

COLOUR BLINDNESS AND CHROMATIC BARRIERS IN ADVERTISING ANIMATION Proposals for Inclusive Urban Visual Communication

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ABSTRACT

The growing presence of digital animation in advertising campaigns, across social media and urban displays, necessitates ensuring visual accessibility for all users, including individuals with colour blindness, who constitute a significant proportion of the population. This study examines the chromatic barriers that can impede comprehension or reduce the impact of messages for users with visual deficiencies. To this end, campaigns on digital platforms and in urban spaces incorporating animated elements were analysed. The findings indicate that the user experience of individuals with colour blindness has been rarely considered, in contrast to other design fields where visual accessibility is more fully developed. Consequently, this study proposes best practices for the creation of animated content, aiming to advance an inclusive model of visual communication. The objective is to integrate universal design principles, in accordance with the European Accessibility Act, published in June 2025 (Level Access, 2024).

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1. Introduction

Digital animation has evolved from a complementary resource to a cornerstone of many advertising strategies within hybrid ecosystems that combine social media, video platforms and interconnected urban media. In Spain, this growth is reflected in the expansion of the sector: the *White Paper on Animation* (DIBOOS, 2024) estimates a turnover of more than €600 million and over 27,000 direct jobs; the *InfoAdex Study* (InfoAdex, 2025) reports advertising investment of €13,080.8 million, with an increasing proportion allocated to digital and outdoor media; and the *Annual Social Media Study* (IAB Spain, 2025) indicates that 86% of Spanish Internet users, approximately 32.4 million people, engage with platforms such as YouTube, Instagram and TikTok, where animation plays a central role in campaign distribution. This overview illustrates how digitisation and media convergence have positioned animation as a strategic communication resource.

In urban spaces, digital out-of-home (DOOH) advertising incorporates dynamic screens capable of segmenting messages in real time and adapting to specific contexts. It is not merely a matter of replacing paper with pixels but of integrating creativity and data to achieve high-impact campaigns. Within this environment, animation offers visual plasticity and narrative efficiency, qualities that make it a privileged format in contexts where exposure to the message is brief and competes with multiple stimuli.

This communicative potential carries an unavoidable responsibility: ensuring that messages are comprehensible to diverse audiences. Colour accessibility constitutes a central challenge. While sectors such as interactive design and video games have established specific guidelines for the inclusion of people with colour vision deficiencies (Campos Baello, 2024), animated advertising, particularly on social media and DOOH, still lacks clear frameworks to guide agencies and advertisers. Recent studies indicate that people with colour blindness encounter significant obstacles when the message relies excessively on colour contrasts that are difficult to distinguish (Monaco, 2022). Accessibility for people with colour blindness is not only an ethical imperative but also a matter of communicative effectiveness.

Animated films have demonstrated how particular colour choices influence the emotional and narrative decoding of visually impaired viewers (Campos Baello & Santín Álvarez, 2025). Similarly, in animated advertising, where colour communicates hierarchies, emotional cues, and brand associations, the lack of inclusive criteria can lead to a loss of meaning, diminished recall, and the exclusion of part of the audience.

This study has three objectives: first, to describe the expansion of advertising animation in Spain and the urban-digital landscape using recent sector data; second, to analyse the most common colour barriers in campaigns disseminated via social media and DOOH; and third, to propose good practices for improving colour accessibility without compromising brand visual identity or creative efficiency. The principal contribution lies in positioning colour accessibility as a dimension of quality in animated advertising, bridging the gap between academic research and professional practice.

2. Context and Theoretical Framework

2.1. Advertising Animation and Consumer Attention in Urban Environments.

Animation has established itself as a central resource in contemporary advertising owing to its capacity to condense messages into a few seconds and to stand out in contexts saturated with stimuli. On both social media and DOOH screens, animated advertisements reinforce brand identity and generate higher levels of recall than static formats (Bhati et al., 2025; IAB Spain, 2025). In urban environments, factors such as viewing distance, ambient light and competition with other stimuli necessitate careful use of contrast and typographic size. Animation offers clear advantages in this scenario, provided it is employed to enhance clarity rather than to introduce unnecessary complexity.

2.2. Colour Blindness and Visual Communication

Colour blindness affects approximately 8% of men and 0.5% of women worldwide (National Eye Institute, 2025). Although it does not prevent individuals from leading a normal daily life, it introduces specific barriers when colour is used as the sole channel of information. In animated advertising, this reliance can hinder the communication of hierarchies, emotions or brand associations (Geddes, 2021). Recent research indicates that, in the absence of accessibility criteria, viewers with colour vision deficiencies interpret narrative and emotional elements differently, resulting in substantial losses in clarity and recall (Campos Baello & Santín Álvarez, 2025).

