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WOMEN'S FACES IN BEAUTY ALGORITHMS: DEHUMANIZATION THROUGH AI-BASED APPLICATIONS

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ABSTRACT

This study aims to examine how the algorithms of AI-based facial processing applications—Meitu, Hypic, Beautycam, and Wink—apply the principles of dehumanization that shape female beauty standards. The urgency of this research lies in understanding how visual technology constructs women's beauty identities through filters that subtly reproduce aesthetic biases, thereby shaping collective perceptions of beauty. The research approach uses qualitative methods with algorithmic and multimodal analysis. Data was obtained by processing photos of 10 female participants with different facial characteristics—skin tone, facial shape, and skin texture—using various AI filter features, interviewing participants about their experiences with these applications, and observing Instagram posts hashtagged #Meitu, #Hypic, #BeautyCam, and #Wink. Analysis of visual posts was conducted using Kress and van Leeuwen's Visual Grammar framework, which was then correlated with textual data in the form of post captions and comments. The findings are read through the perspective of Donna Haraway's Cyborg Theory to examine the body-technology relationship. The results of this study indicate that facial processing applications trigger dehumanization by homogenizing women's visual identities. Although Haraway views this as a form of empowerment, this research proves otherwise. The practice of facial manipulation actually alienates women from authority over their digital bodies, while perpetuating the collective memory of discriminatory beauty standards through this visual circulation. Haraway's concept of the cyborg can only be realized if digital infrastructure is first decolonized.

Introduction

The advent of artificial intelligence (AI) marks a new era in which technology is no longer merely a tool but also participates in the process of determining various values that were previously the exclusive domain of humans, such as ethics, norms, and aesthetics. Currently, AI algorithms are starting to play a role in defining what is considered to be the good (*bonum*), the true (*verum*), and the beautiful (*pulchrum*) (Nitzan et al., 2023). For example, the phenomenon of AI-based female news anchors, presented with "ideal" looks, has now become a new celebrity with a large fan base and high popularity. In this context, beauty standards are no longer simply a matter of taste or cultural construct, but rather the result of algorithmic calculations that unfortunately increasingly obscure diversity (Wang, 2023).

Such algorithmic beauty standards are increasingly penetrating everyday practice through digital facial editing apps that allow users to modify their faces with skin-smoothing and whitening filters, and even filters that can alter the entire facial structure to a version deemed ideal. The widespread use of digital facial editing app filters suggests that certain beauty standards are sought to be realized, suggesting that the appearance of the filtered results influences perceptions of beauty (Andrada, 2025). This is in line with the results of a study by Mironica et al. (2024), which showed that 70% of young women reported dissatisfaction with their bodies, including their faces, leading to consideration of plastic surgery.

Miranti (2020) identified dehumanization as a phenomenon where women are reduced to visual objects judged based on their physical attractiveness. She highlighted that dehumanization stems from the active actions of app users in displaying their bodies for digital existence. However, in this study, we further interpret that dehumanization can be displayed through more subtle aspects, such as how AI algorithms in digital facial processing apps define beauty through the facial modification filter options offered to users. Therefore, this study fills a gap in previous research by highlighting how the work of AI algorithms creates a more biased and hidden dehumanization, compared to the exploitation of women's bodies on social media. The apps that will be analyzed are Meitu, Hypic, BeautyCam, and Wink, which are among the most popular digital photography or facial processing apps on both the Play Store and the App Store, as well as those that descriptively mention the use of AI technology in the process of modifying users' photos.

In the analysis section, this study uses a multimodal analysis method to read visual data and integrate it with textual data. The theory used is Donna Haraway's (2016) Cyborg Theory to explore how beauty algorithms not only represent but also shape collective perceptions of female beauty standards through biased visualizations. As for the research questions formulated in this study are as follows:

1. How do AI-based digital facial processing application algorithms operate through the principle of dehumanization of women's faces?
2. How does the principle of dehumanization shape collective perceptions regarding female beauty standards?

