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VIRTUAL PRODUCTION IN *THE MANDALORIAN*: TECHNOLOGY, HYPERTEXTUALITY, AND SEMIOTIC ISOMORPHISM

VIRTUAL PRODUCTION EN *THE MANDALORIAN*: TECNOLOGÍA, HIPERTEXTUALIDAD E ISOMORFISMO SEMIÓTICO

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RESUMEN

Desde los orígenes del audiovisual, no siempre fue posible traducir con fidelidad el espacio dramático y sus elementos. Resultaba complicado pasar del texto escrito al espacio fílmico de una imagen en movimiento. A raíz del avance de la electrónica y la informática fueron apareciendo nuevas herramientas para generar unidades narrativas que fueran verosímiles a nivel perceptivo. El plano ahora es una realidad mixta formada por nuestro universo y un metaverso virtual.

La presente investigación profundiza en el papel de las tecnologías emergentes en la producción de elementos virtuales en la unidad narrativa así como en sus efectos en el proceso de semiosis tanto en ficción como en la producción de fake news. Para alcanzar los objetivos planteados se aplica un análisis fílmico connotativo-denotativo y sintagmático-paradigmático que nos permitirá observar los efectos de la tecnología en el proceso de semiosis audiovisual. Tras el análisis se constata que existen nuevas herramientas que ayudan a la producción de sentido.

PALABRAS CLAVE

Semiótica; virtual production; Fake news; Mandalorian; análisis fílmico

ABSTRACT

Since its inception, audiovisual media has not always been able to faithfully translate the dramatic space and narrative from the written text to the moving image. Advances in technologies offer new tools to generate visually plausible narratives. The medium is now a mixed reality, consisting of the real world and a virtual metaverse.

The present article analyses the role of emerging technologies in creating virtual elements within film narratives and their influence on the process of semiosis, both in the realm of fiction and potentially in the real world through 'fake news'. To achieve these research objectives, a connotative-denotative and syntagmatic-paradigmatic analysis was made of a film fragment to observe the influence of digital technology on the process of audiovisual semiosis. The study found that these technologies offer new tools for the production of meaning.

KEYWORDS

Semiotics; virtual production; fake news; film analysis

1. INTRODUCTION

The purpose of this research is to determine whether the use of virtual production in the series *The Mandalorian* (Season 2, Episode 5: The Jedi, directed by Dave Filoni, 2021, Disney+) is a crucial element for achieving precision in the process of audiovisual semiosis, or if it merely serves as superficial audiovisual ornamentation. The study aims to explore whether the application of virtual production aids in the exercise of transtextuality, as described in Gérard Genette's book *Palimpsests* (1997), facilitating the transition from written text to visual representation and thereby preserving semiotic isomorphism in the filmic reality.

Hypertextuality, a specific form of transtextuality, as defined by Gérard Genette (1997, p. 9), encompasses the transformation of one text (the hypotext) into another (the hypertext) through processes such as adaptation, imitation, or expansion. Within audiovisual media, the hypotext specifically denotes the original written text (the script), while the hypertext represents its visual narrative adaptation. This distinction is fundamental to understanding how virtual production enables faithful translation of narrative elements across media.

Semiotic isomorphism refers to the logical equivalence and structural correspondence between the semiotic elements of the hypotext and hypertext. It ensures that narrative components and intended meanings are preserved during the transition from written text to screen. Virtual production thus functions as a technological facilitator that supports this preservation, enhancing audiovisual semiosis precision and narrative coherence.

Accordingly, hypertextuality and semiotic isomorphism are closely intertwined in audiovisual adaptation, and their explicit articulation is essential for grasping the semiotic implications of emerging virtual production technologies. This research examines whether integrating virtual environments and new technologies guarantees semiotic coherence and accurately conveys the creator's intended meaning.

These concepts provide a framework for analyzing how virtual production technologies influence the fidelity of audiovisual storytelling. While recognizing these technologies´ potential to generate novel aesthetic conventions due to inherent limitations—as observed with prior cinematic advancements—this study proposes an analytical framework, combining hypertextuality and semiotic isomorphism, to assess virtual environments' effectiveness in preserving narrative meaning.

This study contributes a novel analytical framework, by combining hypertextuality and semiotic isomorphism, to evaluate the effectiveness of virtual production technologies in preserving narrative coherence. By applying this framework to the case study of *The Mandalorian*, the research offers new insights into how virtual production shapes audiovisual semiosis, moving beyond aesthetic considerations to explore its role as a fundamental tool for meaning-making in contemporary media.

