawing, rendering or photography. The target categories and values of the research should become a theoretical basis for developing any kind of representation in linear perspective.

#### 3.2. Sample

The sample selected for this purpose were pairs of images depicting architecture environments. And the challenge was to find a photograph and a drawing of the same place, which led to a non-probabilistic sampling design for convenience. Instagram was the social network of choice due to its image-based disclosure nature and the possibility of designing a sampling validation protocol through a closed circle of hashtags, followers, and other engagement indicators such as likes. The sampling design involved two criteria: a criterion of social validation of the drawings through a minimum number of followers of the profiles focused on freehand architecture drawings (>10,000), and a criterion of the diversity of the drawings considering the variables that had been defined. In addition, the photographs could not receive treatments or artistic intention, but a mere capture of reality. The image search consisted of finding drawings through hashtags (#architecturedrawing, #perspectivedrawing, #archsketch, #urbansketching, #perspective, #streetdrawing, #sketch, #mastersketchers, #architecture, #sketchbook, #drawing) which led from one

profile to another and was tracked in a collaborative diary-record located in the cloud.

The record included 20 Instagram profiles that met the requirements. The design of the visual pattern recognition strategy used 26 image pairs to establish a list of values. Some of the images were discarded for the following reasons. Missing information on the drawing or reference due to the overlapping of both, the drawing was a mimesis of the reference regarding all the variables, or repetitiveness such as images drawn by the same author and drawings with focus on similar variables that would provide a similar global communicative intention. This balancing procedure is based on the search for different uses of each variable in order to establish a category structure on its communicative characteristics.

The final sample was 9 pairs of images (Fig. 1) (numbered 1 to 9 from left to right) which provides a variety of situations regarding how the artist communicate the architectural experience. At this point it is necessary to clarify that the concept of space experience initially arises from drawing on site or engaging the spirit of place (White, 2004). However, not all the examples identify in which setting they drew. The sample is then grouped according to this condition.

- **Drawing from another user's pic reference.** The artist had not experienced firsthand the space depicted in the image. Instead, the artist is relying on the visual information provided by the photograph and will reproduce what it evokes. However, while there may be no room for interpretation of the physical space in the drawing, the photograph may still convey some of the experiential qualities of the photographer's experience of space, such as the lighting or colors which the artist may choose to reproduce. Image pairs 1, 2 and 3 do not provide a record of the artist ever visiting the place.
- **Drawing from a travel photo of the artist.** Memory provides a more comprehensive and profound vision from the memories of the place that provides additional contextual details that does not appear in the reference

picture but is accurate to the artist's experience of space. The artists of image pairs 4, 7, 8 and 9 uploaded the two pictures in the same post, but there is no information on if they did the drawing in situ or after the visit.

- **On site drawings.** Artists focuses on their own experience of the space in the location. They observe and capture the details of the environment such as the light, colors, textures, and shapes to convey a sense of time and place which can evoke emotions and memories. Pictures are provided simply as a reference to the viewer. The image pair 5 post includes a video of the drawing process on site. In the description of the original posts, videos, or time stamps for the time the drawings took were added.
- **Ideation sketch.** The drawing focuses on the idea of the building, projecting the future built environment, thus the reference photograph (in this case a render as it shows a similar view—image pair 6) does not hold the same relevance as in previous typologies, but rather his experience and understanding of the place. This is made clear by the explanatory intention of the drawing, including references or notes.

Discarded images ( $n = 8$ ) due to overlapping (i.e., Fig. 2) were used for the first phase of analysis and development of the visual pattern recognition strategy because they added richness to the sample, but not for the final empirical study.