Although colour vision deficiency mainly affects colour perception, its impact on visual communication also depends on how colour and shape are combined in advertising messages. Studies such as that by García Ramos (2019) demonstrate that these associations do not follow universal principles but are conditioned by contemporary visual culture. In animated advertising, where exposure times are brief, consistency between shape and colour is essential to ensure the legibility of the message.

2.3. Digital Accessibility and Regulatory Frameworks

The Web Content Accessibility Guidelines (W3C, 2018) establish technical criteria for contrast and colour use in digital environments, recommending that communication should not rely exclusively on colour. The European Accessibility Act (European Parliament & Council of the European Union, 2019), in force since 2025, makes these guidelines legally mandatory in the European Union, implemented through the technical framework EN 301 549 (CEN, CENELEC & ETSI, 2021). However, these regulations do not yet specifically address the field of advertising animation.

Accessibility is also closely related to usability. Nielsen's heuristic principles (1994) were pioneering in this area, and more recent studies have adapted these approaches to specific contexts, such as video games and web design (Quiñones & Rusu, 2017). These experiences demonstrate that a design which considers perceptual diversity is not only more inclusive, but also clearer and more effective for the entire audience.

2.4. Colour, Narrative and Accessibility

Colour organises the visual narrative and is not limited to a decorative role. In animated films, the practice of *colour scripting* demonstrates how colour schemes support the atmosphere, tone and rhythm of a story (Amidi, 2011). Transferring this approach to the field of advertising means recognising that the same narrative strategies can become barriers if perceptual limitations are not taken into account. Ensuring accessibility does not mean sacrificing expressiveness but rather ensuring that colour choices are based on clear contrasts and reinforced with other resources, such as typography, iconography or movement.

2.4. Validation Tools and Practices

There are tools that simulate the perception of people with colour blindness, such as Let's Get Colour Blind (Nullbrains, 2024), the colour blind viewing modes of Adobe Photoshop (Adobe, 2024) and the preview features of Adobe Colour (Adobe, n.d.). In addition, simple practices such as reviewing pieces in greyscale, checking luminance contrast or conducting user tests with affected individuals can be implemented. Integrating these checks into the workflow facilitates early detection of problems and significantly improves the accessibility of animated content¹.

¹ Let's Get Colour Blind (Nullbrains, 2024) is a Chrome extension available on Google Play Store that allows you to view different colour blind modes on screen. Unlike other tools, you can adjust colour blind intensity levels and compare colour blind perception with the adapted version, avoiding misinterpretation. It also includes tritanopia simulation, which is no longer available in Adobe Photoshop (Adobe, 2024).

3. Methodology and Case Studies

The research analyses animated advertising campaigns broadcast on digital urban media (DOOH) and social networks, which are currently the main spaces for the circulation of animated advertisements (IAB Spain, 2025; InfoAdex, 2025). The corpus was selected based on three criteria: (1) social relevance of the media, (2) visibility of the campaigns, and (3) presence of colour combinations that could be problematic for people with colour blindness. The set includes both large-format urban screens and short campaigns on platforms such as YouTube, TikTok, and Instagram, covering both the urban and digital dimensions of animated advertising.

3.1. Analysis Procedure

Let's Get Colour Blind simulators (Nullbrains, 2024), Adobe Photoshop display modes (Adobe, 2024) and Adobe Colour preview (Adobe, s.f.) were applied, along with grayscale reviews to check luminance contrast. The analysis also incorporated colour theory criteria and digital accessibility frameworks (Level Access, 2024; W3C, 2018).

3.2. Analysis Variables

The study defined four observation variables, referred to in the text by the letters (a–d):

(a) Luminance contrast. This assesses whether visual elements remain distinguishable even when the colour hue is not perceived correctly. It includes the detection of cases of equiluminance, in which two colours have the same luminance and produce unstable contours.

(b) Multimodal redundancy. This examines whether colour-coded information is reinforced through other channels, such as iconography, typography or contouring. The absence of such redundancy constitutes one of the main barriers to accessibility.

(c) Narrative impact of the colour scheme. This evaluates whether the loss of colour information affects the narrative or symbolic interpretation of the piece, particularly when no additional support resources are provided.

(d) Adaptability of corporate visual identity. This considers whether institutional colours are rigidly maintained or whether they can be adjusted in terms of luminance and contrast to improve accessibility without compromising the brand.

These variables allow the identification of both technical and expressive limitations in the use of colour. Their formulation is based on the WCAG (W3C, 2018), the European Accessibility Act (2025) and heuristic usability principles applied to visual design and animation (Campos Baello & Santín Álvarez, 2025; Quiñones & Rusu, 2017).

3.3. Colour Barriers Identified

Analysis of DOOH and social media campaigns reveals recurring barriers in the use of colour that affect message comprehension for people with colour blindness. The first is the reliance on colour as the sole indicator of information: logos, corporate elements, accents or emphasised features communicated exclusively through a change in colour, without textual or iconic support. The second is the use of equiluminant combinations, which produce unstable contours and reduce legibility. The third is insufficient contrast in high-brightness environments, common in urban displays, which exacerbates the difficulty of distinguishing elements. Finally, social media campaigns often employ highly saturated palettes which, although visually striking, diminish visual hierarchy and make it harder for the viewer to navigate the composition.