1.1. HISTORICAL BACKGROUND OF CINEMA AND CHANGES OF PARADIGM

The ephemeral has been present in cinema since its very origins, associated with the creation and development of the cinematographic space (Molina-Siles *et al.* 2014, 8). Surrounded by a vivid and visible reality, human being have always created their internal imaginary in the form

of moving images, beginning with the earliest painted images long before Niepce created the first photograph (Caerols & Cabezuelo 2015, 58).

In the summer of 1857, in the work *The two ways* of life, the Swedish photographer Gustav Rejlander attempted to create a highly complex photograph given the technology of the time by combining several negatives on a photosensitive material (Brinkman 1999, 4). Later, Méliès would create images which were "the fruit of two techniques [...]: those of the photographer and the theatre actor and illusionist" (Gubern 2014, 43).

In the late 19th and early 20th century, the camera was set free: in 1896, an operator of Lumière spontaneously invented the tracking shot: "He installed a camera on a gondola in Venice; in 1905, in the film La Passion (La Vie et la passion de Jesus Christ, Ferdinand Zecca y Lucien Nonguet,1905) creating a panoramic shoot following the movement of the Three Wise Men arriving before the stable in Bethlehem" (Martin 2008, 36). Zecca makes use of the first VFX which transcend mere spectacle, contributing to the narrative:

> *"Histoire d' un crime (Ferdinand Zecca, 1901) [...] offers two technical novelties: editing through a dissolved transition, and the use of flashbacks to develop a non-linear narrative [...] shows the possibility of the film to show two parallel actions within the same frame without generating confusion [...]" (Dos obras de Ferdinand Zecca 2011)*

From the very moment visual effects are harnessed to serve the narration, film makers reflected on the perspectives of cinematographic reality. On one hand, there was the formalist school, including Arnheim and Eisenstein. According to Ángel Quintana, for Arnheim: "the factors which separated it from the real provided a specificity that permitted the creation of his aesthetic" (Quintana 2011, 60). On the other was the realist perspective taken up by Bazin and Kracauer, for whom the validity of cinema lay precisely in the presentation of real life. For Francisco Javier Gurpegui (2016, p.170): "More than a properly philosophical empiricism [...] Kracauer's option starts from the immersion of the individual in the intuitive visual sensoriality of the world of life" Paradoxically, presenting real life involved formal aspects within the process of cinematographic semiosis which depend on the creation of new technologies, such as the Tessar lens by Zeiss (Talens & Zunzunegui 2008, 167), which allowed the use of defocussing as a technique in meaning making, showing reality based on a perception conditioned by the limitations of the viewers of an image, thus conveying a realistic aesthetic experience.

In 1924, Béla Balázs, in his works Visible Man and the Spirit of Film (2013), includes in the filmic space the first taxonomy of elements generating semiosis of the cinematic art. For this author, "There is no nature as a neutral reality. It is always the setting and background of a scene" (Balázs 2013, 78). For his part, Eisenstein developed the concept of rhythm or cadence as suggested by Delluc and collaborated in the creation of parallel worlds through the symbolism implicit in editing of films such as October (Eisenstein & Aleksándrov 1927).

Similarly, Caldevilla (2004) affirms that during a period of social and political upheaval, the Soviet government clearly perceived the relation between cinematography and propaganda, a tool in the dissemination of ideological program among a public which did not know how to read but could see. Film makers like Eisenstein, Pudovkin or Kuleshov, the fathers of contemporary visual syntax, participated "in classic Méliès style" (299) in the disappearing of figures such as Trotsky and other protagonists of the revolution who fell foul of the regime (298-299).

From the 1950's, television became democratised and Hollywood films, such as *Ben-hur* (William Wyler, 1959), recreated the worlds of historic periods to attract spectators to the cinemas. This democratisation of television would have important consequences, as the new medium was accessible to the majority of the population, incorporating a multitude of perspectives and voices into television content. However, as explained by Anthony Enns (2020, p.3): "Instead of empowering viewers by providing more control over content, this notion of interactivity thus gave producers a more effective method of tracking and manipulating viewer behavior".

The 1970's was the era of super-productions, disaster films and visions of technologically advanced societies, involving the film depiction of unique and unusual scenic spaces.

The company ILM (Industrial Light and Magic) advanced in the application of digital technologies but the film Tron (Steven Lisberger 1982) was the first to create computer-generated spaces and elements, signalling a change in paradigm. However, as noted by Fernández (2016) the cinema industry was blind to the value of these innovations.