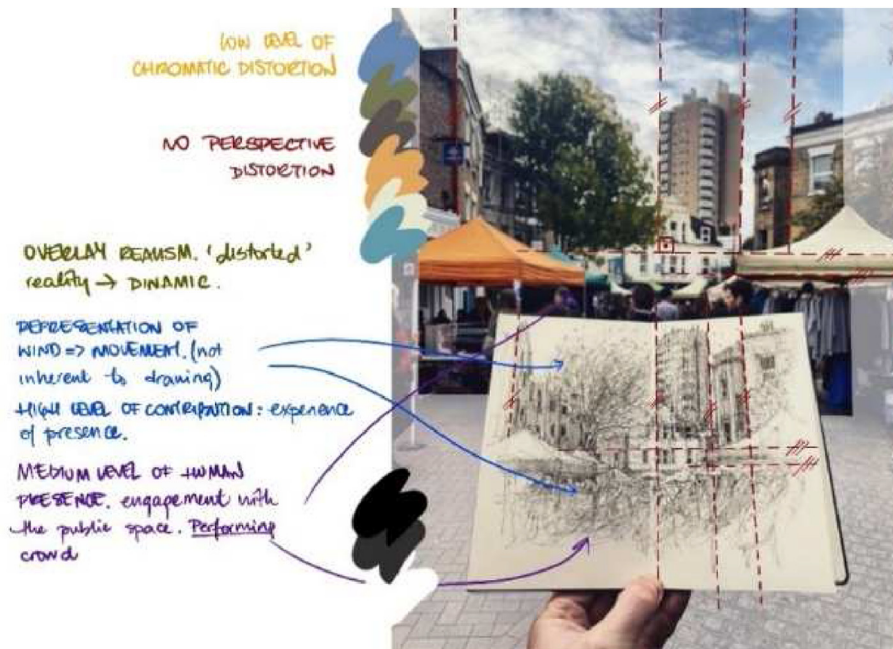
### 3.3. Variables

The exploratory methodology led to determine the following variables, which will be tested to identify and describe measurement values. During the strategy development, content validity was conducted through expert judgement to ensure that the findings are trustworthy and accurate.

Six experts participated in the evaluation and their considerations and opinions were collected individually.



Fig. 1 Sample of the pairs of images. Source: Profiles of the drawings from left to right: Leslie Parsons @montrealsketcher, Albert Kiefer @housesketcher, Neil Whitehead @ennkydraw, Cinta Vidal @cinta\_vidal, Luke Adam Hawker @lukeadamhawker, David Chipperfield @david.chipperfield published in @MaisonValentino, Hesam Hasanpour @hesam\_hasanpour01, 02, 03; Profiles of the photographs from left to right: Alex Zouaghi @a\_ontheroad, Alain Gueranger @alaingueranger, Marcelo Dinardo @edinburghinphotos current profile @withmarcelo, Cinta Vidal @cinta\_vidal, David Chipperfield Architects (@dca.london, @dca.berlin, @dca.milan, dca.santiago), Hesam Hasanpour @hesam\_hasanpour01, 02, 03.

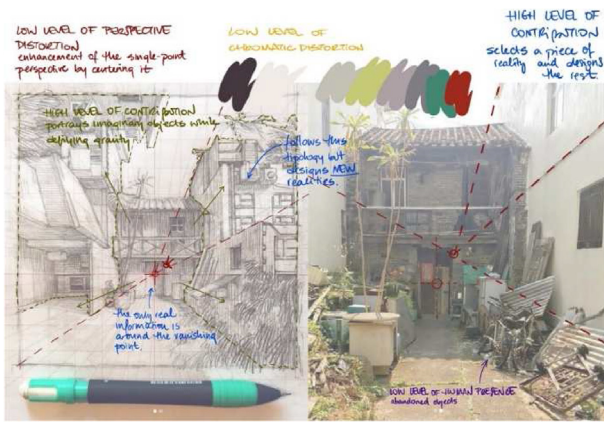


**Fig. 2** Example of a picture that overlaps photography and drawing in which the author's emotion is added and providing storytelling (even modifying the weather or the season). Source: Authors' drawn overlay on Instagram image by Luke Adam Hawker @lukeadamhawker.

The selection criteria for the expert professionals were their work experience, academic background, and recognition in the community. They are professors in architectural graphics, architectural design and visual communication from Spain and Greece. In individual meetings of 1–2 h duration, the objective was to examine what variables were needed to measure the construct and to define what each variable to measure. The questions focused on the clarity, coherence, and relevance for each variable. These assessments implied modifications in the design of the strategy: an increase in variables (from 5 to 6), changes of the variable names, and greater clarity in the definitions of the possible categories that could arise from the image analysis.

- **Human presence.** The presence of the human figure contributes to the accurate representation of space through static images (Saló Samarán, 2019). It brings a sense of dynamism, an inherent characteristic when experiencing an architectural space on site. In addition, it provides information on the use of a place and its surroundings while providing a visual scale that is easily understandable in any context. Moreover, the adjectives that people attribute to the scale of a place do not define its size, "but how big or small it feels" (Anderson, 2002), known as the human scale (Ching, 1997).
- **Distortion of perspective.** Many sketchers, architects and artists consider linear perspective as "... a glorified transformation rather than a realistic portrait of life; they do not aim to tell the literal truth ..." (Xiong, 2019). The alteration of points of view and geometry helps to enhance certain qualities of the scene and provide an exaggerated observation of proportions, resulting in depth or height illusions, for example.

