

From Stereotypes to Strategy: Addressing Gender Bias in AI-Powered Marketing

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Abstract: Gender stereotyping and discrimination have long been embedded in advertising and marketing practices. Although progress has been made, it remains slow and uneven. As artificial intelligence (AI) becomes increasingly central to marketing, optimizing workflows and personalizing content, it also introduces new ethical risks. Algorithmic bias can reinforce existing social stereotypes and systematically disadvantage marginalized groups. This study investigates how marketing professionals perceive bias in AI applications and the strategies they employ to mitigate it. Drawing on qualitative expert interviews with communications managers from agencies and companies, our findings reveal a wide spectrum of awareness: while some view bias primarily as a reputational risk, others recognize it as a profound social issue. Inclusive communication is understood both as a moral obligation and a strategic choice yet often lacks institutional support or systematic evaluation mechanisms. Our analysis highlights that bias is not solely a technical flaw in data or models but can be structurally embedded in creative processes. Interviewees identify team diversity, collaborative feedback loops, critical prompting, and institutionalized spaces for reflection as key practices for fostering inclusivity. However, constraints such as limited time, budget, and organizational commitment frequently hinder consistent implementation. We argue that bias management must be integrated into a broader, ethically reflective marketing strategy. Only through the deliberate convergence of technical, creative, and ethical competencies can AI be harnessed to promote socially responsible and inclusive marketing.

Keywords: Artificial intelligence (AI), Gender bias, Marketing ethics, Communication, Expert interviews

1. Introduction - AI in Marketing Between Efficiency and Ethics

Gender stereotypes have long shaped marketing practices, influencing how products are presented and to whom they are targeted. With the rise of artificial intelligence (AI), these dynamics are not disappearing. Instead, they are being reconfigured and, in some cases, amplified. Understanding how gendered patterns persist or evolve in algorithmic systems is therefore crucial for assessing both the opportunities and risks of AI-driven marketing.

Marketing is at a historic turning point: artificial intelligence (AI) is fundamentally reshaping strategies, creative processes, and audience communication (Haleem et al, 2022, p. 120). Algorithms, once limited to data analysis and automation, now influence not only who sees which content but also how reality is constructed through images, language, and narratives. While efficiency gains make AI systems highly attractive from an economic perspective, they also introduce significant risks.

Central among these risks are algorithmic biases that reproduce gender stereotypes, reinforce existing inequalities, and systematically disadvantage marginalized groups (Turner Lee et al, 2019). This is because AI identifies patterns in data but lacks understanding of the people and motivations behind them (Kozinets and Gretzel, 2021, p. 157). Unlike human judgment errors, AI-related biases are amplified by the scalability of digital systems and remain largely invisible in everyday marketing. Algorithmic outputs are often perceived as “neutral” or “objective,” while the social and technical conditions shaping them go unexamined.

Strategy development with AI therefore takes place within a kind of a “black box” where marketing professionals are excluded from key stages and risk losing influence over decision making. This raises a critical question: how do agencies and companies navigate the tension between efficiency and social responsibility? Marketing in the age of AI must not only leverage technological innovations effectively, but also address fairness, representativeness, and justice—because marketing content constructs normative realities and influences their persistence or transformation (Flowers, 2019).

This study takes these issues as its starting point. It explores how practitioners perceive bias in AI-supported marketing, what strategies exist to identify and mitigate it, and where structural barriers persist. The aim is to bridge the gap between technology-driven optimization and critical reflection in everyday practice, offering guidance for responsible, diversity-sensitive marketing in the era of algorithmic systems.

2. Causes and Social Relevance of Biased Algorithmic Marketing Decisions

Bias refers to a systematic distortion in decisions or outcomes that is not based on objectively justified differences (Turner Lee et al, 2019). In marketing practice, this can manifest in the over- or underrepresentation of certain groups, cultural misinterpretations, language preferences, or the reproduction of social stereotypes (Fui-Hoon Nah et al, 2023). When gender stereotypes enter this equation, they shape how products are marketed and to whom, often reinforcing traditional roles and expectations. In AI-driven systems, such distortions typically stem from three main causes:

- **Human biases:** Stereotypes and social prejudices are deeply embedded in social structures (Kuck, 2023). If these implicit assumptions are reflected in datasets or algorithm design, AI systems can adopt and even amplify them (Turner Lee, 2018, p. 255). This creates self-reinforcing feedback loops. For example, if women are historically targeted for household products and click on such ads more frequently, algorithms will continue to prioritize these ads for women, perpetuating gendered consumption patterns. Other user groups may remain invisible (Turner Lee et al, 2019).
- **Incomplete or unbalanced training data:** A lack of representativeness in training datasets is another key issue (Jain et al, 2023). If certain demographic groups, such as women in leadership roles, are underrepresented, algorithms replicate these gaps in decision-making. This problem is often compounded by limited diversity in development teams and insufficient transparency about data origins (Zhou et al, 2023, p. 2).
- **Unreflective use of proxy variables:** Even when sensitive attributes like gender are excluded to ensure fairness, algorithms may rely on proxy variables to infer group membership (Angwin and Parris, 2016). For instance, height, weight or purchasing behavior can indirectly signal gender, influencing ad targeting and reinforcing stereotypes.

Currently, AI's largest application in marketing lies in operational implementation, particularly in advertising and sales (SRH Berlin University of Applied Sciences, 2023). Automated content creation plays an increasingly central role (Chui et al, 2023), with generative AI widely used for text and image production. Given that marketing content shapes consumer perceptions and norms, AI-driven outputs have significant social impact (Zhou et al, 2023, p. 10). Research has repeatedly demonstrated biases in these systems (Rivas and Zhao, 2023, p. 378; Wach et al, 2023, p. 12). For example, facial recognition technologies exhibit higher accuracy for men and lighter skin tones, while error rates peak for Black women (Buolamwini and Gebru, 2018, p. 3). Generative AI, widely used in marketing, also reflects bias. For example, prompts such as "happy family" often produce images of white families (Bianchi et al., 2022, p. 1495), and professional roles like surgeon or nurse are frequently gender-coded.

Biases extend beyond content creation to ad placement. For instance, automated ad delivery can perpetuate discrimination (Varsha, 2023, p. 4). Turner Lee et al (2019) found exploitative credit card offers disproportionately targeted at African American consumers, while Hao (2021) showed Facebook job ads skewed by gender with technical roles favoring men. Even distribution policies reveal structural bias. Amazon's exclusion of certain neighborhoods from same-day Prime delivery, based on profitability metrics, disproportionately affected socioeconomically disadvantaged, predominantly Black areas (Ingold and Soper, 2016). These examples illustrate how AI in marketing can unintentionally disadvantage specific groups, including women, without explicit intent to discriminate. Addressing these biases is essential—not only ethically but also legally and reputationally (Turner Lee et al, 2019). Companies must ensure AI-supported decisions are inclusive and fair (Rivas and Zhao, 2023, p. 379).

Because marketers rarely influence algorithmic architecture directly (Kozinets and Gretzel, 2021, p. 159), they must critically assess outputs and implement safeguards. Conventional algorithms allow bias detection through comparative testing across groups (Turner Lee et al, 2019). But generative AI poses greater challenges, as outputs lack an objectively correct benchmark (Zhou et al, 2023). Instead, practitioners must identify patterns that signal bias, particularly gendered representations, while recognizing that biased outputs themselves reinforce stereotypes.

Against this backdrop, key questions arise: How do marketing practitioners perceive these challenges? To what extent are they aware of algorithmic bias, especially gender-related distortions? What strategies exist to identify and mitigate such biases, and what barriers hinder implementation? This study seeks to illuminate these underexplored aspects from the perspective of marketing professionals.

3. Methodology

A qualitative research design was chosen to explore how marketing professionals perceive and address AI-related distortions, with particular attention to gender bias. This exploratory approach enabled in-depth insights into subjective interpretation patterns, experiences, and strategies.

The empirical basis consists of eleven guided, semi-structured expert interviews with marketing and media managers, including content creators, strategy specialists, and representatives of communications agencies (see Table 1).