Literature Review

Technology, The body, and Female Identity

Technologies such as AI-based digital facial editing apps are designed to modify facial appearance through selectable filters tailored to the user's preferences. While these features are claimed to promote women's freedom of expression in shaping their self-image, such technologies have the potential to perpetuate narrow and uniform beauty standards, particularly those rooted in Eurocentric views, such as blonde hair, fair skin, or a high nose (Gulati et al., 2024).

Gulati et al. (2024) even describe digital facial editing applications as not only visual modification tools but also body discipline for women. The tendency to continuously monitor and follow trends provided by these applications encourages women to internalize the beauty standards promoted by these technologies. Technology in the beauty industry creates social pressure that encourages women to project self-images in accordance with global beauty industry norms, even though this actually limits women's self-expression (Ma, 2022; Wang et al., 2022; Listyani et al., 2023).

These norms are shaped by algorithms that measure and evaluate women's faces based on specific parameters biased toward certain races, ethnicities, and genders. This bias arises because the algorithms are trained on non-inclusive data, thus failing to represent the diversity of women's faces. Beauty, which should be subjective and contextual, has instead become objective and uniform. This is evident in the phenomenon of "Wanghong Face", a term that refers to a uniform version of beauty shared by most celebrities in China as a digital beauty standard (Chen, 2024).

In more detail, Pushkareva & Zhidchenko (2023) state that women understand beauty as a form of bodily labor that must be performed continuously to meet standard expectations. Therefore, in this context, women's beauty identities need to be continuously adjusted to standards, one of which is through the use of digital facial editing applications. One consequence is that this condition is exploited by corporate capitalism by recommending certain facial filters that are deemed capable of enhancing appearance. Thus, women's identity becomes limited to a visual project, where self-worth is only associated with the ability to appear according to the aesthetics promoted in the digital space. Women are positioned as objects experiencing two layers of control. First, control through certain beauty standards, and second, control by market mechanisms through beauty standards for the benefit of capital (Pushkareva & Zhidchenko (2023).

Donna Haraway's Cyborg Theory

Cyborg theory, introduced by Donna Haraway, generally explains the concept of the posthuman, in which traditional boundaries of identity, such as male and female or human and machine, become blurred by technological change. Thus, identity becomes flexible and difficult to describe. In such conditions, the terms hybridity or hybrid identity emerged, a critique of the essentialist view that assumes everything has a fundamental nature or innate identity (Erdener, 2021; Aboubacar, 2023).

Erdener (2021) explains that there are two perspectives on the concept of cyborg. The first perspective views cyborgs as part of transhumanism, the notion that human functionality can be enhanced through advanced technology. An example is combining the human body with weapons for military purposes. In contrast, the second perspective views cyborgs as part of posthumanism, blurring the boundaries between humans and machines. Therefore, technology is not a tool controlled by humans to maximize their potential, but an active agent capable of influencing them. For example, the current position of the cellphone is not simply a tool controlled by humans, but has become an extension of the human brain. In fact, it has become an active agent capable of shaping lifestyles and even political opinions. Therefore, posthumanism, in this second perspective, emphasizes the relationship between humans and machines.

Through this cyborg concept, identity cannot be interpreted collectively, as in defining women through rigid categories that assume a soft or feminine character. Instead, within the cyborg concept, identity is fragmented, as technology becomes an active agent that blurs the boundaries of these categories. Therefore, women's identities are not inherent but are constantly reshaped, including by technology (Fuller, 2021).

In essence, Haraway's perspective on the concept of the cyborg attempts to break away from the masculinization of technology, specifically how technology is understood and used through masculine narratives and values. Nevertheless, Sued (2018) critiques the cyborg concept, arguing that it can be implemented differently, particularly in Eastern cultures or countries experiencing colonialism. Moreover, in the context of women's beauty identities, the fragmentation of women's identities, which should be seen as liberation from rigid categories, can instead create new forms of oppression. As a result, women tend to feel divided because their local or ethnic beauty identities are incompatible with global beauty standards shaped by technology. Consequently, the theory's claim to universality can be reconsidered through the interaction between technology and socio-historical realities.