To contextualise these barriers, it is useful to refer to colour theory. The contrasts described by Itten (1961) illustrate how certain colour pairs, while aesthetically appealing, can become inaccessible if differences in value are insufficient. Traditional colour theory highlights the importance of tonal value in the perception of shapes (O'Connor, 2023; Schwarz, n.d.; O'Connor), directly relating to the issue of equiluminance. Similarly, the narrative use of colour in animation demonstrates how it directs the viewer's attention and shapes emotional responses (Amidi, 2011; Wu, 2023). In advertising, these narrative functions are combined with brand imperatives, which

explains why many campaigns rely on corporate colours even when doing so creates accessibility conflicts.

4. Results

4.1. Industry Data and Advertising Context

The relevance of advertising animation in contemporary communications cannot be fully understood without considering both its cultural-industrial significance and the advertising investment that sustains its development. This growth is linked not only to the production of feature films and series, but also to the rise of short, versatile pieces that find their principal outlet in advertising.

According to the InfoAdex Study (2025), advertising investment in Spain reached €13.08 billion in 2024, with digital media continuing to gain prominence.

This trend reflects the ongoing transformation of advertising expenditure. Digital media now account for the majority of spending, driven by the expansion of social networks (€856.3 million, +8.5%) and the dynamism of outdoor media, which surpassed €430 million following rapid digitalisation (InfoAdex, 2025). The convergence of animation with digital advertising explains the increasing presence of animated campaigns across urban screens and social platforms, where movement and colour serve as strategic resources for capturing attention.

The DOOH White Paper produced by IAB Spain (2025) highlights that digital outdoor advertising has become one of the most dynamic media in European cities. Its capacity for real-time updates, use of large formats and interaction with contextual data makes it an ideal environment for high-impact campaigns. Within these media, animation offers a competitive advantage through its ability to generate memorable visual stimuli in transit spaces, where viewers' exposure time is limited.

Simultaneously, the Annual Social Media Study (IAB Spain, 2025) demonstrates that platforms such as TikTok, Instagram and YouTube have become key venues for this type of advertising. The brevity of formats, predominantly mobile consumption and the central role of colour and movement make animation an increasingly important resource for brands.

4.2. Selection and Justification of the Corpus

Current animated advertising production is disseminated across multiple media, including urban screens, television, social media and institutional campaigns. Analysing colour accessibility across these contexts therefore requires a diverse corpus. Campaigns were selected on the basis of high visibility, a variety of formats and rich colour palettes, prioritising pieces with potential accessibility barriers and those available digitally. The material was compiled from official platforms, including YouTube, institutional social media channels and campaign websites, as well as from public portfolios of studios, agencies and production companies specialising in animation and outdoor advertising.

4.2.1. Selected Corpus

The corpus comprises commercial, institutional and social campaigns targeting diverse audiences at international, national and local levels. This provides a broad comparative framework for detecting recurring colour accessibility issues and supporting proposals for improvement. To systematise the data for each piece, technical datasheets were created, recording key information (client, medium, production company, date, link and sources), enabling uniform comparison across cases.

4.2.2. Analysis Tools

All pieces were analysed using Adobe Photoshop in colour-blind viewing modes (Adobe, 2024), Let's Get Colour Blind (Nullbrains, 2024) and Adobe Colour (Adobe, n.d.), applying the variables (a–d) defined in the methodology. Each case is presented in its original colour (A), and in colour-