Table 1: Anonymized overview of the experts surveyed

Expert 1	Freelance Art Director and AI-Artist
Expert 2	Senior Art Director, Visual and Conceptual Artist
Expert 3	Managing Director, Publishing and New Media Communication Design, Professor of Media Design
Expert 4	Innovation and Motion Designer Lecturer for Audiovisual Media, Motion Design Analytics, and VFX/CGI/Compositing
Expert 5	Managing Director PR and communications agency
Expert 6	Creative Director and Organizational Consultant
Expert 7	Owner and Graphic Designer Advertising Agency
Expert 8	Owner of graphic design agency
Expert 9	Senior Art Director Graphic design agency
Expert 10	Executive Manager Event Agency
Expert 11	Executive Manager Event Agency

Participants were selected through purposive sampling. Selection criteria included practical experience with AI and strategic or operational responsibility for data-driven communication decisions within their organization.

Interviews were conducted via video conference between October and December 2024, lasting 45 to 60 minutes each. All sessions were recorded and transcribed with participants' consent. The interview guide covered four thematic areas:

1. Understanding, experiences, and handling of bias in marketing communications
2. Use and implementation of AI technologies
3. Perceptions and practices in addressing AI-related biases
4. Strategies for identifying and reducing bias (with and without AI)

Data analysis followed Mayring's (2022) qualitative content analysis. Coding was iterative and theory-driven: initial categories were derived from research questions and literature, then refined inductively during analysis. To enhance interpretive rigor, interim evaluations were discussed within the research team until consensus was reached. Quality criteria included transparency, interrater reliability (sample checks), and systematic reference to original quotes. The key findings and implications are presented in the following chapter.

4. Results

4.1 Attitudes Toward Gender Bias and Diversity-sensitive Communication

The interviews revealed varying levels of awareness regarding bias in marketing. Not all experts were familiar with the term; some admitted needing clarification. Those who understood it correctly described bias as a distortion rooted in habitual perceptions that are unconsciously treated as "standard" (Expert 1). However, this reflective view was rare. Most respondents associated bias primarily with inclusive communication practices, and gender, along with gendered language, was the first and most frequently mentioned topic. It also emerged as the most controversial.

Several experts emphasized the importance of representing gender diversity in marketing content. For some, inclusive communication was seen as a moral and social obligation as well as a strategic necessity: "In this fast-paced, highly globalized world and with the rapid exchange of communication between brands and consumers, you can no longer afford not to act ethically. Consumers demand it. [...] As agencies, we are at the forefront of this very process of creation. We must always ask ourselves what we are causing and how much power we have"

(Expert 5). Others expressed skepticism, viewing gender-sensitive communication as excessive or performative: "People have just become so hypersensitive in recent years and now perceive everything as an affront or a personal insult" (Expert 7).

Between these positions, a pragmatic stance emerged. Some practitioners warned against tokenism or unrealistic portrayals: "That perverts the issue again [...] if it's really the token black person or something like that. One should not overshoot the mark or portray an overly diverse ideal world" (Expert 1).

Interestingly, several respondents argued that marketing should reflect the perceived reality of the target group, even if that reality lacks diversity. For example: "A small contracting business doesn't see itself represented when two of the four people are women and one is dark-skinned; that doesn't fit" (Expert 8).

In further discussion, many experts noted an East-West divide, an urban-rural divide, and an age divide. Diversity-conscious communication, including gender sensitivity, was considered more important in western Germany, in large cities, and among younger people: "If you live in the city, you are confronted with this issue, you deal with it, you think about it. Those who live in rural areas don't think about it, and schools don't communicate these issues" (Expert 11). "We are different in the east than in the west when it comes to such issues. But I also know agency colleagues who are based in the west, where this is a huge topic" (Expert 7).

All respondents confirmed that topics such as bias and diversity are gaining importance in the communications industry, though not all viewed this positively. Some questioned whether inclusive communication is inherently valuable, perceiving it instead as a strategic positioning tool: "I think it always depends on the extent to which worldview should be conveyed in one's attitude" (Expert 9).

Overall, gender bias was recognized as a relevant issue, but opinions diverged on whether addressing it is an ethical imperative, a marketing trend, or a strategic choice. While some see diversity as essential for brand credibility and consumer trust, others fear alienating traditional audiences or creating artificial representations.

4.2 Dealing with Bias and Best Practices for Avoiding it

The interviews revealed a range of approaches to addressing bias in marketing processes. Several structural factors influence how agencies handle the issue. Creative scope often depends on the type of service provided and client specifications: "In PR, we are perhaps a little behind the people who actually run the campaigns" (Expert 5). "At the end of the day, [the client] pays the piper, as the saying goes. So, they decide what gets played" (Expert 11). In some cases, client restrictions were even cited as reasons for excluding diversity considerations altogether. At the same time, respondents noted that clients often fail to embody the diversity messages they promote: "You often encounter clients who put diversity at the forefront of their marketing message only, but that's not diversity. The marketing message is created faster than reality can catch up" (Expert 11).