With the arrival of these new technologies, despite much talk of "the death of cinema" (Gubern 2014, 541), cinema endured and, according to Ángel Quintana" experienced an interesting process of hybridisation, by which, after abandoning a consubstantial part of what was, it has become something else that is both new and old at the same time"(Quintana 2011, 541).

By the 1990's, the use of digital technologies began to evolve with *Terminator 2: Judgement Day* (James Cameron 1991) or *Jurassic Park* (Steven Spielberg 1993). By the end of the decade came *Matrix* (Lana and Lili Wachowski 1999), depicting a parallel world and a milestone in the change towards a digital paradigm. Ten years later, *Avatar* (James Cameron 2009) would receive an Oscar for best photography for a scenography that was entirely digital.

For human perception, if digital photography was comparable to the real physical world, there now ceased to be any difference between the two in film. The image became all consuming. In politics, for example, is primarily an audio-visual space, where image prevails over content.

> *"[...] different authors have proposed alternative terms to describe the new society: telecracy, videocracy, political video, political tele, mediocracy, mediatized society or audiovisual democracy among others". (Donofrio & Rubio Moragas 2019, 116)*

In Spain, the political party Podemos made repeated use of the series *Game of Thrones* (George R.R. Martin 2011-2019) in an attempt to involve citizens in the political process. In fact, as explained by Cascajosa and Rodríguez (2019, 4): "Pablo Iglesias himself has continued to explicitly use Game of Thrones as a conceptual framework, following the party's success in the December 2015 elections".

Cascajosa and Rodríguez (2019, 10) note the following:

> *During his presidency (2009–2017), Obama commented on his favourite series both in interviews and on his Twitter account, highlighting Breaking Bad (2008–2013), Homeland (2011–2020), Boardwalk Empire (2010–2014), Entourage (2004–2011), Modern Family (2012–2020), and The Wire (2002–2008). In 2015 he spoke with the creator of The Wire, David Simon [...] and used the series to talk about his interest in reforming the criminal justice system and taking new approaches to the war on drugs.*

These affirmations invite serious reflection on the predominance of the image over content.

1.2. MATCHMOVING AS AN INTEGRATING ELEMENT: THE LIBERATION OF THE VIRTUAL CAMERA

The creation of virtual cinematographic spaces, along with the liberation of the virtual camera through matchmoving techniques in real time, led to new forms of meaning making in cinema. 2D matchmoving was initially developed by the US military for guided missiles (Seymour 2004). This system was first used in *Hook* (Steven Spielberg 1991) and later in *Cliffhanger* (Harling 1993).

Digital matchmoving gave three dimensionality to those elements used to make meaning: "for a three-dimensional scenography it was necessary to give cinema its third dimension" (Sadoul 1991, 11). In fact, according to Okun and Zwerman (2010, p.8), it was Edison who, in 1914, conducted the first experiments exactly combining cameras in two real sets.

As explained by Hornung (2010, p.14), the matchmover analyses the real-life scenario of a film shoot in order to recreate the focal distance of the lens, height, incline position and movement. All of this is combined with computer-generated images filmed by a twin digital camera in a real scenario.

Matchmoving takes place during the post-production phase using software tools such as 3D equalizer, *Boujou, Pftrack* or *Matchmover*. Directors, actors and cinematographers must now also consider a pro-filmic metaverse. For Casciani, as quoted by Losada-Amor (2014, p.16), "[...] for a hundred years movies have used tricks to fake the third dimension".

In 2004, a new technology appeared which used specific software and hardware to permit matchmoving in real time. The use of virtual cameras took off. In a TED talk, George Bloom (2014), executive producer at CBS Televisión Studios, explained how the use of virtual metaverses to create film sets, dramatically reducing production costs.

Eliot Mack and Phil Mass were the creators of the first technologies which made virtual production possible. They applied their knowledge of robotics and audio-visual technologies to create the Previzion Studio System: "I developed Previzion due to frustration [...] with the traditional visual effects process [...], I was able to begin to build a system for repetitive and boring tasks like lens matching and camera position tracking" (Ferguson 2011)

The technology arrived in Spain in 2010 with the company Área 51. At this time, the Spanish audio-visual sector was unprepared for this change of paradigm. In the words of cinematographer Johnny Yebra (2021), "the technology had lots of possibilities but it had its process, with rules and forms".

Luc Robert, cited by Seymour (2004, p.14), noted the following: "The main benefit of matchmoving software is a marked increase in productivity.[...] bridging the divide between creatives and the industry and impacting the process of semiosis".