Methodology

This qualitative research adopts a multimodal framework for algorithm analysis, employing Kress and van Leeuwen's (2006) Visual Grammar as the visual analysis tool. Specifically, the algorithm analysis method examines how AI-based applications—Meitu, Hypic, BeautyCam, and Wink—generate specific outputs, namely photos of participants' faces processed using beauty filter features.

To address the research questions, the authors used several data sets, including participants' facial edits and Instagram posts, along with their captions and comments as primary data. Additionally, they relied on interviews with participants as secondary data. By synthesizing both the primary and secondary data, the authors examined two key aspects of the research question: the role of algorithms in dehumanization and the influence of dehumanization on collective memory regarding beauty standards.

The initial stage of data collection involved collecting facial photographs using a purposive sampling technique from 10 female participants with different characteristics. The study focuses on two facial aspects: surface (skin tone and texture) and structure (facial shape). Each is divided into subcategories: skin tone (light, medium, dark), texture (smooth, large pores, freckled), and shape (oval, round, square). For skin tone, the study references the Fitzpatrick (1988) skin type spectrum, which describes six skin types' sensitivity to ultraviolet radiation, though for simplicity these types are simplified. The recruitment of these 10 participants was carried out gradually based on facial characteristics, and by the eighth to tenth participant, data saturation was reached as no new visual patterns were identified.

Before starting the analysis, the authors classified each participant's face according to the previously determined subcategories. This classification made it easier for the authors to identify patterns in participants' facial transformations before and after editing with various applications.

Table 1: Classification of Participants' Faces

Participant Code	Category/Subcategory								
	Skin Tone			Facial Shape			Skin Texture		
	Light	Medium	Dark	Oval	Round	Square	Smooth	Large Pores	Freckled
P-1		✓				✓			✓
P-2	✓			✓				✓	
P-3	✓					✓		✓	
P-4	✓			✓			✓		
P-5	✓			✓					✓
P-6		✓			✓				✓
P-7		✓			✓		✓		
P-8			✓	✓					✓
P-9			✓		✓				✓
P-10			✓	✓					✓

The second stage involved analyzing participants' faces using a face-editing app with predetermined filter features. In this study, only automatic filters were used to ensure that the facial edits were truly generated by the AI algorithm, tailored to each face's characteristics. Note that some apps don't offer fully automated features. Therefore, the authors used a filter, typically labeled "natural," to examine how the app's AI defines natural beauty. The results of this second stage of data processing address the first research question.

In the third stage, each participant reviewed the edited photos and gave their opinion. These responses were then used to complete the section on the formation of collective memory of beauty standards.

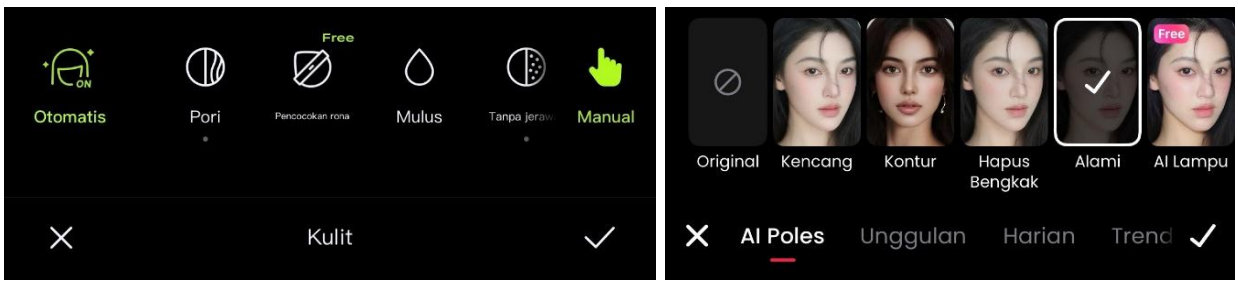

Figure 1: Some Features of Face-Editing Apps Used in Research

In the fourth stage, authors conducted observations on Instagram by searching for posts featuring women's faces using digital facial processing applications via the hashtags #Meitu, #Hypic, #BeautyCam, and #Wink. If a hashtag showed a repeating pattern, the authors moved on to another hashtag. Thus, the number of posts used in this study was 29 (including single posts and slides) with details of 109 images and captions, 4 videos, and 118 comments.