- **Chromatic distortion.** Color has a symbolic value and considerably affects the comprehension of images: from the feelings they evoke (Amencherla and Varshney, 2017), the way they pull or distract attention from them (Jansson et al., 2004) or the way they affect the sense of depth and perspective (López-Chao and López-Pena, 2020). The comparative study of this value aims to understand the role it plays in the analysis and selection process that is inherent to conscious spatial representation. In some of the selected examples, the artist selects only a specific color hue from the real (photographed) scene, considers light differences yet not tonal ones or even disregards all differences of color and light and only depicts shape contour lines.
- **Overlay realism** encompasses the representation of objects that do not exist in the reference or their conscious modification to enhance the appearance of reality. Additions or suppressions of information can enhance a particular message about materiality, environment, use or overall context of the image. These modifications and additions to the reference are not necessarily beautifying ones. Similarly, when reading a depiction of a non-real space, imperfections bring a vivid and human view (Llopis Verdú, 2018) (Fuente Suárez, 2016). An example of overlay realism (Fig. 3) is the use of "impossible objects" which are not impossible in nature but are portrayed as such due to their placement. In this way, the artist intentionally creates a crowded, full space that cannot be achieved through traditional methods.
- **Emphasis** is to focus on the architectural element (Lockard, 1977) through detail contrast. It is the conscious removal and addition of detail, placing the important objects with a rich level of information



**Fig. 3** Study notes on a pair of images. Regarding overlay realism: streets folded vertically, the access waste disappears and even façades visible in the reference photo are modified. Source: Authors' drawn overlay on Instagram drawing and photograph by Cinta Vidal @cinta\_vidal.

against their context, quite empty. By comparison with the reference images and the information that they provide, it was found that contrast in detail addition is very often the result of a communicative intention and not one of imitation of the effects of a lens: focusing the reader's attention in the detailed areas (Park et al., 2019). The subtraction of information can result in a better understanding of the image overall, highlighting the rest of the image and reducing visual noise. When selecting which objects to draw or not, the artist is bringing focus to the relevant elements of their experience of the space, which does not necessarily match the objective view of the space.

- The contribution to the **experience of space** is the depiction of the artist's vision of space. Freehand drawing captures this personal and subjective value, combining the utilities of the above variables to convey to the viewer the feeling of standing in the place. To enhance the viewer's experience, changes can be made to the image, such as making certain features more visible or easier to understand. For example, if an opaque object in the image is obscuring something important, making it transparent can allow the observer to see what is behind it. Adjusting the perspective/focal point and scale/proximity can also provide a wider and more comprehensive view of the scene. Additionally, including orthogonal projections can provide an alternate perspective that overcomes human limitations of vision and enhances the experience for the viewer (Sainz Avia, 1990).

### 3.4. Data analysis and research strategy design

The research proposal required the design of a scientific strategy of a graphic nature to obtain information from the images. First, each image received written annotations and drawings to identify and describe different levels of the variables, as well as the elimination of areas in the photographs that the drawings omitted (i.e., Fig. 4(a)). Then, the different values were compared and grouped aiming to

establish a clear form of graphic synthesis for all the variables. Finally, the graphic syntheses are placed together and grouped by variables to conclude the measurements of each one. The visual simplification processes for each variable are described below.

#### 3.4.1. Human presence

The silhouette of the human beings in the photographic reference (grey) and the drawing (black) are drawn and overlapped. The resulting scheme shows rearrangements of such figures, like changes in size, placement, or even elimination.

#### 3.4.2. Distortion of perspective

Both vertical and horizontal vanishing points and lines of perspective are identified by separate image pairs, rather than overlapping. The linear scheme shows a basic geometric composition and distortion in perspective (alteration of positions or degrees, or deformation of perspective lines).

#### 3.4.3. Chromatic distortion

The chromatic summaries of photographs and drawings are drawn. These geometric abstractions represent the size, shape and position of the main color masses of the images. They are a synthesis of the role that color plays, not only considered as a palette, but as a crucial element in the composition, in harmony with perspective. The Color Analysis Lite application developed by Roy Leizer allowed the selection of colors for the schematic summaries.

#### 3.4.4. Overlay realism

A black line identifies the information removed from the photograph, while a black mass represents the information added to the drawing.

#### 3.4.5. Emphasis

As detail in an image is so directly related to focus, the chosen graphical analysis was one of high contrast and simplicity: the emphasis is placed on black mass and less detailed areas of the image are left blank. This approach helps understand in one glance where the interest lies in an image. When studied together with the other variables, it becomes clear that compositional decisions such as the placement of vanishing points and color application are working towards the same goal as detail addition.