1.3. VIRTUAL PRODUCTION

The creation of pro-filmic spaces and photorealistic virtual elements opens vast new semiotic possibilities for the creation of a narrative unity. According to Vidal:

We understand as virtual production the process of combining real image content and computer graphics, simultaneously, to obtain immediate feedback and make better decisions in the pre-production and production processes. The place where the physical and virtual worlds meet virtual (Vidal, 2022, p. 5).

Technologies of virtual film production are based on three fundamental elements: a system of LED screens or, failing that, chroma keying; a system of matchmoving in real time; and a 3D environment based on the use of a game engine, Unreal Engine 5 being the current standard.

LED screens are used as an advanced technique of rear-projection. As Vidal (2022, p.6) explains: "we can see its use in countless productions, as in the classic example of *North by Northwest* (Hitchcock 1959)". The difference is that, currently, the elements which extend the ludic space of the actors are not real, with parallax and are easily modified in situ.

The matchmoving system meshes physical and virtual reality, creating a mixed environment where the virtual camera and the real camera share, in two different universes, information on position, rotation and optics of the original camera.

For Jon Favreau (2021), executive director and producer of *The Mandalorian* (2021), the use of the Stagecraft tool is very efficient "covering between 40 or 50 percent more pages of script per day, which is an advance in the production process."

In an online round table organised by the ALIA (Alianza de la Industria Audiovisual), broadcast live on May 13, 2021, Roberto Sacristán, director general de Aluzine; Carolina Damián from Somos Robolt; David Monguet, founder of MO&MO film services and Bernat Aragonés, VFX supervisor at Antaviana, spoke about virtual production in Spain. Carolina Damián (2021) noted the interactivity of lighting between virtual and real elements. Actors and directors, she added, can see in situ how the shot is composed. Bernat Aragonés (2021) noted that virtual production has capabilities proper to analogue filming, such as trial-and-error on the set itself. He also highlighted the high cost and steep learning curve in the use of these technologies. On this point, Roberto Sacristán added that the growth of digital platforms will contribute to the democratisation and greater skill in the use of these tools.

Anca Bratu *et al*. (2022), coordinators of virtual production at Orca Studios, noted changes in the workflow: "the production schedule of virtual filming puts additional weight on the start of the shoot" and that the principal challenge is "to educate the industry on VFX decisions prior to production".

The semiologist Daniel Chandler (1999, p.9) remarked that, creating meaning with any precision requires complete command of the tools being used. Feyder and Rosay (1944, p.65), note that: "we, artisans of cinema, have never had time to know in depth an instrument that changes incessantly in our hands, even while we are working".

According to Ángel Quintana (2011, p.109) in the process of creating computer generated 3D spaces for their later coupling with the movement of real actors, scenography becomes 'scenology'. The suffix "ology"is derived from Greek, meaning "study of"; in this case, scenography both transforms and complements the concept of image semiotics. For Tanius Karam (2011, p.2), "More than a doctrine, we have a series of problems, a set of questions on which to reflect.

One of the reasons is, perhaps, the complexity of the subject itself given that the image as an empirical concept is heterogeneous".

Quintana's scenology, inspired by creation in news media, represents an important evolution of the field of visual semiotics. Tanius Karam (2018) would confirm this years later in the seminar: "Semiotics, culture and communication technologies: "You could not take a photograph of an object that did not exist [...] Now with the new digital software you can make films of things that have no empirical references [...] which implies a new semiotics."

To understand the scope of this change, the script must be studied as the bridge between the text and the image. For Gerard Genette (1989, 11-14) the concept of transtextuality is understood as the different forms in which texts can be related to others. According to Genette, there are five categories of transtextuality: intertextuality, paratextuality, metatextuality, architextuality, and what is of most interest here, hypertextuality. The text moves from hypotext to visual hypertext, understanding isomorphism as a form of logical inference based on the assumption that two things are the same in certain aspects.

Since its landmark use in *The Mandalorian* (2019), virtual production has rapidly evolved into a widely adopted technique, enabling this transtextual shift by enhancing the fidelity and coherence of audiovisual adaptations. Its integration has transformed creative workflows, bridging script and screen across global and national contexts.