In the fifth stage, authors analyzed the visual aspects of each post using Visual Grammar and integrated them with patterns emerging from captions, comments, and participant interviews. The integrated data was then interpreted using Cyborg Theory, yielding answers to the second research question. Details regarding Visual Grammar are discussed in a separate subchapter.

As for the coding process consisted of several stages. To code participants' facial visual data, the authors compared original and edited photos and then mapped the results according to patterns that emerged, such as increasingly white skin or lost facial texture. Meanwhile, for coding Instagram posts and interviews, the authors first conducted open coding, grouping visual data from posts, captions, and interview results according to emerging patterns. This was then followed by the axial coding process, in which previously identified patterns were connected into several major themes.

Visual Grammar

Visual Grammar is a concept developed by Kress and van Leeuwen (2006), adapted from Halliday's linguistic concept of Systemic Functional Linguistics (SFL). Halliday used SFL to analyze the grammar of texts and speech in the creation of meaning. This pattern was later adopted by Kress and van Leeuwen to read images, believing that images also possess a grammar that can be classified for scientific analysis.

In line with SFL, Visual Grammar outlines three main functions in meaning-making: Representational Meaning (what is depicted), Interactional Meaning (the interaction of the image/participant with the audience), and Compositional Meaning (the arrangement of visual elements). In the first function, Representational Meaning is divided into two, namely, narrative and conceptual. Narrative is when the person/participant in the image performs an action, while conceptual is when the participant does not perform a certain action, or even when there is no participant. In the second function, Interactional Meaning can be reviewed through several aspects, such as the gaze between the participant and the audience, the distance between the participant and the camera, and the angle at which the participant is shot (camera angle). As for the third function, Conceptual Meaning can be examined through several aspects, such as what is most emphasized/striking in the image (salience), the placement of image elements (information value), and the image's frame (framing).

Table 2: Details of the Three Metafunctions in Visual Grammar

Representational Meaning		**Interactional Meaning**			**Compositional Meaning**		
Narrative	Compositional	Gaze	Social Distance	Angle	Salience	Information Value	Framing

In this study, Visual Grammar was used solely to analyze images in Instagram posts, whereas in the edited photos of participants' faces, authors examined only patterns of facial transformation. This was adjusted to address different research questions. In the first research question, authors focused solely on how the algorithm works, generating microdata from the facial changes it produces. In the second research question, authors focused on the macro dimension to examine how faces are socially represented, which, in this study, serves as a basis for reading the collective memory of beauty standards.

Results and Findings

Authors found that participants' facial transformation data showed a consistent pattern across apps. In the skin tone subcategory, each app consistently brightened participants' photos, even photos with light skin tones, such as P-2, tended to appear pale white, particularly in Meitu, Wink, and BeautyCam. Similarly, the face shape subcategory also led to a uniform shift toward oval and V-shapes across almost all apps, except Wink. Furthermore, authors observed that Wink's edits for P-1 also slightly reduced the nose. Similar to the third subcategory, participants' facial textures also focused on a single visualization that

eliminated all skin texture types. For both participants with large pores and spots, the apps' algorithms rendered faces remarkably smooth, particularly in Hypic, which even removed large pores. However, the edits in the other apps left some large pores and facial texture, though overall they still led to smoother skin.

Figure 2: Participants' Facial Transformation Results from Various Photo Editing Applications. Top Row (P-1) and Bottom Row (P-2)

The analysis, which shows a pattern of standardized beauty, suggests that the app's algorithm uses specific beauty standards. Upon closer inspection, these changes in facial characteristics point to East Asian beauty standards, such as those of China and South Korea, which currently appear to be the new standard of beauty, replacing Western standards. This trend is closely linked to the globalization of K-Pop and K-Drama popular culture, prompting app developers to create facial editing filters that replicate these beauty standards. However, it's important to understand that these facial characteristics have complex cultural roots, related to beliefs about fate, such as removing facial marks under the eyes because they resemble crying, and even slimming the face as a form of sexual independence and an attempt to distance oneself from traditional maternal characteristics (Holliday & Elfving-Hwang, 2012). Ironically, when this cultural complexity is reduced to a mere facial template in an app, the algorithm effectively standardizes these diverse cultural features into a uniform digital aesthetic.