#### 3.4.6. Experience of space

This value is closely related to all the previous ones, depending on them and the way they work together. It is the one that broadly summarizes the artist's communicative intentions and in a certain way a conclusion of the rest. This graphical conclusion blends color schemes and inverts contrast in adding detail, so only the area of the color abstract is in focus. In addition, the deleted information zone is obtained from the drawing, so certain perspective distortions also become visible. Finally, saturation was removed from all images except for areas that represented invisible objects or exaggerated qualities. Figure 4(b) enhances real qualities of the portrayed space through exaggeration to represent the invisible experience of the



**Fig. 4** Exploration of the variables and identification of measurement levels in two pairs of pictures. Source: Authors' drawn overlay on Instagram images by Hesam Hasanpour @hesam\_hasanpour, Neil Whitehead @ennkydraw and Marcelo Dinardo @edinburghinphotos current profile @withmarcelo.

artist. For this, the treatment of color focuses on the effects of sunlight on the surfaces, applying warmer and saturated choices to communicate a particular moment of day, probably a summer sunset.

## 4. Results

This approach does not provide a formula for architectural drawing but defines the strategies and the characteristics common to the method that could be used to enhance its potential and highlight its value. These tools or values are measured in terms of accuracy to reality, assuming the reference photographs as the closest representation of it, opposed to the ideas of the artist. The visual results and the measurement values are the result of the analysis of the 9 pairs of images identified in the sampling section.

### 4.1. Human presence

The representation of human figures in architecture perspective drawings has been discretized in five levels that measure their presence and importance: removal of human presence, no presence, human scale, active presence and human-centered. In the scheme shown below (Fig. 5), human figures in the drawing are marked in black and human figures in the reference in grey.

Removal of human presence (2, 4). The author eliminates all human figures or traces of them that were present in the reference, focusing on the space and its configuration, rather than its use or the way it is lived.

No presence (1). In accordance with the reference, the sketch does not show human figures. It maintains the representation of the photograph, instead of enhancing its absence or providing a human scale.

Human scale (3, 6, 7, 8). Human beings appear, yet not in engagement with the space. The figure or figures do not interact with the space, their presence is unhuman. People do not use furniture or touch architectural elements other than the pavement. The aim is to give a sense of scale.

Active presence (5, 9). The drawing depicts figures or objects used by humans in engagement with the space. They gain a significant amount of space on the canvas, enough to be noticeable at first glance. As individuals they are performing a specific function, and as a mass they provide valuable information about the environment.

Human-centered. The human figure is not the protagonist in any of the examples, since it leads to focusing the message on the stories of those people at a specific moment. This case covers people and objects, including traces of time or how they were used (without the need for figures). The human scale communicates a strong message about space, its functions and the stories behind it.

### 4.2. Distortion of perspective

The identification of vanishing points and imaginary lines (Fig. 6) showed the curvature of the perspective lines (spheric distortion), their change in inclination, and the consequent change in position or number of vanishing points. These results led to four categories of perspective distortion: no distortion, low and medium level of distortion and disregard of perspective.

No distortion (3, 8). There are only minimal errors by the artist with a clear focus on imitating reality.

Low level of distortion (4, 7, 9). Modification of perspective widens or narrows the field of view, noticeable without measuring on closer inspection.

Medium level of distortion (1, 2, 5). The exaggeration of vanishing lines can alter the type of perspective, just as the addition of vanishing points changes the type of view. This kind of distortion can provide an intentional surreal appearance (cases 1, 2), one that cannot be achieved through photography or observation of the real object. It can also help direct attention to a specific feature of the drawing (the height of a building, case 5).

Disregard of perspective (6). Accuracy in perspective is not an important part of the drawing, but rather the opposite. Measurements are changed and objects that would not have been visible change their position or

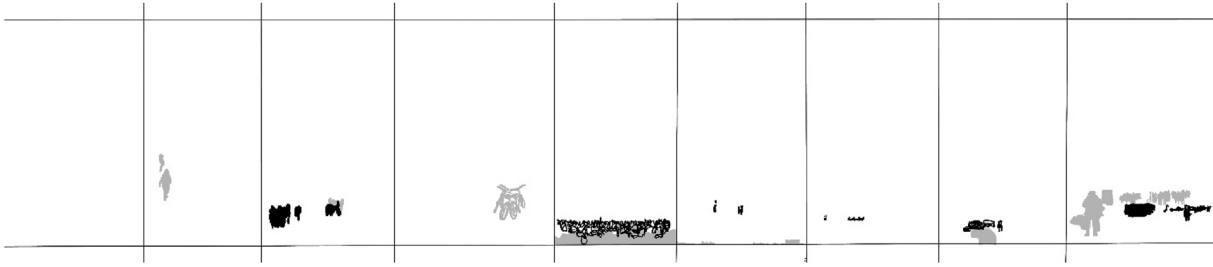


Fig. 5 Synthesis of the human presence in the image pairs. Source: Authors.

inclination to appear. The lack of interest in conveying a realistic scene gives the author the freedom to communicate an idea.