Time pressure and budget constraints were frequently mentioned as barriers: "You have to put everything into context, and you're not paid to spend eight hours on it, but rather one minute" (Expert 10). Despite these limitations, many agencies increasingly see themselves as consultants rather than mere service providers: "As agencies, we are a creative spearhead. We are not just hired to take work off the client's hands. Our job is also consultancy and other ways of thinking that corporations or medium-sized companies often don't have due to their day-to-day business" (Expert 5).

Most respondents acknowledged that bias inevitably influences creative work: "That's always the case in the creative process" (Expert 11). "My bias, shaped by my experiences, upbringing, and view of the world, inevitably influences my work" (Expert 2). At the same time, strategies for dealing with bias ranged from avoidance to proactive inclusion.

But despite growing sensitivity, systematic guidelines remain rare: "There are no systematic discussions or guidelines on how to deal with bias consciously" (Expert 4). Experts identified reflexivity as a key strategy: "I trust my expertise and know-how, based on the situations I have been through" (Expert 5). Internal team exchange was highlighted as a best practice: "That's why it's usually not just one person doing it, but the whole team" (Expert 11). However, some respondents warned against overly aggressive diversity messaging, which can trigger resistance: "This always leads to people developing a guilt/shame complex, which then leads either to withdrawal or to going on the offensive. Then you no longer have an exchange, but only a clash of opinions" (Expert 6).

4.3 AI Usage

All experts surveyed had prior experience using AI tools, whether for research, writing, translation, image generation and enhancement, or even voice synthesis for events. AI was primarily valued for generating ideas and inspiration rather than producing finished content. Respondents consistently described AI-generated communication as overly polished and standardized, often lacking individuality or cultural nuance: "I actually deleted a third of it [...] because it was just meaningless filler, nothing more" (Expert 7). Beyond stylistic concerns, respondents questioned AI's ability to replicate expertise acquired through years of professional experience: "AI saves you from wading through the mud. Instead of wading through three meters of mud, you only have to wade through one meter. But you still have to wade through it, because otherwise you have no idea, otherwise you're not an expert" (Expert 5). This belief in the irreplaceable value of human expertise was deeply rooted. Many practitioners expressed doubts that non-experts could produce high-quality communication using AI alone. Excessive reliance on AI was perceived as a threat to professional identity: "My claim is actually that the basic idea is mine. Otherwise, I would feel stupid at some point. You have nothing to be proud of if you don't create anything yourself anymore" (Expert 7). Despite these reservations, AI was widely appreciated for its efficiency benefits: "But this way, you can deliver much higher quality work in less time [...] Everyone is happy, and in the end, the customer pays less" (Expert 7).

4.4 Recognition of Gender Bias in AI Outputs

Biased AI results were occasionally noticed by respondents, but typically only upon closer inspection and without deeper reflection. For example, one interviewee initially accepted the stereotypical image of a "young, slim, pretty, blonde, white woman" (Expert 10) as completely natural, only later realizing its problematic nature. This illustrates how hegemonic ideals such as whiteness, youth, and beauty often go unchallenged in automated content creation.

Some respondents even expressed discomfort with diverse representations, perceiving them as artificial or restrictive. This suggests that inclusive communication is still considered optional rather than standard in many contexts: "Let's say you have a job to create a setting for a German company where the people involved are primarily white, light-skinned people. [...] There are databases that, of course, always and forever depict multiracial groups. [...] With all due respect for freedom and against distortion, that can sometimes rub you the wrong way" (Expert 8).

4.5 Strategies for Preventing Gender Bias in AI-assisted Workflows

AI is widely valued for its ability to generate ideas quickly, and it is often used by individuals working alone. This solitary workflow increases the risk that stereotypical suggestions such as gendered portrayals slip into the process unnoticed. To counter this, respondents emphasized the importance of a second phase in which drafts are brought "into the room" and critically reviewed with colleagues and clients: "Creative work is never done by a single person. It always has to be a process, and multiple perspectives always have to be brought to the table" (Expert 10). Teamwork and the comparison of diverse perspectives were consistently described as the most effective bias filters.