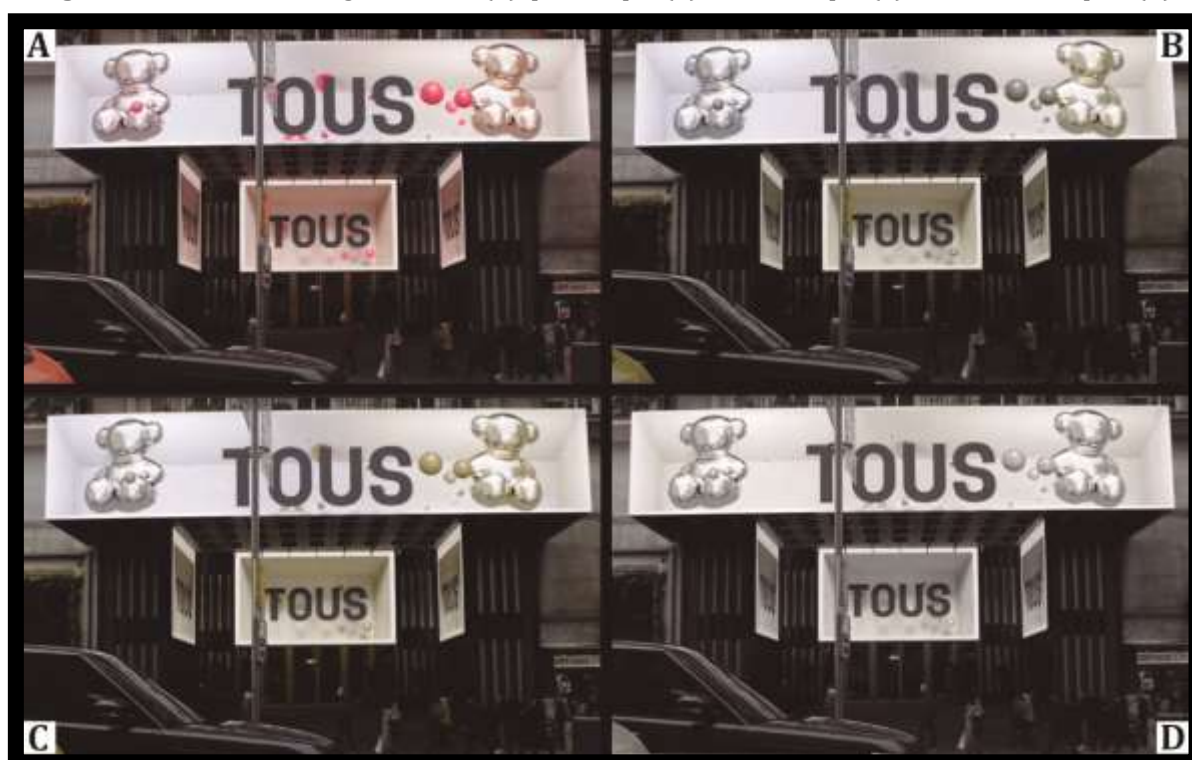
blind modes: protanopia (B), deuteranopia (C) and achromatopsia (D) for cases 1 to 4, and original mode (A), protanopia (B), tritanopia (C) and achromatopsia (D) in case 5.

Table 1. Case 1: Tous

FIELD	DATA
CLIENT/BRAND	Tous
TITLE	Tous bears arrive on Gran Vía
LOCATION/MEDIUM	Anamorphic 3D DOOH, Gran Vía Circuit
STUDIO/PRODUCTION COMPANY	Callao City Lights + technical collaboration with BCN Visuals)
FORMAT	3D digital outdoor advertising (anamorphic)
LAUNCH DATE	December 2022
VIDEO DATE	2023
SOCIAL MEDIA / DISSEMINATION	Callao City Lights presence on Instagram, Facebook and LinkedIn (posts and reels)
LINK	https://youtu.be/Vn6V-07v_Is
MAIN SOURCES	Callao City Lights website and YouTube channel (BCN Visuals, 2023; Callao City Lights, 2023; Callao City Lights, 2024)
CAPTURE TIME	00:42

Source: Own elaboration, 2025.

Figure 1. Case 1: Tous; Original colour (A), protanopia (B), deuteranopia (C) and achromatopsia (D)



Source: Image A: screenshot from the Callao City Lights channel, YouTube (2023); Images C-D: own edits based on Image A (2025).

The Tous campaign on Callao City Lights 3D screens (Callao City Lights, 2023) employs metallic tones and red accents as hierarchical elements. For viewers with normal colour vision, these elements draw attention to the brand; however, in protanopia, a phenomenon of equiluminance in (A) occurs, which reduces the visibility of the red accents against the background. The piece also lacks multimodal redundancy in (B), as it does not incorporate iconography or contouring to reinforce chromatic information. This limitation exacerbates the loss of visual emphasis for

viewers with colour vision deficiencies. From the perspective of narrative impact (C), the diminished contrast undermines the brand's significance and weakens the advertising experience, particularly in a DOOH context where messages must be rapidly comprehended.

The campaign also highlights a tension in the adaptability of the corporate visual identity in (D): the characteristic red of Tous has not been adjusted to enhance accessibility, thereby compromising communicative effectiveness in situations of perceptual diversity.

Table 2. Case 2: *The Walking Dead* / FOX-Vodafone

Field	Data
Client/Brand	FOX Spain / Vodafone
Title	Zombies invade Callao at the premiere of <i>The Walking Dead</i>
Location / Medium	DOOH 3D, Gran Vía Circuit
Studio / Production company	Callao City Lights + technical collaboration with BCN Visuals
Format	3D digital outdoor advertising (anamorphic)
Launch date	November 2022
Video date	2023
Social media / Dissemination	Callao City Lights presence on Instagram, Facebook and LinkedIn
Link	https://youtu.be/Vn6V-07v_Is
Main sources	Callao City Lights website and YouTube channel (Callao City Lights, 2023; Callao City Lights, 2024; BCN Visuals, 2023)
Capture time	01:05

Source: Own elaboration, 2025.