### 4.3. Chromatic distortion

The variation of colors has resulted in four categories comparing palettes in both images (Fig. 7): saturation levels, brightness and hue. These values also consider the location and size of these color disturbances. The following scheme portrays a summary of colors and placement by comparing reference images and drawings.

Disregard of the chromatic values (4, 5, 7, 8, 9). The aim is not to deliver a message related to color, nor does its use enhance an important part of the image. All value is placed on black and white line work or masses of high contrast. Gradation in brightness is not important, these kinds of depictions work with almost absolute darks and lights.

Mimesis of reality (2). Color clearly follows the reference pictures. Distortions are a result of the error range of the artist or the camera. The intention is to deliver a close depiction of reality.

Visual emphasis (1, 3, 6). The color palette is inspired by the reference, changing tonal values, saturation, or applying color in a selective way. These hue variations are kept in the same range as the reference and serve the purpose of highlighting specific features of the space over others.

### 4.4. Overlay realism

Three degrees of contribution to the overlaid realism on the image were found upon observation of the examples: imitation of reality, mild alteration of reality and distortion of reality. The scheme below (Fig. 8) portrays added information with black mass and suppressed or simplified information in thin lines.

Imitation of reality (1, 5, 9). The drawing mimics the reference or very closely.

Mild alteration of reality (2, 3, 6, 7, 8). The drawing roughly respects the reference but knowingly adds or suppresses elements. This enhances a certain composition or adds information about the environment that is not perceptible in a single image. These additions can be unnoticeable if the drawing is not presented side by side to its reference (i.e., the suppression of a floor in case 2 does not surprise the viewer if the reference is not seen).

Distortion of reality (4). The drawing heavily alters reality including impossible objects in the image, that do not exist and do not appear in the reference picture. In case 4, this gives a crowded, messy impression. There is no need to see the reference picture to understand the portrayed image is not real, but the drawing communicates the context with higher complexity and effectiveness than the original.

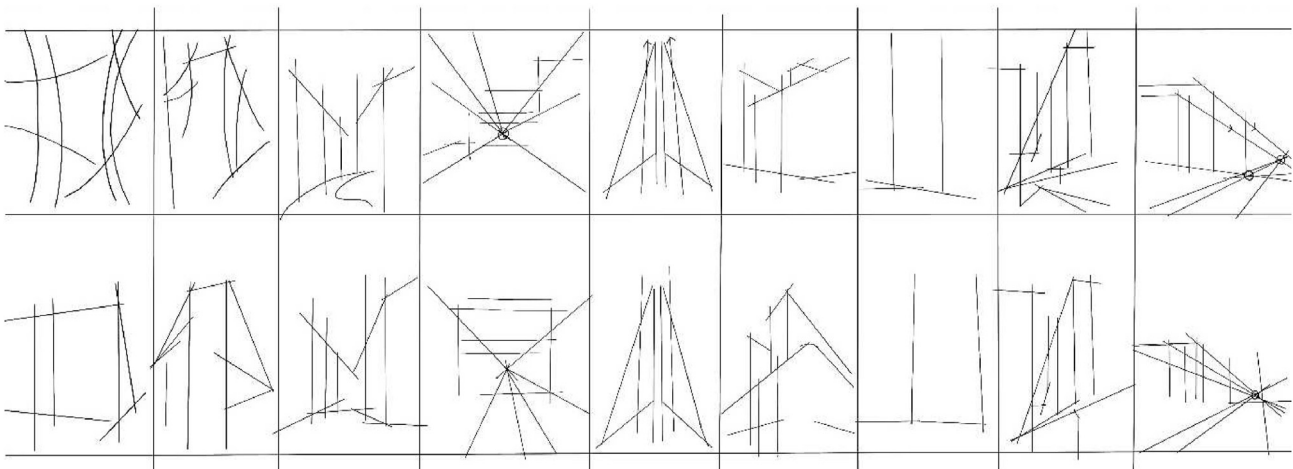


Fig. 6 Synthesis of the distortion of perspective in the image pairs. Source: Authors.