Paradox of Digital Beauty

The facial transformation data above reflects how algorithms regulate beauty standards in the digital space. The data collected by authors from Instagram reveals a paradox, as algorithms tend to lead to uniformity. Because Instagram data is multimodal, authors used the interconnectedness aspect of modals to examine this uniformity. Therefore, the correlative aspect between modals, which, in the context of this study, primarily involves visuals and captions, was also considered.

The 29 posts analyzed generally show a convergent relationship pattern or harmony between the visual aspects and captions. This pattern displays a depiction that the definition of beauty follows trends. For example, the post displays an image slide, edited with a filter that gives it a snowy look, featuring a pale white face, followed by the caption, "Join the trend." When analyzed using Visual Grammar, several similar patterns emerge, such as the Representational Meaning aspect, which shows that the participants in the image are not engaged in any activity other than standing in the snowy setting. Therefore, the authors read this from a conceptual (non-narrative) perspective, with the meaning that the participants want to display their beauty a la the actors of romantic K-Drama films. This aligns with the information that the AI snow filter was indeed pioneered by Meitu, inspired by romantic scenes in K-Drama films (Lee, 2025). In the Interactional Meaning aspect, it seems the audience is invited to focus on the participants' beauty. This is read through the gaze of the participants who are not looking at the camera (offer) which is interpreted as the participants offering themselves to be watched or admired. There are even some images that look at the camera (demand), but the impression they create is still a demand for attention, because they focus only on the participant's eyes, as if demanding the audience to pay attention to the beauty of their eyes. In the social distance section, the distance varies, including close-ups, medium-

shots, and long-shots. However, the nuance in the close-ups and medium-shots is a demand to pay attention to the participant's beauty, while the long-shot is used to show the snowy background as a sign of the participant's involvement in the filter trend. Meanwhile, the angle is eye level, which strengthens the previous argument about the demand for attention. As for the Compositional Meaning aspect, in the salience section, the emphasis is on the face, eyes, white skin, the snowy background, and the attributes worn. Meanwhile, the framing gives the impression that the participant really wants to emphasize the salience aspect by dividing the image into body parts considered the center of female beauty, as well as attributes such as fur jackets that synchronize with the snowy background.

Figure 3: Examples of Instagram Posts Showcasing Trends as Beauty Standards

In several other posts, a similar pattern is repeated, emphasizing the cute aspect of beauty. When read using Visual Grammar, the Instagram images fall into the conceptual-symbolic attributive category, indicating the identity or status of the participants through their associated attributes. In the context of this research, these attributes are dominated by filters such as headphones, unicorn horns, or floral ornaments. In the Interactional Meaning and Compositional Meaning subcategories, a similar pattern is also demonstrated through their derivative aspects. Thus, the two beauty trends, both filters replicating romantic K-Drama scenes and cute filters cosplaying certain fictional characters, indicate how the practice of following trends is interpreted as a beauty standard.

The second pattern discovered by the authors in this multimodal analysis is the normalization of digital manipulation. This is evident in the convergent relationship between visuals and captions across several posts. Participants openly admit that their uploaded appearances are the result of AI-based application editing. When analyzed using the three sub-categories of Visual Grammar, similar patterns emerge. For example, gaze requires the viewer to pay attention to beauty. Social distance close-ups and medium-shots make face or clothing details more visible. Salience emphasizes facial features such as eyelashes, lips, and skin. However, there is one post with a different visualization. It features the upload of an image of a dark-skinned participant. When read at the level of Representational Meaning, it suggests (non-attributively) that the participant wants to present an impression of natural beauty. There are no prominent attributes, and the visual context focuses only on the face. In the caption, the participant explains that the visual is the result of editing in the BeautyCam application. This actually suggests that digital manipulation through facial editing in the application is also part of naturalness. However, previous algorithm analysis found that photo editing through these apps tends to follow East Asian standards. This means we can assume that the participants' photos have been made brighter than they originally were. Therefore, what participants perceive as natural is actually the result of a standardized definition of beauty. This finding suggests that digital manipulation is not something to be hidden. Instead, it is considered a natural way to achieve these natural beauty standards. Numerous comments "celebrate" the post by validating it, further reinforcing this idea.