Figure 2. Case 2: *The Walking Dead* / FOX-Vodafone; Original colour (A), protanopia (B), deuteranopia (C) and achromatopsia (D)



Source: Image A: screenshot from the Callao City Lights channel, YouTube (2023); Images C-D: own edits based on Image A (2025).

The campaign linked to the premiere of *The Walking Dead*, projected on Callao City Lights (Callao City Lights, 2023), features red logos from clients such as FOX. In standard vision, these

elements serve as focal points; however, in protanopia, equiluminance (A) occurs, causing the logos to blend into the background and become visually indistinguishable. The absence of multimodal redundancy (B), as there is no reinforcement through iconography or contouring, prevents this chromatic loss from being compensated for, thereby affecting both the viewer's experience and the visibility of the brand. From the perspective of narrative impact (C), the reduced visibility of the logo undermines the commercial association between the series and the sponsor, diminishing the overall effectiveness of the advertising message.

The campaign further demonstrates a lack of adaptability in the corporate visual identity (D): FOX's institutional red has not been adjusted to improve accessibility, potentially compromising the return on investment in high-exposure media such as DOOH.

Table 3. Table 3. Case 3: *Bilbao Gabonak* (Bilbao City Council)

Field	Data
Client/Brand	Bilbao City Council / Bilbao Dendak
Title	This Christmas, I'm asking for Bilbao
Location / Medium	Institutional campaign on local TV, bus shelters and social media
Creative agency	Sirope Creative Agency
Format	Institutional advert + graphic and digital pieces
Launch date	2023
Social media / Dissemination	Town hall and associated entities (YouTube, Facebook, X, Instagram)
Link	https://youtu.be/jXGBU6GK-8E
Main sources	Town hall press release; local publications; Bilbao Dendak advert on YouTube (Ayuntamiento de Bilbao, 2023; Sirope Agencia Creativa, 2023; Sirope, 2024)
CAPTURE MINUTE	0:24

Source: Own elaboration, 2025.

Figure 3. Case 3: *Bilbao Gabonak* (Bilbao City Council); Original colour (A), protanopia (B), deuteranopia (C) and achromatopsia (D)



Source: Image A: screenshot from the Sirope Agencia Creativa channel, YouTube (2023); Images C-D: own edits based on Image A (2025).

The institutional campaign *Bilbao Gabonak* (Sirope, 2024), linked to the Christmas holidays, employs red and green tones as symbolic elements. In standard vision, the composition conveys

tradition and festivity; however, in protanopia and deuteranopia, equiluminance (A) occurs, causing the colours to blend and eliminating the visual hierarchy. The piece lacks multimodal redundancy (B), as the message relies exclusively on colour, without the support of iconography or text, which impedes comprehension for viewers with colour vision deficiencies. From the perspective of narrative impact (C), the loss of contrast flattens the composition, weakening the institutional message and diminishing its emotional resonance. Furthermore, the use of traditional colours without adjustment highlights a lack of adaptability in the institutional visual identity (D), underlining the need to integrate regulatory accessibility criteria into the graphic design of public campaigns.

Table 4. Case 4: Antiu Xixona

Field	Data
Client/Brand	Sanchís Mira S.A. (Antiu Xixona brand)
Title	We want nougat 2020
Location/Media	YouTube and TV (Christmas campaign)
Studio / Production company	The Mushroom Company
Format	Television commercial
Release date (YouTube)	10 December 2020
Link	https://youtu.be/NyyAXyHVUhU
Social media / Dissemination	YouTube
Capture minute	00:18
Views	Original colour, protanopia and deuteranopia simulation, greyscale
Main source	Antiu Xixona YouTube channel; The Mushroom Company portfolio (Antiu Xixona, 2020; The Mushroom Company, 2020)

Source: Authors elaboration, 2025.

Figure 4. Case 4: Antiu XIXONA; Original colour (A), protanopia (B), deuteranopia (C) and achromatopsia (D)



Source: Image A: screenshot from the Antiu Xixona channel, YouTube (2020); Images C-D: own edits based on Image A (2025).

The Antiu Xixona Christmas advertisement (Antiu Xixona, 2020) employs a traditional palette of reds and greens to convey warmth and festive tradition. In standard vision, this combination reinforces the emotional atmosphere, but in protanopia and deuteranopia, equiluminance (A)

occurs, reducing the contrast between characters and backgrounds and hindering the identification of narrative elements.

The piece does not incorporate multimodal redundancy (B); the narrative relies solely on colour, without the support of shapes, text or outlines to reinforce the visual hierarchy. From the perspective of narrative impact (C), the loss of contrast diminishes the clarity of the story and reduces the emotional intensity of the message, particularly in an advertisement designed to remain memorable for viewers.

Once again, the use of traditional Christmas colours without adjustments demonstrates a lack of adaptability in the corporate visual identity (D). While the aesthetics are preserved, accessibility is limited, compromising communicative effectiveness for a portion of the audience.