1.4. OBJECTIVES OF THE RESEARCH

- To assess whether the use of virtual production in *The Mandalorian* (Season 2, Episode 5: The Jedi, directed by Dave Filoni, 2021, Disney+) significantly contributes to creating a scenic space that allows for semiotic precision in audiovisual narrative.
- To analyze whether virtual production facilitates the exercise of transtextuality, as described by Gérard Genette (1997) in Palimpsests, enabling an effective transition from written text to visual representation.
- To identify whether the integration of emerging technologies in virtual production preserves semiotic isomorphism and contributes to a coherent and precise filmic representation.
- To determine if the application of virtual environments goes beyond being a mere visual tool and becomes an essential component for meaning-making in the process of semiosis.
- To explore the potential consequences of using virtual production elements not only within fictional narratives but also in the informative media, examining how these technological innovations might affect the process of semiosis in news and media content creation.
- To reflect on the broader implications of virtual production on the film industry workflows and the audience's reception of digitally created content, particularly in the context of immersive experiences and the evolving perception of audiovisual realism.

1.4. JUSTIFICATION OF THE RESEARCH

The audiovisual production field has undergone a significant transformation with the adoption of emerging technologies, positioning virtual production as an essential tool for creating content

that challenges the limits of what is visually possible. This research is justified by the need to understand how these technological innovations impact the construction of meaning within audiovisual narratives and contribute to the semiotic experience of the viewer.

Specifically, analyzing a series such as *The Mandalorian* (Filoni, 2021), renowned for its pioneering use of virtual production, provides an ideal case study to explore the effectiveness of these tools in preserving semiotic coherence and narrative precision. This study seeks to understand whether virtual production enables an authentic exercise of transtextuality.

Furthermore, the research addresses the need to discern whether these technologies go beyond being mere aesthetic resources to become fundamental elements for creating an immersive and meaningful experience. This is particularly relevant today, as the ability to produce images without empirical referents may influence audience perception and critical reception of audiovisual content, redefining the relationship between creator, technology, and audience.

It is also necessary to verify whether, as with previous technologies, virtual production gives rise to characteristic formal aspects that define an aesthetic of use or the limitations of such technology when applied to fiction. This has often been the case throughout the history of cinema and fiction, where technological innovations have shaped visual and narrative conventions that reflect both the possibilities and inherent constraints of their implementation.

Understanding these aspects is crucial for audiovisual professionals, semiotic researchers, and academics who seek to explore the boundaries of digital storytelling and its implications for developing content that integrates advanced technology without losing the essence of storytelling.

According to Allen and Gomery (1985, p.5) "the film historian has to consider what are the relevant technological changes, point out the transcendence they have had and indicate the place they deserve in the history of cinema".

2. DESIGN AND METHODOLOGY

The hypothesis is formulated from a specific theoretical perspective: The virtual does not substitute the real but rather offers a set of tools for "scenology", as proposed by Ángel Quintana (2011, p.109).

The methodological design starts from a series of questions that configure this hypothesis. In this regard:

1. Does the use of virtual scenic space through virtual production systems provoke changes in the cinematic image and the production of meaning?
2. Is the modification due to the fact that the result differs from traditional methods or because it reconciles artistic intent and industrial demands?
3. Does the above question lead to the creation of images lacking empirical referents that could be perceived as real within the informational context?

The present research used a qualitative methodology given that, as noted by Karam (2011, p.2), the image as an empirical concept is heterogeneous.

For this study, the methodology required the consultation of a highly specific bibliography and a form of film analysis from connotative-denotative, syntagmatic-paradigmatic perspectives complemented by open, in-depth interviews with experts in the sector, including the cinematographer Johnny Yebra and scriptwriter Nacho Faerna. This approach allows for the analysis of the effect of virtual production technology on the process of audio-visual semiosis with maximum objectivity.

In addition to the semiotic framework, a custom taxonomy was applied to each shot, covering denotative aspects (e.g., shot size, optics, angle, sound) and connotative dimensions (symbolic hierarchy, spatial balance). Syntagmatic and paradigmatic analysis further revealed narrative structure and oppositional meanings. This method enables a focused examination of semiotic isomorphism between the written hypotext and the audiovisual hypertext.

The Mandalorian (Season 2, Episode 5: The Jedi, directed by Dave Filoni, 2021, Disney+), specifically the fragment between 40:02 and 41:18. This fragment was chosen because it is an exterior scene in a peculiar landscape, essential for the creation of a specific meaning and very difficult to create physically. The script specifies that the protagonist, *the Mandalorian*, must deliver the Baby Yoda to the Jedis. To do so he must travel to the planet Corvus and find the Jedi Ahsoka Tano. This is a forest planet within the Star Wars universe but, due to the actions of the ruler of the planet the trees appear dead and the forests destroyed. This is a familiar scenario on planets victims of the final phase of the imperial conquest of the galaxy. Thus, in the script, the planet is a dramatic scenario where the action takes place and vitally important to creating intertextual semiotic isomorphism in the step from written hypotext, written, to hypertext, audio-visual. This is key to creating the specific meaning intended by the image; that is, for the scenic or filmic space to transmit all the attributes that define the forests and shadowy atmosphere of the planet Corvus requiring a very specific form of cinematography.