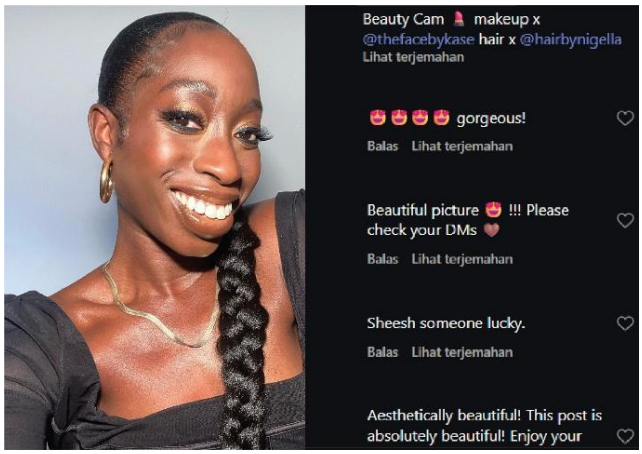

Figure 4: Example of an Instagram Post Showcasing the Normalization of Digital Manipulation and Validation in the Comments Section

This second pattern also aligns with the results of interviews conducted after participants viewed their edited photos. Interview data showed that all participants preferred the edited photos to the originals. Some of the reasons cited were that their faces appeared brighter, their cheeks slimmer, their acne blemishes less visible, and their symmetrical appearance.

> "*So I prefer edited photos because they look fresher, clearer, and more pleasing to the eye, and there's no hesitation in posting them on social media, of course.*" (Interview data: P-5)

> "*In my opinion, edited photos are better, because when the photo is edited, the face becomes brighter than the original, and can cover things like acne scars or dark areas under the eyes, especially for uploading on social media, it is better and more preferable when the photo has been edited than an unedited photo.*" (Interview data: P-3)

> "*The edited results are definitely better. Besides looking healthier and fresher, the edited photo still shows my original face, which hasn't changed my facial features at all.*" (Interview data: P-6)

The consideration that edited photos are deemed more suitable for social media posting was also one of the findings from the interviews, indicating that digital manipulation is no longer a normal practice but rather an aesthetic necessity. However, participants also provided a limitation, stating that this is permissible as long as it does not remove the basic characteristics of the original face.

The final pattern found in the Instagram upload data is the ambivalence between authentic and idealized identities. This pattern is evident in the divergent or incongruent relationship between visuals and captions. This incongruity is demonstrated through patterns in which participants display their authentic side through captions, such as mentioning their messy room or their ongoing search for identity. However, at the same time, participants also use filters for their visual aspects, a form of negotiation within the platform's logic.

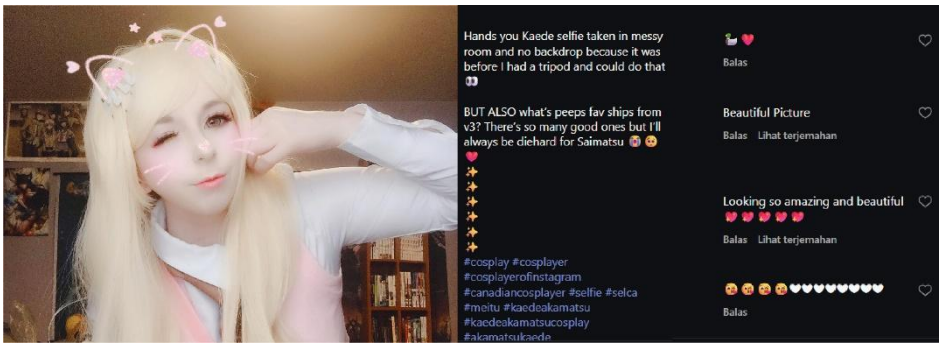

Figure 5: Example of an Instagram Post Showcasing the Ambivalence between Authentic and Ideal Identities

In social media culture, such admissions of vulnerability often serve to gain public support through self-deprecation. This is reinforced by the visual aspect, which emphasizes aesthetic self-presentation, while the comments section tends to neglect narratives of authenticity and instead focuses on an idealized appearance through praise of participants' aesthetic beauty.