Table 5. Case 5: Movistar Junior

Field	Data
Client/Brand	Movistar
Title	3D animation advert – Movistar Junior
Location/Media	TV, YouTube; Animal Studios portfolio
Studio / Production company	Animal Studios
Format	3D animated children's advert
Release date (YouTube)	19 December 2019
Link	https://youtu.be/2lgPZGHNpZA
Capture minute	0:06
Views	Original colour, tritanopia simulation, greyscale
Main sources	Animal Studios YouTube channel; Animal Studios website (Animal Studios, 2019; Animal Studios, 2025)

Source: Own elaboration, 2025.

Figure 5. Case 5: Movistar Junior; Original colour (A), protanopia (B), tritanopia (C) and achromatopsia (D)



Source: Image A: screenshot from Animal Studios channel, YouTube (2020); Images C-D: own edits based on Image A (2025).

The Movistar Junior campaign, developed by Animal Studios (Animal Studios, 2025), features a 3D commercial aimed at children, with characters rendered in shades of blue against saturated green and yellow backgrounds. In standard vision, the colour contrast allows the protagonist to be easily identified. However, in tritanopia, the differentiation between figure and background is reduced, producing an equiluminance effect (A) that diminishes the perception of visual

hierarchies. The piece does not incorporate multimodal redundancy (B); the narrative relies on colour to guide attention, without the support of shapes, text or distinctive animation to compensate for the loss of chromatic information. From the perspective of narrative impact (C), the resulting confusion between character and background affects the comprehension of the action, particularly in a piece designed for children, where visual clarity is essential.

Finally, the use of corporate colours without adjustments reveals a lack of adaptability in the visual identity (D), demonstrating that even prominent brands can overlook accessibility considerations, thereby compromising communicative effectiveness with vulnerable audiences.

5. Findings and Discussion

5.1. Main Findings of the Research

Analysis of the selected campaigns reveals systematic errors in the use of colour in animated advertising, which compromise accessibility for people with colour vision deficiencies. These errors can be grouped into four main categories, allowing us to identify regulatory gaps and propose sector-specific improvements.

5.1.1. Equiluminance and Conflicting Combinations with Neutral Colours

The research confirms that equiluminance, when two distinct colours share the same luminance and are perceived as having equal brightness, produces unstable contours and a loss of visual hierarchy, affecting both viewers with CVD and those without perceptual impairments.

An additional phenomenon, not addressed by current WCAG guidelines, has also been identified. The combination of conflicting colours, such as red, green, magenta or blue, with neutral backgrounds, such as grey, brown or tan, creates particular problems for people with CVD (W3C, 2018). This occurs because viewers with colour vision deficiencies perceive reds and greens in a manner similar to how standard viewers perceive neutral tones, that is, as greyish or brownish ranges. Consequently, combining neutral colours with conflicting tones produces a perceptual overlap that hinders visual differentiation, even when the colour pairs are not traditionally considered problematic. This effect is evident in campaigns such as *The Walking Dead*, *Tous*, and *Antiu Xixona*.

This finding constitutes an original contribution of the study, demonstrating that colour accessibility does not rely solely on avoiding traditionally conflicting pairs, but also on understanding how colour perception is influenced by context and luminance. Current WCAG 2.1 guidelines do not address this interaction, leaving a critical aspect of the colour-blind perceptual experience in advertising unregulated.

5.1.2. Multimodal Redundancy

The campaigns analysed frequently rely exclusively on colour to convey key information, without reinforcement through shapes, text or outlines. This absence of visual redundancy contravenes the principle of universal design and WCAG 1.4.1, which stipulates that information must not be conveyed by colour alone (W3C, 2018).

The lack of redundancy is particularly problematic in media such as DOOH and social networks, where exposure times are brief and viewer attention is highly contested.

5.1.3. Narrative Impact of the Colour Scheme

Loss of contrast and confusion between figure and background affect the narrative and emotional clarity of the campaigns. In pieces such as *Movistar Junior*, *Antiu Xixona*, and *Bilbao Gabonak*, colour confusion impedes the identification of characters and actions, particularly for children or institutional audiences. The absence of colour accessibility not only limits inclusion, but also reduces the communicative effectiveness and interpretative significance of the message.

5.1.4. Adaptability of Corporate Visual Identity

Corporate identity manuals often exhibit structural rigidity that prevents the adaptation of institutional colours to ensure accessibility, as observed in campaigns such as Tous and *The Walking Dead* / FOX-Vodafone.

The brands analysed do not implement accessible logo variants or luminance adjustments, which constrains inclusion without necessarily compromising aesthetic quality. This lack of flexibility represents a structural barrier that should be addressed from the brand design phase onwards.