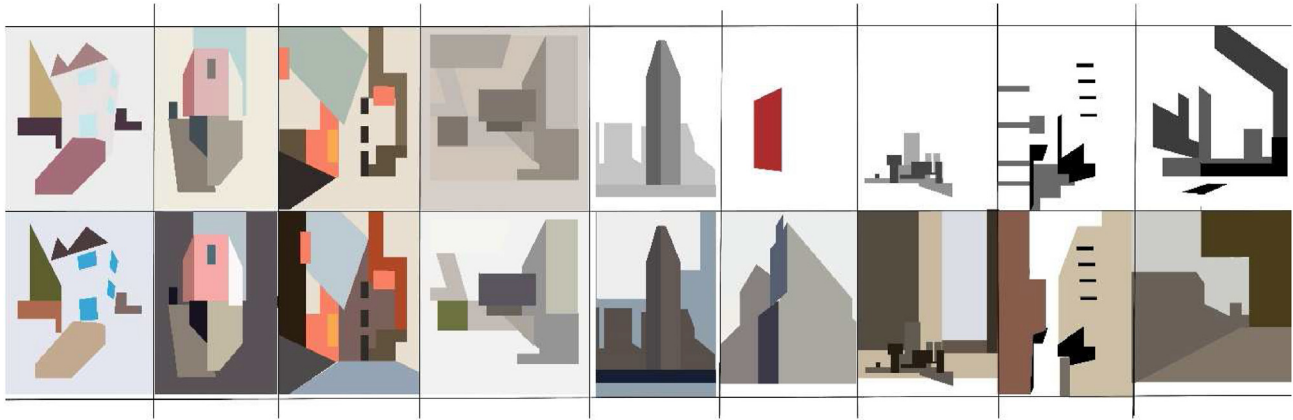


Fig. 7 Synthesis of the chromatic distortion in the image pairs. Source: Authors.

#### 4.5. Emphasis

The contrast of a black surface (more detail) and white canvas highlights the attention-grabbing strategy (Fig. 9). The levels measure the relationship between detailed and undetailed areas in terms of surface and in terms of richness of information.

Homogeneous distribution of information (1, 2, 3). The drawing does not enhance the contrast between elements of high importance and the rest in terms of detail. The drawing has a homogeneous level of detail and visual weight throughout the area, high or low. These kinds of representations convey a quiet, still image, and the reading of the image is not influenced by detail but by color, perspective, or other compositional elements.

Contextual focused (8, 9). These portrayals have quite a balanced surface relationship between full and empty areas in terms of detail and information. Part of the compositional value relies on this addition and suppression of information because it creates lines or directions that guide reading. Detail is usually focused on the vanishing point, and it serves the purpose of further enhancing the character of the subject in contrast to its context.

Object focused (4, 5, 6, 7). A high level of contrast between the elements in a drawing creates a dramatic image that is read in a very clear way. The surface relationship between detailed and undetailed areas is not so balanced, leaving most of the image undetailed. This makes the effect of the highly detail areas much more visible. The composition of the images relies on this quality, that is the focus of the efforts of the artist: everything that is not the

subject is irrelevant and appears in the drawing only to accompany the focus.

#### 4.6. Experience of the space

The combination of the visual syntheses provides a visualization of the contributions to communicate the experience of the space. The following scheme (Fig. 10) overlaps the chromatic summaries and the scheme depicting the focus on the level of detail, two related variables. The information that mimics the reference is presented in black and white, and new contributions to the drawing appear in color. The results lead to three levels of contribution: low, medium and high.

Mimesis or focused-oriented (1, 2, 5, 7, 8, 9). The representation simulates the reference with little or no contributions. The intention is to portray a still image of the space, the perceptive values related to other qualities such as environment or context are not the focus.

Representation of the invisible experience (3, 6). The drawing portrays invisible things in the reference or enhancing their qualities through exaggeration. These contributions are invisible in the reference image, but the architect/artist feels them on the site (e.g., making an opaque object transparent, opening the visual field, including orthogonal projections of an object). The result is closer to how the artist lived that place at a specific moment or period.

Unreal representation in favor of communication (4). The contributions are the result of the personal experience of the artist, and unrelated to both the image and the reality of the space from an objective point of view (overlay realism). The result is a successful communication of a personal experience.