For such exchanges to work, a culture of trust is essential. When team members feel secure, they are more likely to question their own assumptions and accept counterarguments. Managers should therefore actively create spaces for open dialogue through regular retrospectives, feedback sessions, and clearly articulated values to make bias visible before it shapes the final product: "You really have to sit down and look at what we've experienced and why things happened the way they did. Why did they go so wrong or so right? What could have been different? You really have to ask yourself these questions and figure it out together" (Expert 6).

Another key strategy is demystifying technology by framing AI as a neutral tool rather than an autonomous decision-maker: "AI is a tool, a machine. [...] The error always lies with the prompt" (Expert 1). This perspective shifts responsibility back to the human operator. If diversity, including gender representation, is desired, it must be explicitly formulated in the prompt. Clear guidelines on gender, age, and cultural background can reduce stereotypical outputs from the outset. While precise prompting does not replace human review, it significantly lowers the risk of bias entering the creative process.

4.6 Expectations for the Future

In the agencies surveyed, generative AI is already firmly integrated into the early stages of the process: it supports ideation, pitch development, and initial conceptual drafts. However, its output is still considered inferior for final products and is routinely curated or redesigned by humans. Despite these limitations, experts

agree that system performance will continue to improve. Future applications will require models to be fine-tuned to customer-specific brand identities, communication guidelines, and organizational values: "But if there's a bot behind it that's really well briefed on your customer or your own company, then those things will start to churn out really awesome texts" (Expert 5). This outlook highlights a shift toward co-creative human–machine interaction. Respondents anticipate that specialized AI professionals will become part of agency ecosystems: "We won't be able to do everything ourselves; that will never work. It's not a one-man show with computer support" (Expert 11). Instead of purchasing fewer external services, agencies will restructure their outsourcing: "We have to recognize that a new profession or activity is emerging that is different. There will be experts in creating AI-generated images" (Expert 5).

However, as agencies delegate more tasks to AI, human feedback loops shrink. This increases the need for individual self-reflection, as collective correction mechanisms become less effective: "You have to challenge everything you get out of it, again and again" (Expert 10).

For gender-sensitive communication, this means practitioners must consciously examine their own assumptions and biases, especially when automated outputs risk reinforcing stereotypical norms. The future of AI-assisted marketing will depend not only on technical refinement but also on the ethical and reflective capacities of those who use it.

5. Discussion

From a cognitive psychology perspective, perception is never neutral; it follows learned heuristics and culturally shared norms. In marketing practice, this "cognitive shortcut" manifests in seemingly self-evident imagery (young, white, slim), in gender-specific language, or in stereotypical associations of milieus and consumer needs. Yet the experts surveyed primarily focus on visible output ("Do we represent everyone?") rather than the unconscious processes shaping that output. This narrows awareness from an epistemic level to a purely production-technical one.

Attitudes toward bias span a broad spectrum: from outright rejection ("hypersensitivity") to pragmatic balancing acts to explicit ethical commitment. Contextual differences (East-West, urban-rural, generational) further reinforce these divergences. Almost all respondents cite "inner attitude," education, and life experience as their compass against bias. Reflective self-examination, whether spontaneous ("gut feeling") or methodical ("design thinking loop"), is considered essential for minimizing bias. However, this personalization has an ambivalent effect: while it underscores professional autonomy, it shifts responsibility from systems to individuals. A lack of diversity checks is interpreted as a personal competence gap rather than an organizational shortcoming. This creates structural blind spots: selective attention exists, but formal mechanisms are largely absent. Without institutional safeguards, there is a risk of a vicious circle in which those who overlook certain groups do not even notice their own blind spots.

The communicative power imbalance persists: bodies and realities that are not shown in media and marketing remain invisible. At the same time, clients fear that overly diverse "ideal worlds" may appear moralistic or artificial. This tension between representation ethics and market logic often results in tokenism—diversity as a compulsory exercise that provokes resistance when not embedded in brand and organizational context.

Artificial intelligence amplifies these dynamics. Even the choice of words in a prompt creates semantic spaces; language structures reality before the first image appears. The link between reflection and prompt design becomes clear: only those aware of their own cultural assumptions can brief AI to generate diverse and realistic outputs. Because models rely on historical datasets, they replicate existing distortions while reducing human control, especially under time and budget pressure. This creates a triple risk constellation: black-box logic, diminished collective reflection, and acute efficiency demands.