In this fragment we clearly see the differences between what Bobes (2001, 10-13) referred to as the dramatic space (the place where the drama takes place, situating the characters), ludic space (the place created by the actors through their positions and movements), scenographic space (the dramatic locations reproduced in the scene through sets and décor) and scenic spaces (physical locations which are used to represent other spaces). The brief duration of the fragment permits a close analysis. The space is, within the process of semiosis, the focal point around which all other signifiers orbit. In the "making-of" material about the film, we observe the production process on the set, confirming which elements are physical and real and which are virtual within the ecosystem created by Unreal Engine in the LED screen. This is an ideal opportunity for analysis.

In the chosen fragment we see the combination of ludic and scenographic spaces within a mixed scenic space that conveys a specific narrative meaning.

The study conducted a connotative and denotative analysis complemented by a syntagmatic-paradigmatic analysis. In this way, the formal aspects of the semiotic process linked to this technology are revealed which combine artistic intent and expression with the demands of industry. The denotative analysis is based on the evidence drawn from the objective descriptions of objects, people, décor or landscape. Denotation involves formal elements: types of shots, photographic parameters, framing, etc. Connotative analysis is centred on the underlying values of the image

and its relation between one concept and others. It also involves expressive, communicative, emotive and aesthetic aspects such as the angle of vision, focal distance, the relation between framing and object, depth of field, point of view, definition and lighting.

For Tanius Karam (2011, p.7) "the connotative and denotative become complementary qualities that change according to the context of production and reception of signs. To analyse the connotations of a series of signs is to study the cultural codes that condition those meanings."

The parameters of the denotative analysis of the chosen fragment are shot length, optics, angle, movement, duration, composition, point of view and sound. The connotative analysis studied each shot and its meaning as a whole.

We can distinguish between a normal camera lens (35mm to 55mm), angular lens (20mm or less) with a tendency to distort or amplify spaces, and telephoto lens (70 mm) with less depth of field, favouring racking focus as a narrative technique.

Assuming that the choice of optics influences the process of semiosis, the shots are classified as general, medium and closeups, examining the possible correlations between the scale of the shot and the use of specific camera angles or other formal denotive features. The camera shots can be described as high-angle, low-angle or normal and are used as a reference for the characters since, as noted above, we assume that stories take place in locations that represent a semiotic focus of the narrative. The camera movements may be static, soft, marked or tracking shots. The duration of the shots may be long, medium or short.

The syntagmatic analysis serves to study the superficial plane of a message, and the order of presentation of signs. This is a structuralist technique which seeks to identify relations between the parts and the whole of a narrative.

Karam (2011, p.7) uses the analogy of a chain, in which the syntagmatic analysis focusses on each individual link.

As an applied method of analysis, Gunter Kress and Theo van Leewen (2006, p.174) offer a few cues: the three spatial dimensions are translated into three types of visual analysis (left-right, top-bottom, centre-margin); the iconicity of the image; the type of figuration and the composition (static, asymmetrical, continuous, in spiral) and the dimensionality of the image.

According to Tanius Karam (2022, p.7), paradigmatic analysis serves to identify the possible combination of signs and what is revealed through the use of a signifier. The analysis employed signifiers, absences, commutation testing, binary oppositions, and distinctions between metaphor and anecdote.

It is difficult to obtain objective results in the area of science dealing with the making of meaning within a given cultural context. One approach is to use the models of analysis proposed above to analyse aspects of the intertextuality produced, moving toward a quantitative approximation, and to reveal —or not— aspects related to intertextual isomorphism.

All the methodological tools used were combined to filter the results and draw conclusions. The results of the analysis are contrasted with theories of visual and spatial semiotics mentioned above.

3. FIELDWORK AND DATA ANALYSIS

The analysis began with examining the formal denotative aspects of the narrative units in the selected fragment. The scene analyzed, characterized by its photorealistic style, consists of fifteen medium shots, five general shots, and five close-ups. The data collected included detailed observations of camera usage, angles, movement, and shot duration.