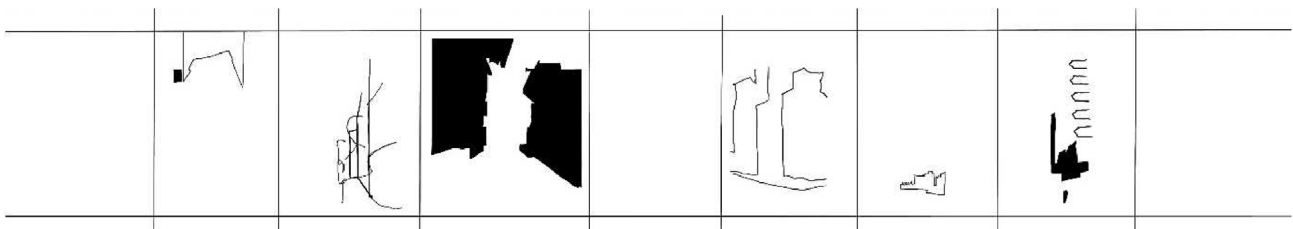


Fig. 8 Synthesis of the overlay realism in the image pairs. Source: Authors.

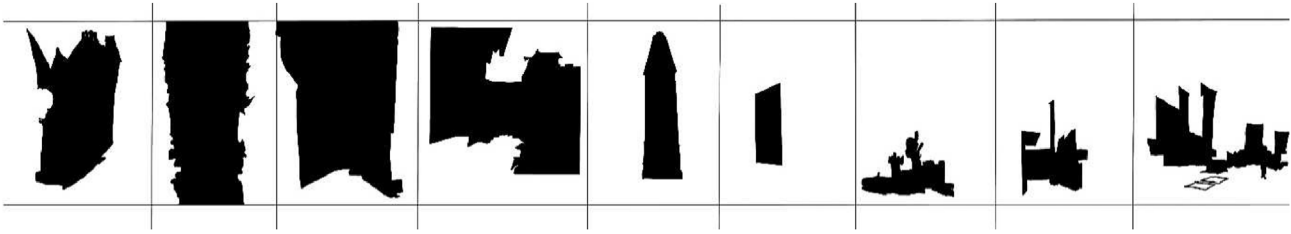


Fig. 9 Synthesis of the detail contrast in the image pairs. Source: Authors.

## 5. Discussion

The research has identified some communicative value of hand-drawn perspectives through a comparative analysis of pairs of images published on social media. Six variables were used to evaluate the image pairs: human presence, distortion of perspective, chromatic distortion, overlay realism, emphasis, and experience of space. The exploration of the communicative meaning of each variable in the image pairs led to the establishment of preliminary categories within each variable that structured their possibilities of use. And finally, the visual synthesis and isolation of each image variable facilitated the interpretation of the results.

Regarding human presence, the results provided five possibilities among which its function as human scale and active presence stand out. This choice of representation of the space experience conveys a sense of size, as previously stated by Anderson (2002) and favors the dynamic capture of the relationship between people and architecture. A closer view to the experience on site than those drawings that remove the human presence. The absence of human presence in some drawings can result in a less immersive experience of the space.

Distortion of perspective in the drawings has shown four levels of modification on their reference pictures. The results confirm previous statements regarding the fact that distorted drawings do not reproduce the literal truth (Xiong, 2019), but the distortion does not enhance their storytelling either. In some of the cases, it seems to be an aesthetic issue and only one case stands out for communication reasons. The findings suggest that a moderate level of distortion can draw the viewer's attention to a specific feature in a natural way.

The use of color in architectural drawings is another variable that affects the experience of space and the feelings they evoke (Amencherla and Varshney, 2017). While some drawings chose to remove the color message, others used a chromatic distortion to emphasize the information in certain areas as recorded in previous literature (Jansson et al., 2004).

Concerning the realism representation and how some characteristics contribute to a true communication about the experience of the space, some drawings incorporated imperceptible modifications without the reference picture next to them, but which reflect the artist's view. This result supports similar contributions that sought a vivid view of non-real spaces (Llopis Verdú, 2018). This research found the use of great distortion of reality in favor of the communication of the atmosphere of the place can complete the experience of space. Some of these envisioning strategies are natural to architectural drawing as stated by Sainz (1990) like multi-view systems, augmented information or unreal views through transparent walls or other architectural elements.

The selection of information in the place is from the artist's senses. Therefore, if we focus on the amount of detail and the emphasis between areas of the drawing, the results corroborate its ability to catch the viewer's attention (Park et al., 2019). In addition, the findings shed light on three category application patterns: homogeneous distribution of information, contextual focused and object focused. While the contextual focused case seeks to convey the artist's experience of the space through an attempt to immerse the viewer in the place, the object focused one aims to guide the observer directly to the element of interest to the artist.