5.2. Main Findings of the Research

The results obtained in this research confirm and extend the principles established in accessibility regulations and usability literature. Guidelines such as those of the World Wide Web Consortium (W3C, 2018) and the European Accessibility Act (European Parliament and Council of the European Union, 2025) emphasise the importance of contrast and the avoidance of information conveyed exclusively through colour. Similarly, Nielsen's heuristics (1994) and the more recent proposals by Quiñones et al. (2017) recommend the integration of visual redundancy as a strategy to improve comprehension in environments saturated with visual stimuli.

However, the study also highlights regulatory and conceptual gaps that have not been addressed until now. One of the most significant is the problem of neutral and muted colours, such as greys, browns, and tans, when combined with conflicting shades such as red, green, magenta, or blue. Although these colours are not traditionally considered problematic, their use as a background or secondary element generates perceptual interference for people with colour vision deficiency, who perceive reds and greens in a manner similar to how standard users perceive neutral tones, that is, as greyish or brownish shades.

This perceptual overlap hinders visual differentiation and is not addressed in current W3C criteria, which focus primarily on avoiding specific colour pairs and ensuring minimum contrast levels. The research demonstrates that the interaction between neutral and conflicting colours constitutes a significant accessibility barrier, particularly in animated advertising, where exposure times are brief and visual clarity is critical.

Furthermore, the rigidity of corporate identity manuals emerges as a structural obstacle to colour accessibility. Most of the brands analysed do not provide accessible versions of logos or luminance adjustments, which limits the possibility of adapting visual elements without compromising aesthetics. This situation underlines the need to review corporate design criteria from an inclusive perspective.

Taken together, these findings suggest that colour accessibility in animated advertising requires specific criteria distinct from those applied in film, video games, or web design. Current regulations should be expanded to address phenomena such as contextual equiluminance and the altered perception of neutral colours by users with colour vision deficiencies, as well as to encourage flexibility in the application of corporate visual identities.

5.3 Differences with Other Fields

The analysis indicates that colour accessibility in animated advertising presents particularities that distinguish it from other creative fields. Although it shares with animated films, graphic design, and video games the need to ensure visual perception for diverse audiences, the conditions of advertising production and consumption introduce additional requirements.

The most notable is the fleeting nature of the message. On urban screens or social media, an advertisement has only a few seconds to capture attention, which limits the opportunity to compensate for perceptual limitations. Added to this is the dependence on corporate colour, with little allowance for adjustment, and the demand for immediate memorability. If a logo or colour accent is not perceived, the impact of the campaign is immediately diminished.

In the professional context, the results confirm that the rigidity of corporate identity manuals hinders colour accessibility. These documents frequently prescribe brand colours without

providing perceptible alternatives, leaving creative teams limited capacity for adaptation and restricting inclusion in advertising campaigns.

These factors, together with the findings regarding conflicting interactions between neutral colours and shades indistinguishable to people with colour vision deficiency, as well as the presence of contextual equiluminance, reinforce the necessity of developing specific criteria for animated advertising. Such criteria are not yet covered by existing regulatory frameworks, including those of the World Wide Web Consortium (W3C, 2018).

5.4. Proposals and Recommendations

The following recommendations integrate established visual accessibility criteria, such as those set out by the World Wide Web Consortium (2018) and the European Accessibility Act (2025), together with original contributions derived from this research. These proposals respond to regulatory gaps identified in the analysis of animated advertising campaigns.

In particular, the recommendations incorporate the following innovative findings, which are not covered by current regulations:

1. Contextual equiluminance, which affects readability even when the colours used are contrasting in hue due to their similar luminance.
2. The conflicting interaction between neutral colours, such as greys, browns, and tans, and shades that cannot be distinguished by people with colour vision deficiency, causing perceptual confusion when combined in backgrounds and key elements.
3. The absence of accessible versions in corporate visual identity manuals, which prevents the adaptation of logos and graphic elements without compromising the brand, limiting inclusion from the design stage onwards.

These recommendations aim to improve colour accessibility without undermining the visual identity of brands and to establish specific protocols for animated advertising, considering its particular conditions of consumption, exposure, and demand for immediate salience.

Colour perception is mediated by cultural and contextual factors and does not respond to universal principles. Studies such as that by García Ramos (2019) show that form-colour associations vary according to the learned visual environment, even among specialised audiences. This variability makes it necessary to empirically validate colour choices and avoid assumptions about their interpretation.

Although usability heuristics (Nielsen, 1994; Quiñones & Rusu, 2017) recommend not relying exclusively on colour to convey information, in the field of animated advertising these guidelines are insufficient if they are not adapted to the specific conditions of the medium. The brevity of exposure time, the saturation of stimuli, and the need to capture attention immediately require more precise strategies, such as visual redundancy through colour, shape, and typography, and perceptual validation in real scenarios.

The issue of equiluminance must be incorporated as a technical criterion in campaign design. In advertising contexts, where attention is directed to the most prominent elements, this phenomenon compromises communicative effectiveness. Greyscale previewing is therefore recommended as a systematic practice to detect contrast deficiencies and correct them without compromising brand identity.