Figure 1. Filming *The Mandalorian* (Episode 2x05, The Jedi, dir. Dave Filoni)

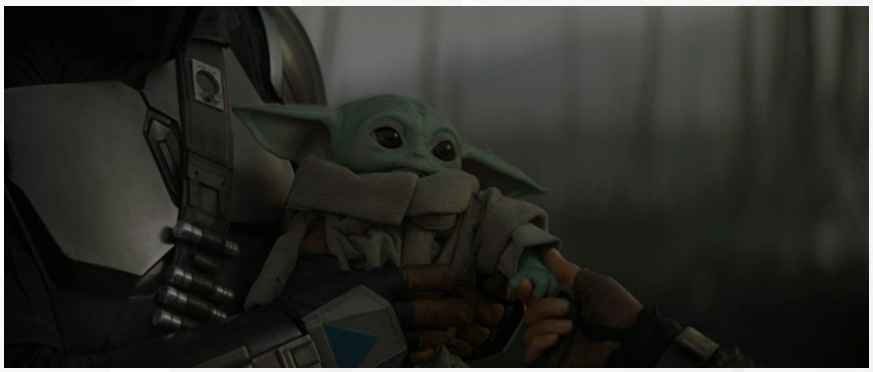
Note. Frame extracted from The virtual production of *The Mandalorian* season two (ILM, 2021). https://www.youtube.com/watch?v=-gX4N5rDYeQ

The use of telephoto lenses dominated the scene, providing a shallow depth of field. Reviewing "Making of" materials confirmed minimal distance between characters, the camera, and the LED screen backdrop. The medium shots consistently utilized telephoto lenses, with only one wide-angle lens in the final shot. The normal lens appeared in four shots: three general and one medium.

4. RESULTS

The findings indicate specific trends in camera techniques and shot composition. *The Mandalorian*, as the central figure, is typically shown using low-angle shots, while Ahsoka Tano appears with higher-angled shots, signifying subtle power dynamics. Baby Yoda's portrayal mostly features neutral angles, subtly favoring *the Mandalorian*'s perspective.

Figure 2. From *The Mandalorian* (Episode 2x05, The Jedi, dir. Dave Filoni, 2021)



Note. Frame taken from the original broadcast

Camera movement analysis highlighted four tracking shots: one general shot with a normal lens and three medium shots using telephoto lenses. Movement intensity corresponded to dialogue rather than shot scale. Shot duration analysis revealed five short shots, sixteen medium shots, and four long shots, showing varied pacing without clear ties to descriptive functions.

Connotative analysis demonstrated that *the Mandalorian* functions as the central semiotic element. Baby Yoda holds an implicit superior position, while Ahsoka Tano's role indicates a perceived inferiority in relation to the protagonist. The harsh, desolate setting underscores thematic elements of isolation and conflict.

Syntagmatic analysis generally showed left-to-right framing, placing *the Mandalorian* on the left and supporting elements on the right. Visual compositions often featured spiral arrangements, contributing depth and a dynamic spatial representation. Commutation testing suggested that changing the planet Corvus for another would alter the narrative's meaning, reinforcing the importance of the chosen scenic space.

Figure 3. Low-angle shot with rack focus. From *The Mandalorian* (Episode 2x05, The Jedi, dir. Dave Filoni, 2021)

Note. Frame taken from the original broadcast

Overall, the semiotic nucleus centered on *the Mandalorian*, supported by the symbolic elements of the ship and Baby Yoda. The concluding frame depicted *the Mandalorian*'s departure, implying finality and transition.

Figure 4. Example of spiral composition. From *The Mandalorian* (Episode 2x05, The Jedi, dir. Dave Filoni, 2021)

Note. Frame taken from the original broadcast

5. DISCUSSION AND CONCLUSIONS

There have been many technical advances which have changed the process of semiosis in film. Each change in creative or industrial paradigm brings with it a change in models of industrial production and established audio-visual syntax.

Figure 5. *The Mandalorian* leaves planet Corvus. From *The Mandalorian* (Episode 2x05, The Jedi, dir. Dave Filoni, 2021)

Note. Frame taken from the original broadcast

The results of this study show that the creation of virtual elements or scenic spaces, perceived as real, involves the materialisation of everything the scriptwriter seeks to bring to the image. The script, without material limits, permits the coincidence of the reality perceived by the viewer and the director, as suggested by Etienne Souriau, cited by Buckland (2004, p.47).