Structured team exchange remains the most effective antidote: design thinking sprints, peer reviews, and multi-eyes principles ensure multi-perspectivity even under tight deadlines. Inclusion is more likely to succeed when it emerges from voluntary, dialogical processes rather than prescriptive mandates; reactions to AI-driven diversity efforts range from skepticism to resistance. The first step is to frame inclusive communication as enrichment rather than restriction. Bias awareness must remain voluntary, but organizations should provide explicit frameworks (time, budget, and tools) to support it. These findings echo Turner Lee et al (2019), who advocate for team diversity and cultural sensitivity in decision-making.

There is no simple solution because bias is inherent in the creative process, with or without AI. What is needed is a combined approach: awareness-raising, space for reflection, formalized procedures, and new skill profiles

such as prompt engineers or AI ethics consultants who align ethical and economic goals. Only the integrated combination of individual self-assessment, precise prompting, institutional safeguards, and collaborative review loops can prevent efficiency gains from reinforcing stereotypes or creating new forms of tokenism. Bias is systemic; addressing it requires interdisciplinary, process-oriented strategies and remains a central challenge for research, education, and practice development.

6. Recommendations for Action

To effectively mitigate the risks outlined above, agencies should begin by implementing an awareness program that addresses both the cognitive and technical dimensions of bias. Short training sessions can clarify what bias means (psychologically, culturally, and algorithmically) while introducing the basics of critical prompting. The goal is to establish a shared vocabulary and a minimum level of sensitivity among all project participants. This knowledge base should inform the development of a code of ethics that anchors practical tools such as briefing checklists (including gender and diversity criteria), structured review loops, and periodic audits. In this way, bias management becomes an organizational responsibility rather than an individual burden.

A simple but effective measure is the dual-control principle: every AI-generated design should be reviewed by at least two reviewers with different technical backgrounds and two with different cultural perspectives. This “2 + 2 rule” ensures multi-perspectivity even under time pressure. To prevent reflection from being sacrificed for efficiency, agencies should allocate fixed time and budget buffers for retrospectives, external input, and corrective measures. Creating communication spaces outside of project work, such as regular feedback rounds and open forums, combined with diverse teams fosters a culture where bias can be openly discussed and addressed.

Transparency is another key pillar. Every published content should disclose whether and which AI tools were used. Systematic documentation, including the tool, core prompt, and parameters, serves internally as a learning archive and externally as a signal of trust. Taken together, awareness building, institutional guidelines, diverse review loops, scheduled reflection time, and disclosure form a practical framework that enables efficiency gains without reinforcing stereotypes or creating tokenistic representations.

These recommendations align with the principle of human-in-the-loop: responsibility remains with humans, ensuring clear ethical accountability. Ultimately, preventing gender bias in AI-assisted marketing requires a combination of education, structural safeguards, and collaborative processes, not only to protect against distortions but to actively promote inclusive and authentic communication.

7. Conclusion and Outlook

This article demonstrates that bias in AI-supported marketing is not a marginal technical issue but a profound ethical, strategic, and organizational challenge. Distortions arise less from technology itself than from socially entrenched patterns of perception, insufficient space for reflection, and a lack of institutional safeguards.

The topic is particularly relevant at the intersection of creativity, efficiency, and responsibility: marketing professionals act not only as producers of economic messages but also as co-creators of cultural representation. This dual role creates a responsibility both for content design and for the selection, management, and control of algorithmic systems.

Effective bias management requires an integrative approach that combines individual awareness, collaborative processes, and organizational frameworks. Ethical reflection must be deliberately embedded in technology-supported creative workflows to ensure that AI’s potential is harnessed without reinforcing gender stereotypes or other social biases. Innovative marketing in the age of AI will not be measured solely by technological performance but by its ability to deliver ethically informed, inclusive design.

Looking ahead, this calls for interdisciplinary strategies: structured team exchange, formalized review loops, and new professional roles such as prompt engineers and AI ethics consultants. These measures can help balance efficiency gains with cultural sensitivity. Bias is systemic; addressing it demands continuous research, education, and practice development—making it a central field for future work in marketing and communication.

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