Similarly, corporate visual identity manuals, by not considering variants perceptible to people with colour blindness, limit the possibility of adapting logos and graphic elements without compromising the brand. If accessibility is not integrated from the design stage, subsequent adaptations are insufficient to ensure inclusive campaigns. These manuals usually include versions of the logo in colour, white, black, or greyscale, but they do not consider how these variants are perceived by people with colour vision deficiency.

We propose incorporating colour accessibility as a structural criterion from the design phase, including:

1. Accessible versions of logos and isotypes, with luminance adjustments and protective outlines.
2. Secondary palettes perceptible to people with colour vision deficiency.

3. Accessible alternatives for accent colours, fonts, icons, and other graphic elements.

These measures prevent barriers rather than correcting them after the fact and facilitate visual consistency in digital campaigns and urban media. It is also recommended that colour accessibility be integrated into internal regulations and best practices in the sector, so that it does not depend exclusively on the initiative of creative teams, but becomes established as a cross-cutting standard in visual communication.

Below is a set of recommendations organised in the form of a checklist, which translates the criteria analysed into operational guidelines for improving colour accessibility in animated campaigns.

5.4.1. Perceptual validation and systematic testing

1. Simulate the piece in different types of colour blindness
2. View in greyscale to check legibility in terms of luminance.
3. Verify luminance contrast between main elements and background.
4. Conduct tests with diverse users, including people with CVD.

5.4.2. Control of chromatic variables

1. Avoid problematic colour pairs due to equiluminance, such as red-green, magenta-blue, and magenta-green.
2. Avoid questionable colour tones on neutral grey, tan, or brown backgrounds with equiluminance, for example red-green on grey or brown, or blue on green.
3. Adjust the relative luminance of contrasting colours to ensure differentiation.
4. Prioritise clear contrasts between key elements and the background in dynamic scenes.

5.4.3. Visual redundancy

1. Reinforce the message by combining colour + shape + typography.
2. Avoid conveying information exclusively through colour.
3. Use distinctive shapes or outlines in logos or symbols.

5.4.4. Integration with corporate identity

1. Include accessible versions of logos such as white, black, monochrome, or with protective outline.
2. Develop accessible secondary colour palettes within the brand manual.
3. Consider accessible variants in supporting elements: fonts, anagrams, mascots, icons.
4. Validate that the application of corporate colours in DOOH and social media does not compromise legibility in real scenarios.

5.4.5. Display context

1. Test the piece in real lighting conditions, including outdoor screens and mobile devices, in colour-blind modes.
2. Consider the saturation of visual stimuli in urban spaces and social media in colour-blind modes.
3. Ensure that the main message is recognisable in exposures lasting a few seconds in colour-blind modes.

5.4.6. Structural recommendations

1. Incorporate colour accessibility into regulations and best practices for agencies and public bodies.
2. Establish specific heuristics for animated advertising, adapted to the fleeting nature of the medium.
3. Document testing protocols that form part of the campaign production flow.

4. Promote the training of design professionals in colour accessibility applied to visual communication.

6. Conclusions

The study confirms that animated advertising exhibits systematic deficiencies in terms of colour accessibility. Loss of contrast, the uncritical use of conflicting colour pairs, and the absence of verification protocols are recurrent across the different media analysed, including digital outdoor advertising (DOOH), television, and social networks, thereby compromising the legibility of messages.

These barriers have a dual impact. On one hand, they restrict the right to universal communication for people with colour vision deficiencies. On the other hand, they reduce the economic effectiveness of campaigns, as a portion of the audience is unintentionally excluded. The immediacy and fleeting nature of the advertising message exacerbate this problem: advertisements must convey their message within seconds, leaving no margin for adaptation on the part of the viewer.

The results also offer original contributions to the state of the art. The research identifies equiluminance as a critical factor that compromises legibility in animated campaigns, even when colours are contrasting in hue. It highlights the rigidity of corporate identity manuals as a structural obstacle that limits the introduction of colour adjustments for accessibility. Moreover, it detects the conflicting interaction between neutral colours, such as greys, browns, and tans, and shades that cannot be distinguished by people with colour vision deficiency, generating perceptual confusion when used in backgrounds or key elements.

Within this framework, the study proposes specific recommendations and operational protocols for animated advertising. These differ from the guidelines applied in film, video games, or web design, addressing the particular conditions of the medium. The operational checklist constitutes a practical tool for implementing these principles in the design of accessible animated campaigns.

The added value for the sector lies in recognising that colour accessibility is not merely an ethical concern but also a strategy for optimising resources and enhancing communicative effectiveness. Incorporating accessible versions of logos, colour palettes, and visual elements from the initial stages of brand creation would prevent accessibility issues rather than addressing them reactively, while simultaneously ensuring inclusion and maximising return on investment.

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