Not only is it possible to materialise in film everything contained in the script, but, as noted by Albert Vidal (2022, pp. 5–9) and Bernat Aragonés (2021), it is also possible to produce a mixed real-virtual scene that is fully interactive from a creative point of view: altering materials, lighting, or colours in line with the director's creative vision, and thus transcending the limitations of analogue technology. Although we are in the early stages of these changes, it is important, according to Tanius Karam (2018), to reflect on the new processes of visual semiosis they imply.

For Anca Bratu (2022), these new systems require that a great deal of post-production is exhaustively prepared in pre-production. Thus, twelve years after the first attempt at virtual production, the industry is beginning to assume the changes in workflows, offering greater flexibility.

It is necessary to establish new foundations for cinematography in new ecosystems, incorporating professionals with hybrid profiles, in contrast to the prognostications of Bloom (2014), who foresaw a notable reduction in film crews.

The results of the research show that the use of virtual production techniques and virtual scenarios result in changes to moving images and the making of meaning.

The scenic space is a key element to the creation of meaning. In the fragment selected, the planet Corvus does not exist physically; its characteristics are so specific that it would require the enormous alteration of any existing landscape. Even then it is probable that the desired intertextual isomorphism would not take place. Now, the cinematographic image can draw on virtual elements first developed in videogame engines that are interactive on the set. The rendering on film of a scenic space which does not physically exist, and wherein meaning is made, is revo-

lutionary. Not only because this virtual creation may be attractive to the industry but because It permits an 'a la carte' and in situ modification. Thanks to virtual production, a photorealistic moving image is created in which the character of *the Mandalorian* experiences highly specific circumstances.

However, for Ignacio Lacosta from Xreality Studios (2021), this technology has its limitations, which explains the frequent use of telephoto lens in medium shots, conditioned by the dimensions of the plane and videowall. Thus, we are witnessing the birth of new aesthetic conventions, including the use of unfocussed backgrounds. This generates an intertextual semiotic isomorphism but these limitations may also involuntarily alter or modify the process of semiosis.

Today, moving images can be created using technology that do not require an empirical physical referent. What began as art can also be applied to the creation of highly persuasive communication content, including the ability to produce 'fake news'. In the post-truth era, including the massive distribution of content through social media, these technologies can pose a serious potential risk for the consumer of this content.

> *[...] A Chinese government spokesman spread the rumour that the virus was brought to China by the United States, which was soon reported in Chinese state media. Russian media also suggested that Covid-19 was created in a US laboratory in Georgia. And Venezuela's President Nicolas Maduro said the virus was a possible biological weapon aimed at China, as well as recommending natural recipes to cure the virus in a tweet that was deleted by Twitter. (Pérez Da Silva et. al 2020, 5).*

García Acosta and Gómez Masjuan (2022, p.99) explain that fake news can have its origins in real, hyperbolised facts. If this hyperbolisation takes place through the image and the spectator accepts this image as real, the effect can be very powerful, even if the falsity of the image is later revealed. An example of this was the false video by Boston Dynamics in June 2019. This was a disturbing video showing a robot being "abused" during a training session and rebelled against its human trainer. Viewers expressed their abhorrence for this abuse and even supported the rebellion of the robot against its human master. This was a magnificent piece of work by CGI from Corridor Digital, and based on a real video from Boston Dynamics which tested the resistance of the latest generation of the Atlas model.

Thus, intertextual semiotic isomorphism has reached a level that, along with new habits of news consumption, have created a fecund breeding ground for the creation and dissemination of perceptively real 'fake news':

> *The interconnected world we face has transformed the conditions for accessing, producing and disseminating information. With the expansion of digital social media and the increasing use of mobile devices, practices have changed. Due to the loss of intermediation, the news reaches our Facebook account interspersed with comments from our friends. (García Acosta, G. Gómez Masjuan, M 2022, 92)*

It is only by combining these emerging technologies with a mastery of the classic aspects of formal narration developed over the last century can precise meanings by created.

We can conclude that artistic aspirations and the demands of industry have found common ground and it is evident that the virtual image will lead to changes in the making of meaning.

Mixed realities can be created, generating real visual messages in the eyes of ads which may become extreme precise in their capacity to transmit any meaning desired.

Lived experience, and the statements of professionals involved in the development of virtual production suggest we are in the initial phase of implementation of these technologies. And in the words of Bryce Dallas Howard « it is our job to continue promoting this medium [...] keep challenging the tools of storytelling and ask ourselves again and again how we can offer more to our audience» (Ilm.com, s/d).

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