Complementing these findings, interview data also showed a similar effect: that edited photos made participants feel more confident, even though they acknowledged that the images didn't fully represent themselves. Thus, participants appeared to be balancing reality with the demands of idealization in these digital interactions.

> "*I personally prefer edited photos because they look neater and conform to the visual standards I often see in the media. Editing also makes me appear more confident, although I realize it doesn't fully represent the real situation.*" (Interview data: P-4)

Discussion

Digital Body Alienation

If the above findings are read through Haraway's (2016) perspective on the Cyborg, then women's efforts to follow the beauty filter trend as a benchmark for modern beauty do not constitute a loss of identity, let alone feelings of insecurity due to a lack of beauty. Cyborg reads this as a form of women's awareness, translating their true faces into visual algorithms so they can be read and verified by the system. Continuing this logic, the discovery of patterns of normalization of digital manipulation carried out by women also does not constitute a degradation of women's identity, but rather a form of empowerment because they can freely determine the direction in which their identity is formed. Furthermore, the finding that there is ambivalence towards women's identity, from Cyborg's perspective, is actually an advantage. Cyborg seeks to eliminate the binary system that, in this context, seems to require women to choose between their true identity and their ideal. For Cyborg, the ability to apply both is a form of female empowerment, even as she feels insecure, but on the other hand, she practices a form of visual enhancement. This is what Haraway (2016) calls irony, the ability to live in two different tensions as a form of the highest consciousness of cyborg humans.

However, Haraway's utopian reading, which sees the fusion of humans and machines as a form of emancipation, hits a dead end when confronted with the cultural realities of the participants. Referring to Sued's (2018) critique, Haraway's Cyborg concept proves incompatible with readings of subjects in postcolonial countries. For example, AI-based beauty app algorithms are not neutral, but rather a system shaped by East Asian racial standards. Therefore, women's efforts to translate their faces through beauty filter trends are not truly a strategy of empowerment, but rather an attempt to survive and avoid being marginalized within this unequal system. It is at this point that the process of dehumanization occurs, as participants are increasingly distanced from their digital bodies through attempts to achieve the standards of the beauty algorithm. Instead of empowering themselves by being able to freely determine their own identity, this freedom is instead directed by the system through biased choices. Thus, dehumanization is

not simply changing the body's shape, but rather distancing itself from the body's owner. Once again, it is not because the change is dissimilar to the body's original shape, but because the change is not produced by the person's free will, but rather provided by a discriminatory system. These kinds of patterns are constantly replicated, circulating in digital spaces to shape collective perceptions of what is considered beautiful.

Conclusion

The findings of this research analysis indicate that the phenomenon of facial manipulation through AI-based applications creates a form of dehumanization in the form of standardizing women's identities by eliminating the uniqueness of their bodies. However, Haraway actually views this phenomenon as a form of women's liberation, which she calls cyborg, namely the merging of human and machine identities. Haraway attempts to fill the gap in the concept of essentialism commonly exploited by patriarchy that women are identified with their innate identity—meek and obedient—by promoting the concept of cyborgs, where this identity is constructed through women's free will. Therefore, women's efforts to follow trends through beauty filters are a form of empowerment. However, Haraway's view is not without its loopholes, because for postcolonial countries, the cyborg perspective is incompatible with its implementation, as the systems built are highly biased. In fact, the practice of facial manipulation does not further liberate women, but distances women from authority over their digital bodies, because the system directs them to discriminatory choices. This research views that the cyborg spirit promoted by Haraway will be created if the digital infrastructure of the application is first decolonized.

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