Individually delving into the above variables has led to a comprehensive evaluation proposal for the experience of space. In the process of synthesizing the information gathered from these variables, three distinct categories were identified. These categories were not previously discussed in the literature: mimesis or focused-oriented drawing, representation of the invisible experience and unreal representation in favor of communication. This proposal is not a direct combination of the variables studied in the research, but their interpretation allows them to be defined. The first is related to how people perceive and represent the physical aspects of the space, such as its layout, design, and overall aesthetic. The second category is more focused on how people experience the space on a

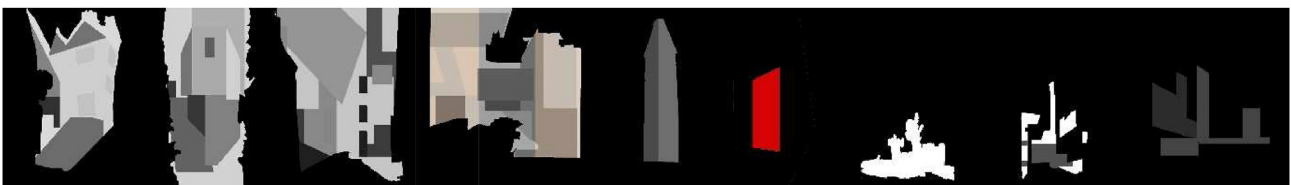


Fig. 10 Synthesis of the contributions to the experience of space in the image pairs. Source: Authors.

deeper level, beyond just its physical attributes. This might include things like the emotions or memories that the space evokes, or the sense of identity or belonging that people might feel in the space. And the third category involve using metaphors or analogies to describe the space, or creating visual representations that help others understand what the space is like.

This research faced two major limitations that must be considered in the discussion of results. The first is that the visual variable categories come from a sample biased in cultural terms since only English language was used to select the hashtag words that identified the images. Therefore, the sample does not include communicative characteristics or aesthetic qualities that other cultural communities use to convey the experience of space. Previous literature shows differences in representation such as the choice of the type of perspective between Eastern and Western culture. However, the results can serve as a basis of the communicative qualities in linear perspective to convey the experience of space and later be completed as occurs in other fields of knowledge. This scenario is an opportunity to call for collaboration with international academics interested in the representation and analysis of the architectural space.

The second limitation concerns the non-probability sampling, which does not allow generalizing the research findings. But this limiting methodology choice accelerated the exploratory testing. The findings provide a construct structure that will facilitate future research using a quantitative approach to validate, refute, or complement these results.

## 6. Conclusions

Architectural communication in social media has led to a trend of photorealistic representation. Although this is not a problem, it is possible that the efforts focused on this end left behind the message of architecture.

The theoretical framework established communicative qualities in different types of representation, but some are more common in certain types of drawings. For example, a draftsman needs to identify the environment's information to quickly draw what he perceives, while a renderer does not need to add or extract information when he has the complete model (with textures, lighting and cameras).

To delve into these visual intentions to communicate the experience of space in architecture, this research designed a visual pattern recognition method to compare pairs of images that favored the identification of communication variables and their categories. The measurement variables were the level of human presence, the distortion of perspective, the chromatic distortion, the overlay realism and the emphasis.

Visual synthesis favored the interpretation of comparisons with various levels of measurement depending on each variable. These values are not a scale that indicates worse or better communication, but they do locate the levels of distortion that can serve as a precedent for subsequent correlation studies with perception variables or the development of automated methods such as using machine learning.

The categories confirmed evidence from previous literature, provided new possibilities and identified shortcomings in the use of architectural graphics strategies. Therefore, the analysis proved that the variables were a logical and valuable choice for evaluating the author interpretation of the place.

Clearly, linear perspective is not the only representation system that communicates experience of space, nor are the variables in this manuscript a complete framework. The point of view, the viewing angle, the height of the viewer or the composition are other key factors that influence storytelling. Just as there are representations to transmit reality, technical rigor or personal experience.

The findings establish theoretical bases to determine quantifiable measurements of the different visual variables and their communication categories. Thus, the idea is to develop tools that can detect and differentiate these drawing patterns aiming for massive image analysis. Subsequently, the goal of this approach will be to delve into how people perceive these communicative possibilities, so it will be mandatory to perform perception studies with techniques such as eye tracking. Furthermore, it will be of great interest to compare the variation of architectural experience between cultures and other representation systems. As well as analyzing how communicative decisions change in relation to the type of experience with the space in terms of drawing setting.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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